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Fiscal Policy and Financing for Development in Developing Countries

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par

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List of acronyms

AIC	Akaike Information Criterion
AML/CFT	Anti-Money Laundering/Combating the Financing of Terrorism
ATT	Average Treatment on the Treated
BBR	Balanced Budget Rules
BIC	Bayesian Information Creterion
CERDI	Centre d'Etudes et de Recherches sur le Développement International
CBI	Central Bank Independance
CFE	Country Fixed-Effects
UN Comtrade	United Nations International Trade Statistics Database
DCs	Developing Countries
DR	Debt Rules
EAP	East Asia and Pacific
EMBIG	Emerging Markets Bond Index Global
ER	Expenditure Rules
EU	European Union
FATF	Financial Action Task Force
FDI	Foreign Direct Investment
Fed	Federal Reserve
FR	Fiscal Rules
GDP	Gross Domestic Product
GFI	Global Financial Integrity
GMM	Generalized Method of Moments
GNP	Gross National Product
GRD	Government Revenue Dataset
ICRG	International Country Risk Guide
ICTD	International Centre for Tax and Development
IFFs	Illicit Financial Flows
IFPRI	International Food Policy Research Institute
IFRS	Index of Fiscal Rules Strenght
IMF	International Monetary Fund
IQ	Income inequality
IV	Instrumental Variables
LAC	Latin American and the Caribbean
LLR	Local Linear Regression
LMF	Lagrange Multiplier F-Test
MENA	Middle East and North Africa
NCCT	Non-Cooperative Countries and Territories
NLS	Nonlinear Least Squares
NN	Nearest Neighbor
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development

OFCs	Offshore Financial Centers
OLS	Ordinary Least Squares
PS	Propensity Score
PSM	Propensity Score Matching
PSTR	Panel Smooth Transition Regression
PTR	Panel Threshold Regression
RSS	Residual Sum of Squares
SA	South Asia
SDGs	Sustainable Development Goals
SGP	Stability and Growth Pact
SPEED	Statistics on Public Expenditures for Economic Development
SSA	Sub Saharan Africa
SWIID	Standardized World Income Inequality Database
TFE	Time Fixed-Effects
TOT	Terms of Tade
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNU-WIDER	United Nations University World Institute for Development Economics Research
US	United States
USSR	Union of Soviet Socialist Republics
VAT	Value-Added Tax
WDI	World Development Indicators
WEO	World Economic Outlook
WIID	World Income Inequality Database

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General Introduction

"When countries have fiscal space and no real prospect of a sovereign crisis, the cost of bringing down the debt is likely to exceed the crisis-insurance benefit. The best policy might be to simply live with higher debt."

(Ostry et al. 2015)

Developing countries face many development challenges (e.g. unemployment, food insecurity, inequalities, low productivity, high exposure to crises and natural disasters). In order to address these challenges and promote sound macroeconomic conditions, fiscal policy can be used as a powerful instrument to regulate the economic activity (Stiglitz, 2012). Following Wong et al. (2002), we define fiscal policy as *"government's measures to guide and control spending and taxation"*. The effectiveness of fiscal policy relies on the existence of room for fiscal maneuver, namely fiscal space. Fiscal space can be defined in many ways. The existing definition in the literature emphasize to some extent on fiscal sustainability. In line with Ostry et al. (2010) and Ghosh et al. (2013), we define fiscal space as *the difference between the current level of public debt and the debt limit*[1] *implied by the country's historical record of fiscal adjustment.*

The literature related to fiscal space in developed countries is large (e.g. Bohn, 1998, 2007; Heller, 2006; Williams and Hay, 2005; Schick, 2009; Escolano, 2010; Ostry et al., 2010; Novignon and Novignon, 2015; Saxegaard, 2014; Hulbert and Vammalle, 2014; Kim, 2015; Reinhart and Rogoff, 2008; Roy and Heuty, 2012; Mendoza and Ostry, 2008; Ostry and Abiad, 2005; Aizenman and Jinjarak, 2010; Aizenman et al., 2013; Ghosh et al., 2013; Ostry et al., 2015; Kim and Ostry, 2018). For example, Ostry et al. (2010) and Ghosh et al. (2013) based on the historical track record of adjustment and find that many developed countries have either very little or no additional fiscal space. In the same vain, Ostry et al. (2015) find evidence that living with higher debt might be the best policy when countries have fiscal space and no real prospect of a sovereign crisis. In fact, the cost of bringing down the debt is likely to exceed the crisis-insurance benefit under these conditions. As for developing countries, the literature on fiscal space is rather sparse (Adedeji et al., 2016; Baum et al., 2017). For instance, Adedeji et al. (2016) explore the relationship between debt dynamics and the probabilistic distribution of the primary balance and the effective interest rate. Their approach is particularly useful in developing countries where the lack of relevant data makes it difficult to estimate detailed fiscal reaction functions. They find that about 60 percent of these countries have fiscal policy space to address adverse shocks, subject to the availability of domestic and external financing. However, Baum et al. (2017) show that even under benign conditions, the fiscal space available in low income countries is likely insufficient to undertake the spending needed to achieve the SDGs. They recommend DCs to improving public investment efficiency and domestic revenue mobilization in order to create more room for fiscal maneuver. Several macroeconomic relationships connected with fiscal space are underexplored in these countries (fiscal rules-

[1] Debt limit is the debt ratio above which debt dynamics become explosive (Ostry et al, 2010).

inequality, illicit financial flows-tax revenue, composition of government spending-cost of financial market access, fiscal rules-financial market access). We contribute to the literature by examining these relationships.

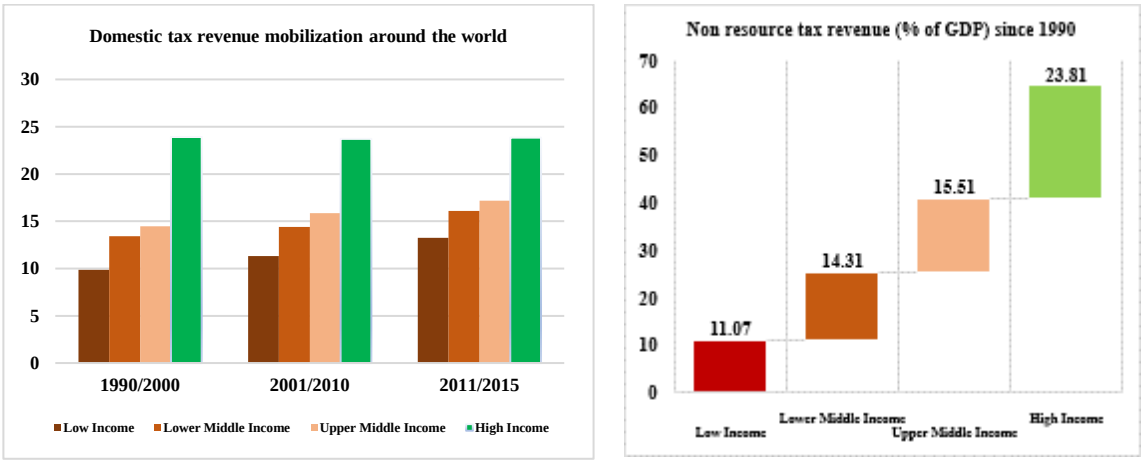
Based on the three main functions[2] of fiscal policy defined in the seminal work of Musgrave (1959), this thesis investigates the pathways through which government could mobilize more resources in developing countries to meet these objectives and find a way to finance their development. More specifically, it focuses on the three main instruments of fiscal policy- tax policy, expenditure policy, and overall budgetary policy- and tries to investigate the ways in which they could serve for development finance purposes.

Several studies show that fiscal policy is a key element to improve fiscal performance (Corbacho and Schwartz, 2007; Debrun et al., 2008; Debrun and Kumar, 2007; Deroose et al., 2006; Guerguil et al., 2017; Kopits, 2004; Schaechter et al., 2012; Tapsoba, 2012), reduce inequalities (Azzimonti et al., 2014; Larch and Turrini, 2010; Milasi, 2013), enhance economic growth (Devarajan et al., 1996; Schclarek, 2007; Stiglitz, 2015; Summers, 2014), and increase well-being (Bom and Ligthart, 2014; Ganelli and Tervala, 2016).

According to the UNDP (2010), domestic revenues are limited in many developing countries and below the level of 20% of GDP that should allow them to achieve development goals. Developing countries need to raise funding (national and international) in order to further finance their economic development and achieve the Sustainable Development Goals (SDGs). Several factors explain the low level of revenue collection in developing countries. Stiglitz et al. (2006) argue that "the tax base is almost always significantly narrower in developing countries, and tax compliance is significantly lower (due in part to tax avoidance and tax evasion, but also to a lack of information that can be used to monitor tax compliance)". Consequently, we can observe that in developing countries, tax revenues derive less from direct taxes such as income or corporate taxes, but much more from indirect taxes compared with developed countries (Stiglitz et al., 2006). In this situation, governments in these countries find it easier to increase social contributions, crowding-out private investment and reduce the scope for stimulating the economy through tax cuts. As we can observe in Figure 1 below, developing countries record a lower tax to GDP ratios since the 1990s. The pace of the evolution of tax to GDP ratios have been nearly similar in each group of countries (for each decade).

[2] These functions are: (i) allocation, (ii) distribution and (iii) stabilization.

Figure 1 : Low domestic resources mobilization in DCs[3]



Source : Author construction based on WDI and ICTD's Government Revenue Dataset (GRD)

Rising levels of income inequality (IQ) has become a global issue, including developed, emerging and developing countries. Hence, a large and expanding literature provides a broad overview of this topic (see e.g. Anand and Segal, 2008; Piketty, 2014; Alvaredo et al., 2017; Wilkinson and Pickett, 2009; Stiglitz, 2012; Atkinson, 2015). Our analysis supports the 10th SDGs (reduced inequalities) designed to *"Progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average by 2030"*(first target) and *"Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality"* (fourth target). It contributes to the literature devoted to identifying policies that may reduce income inequality. A fiscal policy rule (FR) is a permanent constraint on fiscal policy, expressed as a summary indicator of fiscal performance – for example government budget deficit, borrowing, debt, or a major component thereof (Kopits and Symansky, 1998). Several rationales for the adoption of fiscal policy rules are mentioned (Kopits and Symansky, 1998). Fiscal rules aim to (i) foster macroeconomic stability, (ii) support other financial policies, (iii) maintain fiscal sustainability, (iv) avoid negative spillovers within a currency union , (v) ensure the credibility of government policies over time. In the light of these objectives, FR affect various dimensions of the fiscal policy, which received by far the greatest attention among all policies aiming at reducing IQ both from international institutions (e.g. OECD, 2015, chapters 3 and 7; or IMF, 2017) and academia—for recent surveys, see e.g. Bastagli et al. (2012), Heshmati and Kim (2014), Clements et al. (2015), or Anderson et al. (2017). Even if fiscal rules (FR) may not be originally designed to fight IQ, the important side effect we unveiled suggests that they should not be treated as neutral in terms of IQ. Instead, we provide several insights that may contribute to the design and implementation

[3] SDGs suggest more domestic resources mobilization to face though challenges in the developing world.

of appropriate FR with the goal of curbing IQ. As we can observe in Figure 2a., inequality measured by the GINI index is more important in many regions, including LAC, SA, SSA, EAP and MENA. Figure 2b. highlights that inequality is particularly pronounced in developing countries in comparison with advanced economies.

Figure 2 : Important inequality in the developing world

Figure 2a.

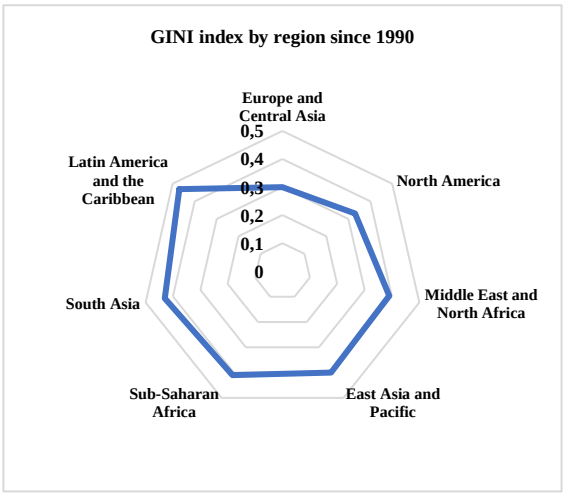
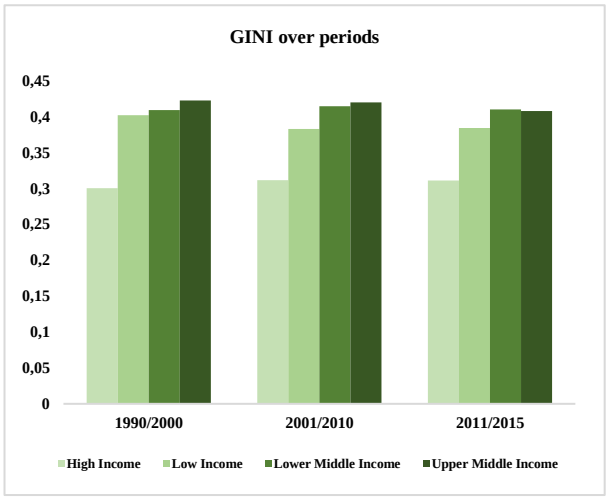


Figure 2b.

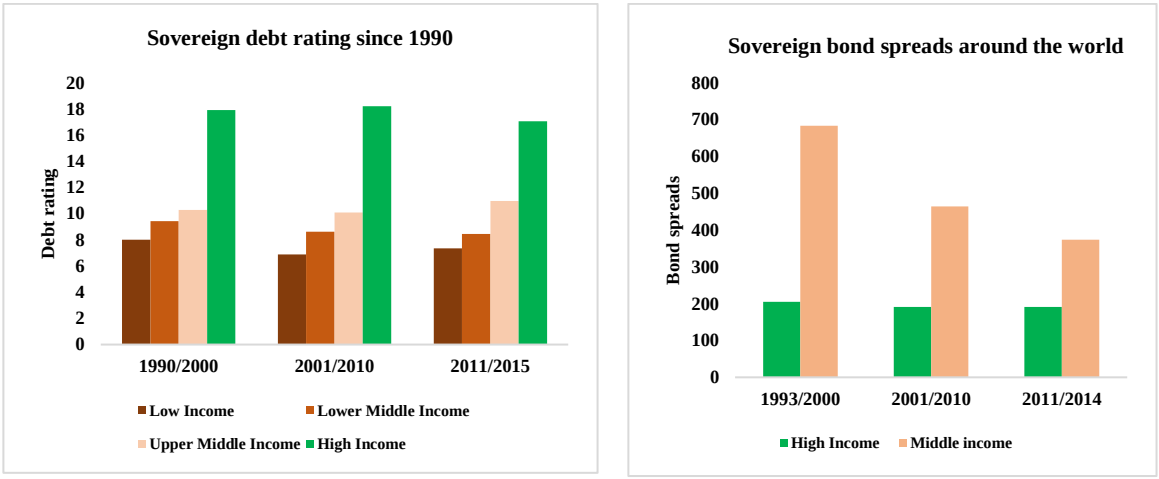


Source : Author construction based on the Standardized World Income Inequality Database (SWIID)

Meanwhile, developing countries have no access to financial markets at lower costs (Figure 3) since debt ratings (bond spreads) are low (high) in these countries. However, the access to capital on international financial markets is necessary for developing countries from the perspective of achieving the Sustainable Development Goals. For instance, raising such resources may provide a solution against poor infrastructures, inequalities, natural disasters, food security, and so forth, in line with the current commitment to achieve the 2030 sustainable development agenda by reducing poverty, increasing prosperity, and promoting sustainable development. Several studies have investigated the determinants of financial market access in developing countries (e.g. Edwards, 1984; Martinez et al., 2013; Min, 1998; Fouejieu and Scott, 2013; Balima et al., 2017; Rowland and Torres, 2004; Borio and Packer, 2004; Bellas et al., 2010; Ferrucci, 2003; Eichengreen and Mody, 1998; Eichler, 2014; Gupta et al., 2008; Akitoby and Stratmann, 2008 Gelos et al., 2011; Arbatli and Escolano, 2012; Glennerster and Shin, 2008; Block and Vaaler, 2004; Afonso and Jalles, 2013; Badinger and Reuter, 2017; Bayoumi et al., 1995; Heinemann et al., 2018; Iara and Wolff, 2014; Thornton and Vasilakis, 2017). We contribute to this literature in different ways. First, we look at the effect of the composition of government spending on sovereign bond spreads. To better capture compositional effects of public spending, we report each type of expenditure on total public expenditure. This variable

best reflects government economic policies decisions. Second, we extend the literature by exploring both the heterogeneity and the interactive effects of various types of fiscal rules on financial market access in developing countries. In doing so, we reveal important differences between balanced budget rules, debt rules, expenditure rules, and their interactions.

Figure 3 : Poor access to international financial markets in DCs

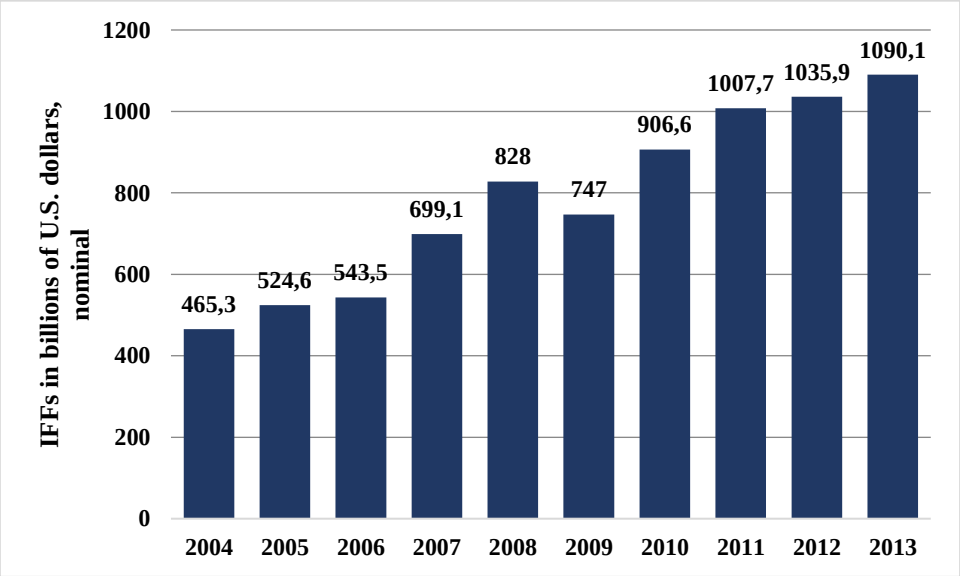


Source : Author construction based on Kose et al. (2017) and JP Morgan EMBIG

Furthermore, illicit financial flows (IFFs) are increasing in the developing world (Figure 4). However, IFFs constitute a potential source of loss of domestic revenue mobilization for developing countries by reducing the tax base (Kar & Cartwright-Smith, 2010; Kar & LeBlanc, 2013; Ndikumana & Boyce, 2012). This phenomenon combined with the poor quality of institutions could harm the ability of these countries to mobilize necessary resources to finance their development. As a matter of fact, several developing countries tend to be trapped in poverty due to structural factors including inequalities, epidemics, low productivity, exclusion from financial markets and high exposure to crises and natural disasters (UN, 2013; IMF, 2014). Developing countries need to bridge their infrastructure gap in many areas such as education, health, electricity, roads, ports, highways, etc. (Arezki & Sy, 2016; Calderón & Servén, 2004) in order to improve economic growth and reduce dependency on official development assistance. According to Global Financial Integrity (2015), developing and emerging economies lost US$7.8 trillion through illicit financial flows from 2004 through 2013, with illicit outflows increasing at an average rate of 6.5 percent per year—nearly twice as fast as global GDP (see Figure 4 & Figure 5). The global development implications of this phenomenon are meaningful. Altogether, the annual amount of IFFs in 2013 (US$1.1 trillion) surpasses the cumulated amount of foreign direct investment (FDI) and net official development assistance (ODA) which these economies received. As an illustration, funds that flowed illicitly out of developing countries were roughly 1.3 times the US$858 billion in total

FDI, and they were 11.1 times the US$99.3 billion in ODA that these economies received in 2013.

Figure 4 : IFFs in developing countries from 2004 to 2013



Source : Author construction based on Global Financial Integrity data

Combating illicit financial flows is probably one of the most important issues in developing countries (Ajayi & Ndikumana, 2015; Tanzi, 1996; Buchanan, 2004).

«What does $1,000 million or $1 billion of stolen public money mean to the village blacksmith who molds farm hoes or sears cutlasses in a village in a poor developing country? Not much. […]. By contrast, the following cost and benefit calculus is sure to capture the blacksmith's attention: *The amount of money an emir expends on a single trip to Europe for medical check-up would build a clinic big enough to serve a community of 5000 people; the amount of foreign exchange a top civil servant pays yearly to educate a single child abroad would build a primary school capable of providing basic education to hundreds of pupils; the amount of money a politician spends to sponsor his wives and children's trips to Saudi Arabia for lesser pilgrimage, to Dubai for shopping, and Europe for holidays annually is enough to establish community banks and provide access to capital for thousands of small businesses or fund poverty alleviation projects in several communities*» Ajayi and Ndikumana (2015).

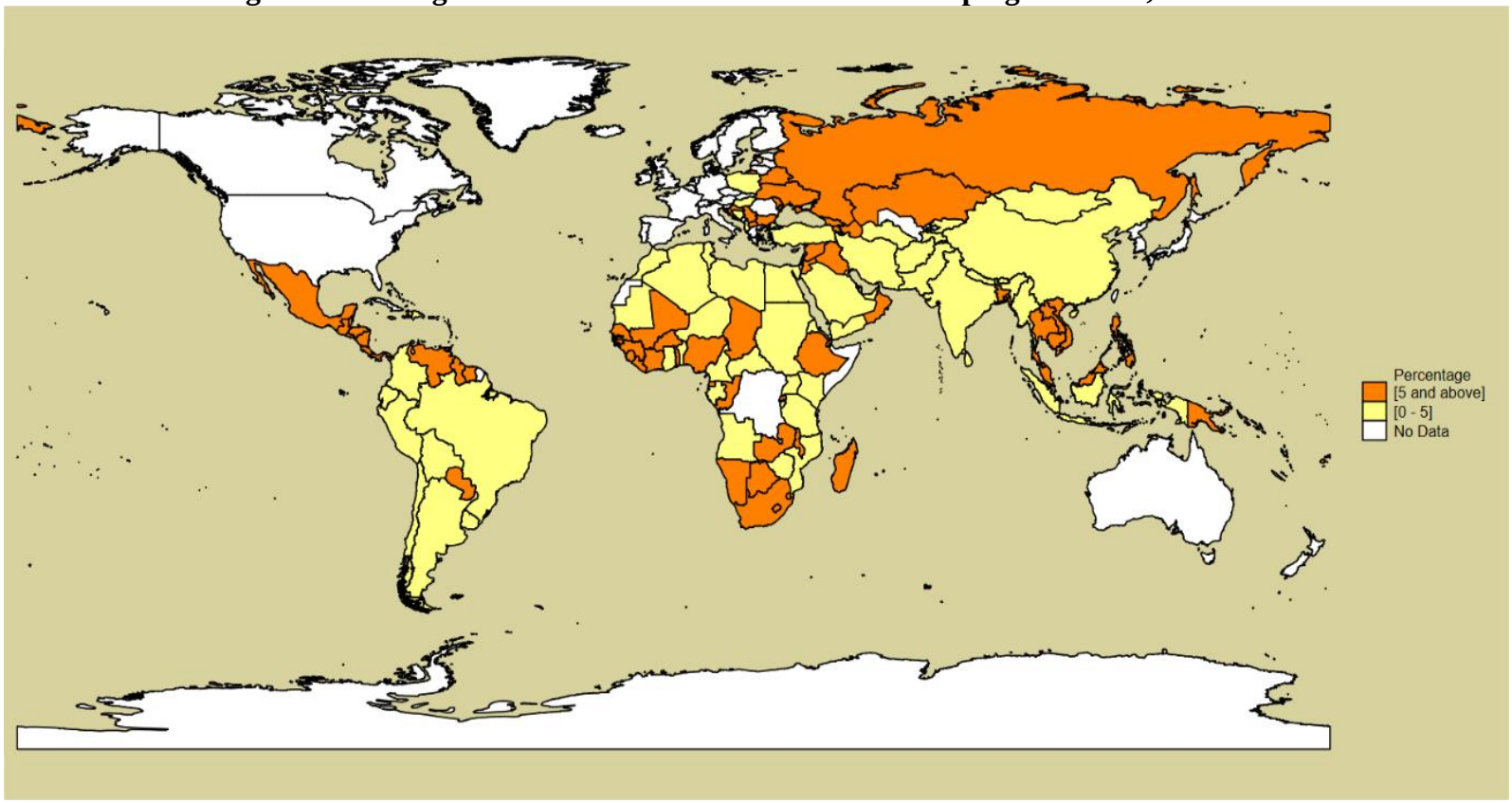
Relying on the popular literature on the determinants of tax revenue mobilization (see e.g. Agbeyegbe et al., 2006; Becker and Fuest, 2010; Benon et al., 2002; Bird et al., 2008; Chelliah, 1971; Chelliah et al., 1975; Clausing, 2007; Devarajan et al., 2002; Eltony, 2002; Exbrayat and Geys, 2014; Ghura, 1998; Gupta, 2007; Keen and Mansour, 2010; Leuthold, 1991; Lotz and Morss, 1967; Mahdavi, 2008; Mao and Wu, 2019; Stotsky and WoldeMariam, 1997; Tait et al., 1979; Tanzi, 1992, 1991; Tanzi and Aguirre, 1981; Tanzi and Zee, 2000), the novelty of this thesis is given by assessing the effects of combating IFFs on domestic tax revenue mobilization in developing countries. In fact, analyzing the pathways through which tackling IFFs foster tax

revenue mobilization is an important question in developing countries since IFFs represent funds that would be used to face development challenges[4] (such as inequalities, infrastructure gap, etc.) in these countries. They contribute to worsening macroeconomic conditions (investment, growth, public debt) given that they reduce the economic performance. Consequently, they jeopardize the mobilization of internal resources. Moreover, public tax compliance will be considerably eroded if agents are aware of the existence of large IFFs.

Last but not least, the quality of institutions is poor in developing countries (Kaufmann et al., 2011; Acemoglu, Gallego, & Robinson, 2014; Acemoglu, Johnson, Robinson, & Thaicharoen, 2003; Acemoglu, Johnson, & Robinson, 2005; Acemoglu, Naidu, Restrepo, & Robinson, 2019). In compliance with Brandeis (1914) who states that *"Sunlight is said to be the best of disinfectants; electric light the most efficient policeman"*, we think that transparency and good institutions are fundamental for a sound implementation of fiscal policy in developing countries (see e.g. Prakash and Cabezon, 2008; Dabbla-Norris et al., 2010). Therefore, this thesis focus on the quality of institutions. Figure 6 shows that government effectiveness, the control of corruption and the quality of bureaucracy are by far low in developing countries in comparison with developed countries between 1990 and 2015. Considering all this, we investigate if the effect of fiscal policy on financial market access is subject to nonlinearities with respect to the quality of the institutions. Indeed, the literature on the political underpinnings of fiscal policy highlights the key role of governance for fiscal transparency, which supports the credibility of fiscal policy and limits political budget cycles, leading to better ratings (Arbatli and Escolano, 2015) and lower spreads (see e.g. Ciocchini et al., 2003; Glennerster and Shin, 2008). In addition, institutions also affect the nature of public spending in a country: Rajkumar and Swaroop (2008) show that good institutions positively impact the efficiency of public investment, which may explain their favorable effect on spreads (see e.g. Martinez et al., 2013; Eichler, 2014). Consequently, institutions may influence the effect of fiscal policy on financial market access.

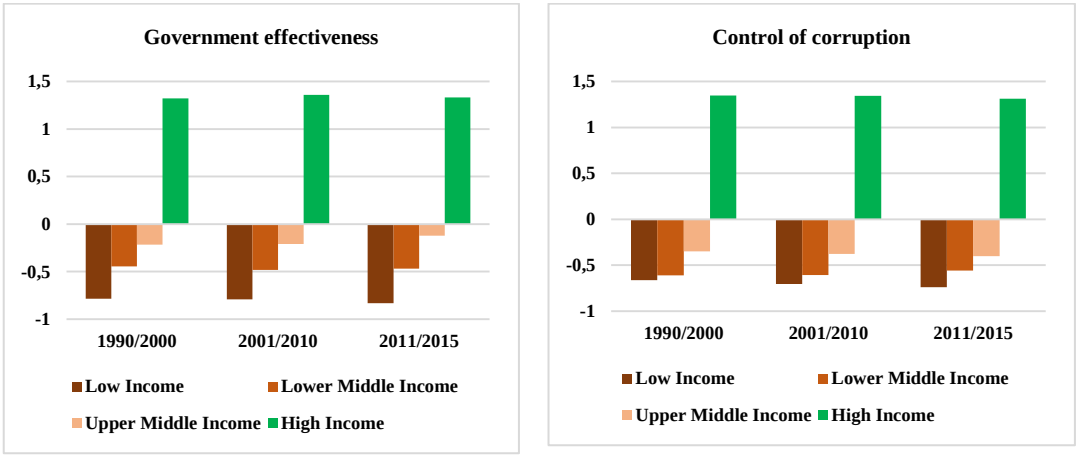
[4] We support the 2030 Agenda for Sustainable Development (SDGs, 2015). In fact, the 16th goal ("Promote Just, Peaceful and Inclusive Societies") targets to *"Significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime by 2030"*(fourth target) and to *"Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime"* (eleventh target).

Figure 5 : Average illicit outflows to GDP ratio for developing countries, 2004-2013



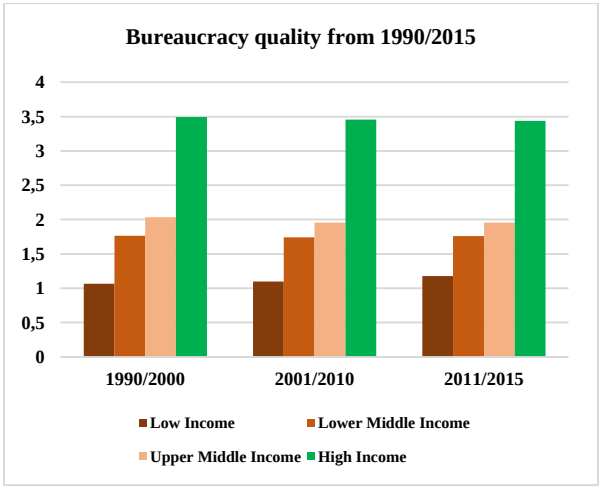
Source : Author construction based on Global Financial Integrity data

Figure 6 : Poor quality of institutions in DCs



Source : Author construction based on World Development Indicators (WDI)

Note : Government effectiveness measures perceptions of the quality of public services, their independence from political pressures, the quality of policy formulation and implementation, and the credibility of the commitment of government with respect to these policies. While control of corruption measures perceptions of the extent to which public power is exercised for private gain and "capture" of the state by elites and private interests as well. Comprised between -2.5 and 2.5, higher value indicates better institutions.



Source : Author construction based on ICRG dataset

Note : Comprised between 0 and 4, bureaucracy quality measures the degree from which the bureaucracy tends to be somewhat autonomous from political pressure and to have an established mechanism for recruitment and training. Higher value is associated better institutions.

Theoretical foundations

The theoretical foundations of this thesis are multiple. First, we draw upon the (neo)classical and the (neo)Keynesian theories related to the effectiveness of fiscal policy (e.g. Keynes, 1936; Domar, 1944; Samuelson, 1958; Phelps, 1961, 1965 ; Diamond, 1965; Sargent and Wallace, 1976; Sargent and Wallace, 1981; Lucas Stokey, 1983; Long and Plosser, 1983; Aschauer, 1989; Barro, 1990; Romer, 1990; Bohn, 1998, 2007; Woodford, 2001; Stiglitz, 2002; Alesina et al., 2002; Ostry et al., 2010; Stiglitz, 2012). Some researchers find that government spending is not effective in improving economic growth (Long and Plosser, 1983; Lucas Stokey, 1983; Samuelson, 1958) while others claim that government spending can be very effective through the fiscal multiplier (Keynes, 1936; Stiglitz, 2012). According to Stiglitz (2012), government spending can be even more effective when supporting high productivity investments (including those that facilitate the restructuring of the economy) since such investments not only yield high direct returns but also "crowd in" private investments. Consequently, not only the deficit is reduced in the medium term, but also consumption might be stimulated (consumers realize that their future tax burdens will be lower than it could have been and thus can consume more today). Also, government spending on structural reforms help move resources from old, less competitive sectors to new sectors and therefore stimulates the economy (Stiglitz, 2012).

Second, we draw upon the political business cycle theory (Wicksell, 1958; Nordhaus, 1975, Buchanan and Wagner, 1977; Hibbs, 1977; Weingast et al., 1981; Persson and Persson, 1987; Rogoff and Sibert, 1988; Persson and Svensson, 1989 ; Alesina and Tabillini, 1990; Aghion and Bolton, 1990; Alesina and Rosenthal, 1995; Lane and Tornell, 1996; Velasco, 2000; Persson and Tabellini, 2002; Talvi and Vegh, 2005; Alesina and Tabillini, 2005; Persson et al., 2006). According to this theory, deficit bias (which may lead to a sub-optimal fiscal policy) is the result of governments' "short-sightedness", the "common pool" problem or the "time inconsistency" problem. For instance, governments could run excessive deficits in order to stay in power as long as possible (opportunistic behavior) or to reduce the room for maneuvers of their successors with different political ideology (conflicts of interest). To address this sub-optimality, a growing call for implementing fiscal policy rules is expressed (see e.g. von Hagen and Harden, 1995; Hallerberg and von Hagen, 1999; Beetsma and Uhlig, 1999; Krogstrup and Wyplosz, 2010).

Finally, we rely on the theory of institutions (North, 1991; Stiglitz, 2002) which claims that economic institutions (e.g. fiscal, monetary, property rights, trade institutions) act as a major player

in reducing transaction costs and facilitating trade. For instance, (North, 1991) shows that the quality of institutions is a solution to market failures by distinguishing formal institutions (constitution, laws, regulations) and informal institutions (sanctions, customs, traditions, and codes of conduct).

Value added of the thesis (Contribution)

Relying on the role of fiscal policy in terms of improving development finance, this thesis aims at identifying and investigating pathways through which developing states can allocate their means for financing development. To this end, we attempt to determine how governments in developing countries could manage fiscal policy to strengthen macroeconomic stability and improve their borrowing conditions in international financial markets. We also investigate relevant channels through which developing countries could enhance resources mobilization to sustainably finance their development. To do so, it specially focuses on issues not addressed yet but important in the existing literature and based essentially on empirical analyses (theoretically based insights). Using suitable analysis tools, we conduct policy-oriented and applied macroeconomic researches. For instance, public authorities can focus on many conduits (investments, reduction of inequalities, improvement of governance quality, fight against illicit financial flows, etc.) to ensure the conditions allowing these countries to sustain their growth process. Our findings unveil sizeable causal effects between several macroeconomic relationships in connection with fiscal space in the developing world (fiscal rules-inequality, illicit financial flows-tax revenue, composition of government spending-cost of financial market access, fiscal rules-financial market access). Economically meaningful, our findings are robust to a wide set of alternative measurement, methodology, and modeling specifications. Moreover, we unveil heterogeneities and nonlinearities in these effects, related to developing countries' macroeconomic conditions and institutional frameworks. Lastly, we are convinced that the policy implications arising from our analyses could improve the conduct of economic policy in developing countries.

Outline and Main results :

The thesis is organized around four chapters.

In **Chapter 1**, we investigate the effects of public expenditures on sovereign bond spreads in emerging market countries. Relying on a panel of 30 emerging markets economies from 2000 to

2013, we use IV approach and GMM-system alike to account for the existing endogeneity. We also use Hansen (1999) model and PSTR method to assess the non-linearity between bond spreads and government spending, depending on the quality of governance. We show that developing countries could have a better access to international financial market by supporting public investment and reducing current spending. Specifically, spending on human capital (education and health) and other public infrastructures significantly reduce bond spreads. The magnitude of the effects of public spending on spreads is quite meaningful as current spending increase spreads while public investment reduces spreads by up to more than 100 basis points in our sample of countries. Our results survive to several alternative specifications (when we control for the global financial crisis, the US Treasury bill rate, cumulated past defaults, Oil reserves, etc.). Developing countries should also improve the quality of governance since financial markets award well governed countries with better borrowing conditions.

Then, **Chapter 2** moves to analyzing the strength of fiscal rules in terms of improving financial markets access for developing countries. We use entropy balancing and various propensity score matching as well. We find that the adoption of fiscal rules reduces sovereign bond spreads and consequently improve financial market access. The extent of this effect is not negligible since fiscal rule adoption lowers bond spreads by up to more than 1.5% while it increases sovereign debt ranking by up to more than 1 grade. Our sample of countries includes 36 developing countries, which are part of the JP Morgan Emerging Markets Bond Index Global (EMBIG), over the period 1993-2014. Indeed, this result is explained by the credibility of fiscal policy channel: more credible governments are rewarded in the international financial markets with low sovereign bond spreads and high sovereign debt ratings. These results are robust to a wide set of alternative specifications (2009 global crisis, hyperinflation episodes, high debt periods, exclusion of former USSR countries, exclusion of countries which are members of a monetary union). Our findings are particularly appealing and show that the adoption of fiscal rules is a substantial instrument for policy makers to improve developing countries' financial markets access.

We explore in **Chapter 3** the relationship between fiscal rules (FR) and income inequality (IQ). In a large panel of developing countries, propensity score matching estimations reveal that countries that adopted FR experience a significant decrease in their IQ with respect to countries that did not. Economically meaningful, this favorable effect is robust to a wide set of alternative measurement,

methodology, and modeling specifications. Moreover, we unveil significant differences among FR: balanced budget and debt rules robustly decrease IQ, contrary to expenditure rules that increase it. Finally, the effect of FR on IQ is subject to heterogeneity related to structural factors. Given the current global IQ trends, our results showing that the FR are not neutral for IQ may provide insightful evidence for governments of countries aiming at adopting FR. Our analysis contributes to the literature devoted to identifying policies that may reduce IQ. Even if FR may not be originally designed to fight IQ, the important side effect we unveiled suggests that they should not be treated as neutral in terms of IQ. Indeed, developing countries could finance their development in a sustainable way (via the reduction of inequalities) by adopting fiscal rules.

Furthermore, we assess the effects of combating illicit financial flows on domestic tax revenue mobilization in developing countries in **Chapter 4**, using propensity score matching. At this end, we use data on countries' compliance with Financial Action Task Force (FATF) Recommendations as treatment variable and involve 58 developing countries around the world. In fact, The Financial Action Task Force (FATF) develops and promotes policies to protect the global financial system against money laundering, terrorist financing and the financing of proliferation of weapons of mass destruction. Its Recommendations provide a comprehensive and consistent regulatory framework for anti-money laundering and combating the financing of terrorism, as well as the financing of proliferation of weapons of mass destruction. Since 2003, these Recommendations have been endorsed and recognized by over 180 countries as the international standard for anti-money laundering and countering the financing of terrorism (AML/CFT). We find that countries which comply with FATF Recommendations (Cooperatives countries) record higher values of domestic tax revenue compared to those which do not comply with those Recommendations (Non-cooperatives countries). Otherwise, Cooperatives countries outperform Non-cooperatives countries in terms of domestic tax revenue mobilization. More interestingly, the extent of this adverse impact depends on tax components: goods and services taxes are more affected, followed by VAT and excise taxes. These results are robust to countries' structural characteristics (macroeconomic conditions and political situation as well). Our results suggest that developing countries could mobilize more domestic tax revenue by implementing policies to curtail IFFs. Moreover, they should establish sound institutions.

Finally, we conclude, draw some policy recommendations and suggest some areas in which future research is needed (**General Conclusion**).

Before shifting to **Chapter 1**, it is worth noting that even though the four chapters of the dissertation are linked consistently, for ease of reading, we tried to render each chapter self-sufficient. Accordingly, the reader will notice that the presentation of the methodology of propensity scores-matching is repeated, where appropriate, throughout the chapters.

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Part 1: How governments could improve external resources mobilization?

Chapter 1

Does the composition of government expenditures matter for sovereign bond spreads' evolution in developing countries?

This chapter is joint work with Jean-Louis Combes and Alexandru Minea. A slightly different version of this chapter is published in *Economic Modelling*

I. Introduction:

Access to capital on international financial markets is necessary for developing countries (DCs) who strongly aspire to develop investment and accelerate growth. According to the efficient market theory, this access is influenced by economic fundamentals (e.g. inflation, growth, deficits) as investors exploit all the available information about factors that may affect these countries' default risk. Then this access can depend on the composition of government spending. From the 1980s sovereign debt crisis, investors lowered purchases of securities issued by DCs owing to their high risks. In doing so, they demand a high yield for holding debt instruments issued by DCs. The Bretton woods institutions constantly required for DCs to direct their public spending towards positive externalities generating activities (health, education, infrastructures…).

An important issue is to know how disaggregated public spending affects sovereign bonds spreads. This paper aims to quantify the effects of the composition of government spending on sovereign bonds spreads. Researches on the link between fiscal policy and sovereign bonds spreads reach different conclusions. Some authors find that fiscal variables (public deficits, debt/GNP) have significant effect on sovereign bonds spreads (Edwards, 1984; Min, 1998) while others find they have no effect on spreads (Akitoby and Stratmann, 2008; Gupta and al., 2008). The originality of this paper is that it examines how the composition of government spending influences sovereign borrowers' access to international financial markets. To better capture the compositional effect of public spending, we report each type of expenditure on total government spending. This variable best reflects government economic policies decisions.

We contribute to the literature on fiscal policy as a determinant of government bond spreads by investigating how the composition of public spending (current spending to total expenditure, public investment to total expenditure and spending on education, health, social protection, economic affairs, and defense) affects bond spreads. In fact, public expenditures have different returns (productive or unproductive), which is why their effects on growth are different (Aschauer, 1989; Aschauer, 1990; Munnell, 1990; Ford and Poret, 1991; Costa et al., 1987; Garcia-Milà and McGuire, 1992; Easterly and Rebelo, 1993; Tatom, 1991; Evans and Karras, 1994, Sturm and De Haan, 1995, Hurlin and Minea, 2013, etc.). In doing so, they affect the "fundamentals" that determine market sentiment in relation to sustainability and the dynamics of the debt (spread). Although we focus on public expenditures' flows, our work is closely linked to those of Aschauer (1989, 1990). For instance, in his seminal paper, Aschauer (1989) reveals that nonmilitary public

capital stock strongly affects productivity as compared to military spending. He also finds that a "core" infrastructure (comprising streets and highways, airports, electrical and gas facilities, mass transit, water systems and sewers) mostly explains productivity in the US during the period span from 1949 to 1985[5]. This latter result is consistent with the extension to a panel of the G-7 industrial countries (Aschauer, 1990). Several studies confirm Aschauer's findings (Munnell, 1990; Ford and Poret, 1991; Costa et al., 1987; Garcia-Milà and McGuire, 1992; Easterly and Rebelo, 1993; etc.). However, Tatom (1991) claim that their estimates are suspect as they do not account for (i) relative price of energy, (ii) time trend and notably (iii) non-stationarity of their variables. All these problems lead to spurious estimates that overstate the effect of public capital on productivity. In the same vein, Evans and Karras (1994) show that there is no evidence that government capital is productive and underprovided in a panel of seven countries[6] including the US[7]. Furthermore, Sturm and De Haan (1995) assess the soundness of Aschauer (1989)'s econometric method and reach the conclusion that it is not well founded. In fact, as soon as variables used are neither stationary nor cointegrated, level estimations are not suited. Indeed, they use first differences estimates and find peculiar results[8]. Given this uncertainty, Hurlin and Minea (2013) question the reliability of the production function in estimating the genuine rate of return on public infrastructures. Their results suggest that the best empirical strategy to estimate government capital productivity consist to remove the common stochastic trends from only non-stationary independent variables[9]. Otherwise, we investigate isolated effect for each of these types of expenditures on sovereign spreads. What type of expenditure does mostly affect sovereign risk[10]?

Furthermore, we investigate if the effect of public spending on government bond spreads is subject to nonlinearities. We study the nonlinearity of public spending on spreads with respect to the quality of institutions since it is assumed that sovereign bond spreads depend on the quality of public spending and that this latter depends on institutional quality. Several empirical evidences

[5] This corroborate results of an earlier work by Ratner (1983).
[6] These countries are Belgium, Canada, Finland, Germany, Greece, the UK and the US. Remark that this paper is written under the Clinton Administration which undertaken a large increase in public investment on the grounds that government capital is highly productive and underprovided in the US.
[7] Note that Evans and Karras (1994) find a statistically significant effect of government capital on productivity when there are some misspecifications in the production function leading to ignore time effects in productivity growth as in Aschauer (1990).
[8] Their results show a negative private capital elasticity and labour elasticity superior to unity, both in the US and the Netherlands (1945-1985).
[9] This finding is at odd both for Aschauer (1989) and Tatom (1991) who differentiate all variables (regressand and all regressors) in his model.
[10] Sovereign risk refers to the probability that a State will not be able to meet its financial commitments on time.

emphasize that quality of institutions is the main drivers of growth in developing countries (Acemuglu et al., 2002; Easterly et al., 2002; Rodrik et al., 2002). Good institutions can therefore promote developing countries' access to capital by enhancing their growth. Is institutional quality able to reverses the link between public spending and sovereign spreads in developing countries? Under what conditions could public spending reduce bond spreads in these countries? We use alternative estimation methods to analyze this topic.

We find that the composition of public spending, unlike their level, affects sovereign bond spreads. Increasing public investment favors access to capital markets while the opposite occurs with current spending. We also highlight a nonlinear relationship between public spending and spreads. The effect of public spending on spreads depends on the quality of institutions proxied by government effectiveness, political stability and control of corruption. Our findings suggest that developing countries could improve their borrowing conditions on international capital market by reducing current spending and supporting public investment. They should also improve the quality of their institutions.

The remainder of this paper is organized as follows. Section 2 lays out the literature review on the determinants of bond spreads. Section 3 outlines the underlying model and analytical structure. Section 4 describes the data, summarizes the main econometric results and explores their sensitivity. Section 5 investigates possible nonlinearities. Section 6 concludes and discusses some policy implications.

II. Literature review

Various studies on the determinants of sovereign bonds spreads emphasize the importance of country specific factors. Indeed Edwards (1984), in a seminal paper, finds that external debt and debt service are the key determinants of spreads follow-up by current account, international reserves and the investment ratio for a given country. In the same vein, Min (1998) underscores the significance of a set of macroeconomic variables such as inflation, foreign assets, terms of trade and real exchange rate in the determination of spreads. Besides, Fouejieu and Scott (2013) estimating the effects of inflation targeting (IT) on spreads, find that countries which have introduced inflation targeting experience low bonds spreads compared to the others one. They argue that this difference is due to the fact that inflation targeters have a greater stability and pre-visibility in terms of inflation in the long run. This result is proved by Balima et al. (2017) who show that IT matters for lower spreads, but this favorable effect is sensitive to countries several

structural characteristics. So, Rowland and Torres (2004) argue that creditworthiness is crucial in fixing emerging countries' sovereign debt cost. The review of three perspectives on country risk, namely debt intolerance, original sin, and currency mismatches, leads Borio and Packer (2004) to assert that good domestic macroeconomic and structural policies are essential for country risk management. The determinants of sovereign bonds spreads depend on the time horizon. Indeed, Bellas et al. (2010) find that fundamentals are significant determinants of emerging market spreads in the long run, while financial volatility is a more important determinant of spreads in the short run. They show also that political risk is an important long-term determinant of sovereign bond spreads in emerging markets countries (by impacting the ability of governments to repay their bondholders). From the point of view of Ferrucci (2003), market spreads broadly reflect fundamentals, as well as non-fundamental factors (capital market imperfections, such as higher investor risk appetite resulting from lower global interest rates) in emerging markets economies between 1995 and 1997. Finally, Eichengreen and Mody (1998) find that market sentiment has played a crucial role in spreads movements over 1991-1997 in emerging countries.

A second strand of literature investigates the short-term effects of fiscal policy (Giavazzi et al., 2000; Gupta et al., 2008; Akitoby and Stratmann, 2008; Alesina et al., 2002; Corsetti and Meier, 2009). For instance, a fiscal effort imputed to reduce unproductive public expenditures can increase the expected growth, namely a twofold positive effect in relation to which financial markets would be less stringent in terms of risk premia. Akitoby and Stratmann (2008), find that budget composition is important given that achieving the budget consolidation' goal by expenditures-based adjustment is associated to low spreads compared to revenue-based adjustment. Alesina et al. (2002) also analyze the effects of public expenditures on private investment in OECD' countries and find that low public expenditures can involve high investment and economic growth throughout low capital taxes. The extent of these effects depends on the nature of changes (transient or permanent) in public expenditures (Corsetti and Meier, 2009). Moreover, Giavazzi et al. (2000) and Gupta et al. (2005) underline that fiscal consolidation considerably reduces credit spreads especially in countries which have poor initial fiscal conditions. Then the composition of fiscal policy is determinant: a high public investment contributes to reduce spreads if it does not increase fiscal deficit. In a study on the effects of fiscal policy on investment in OECD countries, Alesina et al. (2002) find a negative effect of public spending on profits and private investment. They explain this result by the crowding-out effect of public sector hiring on private sector. Furthermore,

Alesina et al. (1998) conclude in a study on the economic effects of fiscal adjustment that all adjustments are not recessive. Some adjustments are recessive, and others are not. Working on 19 OECD countries from 1960 to 1995, they define two types of fiscal adjustments: type 1 adjustments consisting of a reduction in current expenditure and a type 2 adjustment based on both higher taxes and lower public investment. The main channels through which fiscal adjustments are transmitted to the economy are the labor market, the effects of expectations and the effects of credibility. According to these authors, only type 1 adjustments are expansionist. However, Schclarek (2007), using a mixed sample of 19 developed and 21 developing countries, shows a positive effect of expansionary fiscal policy on private consumption over the period 1970 to 2000. By the same token, Devarajan et al. (1996), investigate the composition of public spending on growth and show that current spending positively affects growth of 43 developing countries while the effect of public investment is negative. They explain this result by a diminishing marginal return of public investment in developing countries. This may be due to the existence of some nonlinearities between public spending and economic growth.

A last strand of literature explores the interactions between fiscal policy and political institutions and unanimously conclude that high-quality institutions are fundamental for implementing sound fiscal policies. In this regard, Prakash and Cabezon (2008) as well as Dabbla-Norris et al. (2010) show that the more the budget is transparent, and institutions are high quality, the less there are public deficits in low-income countries. Government effectiveness is noticed as a fundamental determinant of spread for emerging markets (Eichler, 2014) and more specifically in Latin American countries (Martinez et al., 2013) as well as inflation, terms of trade, external debt and currency reserves. In the same vein, Baldacci et al. (2011) analyze the main factors that explain country risk in a sample of 46 countries, over the period 1997-2008 and conclude that low country risks involve low spread particularly during financial crisis wherein markets are more sensitive to institutional instability. These authors find additionally that fiscal variables are important in determining spreads: countries which have the highest debts and/or deficits have high spreads. Furthermore, Faria et al. (2006) emphasize the importance of institutional factors in the determination of capital markets' access during previous periods of globalization. Similarly, Gelos et al. (2011) point out country's vulnerability to shocks and the quality of policies and institutions as the main factors that determine market access by developing countries. They also make evidence that market access is not influenced by a country's frequency of defaults. Focusing on the financial

cost of governments' opacity, Arbatli and Escolano (2012) argue that fiscal transparency is related with better rating. In short, Glennerster and Shin (2008) show that countries which have introduced IMF fiscal transparency reforms have later experienced low sovereign bonds spreads. Investigating on *« The price of democracy »* in developing countries, Block and Vaaler (2004) indicate that agencies and bondholders view elections negatively, increasing the cost of capital to developing democracies. They find that credit rating agencies downgrade developing countries' ratings and that bond spreads is significantly higher approximately two months before an election. The combination of human capital and institutional quality has been a key determinant of emerging market countries' ability to attract international investors during the previous waves of financial globalization, namely since 1870 (Faria et al., 2006). Alfaro et al. (2005a, 2005b) and Wei (2005) work on several mixed countries from 1970 to 2000 and provide evidence that the institutional quality of the host country is a key determinant of international capital flows over the long run. Using OLS and Heckman selection's model, Ciocchini et al. (2003) highlights that more corrupt countries must pay a higher risk premium when issuing bonds because the global bond market ascribes a significant cost to corruption. Then, higher corruption increases borrowing costs on the international market for both government and firms in developing countries. Finally, Arezki and Brükner (2012) shed light on the fact that commodity price boom reduces spread in democracies while their increases spreads in autocracies in a sample of 38 emerging market economies.

The model used in this paper stems from sovereign risk spreads theory (e.g. Edwards, 1984 Eichler, 2014; Gupta et al., 2008; Akitoby and Stratmann, 2008) as well as the discussion on the effects of fiscal policy - "keynesian" versus "non-keynesian" effects - (e.g. Alesina et al., 1998; Alesina et al., 2002; Schclarek, 2007; Devarajan et al., 1996). In order to test the hypothesis according to which public spending have different effects on spreads, we focus on various components of public spending: current spending as a ratio of total expenditure, public investment as a ratio of total expenditure, total expenditure as share of gross domestic product (GDP), spending on education, health, social protection, economic affairs and spending on defense[11]. We also investigate the existence of a possible non-linear effect between public spending and sovereign spreads. Do the effects of public spending on spreads depends on the quality of institutions?

[11] We use unadjusted public spending in the business cycle because, as pointed out by Alesina et al. (1998), it is difficult for economic agents to distinguish discretionary expenditures from cyclical effects of the budget. Moreover, there is no agreement between professional economists in this field.

III. Basic model specification

To estimate the effect of public spending on government bond spreads and allow our results to be compared with the related literature (e.g. Edwards, 1984; Baldacci et al., 2011; Martinez et al., 2013), we start with a panel data model:

$$Log(embig)_{it} = \alpha_i + \beta X_{it} + \lambda_t + \varepsilon_{it} \quad (1)$$

in which $(embig)_{it}$ represents government bond spreads; X_{it} represents a vector of explanatory variables; α_i and λ_t are respectively country and time fixed effects, and ε_{it} an error term. The vector of explanatory variables comprises various components of public expenditure (current spending, public investment, total expenditure, spending on education, health, social protection, economic affairs and defense) and other control variables. Current spending is assumed to increase sovereign spreads by crowding out private investment. Public investment stimulates growth (Barro, 1990) and therefore reduce bond spreads. However, public investment can also crowd out private investment and increase spreads. Moreover, as noted by Devarajan et al. (1996), misallocating government spending in favors of public investment at expense of current spending can create adverse effect. This is supported by the fact that several components of current spending (compensation of employees, uses of good and services …etc.) bolster human capital. Indeed, the knowledge and skills that individuals possess directly increase productivity and the ability of an economy to develop and adopt new technologies. The expected sign of total spending is, a priori, ambiguous. Neoclassical theory shows that any increase in public spending could crowd out private spending. The intervention of the State in the economy is thus ineffective in this vision. Conversely, the Keynesian vision of the economy emphasizes that public spending has a multiplier effect: the increase in public spending would stimulate aggregate demand and thus the national income. In this way, an increase of public spending can also be either directly productive or increases the productivity of private spending.

Drawing upon the literature on the determinants of spreads, we control for these variables:

(1) The growth rate of gross domestic product (GDP growth), which controls the economic cycle and monetary conditions. It is assumed to reduce bond spreads since economies with high GDP growth rate can easily repay their debt.

(2) The inflation rate (inflation) which is an indicator of macroeconomic stability. It positively affects spreads. For example, monetary financing of the budget deficit can drive inflation up, increasing the cost of capital (equipment, etc.). This is taken in logarithm [Log (1 + inflation)].

(3) The ratio of debt to gross domestic product (Debt). It is recognized that a high debt ratio increases, all other things being equal, the risk of default and therefore the spreads. This can be explained by the fact that a high indebted country spends more on debt service payments[12].

(4) The payment defaults (Debt default). It is a dummy variable that is worth 1 if a country has failed or restructured its debt (which disadvantages investors) in a given year and 0 otherwise. According to Reinhart et al. (2003) a country may be a victim of "debt intolerance[13]" when it fails at least once in its history (i.e. a serial defaulter). The lack of payment further weakens its institutions (budgetary and financial institutions) and makes them less able to cope with possible debt problems and future defaults. A country can sustainably emerge from debt intolerance if it reduces its external debt (Reinhart and Rogoff, 2008). Defaulting countries are penalized in financial markets by high spreads.

(5) Terms of trade. The sign of this variable on sovereign spreads is expected to be negative. Indeed, a change in the terms of trade resulting from a change in export market prices (an increase of demand for domestic products on the international market) reduces spreads. In this case, the increase in the terms of trade allows the country to obtain foreign currency to pay for its debt service, thus reducing the risk of default.

(6) The total currency reserves in months of imports. This variable is considered by the IMF as an appropriate indicator for reserve needs for countries with limited access to capital markets. It is expected to negatively affect bond spreads. It measures the country's ability to repay foreign debt denominated in foreign currencies. The higher the ratio of reserves in months of imports is; the lower are bond spreads, *ceteris paribus*.

(7) The FDI net inflows as share of GDP that measures the capacity of a given country to attract foreign investors. Theoretically, this variable reduce spreads insofar as private investment would improve the macroeconomic situation e.g. employment, growth and external equilibrium.

[12] Debt service is the total government expenditure on debt repayment (principal + interest), often expressed as a percentage of GDP.
[13] Debt intolerance is the inability of emerging markets to manage levels of external debt that would be manageable for developed countries under the same circumstances (Reinhart et al., 2003).

(8) A composite index (index) which captures the governance quality. It represents a simple average of seven ICRG indicators[14]. This variable is supposed to reduce sovereign bond spreads as sound institutions reinforce investors' confidence towards a given country.

IV. Empirical analysis

1. Data and stylized facts

We use a homogenous panel of 30 emerging countries that are part of the JP Morgan Emerging Market Bond Index Global (EMBIG). The choice of this sample of emerging countries is dictated by the availability of data on both spreads and various independent variables. Our data are in annual frequency, and span from 2000 to 2013[15]. Data on sovereign bond spreads come from the JP Morgan EMBIG (EMBIG), which includes all sovereign foreign debt instruments issued by emerging countries. These instruments include international borrowings denominated in US dollars, such as Brady bonds, loans, and Eurobonds with a face value of at least US$ 500 million and a maturity of 12 years. The government bond spread is calculated with respect to the US government bonds, which are considered as risk-free, and is taken in log to reduce potential heteroscedasticity issues. Data on government spending comes from the International Monetary Fund (IMF) World Economic Outlook database. We use three measures of government spending in our analysis. On the one hand, an aggregated measure, which includes all government spending, expressed in % of GDP (Expenditure). On the other hand, we disentangle government spending into current spending and public investment. The former (Current) includes the final consumption expenditure, property income paid, subsidies, and other current transfers, e.g., social security, social assistance, pensions, and other welfare benefits. The latter (Public investment) is related to "productive" government spending, and measured by government gross fixed capital formation, where the general government comprises central and subnational governments but excludes other public entities such as state-owned enterprises and public-private partnership arrangements. To seize a composition effect, both variables are expressed as a share of total government spending. Data on sovereign default stem from Reinhart and Rogoff (2009) revised database. Finally, data on all other control variables come from World Development Indicators, Worldwide Governance Indicators, ICRG and Database of Political Institutions. Figure 1 below depicts the average

[14] These indicators are government stability, internal and external conflict, corruption, military in politics, religious and ethnic tensions and democratic accountability.
[15] Appendix A3. describes our data . All variables in our model are stationary in level (see Appendix A4).

evolution of EMBIG over the period 2000 and 2013 in DCs. As we can observe, EMBIG is lower in Asia countries relative to the rest of the world.

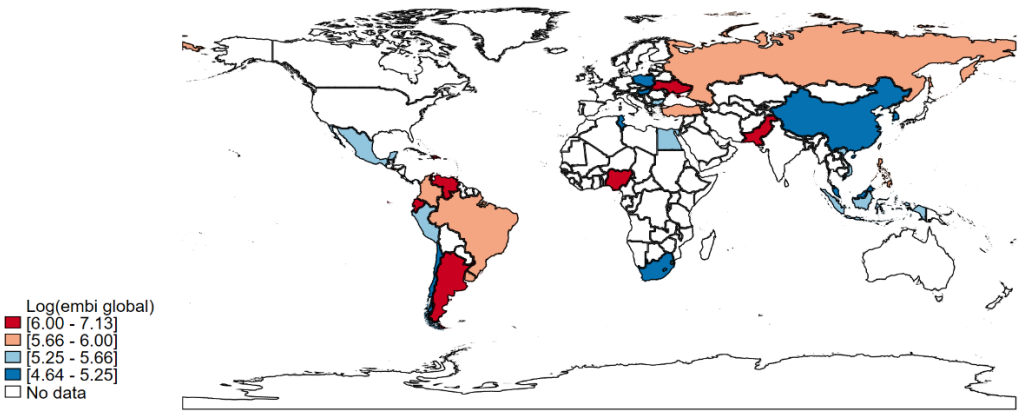
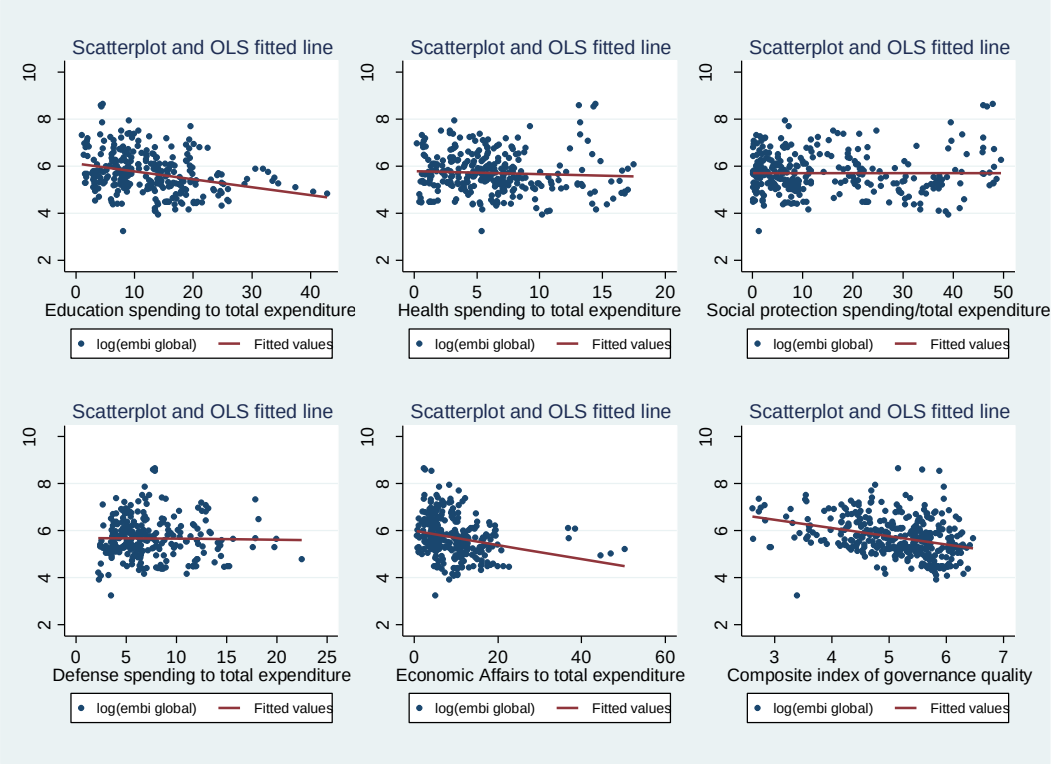


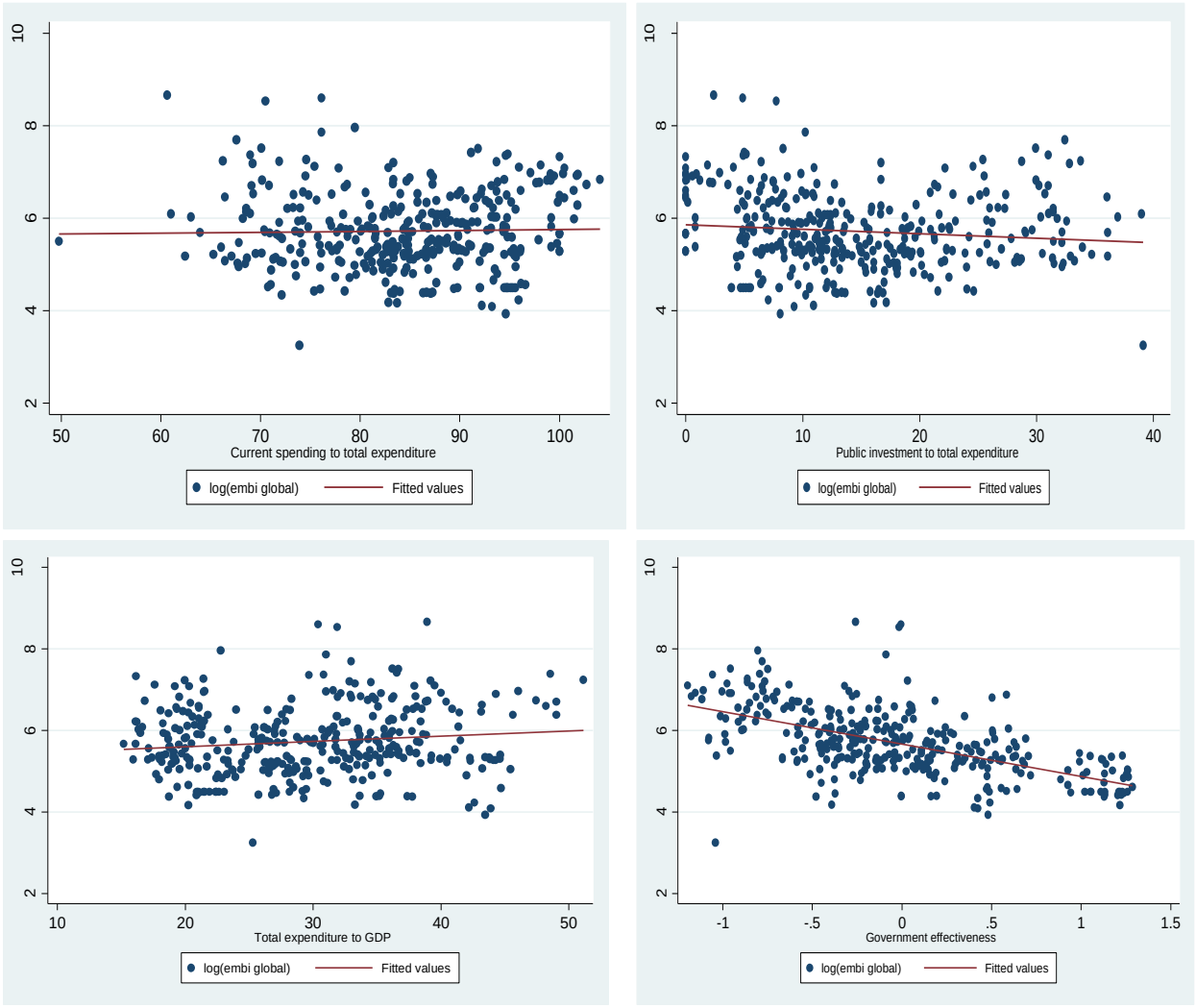
Figure 1: World map of emerging markets bonds index global from 2000 to 2013



Note: The Y axis represents the value of emerging market bond index (in Logarithm) while the X axis shows each type of functional public expenditure

Figure 2: Emerging markets spreads and functional repartition of government expenditures

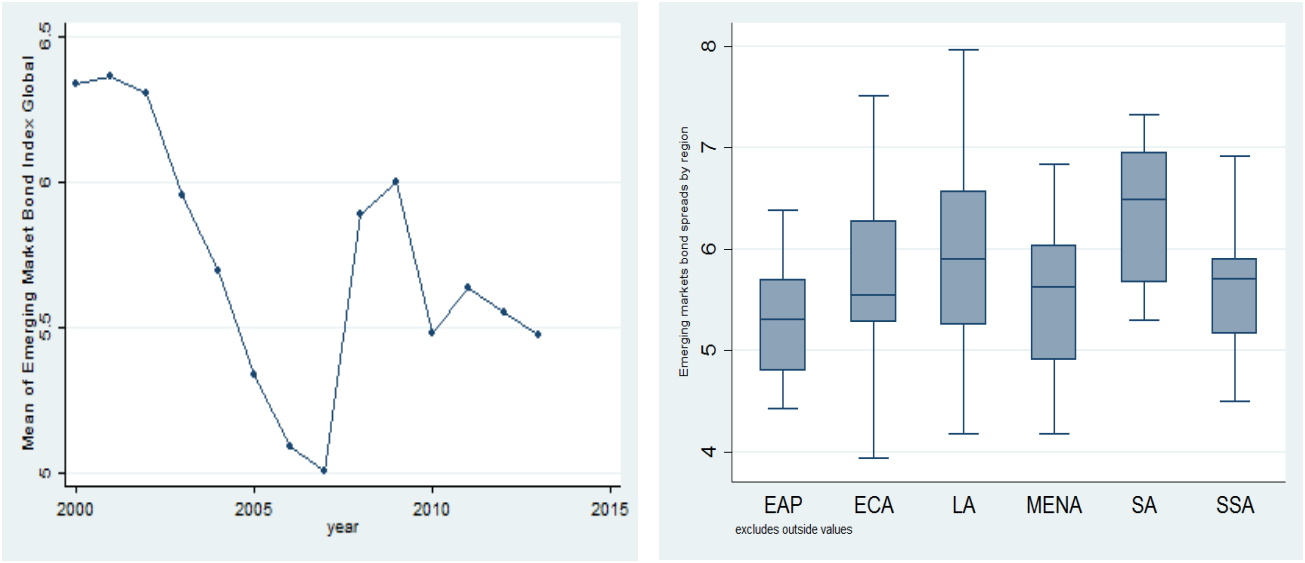
In Figure 2 & 3, we outline the relation between sovereign bonds spreads and various types of government spending. Public investment is negatively related to spreads while current spending and total expenditure have a positive relationship with spreads. Moreover, government spending on education, health and economic affairs are negatively correlated with bond spreads.



Note: The Y axis represents the value of emerging market bond index (in Logarithm) while the X axis shows each type of fiscal or political variable.

Figure 3: Emerging markets spreads and selected Fiscal and political variables

The evolution of emerging markets spreads (Figure 4) shows that they fell from 2000 to 2007 (saving glut period) when they reached their lowest level. They rose in the aftermath of the global crisis of 2008, before a phase of decline since 2009. So, does global crisis make any difference in the relationship between government spending and sovereign bond spreads? Latin America area is more affected by bonds spreads increases during this period.

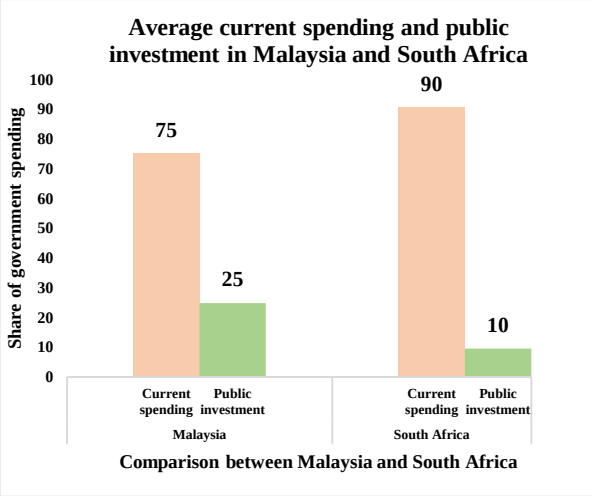


Note: The Y axis represents the mean value of emerging market bond index (in Logarithm) while the X axis indicate the time span (left side of the figure) and the different regions. EAP stands for East Asia and the Pacific, ECA represents Europe and Central Asia, LA means Latin America, MENA indicates Middle East and North Africa, SA stands for South Asia and finally SSA represents Sub-Saharan African

Figure 4: Evolution of EMBIG over time and bonds spreads repartition by country group

Countries that have a high ratio of current spending as share of total expenditure show the highest bond spreads. Figure 5 below makes a comparison between Malaysia and South Africa. In fact, Malaysia and South Africa are both emerging countries and have not experienced any debt default over 2000 to 2013. However, the dynamic of bond spreads is different in these countries. Indeed, bond spreads are around 145 basis points and 192 basis points in Malaysia and South Africa, respectively. Meanwhile, the composition of government spending differs in these countries[16]: current spending represents 75 per cent of total expenditure in Malaysia (25 per cent for public investment) while it constitutes 90 per cent of total expenditure in South Africa (10 per cent goes to public investment). In this light, the composition of government spending could matter for government bond spreads.

[16] Nevertheless, the level of government spending between these countries is similar (28.7 percent of GDP for Malaysia and 29 percent of GDP for South Africa) even if per capita spending is different in these countries (per capita spending is higher in Malaysia).



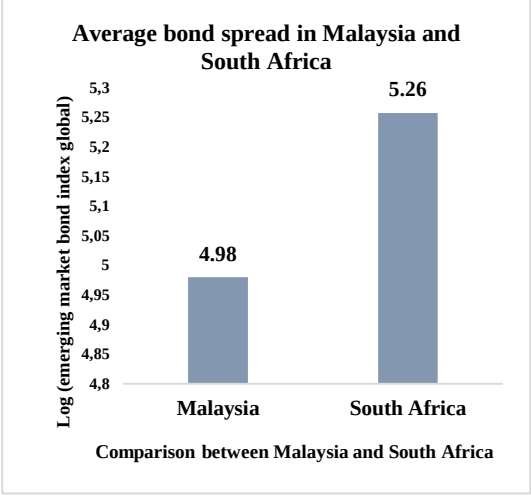


Figure 5: Composition of government spending and bond spreads in Malaysia and South Africa (2000-2013)

2. Empirical results

a. Effects of government spending on sovereign spreads

The identification of a causal effect of public spending on government bond spreads is a difficult task. In particular, simple OLS estimations of the model (1) may be polluted by the presence of potential endogeneity. Reversed causality is a primary source of endogeneity; for example, a country may change its public spending behavior following an increase in risk premia on the issued bonds. Also, some factors that are not taken into account (such as agents' expectations) can affect both public spending and spreads.

To address these endogeneity issues, the traditional solution is to draw upon instrumental variables (IV). However, finding time varying IV that fulfill the usual econometric restrictions is challenging with macroeconomic series. Consequently, we draw upon a combination between internal and external IVs, through augmenting the System-GMM model of Blundell and Bond (1998), which uses lagged variables as instruments and is particularly appropriate to deal with inertia in spreads, with additional IVs. Following the related literature (see e.g. Fatas and Mihov, 2003; Akitoby and Stratmann, 2008), we include two external instruments for government spending, namely the urbanization rate and the age dependency ratio, which are expected to affect public spending (but not spreads) directly[17].

[17] For instance, Pearson et al. (1989) suggest that a rise in the proportion of old people could increase pensions, health, and social services spending (see also Busemeyer et al., 2009), while a higher urbanization rate may be associated with the need of additional public infrastructures. We also assess the sensitivity of our results using an IV approach using these external instruments (Appendix A6).

Table 1: The effect of public spending on government bond spreads

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Lag embig	0.530***	0.602***	0.551***	0.540***	0.612***	0.533***
	(0.0856)	(0.0827)	(0.0773)	(0.169)	(0.182)	(0.129)
GDP growth	-0.0744***	-0.0576***	-0.0848***	-0.116***	-0.109***	-0.125***
	(0.0129)	(0.0134)	(0.0213)	(0.0309)	(0.0221)	(0.0326)
Inflation	3.306***	2.973***	1.928*	2.991*	4.099***	2.448*
	(0.882)	(0.942)	(1.155)	(1.618)	(1.574)	(1.265)
Reserves/months	-0.0371*	-0.0564*	-0.0396**	-0.0619**	-0.0731**	-0.0413*
	(0.0195)	(0.0333)	(0.0193)	(0.0260)	(0.0315)	(0.0230)
Debt default	0.854***	0.702**	0.857***	0.913**	0.935**	0.654**
	(0.267)	(0.301)	(0.221)	(0.421)	(0.472)	(0.318)
FDI Inflows	0.00275	0.00361	0.00425	-0.00201	-0.00520	0.00540
	(0.00495)	(0.00602)	(0.00472)	(0.00388)	(0.0104)	(0.00545)
Terms of Trade	-0.000258	0.000417	0.000139	0.00151	-0.000413	0.000261
	(0.000630)	(0.00240)	(0.000978)	(0.00153)	(0.00108)	(0.00198)
Index	-0.115*	-0.106	-0.117	-0.108	-0.0469	-0.165
	(0.0590)	(0.120)	(0.122)	(0.0858)	(0.106)	(0.150)
Expenditure	0.00645	-0.0325	-0.0127	-0.0726	-0.0646	-0.0779
	(0.0102)	(0.0239)	(0.0115)	(0.0616)	(0.0563)	(0.0525)
Debt	-0.000628	0.00982	-0.000701			
	(0.00263)	(0.00641)	(0.00273)			
Gov. Revenue				0.0626	0.0480	0.0615
				(0.0523)	(0.0471)	(0.0443)
Net Current		**0.0345****			**0.0259*****	
		(0.0141)			**(0.00915)**	
Public Invest			**-0.0280****			**-0.0372***
			(0.0134)			**(0.0193)**
Constant	3.370***	1.002	4.311***	4.060***	1.783	5.172***
	(0.670)	(1.210)	(0.882)	(1.141)	(1.616)	(1.508)
N	326	326	325	284	284	283
AR1	0.008	0.037	0.007	0.030	0.031	0.012
AR2	0.225	0.274	0.171	0.469	0.738	0.204
Hansen	0.133	0.202	0.136	0.376	0.316	0.328
Nb of group	28	28	28	28	28	28
Number of Z	22	23	22	21	23	24

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1 presents the estimations. Following the literature on fiscal policy (e.g. Combes et al., 2018, for a recent contribution), we restricted and collapsed the instrument set to avoid the proliferation of instruments (Roodman, 2009), and corrected standard errors for the finite sample bias (Windmeijer, 2005). Before discussing the main results, observe that usual diagnostic tests support the quality of our fitting: the Hansen J-test does not reject the null hypothesis that our instruments are valid (i.e. uncorrelated with the error term), and the AR (2) test suggests the absence of second-order autocorrelation of the error term. In addition, the high coefficient of the lagged EMBIG confirms the important persistence in the dynamic of spreads, and, therefore, the appropriateness of drawing upon the System-GMM model. Finally, whenever significant, control variables present the expected sign: higher GDP growth and reserves (inflation and debt default probability) decrease (increase) government bond spreads.

Results show that current spending positively and significantly increases spreads whereas public investment significantly reduces bonds spreads: a rise in current spending (public

investment) of 1% increases (decreases) sovereign spreads by around 103 (102) basis points. When public investment is high, it helps to develop domestic investment. The increase in domestic investment increases tax resources available to pay for debt, thereby reducing spreads. In addition, public investment by raising the level and efficiency of a country's human capital is valued by capital markets as countries with a high level of human capital have low spreads. In sum, the negative effect of public investment on spreads is consistent from the point of view of endogenous growth (Barro, 1990). This theory argues that public investment or "productive" government spending stimulate growth insofar as they favor private sector's expansion. However, Barro's conjecture that government spending (even productive spending) are financed by distortive taxes means that there is an optimal threshold of tax rate above which an increase in public investment will discourage investors. This can increase sovereign bond spreads. Investors interpret a rise in unproductive spending as a sign of a poor prospect for growth in the future[18]. The effect of total expenditure on spreads is however insignificant although positive.

Overall, the effects of government spending on spreads depend on the type of spending. Current spending increase bond spreads in developing countries. In doing so, the effectiveness of redistribution policies is being challenged in financial markets. Countries that reduce current spending report to investors their willingness to meet their commitments through unpopular policies (while accepting the risks associated with them). Public investment is valued by financial markets in these countries. As Gupta et al. (2008), Fouejieu and Scott (2013) and unlike Akitoby and Stratmann (2008) we find that some components of government spending increase spreads. It is therefore essential to consider the structure of government spending in developing countries. Increasing public investment could enhance growth and improve the borrowing conditions in financial markets while the opposite could be achieved by increasing current spending.

b. Functional repartition of government spending and sovereign bond spreads

Table 2 reports the estimations of the effect of government spending disaggregated by functional type, expressed in ratio of total expenditure, on sovereign bond spreads. As we can observe, government spending on education and health significantly reduce sovereign spreads. Since these categories of government spending are considered as an investment in human capital, their increase can improve the productivity in the developing world. With a well-educated and healthy

[18] Therefore, they require a higher premium following an increase of current spending.

population, international financial markets do not doubt a country's ability to honor its commitments. We explain this confidence by the fact that investors expect a considerable prospect for future growth following an increase of these types of spending. The size of health spending is slightly higher than that of education spending. A 1% increase in public health spending reduces spreads by 1.05% while the increase in education spending by 1% reduces spreads by 1.04%. Our results also show that government spending on social protection and military spending increase sovereign spreads in emerging countries. This could be explained by the fact that these types of spending, considered as "unproductive" by some economists, crowd out private investment. In doing so, they reduce investors' expectations in terms of prospect for future growth. Indeed, a 1% increase in social protection spending increases spreads by 1.02%. The increase in spreads is 1.06% for a 1% increase in military spending. Government spending in economic affairs does not affect sovereign bond spreads in developing countries.

Table 2: The Effect of different types of spending on bond spreads

	[1]	[2]	[3]	[4]	[5]
Lag embig	0.421***	0.501***	0.708***	0.635***	0.559***
	(0.106)	(0.115)	(0.153)	(0.135)	(0.100)
GDP growth	-0.0787***	-0.0928***	-0.0338***	-0.0492***	-0.0576***
	(0.0155)	(0.0139)	(0.0104)	(0.00807)	(0.0189)
Inflation	1.646	1.405*	0.295	2.223***	2.902**
	(1.013)	(0.847)	(0.936)	(0.502)	(1.335)
Reserves/months	-0.0315	-0.0227	-0.0164	-0.0304	-0.0296
	(0.0295)	(0.0204)	(0.0340)	(0.0189)	(0.0213)
Debt default	1.003***	1.100***	0.466	0.771***	0.726**
	(0.374)	(0.145)	(0.366)	(0.255)	(0.307)
Net ODA	-0.0298	-0.0563*	0.0403	0.00488	-0.0142
	(0.0245)	(0.0297)	(0.0547)	(0.0366)	(0.0335)
Terms of Trade	0.00107	0.00122	0.000550	0.0000447	0.000470
	(0.00167)	(0.000765)	(0.00208)	(0.000967)	(0.00138)
Index	-0.0786	-0.0732	-0.142	-0.169***	0.0193
	(0.0740)	(0.0673)	(0.0964)	(0.0592)	(0.0852)
FDI Inflows	0.0188	0.0299	-0.0396*	0.0132	0.0323
	(0.0204)	(0.0193)	(0.0223)	(0.0173)	(0.0464)
Expenditure	0.0184	0.00813	0.00196	0.0256***	0.0223
	(0.0116)	(0.0139)	(0.0219)	(0.00808)	(0.0222)
Education	**-0.0376****				
	(0.0164)				
Health		**-0.0476*****			
		(0.0164)			
Social Protection			**0.0205***		
			(0.0122)		
Economic affairs				**0.0115**	
				(0.0209)	
Defense					**0.0627***
					(0.0350)
Constant	3.871***	3.480***	2.321**	2.220*	1.433**
	(0.776)	(0.870)	(1.048)	(1.178)	(0.690)
N	217	217	217	215	190
AR1	0.030	0.017	0.005	0.007	0.021
AR2	0.967	0.979	0.014	0.184	0.455
Hansen	0.286	0.618	0.433	0.662	0.859
Numb of group	24	24	24	24	21
Number of Z	21	20	22	21	20

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3. Sensitivity analysis

We assess the robustness of our baseline results with respect to many factors (Appendix A6-A10).

Indeed, we control for government revenue (Table 1 above) and the net official development assistance received (Appendix A7). Our results remain unchanged. We also account for some seigniorage variables (Appendix A7), namely base money growth and monetary ratio. The results are robust to the introduction of these variables. We introduce both compositional and level variables (Appendix A7) and we unveil that the composition of government spending matters on spreads, while the level of government spending is not significant. Our results survive when we account for the Federal Reserve interest rate (see Table 3 below). The effect of the composition of public spending still matters on spreads when we control for oil rents (Appendix A7) and the number of defaults cumulated in the past (Appendix A7). This later variable is not significant, implying that there are no memory phenomena. Countries that have experienced many payments default of debt in the past do not outperform those with few defaults in terms of sound management of debt and consequently low spreads. In addition, the 2008 great recession (see Table 3 below) does not alter the existing link between government spending and spreads in developing countries. However, this crisis does significantly increase bond spreads in these countries.

We also perform many sensitivity analyses using IV approach (Appendix A6). We first assess the sensitivity of our results with respect to the combination of control variables. This is motivated by the fact that our results could be sensitive to the number of control variables. To do this, we estimate three equations for each type of public expenditure. In the first equation we control for GDP growth, debt ratio and payment defaults. In addition to these variables, we include the inflation rate in the second equation. In the third equation, we introduce international reserves and the terms of trade. All in all, our results are robust to the combination of control variables. We also explore the effects of government spending on sovereign spreads by region. We consider two (2) regions, namely the Latin American and the Caribbean and the Eastern Europe and Asia[19]. Our objective is to unveil some possible heterogeneities with respect to the region. We find evidence that our results are not sensitive to the region (see Appendix A6).

[19] We disregard Sub-Saharan Africa and the Middle East regions since the number of countries belonging to these regions is low in our sample.

Table 3: The effect of public spending on government bond spreads

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Lag embig	0.633***	0.765***	0.729***	0.584***	0.612***	0.781***
	(0.0678)	(0.0841)	(0.0885)	(0.0838)	(0.0803)	(0.114)
GDP growth	-0.0509***	-0.0473***	-0.0452***	-0.0697***	-0.0618***	-0.0757***
	(0.00612)	(0.00871)	(0.0110)	(0.0182)	(0.0161)	(0.0133)
Inflation	1.734	1.545*	2.372***	2.787**	2.745***	4.640***
	(1.148)	(0.911)	(0.794)	(1.326)	(1.027)	(1.796)
Reserves/months	-0.0352	-0.0380**	-0.0363*	-0.0245	-0.0611***	-0.0440
	(0.0234)	(0.0193)	(0.0196)	(0.0172)	(0.0210)	(0.0354)
Debt default	1.034**	0.446***	0.345	0.729**	0.568**	0.581**
	(0.423)	(0.142)	(0.237)	(0.367)	(0.226)	(0.273)
Debt	0.00120	-0.00377	0.00730	-0.000466	-0.00328	-0.00355
	(0.00278)	(0.00362)	(0.00488)	(0.00925)	(0.00331)	(0.00885)
FDI Inflows	-0.00328	0.00742	0.00244	0.00642	0.00919	0.00967
	(0.00455)	(0.00526)	(0.00459)	(0.00401)	(0.00613)	(0.00607)
Terms of Trade	-0.000116	-0.000818	-0.00104	0.000217	0.000486	-0.00219
	(0.000833)	(0.00115)	(0.00116)	(0.00124)	(0.00128)	(0.00154)
Index	-0.121**	-0.0315	-0.0820	-0.0899	-0.0414	0.00524
	(0.0611)	(0.113)	(0.117)	(0.0766)	(0.151)	(0.134)
Expenditure	0.00711	-0.00219	-0.0143	-0.000479	-0.0107	-0.0153
	(0.0125)	(0.0174)	(0.0177)	(0.0123)	(0.0150)	(0.0237)
Crisis	0.641***	0.707***	0.678***			
	(0.0759)	(0.0735)	(0.0748)			
Fed rate				-0.0477***	-0.0684***	0.00860
				(0.0112)	(0.0156)	(0.0275)
Public Invest		**-0.0387****			**-0.0324****	
		(0.0164)			**(0.0165)**	
Net Current			**0.0273****			**0.0257****
			(0.0118)			**(0.0115)**
Constant	2.651***	2.521***	0.277	3.101***	3.741***	0.348
	(0.533)	(0.853)	(1.199)	(0.790)	(0.943)	(1.411)
N	326	325	326	326	325	326
AR1	0.001	0.000	0.006	0.012	0.012	0.022
AR2	0.836	0.539	0.942	0.129	0.117	0.191
Hansen	0.107	0.148	0.114	0.107	0.159	0.241
Nb of group	28	28	28	28	28	28
Number of Z	23	25	26	26	27	27

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: The negative sign of the Federal reserve interest rate could be explained following Eichengreen and Mody (1998), Kaminsky and Kleist (1999) and Jahjah and Yue (2004). These authors emphasize the demand and supply argument: when US interest rate increase, there are fewer sovereign bond issuer countries in the market. Given the demand for bond in emerging market, the reduction in supply then lower bond spreads.

V. Non-linearities between public spending and bond spreads

In this section, we investigate if the effect of government spending on bond spreads is subject to nonlinearities. To do so, we draw upon the popular panel smooth transition regression (PSTR) model proposed by Gonzales et al. (2005) which allows modeling situations where the transition from one regime to another is gradual (smooth).

$$Y_{it} = \mu_i + \alpha_1 k_{i,t} + \alpha_2 k_{i,t}\, G(q_{i,t-1}; \gamma, c) + \alpha_3 X_{it} + \varepsilon_{it} \qquad (2)$$

where μ_i represents country fixed effects, ε_{it} the error term which is independent and identically distributed, Y_{it} is the sovereign spread, $q_{i,t-1}$ is the transition variable and X_{it} a vector of control variables. $k_{i,t}$ represents government spending. Following Granger and Terasvirta, 1993; Gonzàlez

et al., 2005 and Villieu and Eggoh, 2013, we suppose a logistic transition function $G(q_{i,t-1};\gamma,c)$ with a single threshold.

$G(q_{i,t-1};\gamma,c)= [1 + exp(-\gamma\pi_{j=1}^{m}(q_{i,t-1};\gamma,c_j))]^{-1} \in [0;1]$ with $\gamma > 0$, $c_1 < \cdots < c_m$

where $(c_1, c_2, \ldots c_m)$ is a dimension vector m grouping the threshold parameters and the parameter γ makes it possible to characterize the slope of the transition function. When $\gamma \to \infty$ the transition becomes abrupt and the PSTR converges to a PTR with two regimes (to the left, respectively to the right of c). On the other hand, for $\gamma \to 0$, $G(.) \to 1/2$ PSTR estimates correspond to that of a panel with individual fixed effects. For values of γ between these two extremes, the transition is smooth between the two regimes.

Compared to a model with a sharp transition (Hansen, 1999 panel threshold regression-PTR- model), the PSTR method identifies an infinity of regimes, each describing a different effect of government spending on sovereign spreads, as a function of $(q_{i,t-1};\gamma,c)$. The effect of public spending on spreads for $(q_{i,t-1};\gamma,c) \ll c$ is equal to α_1 and the effect for $c \ll (q_{i,t-1};\gamma,c)$ is equal to $(\alpha_1 + \alpha_2)$. The two extreme regimes of the PTR are thus found. For any other value of $q_{i,t-1};\gamma,c$ between these two extremes, the impact of public spending on sovereign spreads is given by the following expression: $\frac{dY_{it}}{dk_{i,t}} = \alpha_1 + \alpha_2\, G(q_{i,t-1};\gamma,c)$.

Three major steps are typically used in a PSTR model. The first step is to find the number of possible regimes or equivalently the number of transition functions necessary to capture all heterogeneity and non-linearity of the data. It consists of first testing the linear model without introducing the transition function $(H_0: r = 0)$ against a model with threshold effects with a minimum of a transition function $(H_1: r = 1)$. If the linear model is rejected, the next step is to find the number of transition functions to be admitted in the model. We test in an iterative way the number of possible significant regimes and the procedure stops when the null hypothesis is accepted $(H_0: r = i \; versus \; H_1: r = i + 1)$ with $(i = 1, \ldots, r)$. The transition functions or the transition variables are not necessarily the same. In the second step, we determine the number of thresholds (m) to be admitted in the transition variable $q_{i,t-1}$ such that $c_{j,min} > min_{i,t}\{q_{i,t-1}\}$ and $c_{j,max} < max_{i,t}\{q_{i,t-1}\}, j = 1, \ldots, m$. Colletaz and Hurlin (2006) propose to retain the value of m for model which minimizes the Residual Sum of Squares (RSS), the Akaike Information Creterion (AIC) and the Bayesian Information Creterion (BIC). However, Gonzalez et al. (2005) considers that in practice it is usually sufficient to consider $m = 1 \; or \; m = 2$, since these values generally

allow to capture the variations in the parameters to be estimated. Finally, in the third step we estimate the parameters of the PSTR model using nonlinear least squares (NLS) method.

Of course, there are many possible candidates for the variable q. Among such candidates that may drive nonlinearities, we choose to focus on a broad proxy of the overall environment in a country, namely the quality of its institutions. This choice is motivated by the literature on the political underpinnings of fiscal policy that highlights the key role of governance for fiscal transparency, which supports the credibility of fiscal policy and limits political budget cycles, leading to better ratings (Arbatli and Escolano, 2015) and lower spreads (see e.g. Ciocchini et al., 2003; Glennerster and Shin, 2008). In addition, institutions also affect the nature of public spending in a country: Rajkumar and Swaroop (2008) show that good institutions positively impact the efficiency of public investment, which may explain their favorable effect on spreads (see e.g. Martinez et al., 2013; Eichler, 2014). Consequently, institutions may influence the effect of government spending on sovereign bond spreads. Among different variables that aim at capturing institutions, we draw upon the popular government effectiveness variable from the Worldwide Governance Indicators (WGI) of (Kaufmann et al., 2011), which is an important determinant of spreads for emerging markets (Martinez et al., 2013; Eichler, 2014). Comprised between 2.5 and 2.5, with a higher value signaling better institutions, government effectiveness measures perceptions of the quality of public services, their independence from political pressures, the quality of policy formulation and implementation, and the credibility of the commitment of government with respect to these policies.

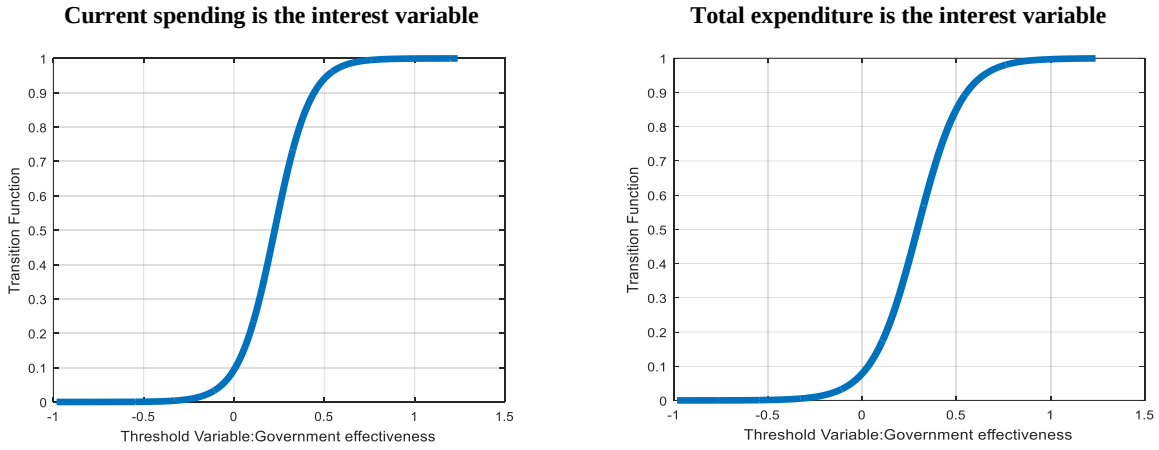


Figure 6: Transition functions

Table 4. Estimation of parameters for PSTR model[20]

Government effectiveness is the threshold variable

	Net Current spending	Total expenditure
Parameter α_1	0.0083(0.0069)	0.0179(0.0090)*
Parameter α_2	-0.0339(0.0088)***	-0.0751(0.0264)**
Parameter c	0.2254	0.2927
Parameter γ	10.0802	8.4098

Table 4 above presents the estimations using PSTR. The LMF test allows to reject the null hypothesis of the absence of a non-linear effect between government spending and spreads with respect to the quality of institutions. Thus, the effect of public spending on sovereign spreads depends on the quality of institutions. As we can observe, the effects of different types of government spending are positive first and above a certain level of government effectiveness these effects become negative and significant[21]. For low levels of government effectiveness, government spending increases sovereign spreads in developing countries. However, this relationship is reversed and becomes negative when the level of government effectiveness exceeds a certain threshold c. The low values of γ indicates that the PSTR structure is appropriate to model the non-linearity when the threshold variable is government effectiveness. Figure 7 shows the sensitivity of sovereign spreads to government spending with respect to the quality of institutions. This figure suitably describes the flexibility in the evolution of the elasticity of bond spreads in relation to government spending. It shows that this elasticity is a decreasing function of the quality of institutions: high government effectiveness is associated with a negative elasticity. When government effectiveness is low, the elasticity of bond spreads in relation to government spending is high and changes between the values 0.01 and -0.03 for current spending (or 0.02 and -0.06 for total expenditure). Above a certain threshold c (0.2254 or 0.2927 depending on the type of spending), the elasticity of bond spreads in relation to government spending begins to decrease, before decreasing considerably. The effect of government spending on bond spreads becomes negative above the threshold.

[20] c denotes the estimated location parameters while γ denotes the estimated slope parameters for each transition function.

[21] The median value of government effectiveness is -0.11933 slightly. In ours sample, 11 countries are below this median value while 11 other countries are above (see the appendix for details).

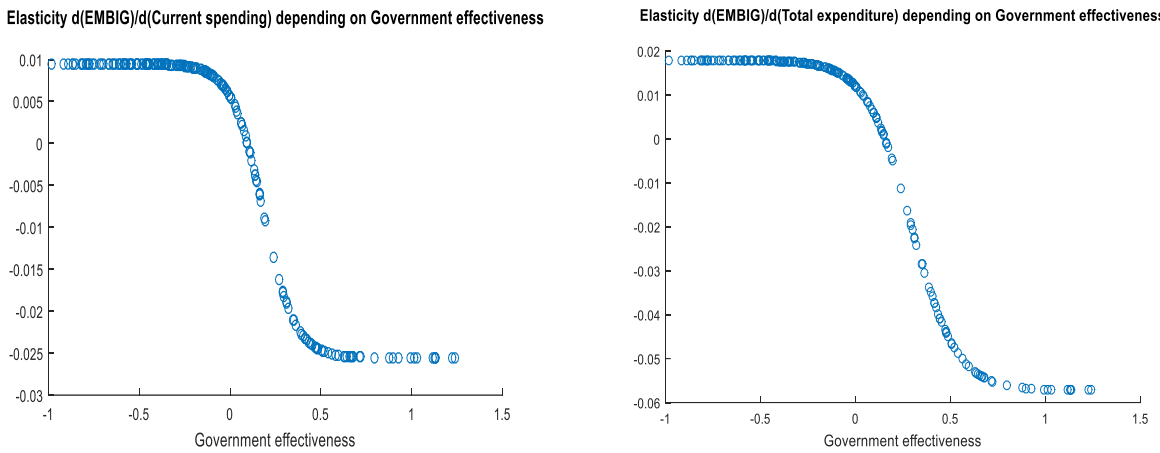


Figure 7: Elasticity d(EMBIG)/d(Government spending) and Government effectiveness

VI. Conclusions and policy implications

This paper contributes to the surprisingly sparse literature on fiscal policy as a determinant of government bond spreads by focusing on one of the most important components of fiscal policy, namely government spending. Drawing upon a System-GMM model augmented with external instrumental variables (IV) to capture a causal effect, estimations performed on a homogenous panel of 30 emerging countries that are part of the JP Morgan EMBIG revealed the following.

First, contrary to the lack of influence of total spending in % of GDP (no level effect), we found that higher current spending (public investment) expressed in ratio of total spending significantly increase (decrease) government bond spreads. Moreover, this composition effect was found to be robust when: (i) controlling for total spending in % of GDP; (ii) including or not interest payments in the accountancy of current spending; (iii) accounting for the level effect of current spending and public investment (in % of GDP, see Akitoby and Stratmann, 2008, and Baldacci et al., 2008, 2011); and (iv) using alternative estimation methods, additional controls, or different subsamples. Finally, using methods that potentially allow for the identification of endogenous thresholds with panel data, we unveiled that the effect of disaggregated public spending on government bond spreads are subject to nonlinearities related to the quality of institutions. While confirming our main findings, these estimations suggest that better institutions may support a favorable effect of public spending on spreads, particularly for current spending.

Overall, our analysis shows that, contrary to aggregated public spending, disaggregated public spending are not neutral for government bond spreads. From a policy perspective, the main takeaway of our study is that emerging countries could improve their borrowing conditions on international capital markets when increasing public investment or controlling their current expenditures, such as public wages, social transfers, and so forth. Although they may be domestically unpopular, the latter policies could be valued by financial markets, and allow emerging countries to raise international funding at lower costs in order to further finance their economic development.

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APPENDICES

APPENDIX A1. PRESENTATION OF GOVERNMENT SPENDING DATA

Total Expenditure = Expense (1) + Net acquisition of non-financial assets (2)
Expense (1) = Current expenditure
Compensation of employees
Wages and salaries
Social Contributions
Uses of goods and services
Consumption of fixed capital assets
Interest
Subsidies
Grants
Excludes grants to other government units (Due to consolidation and for the purpose of this exercise)
Social benefits
Other expense
Net acquisition of non-financial assets (2)= Public Investment
Fixed assets
Inventories
Valuables
Nonproduced assets

Source: The IMF's Government Finance Statistics Yearbook—Maps of Government for 74 Countries

Net Current spending	It equals the General government expense,[22] and is expressed as a ratio of total expenditure.	IMF World Economic Outlook
Public investment	It encompasses the General government net acquisition of nonfinancial assets,[23] and is expressed as a ratio of total expenditure.	
Total Expenditure	Expense plus the net acquisition of nonfinancial assets (excluding valuables,[24] if possible), and is expressed in % of GDP.	

[22] It comprises spending on goods and services consumed within the current year in order to sustain the production process. This includes compensation of employees, the use of goods and services, consumption of fixed capital assets, interests, subsidies, grants, social benefits, and other expenses. We subtract interest payment to obtain the net current expenditure.

[23] The net acquisition of nonfinancial assets equals gross fixed capital formation less consumption of fixed capital plus changes in inventories and transactions in other nonfinancial assets (IMF Government Finance Statistics Manual, 2001).

[24] Valuables are produced assets that are not used primarily for purposes of production or consumption but are held as stores of value over time (IMF Government Finance Statistics Manual, 2001).

APPENDIX A2. DEFINITION AND SOURCES OF VARIABLES

Variable	*Definition*	*Source*
Sovereign bond spreads	It covers all sovereign foreign debt instruments issued by emerging countries, including international borrowings denominated in US dollars such as Brady bonds, loans, and Eurobonds with a face value of at least US$ 500 million and a maturity of 12 years.	JP Morgan, Datastream
Growth rate of GDP	Annual percentage growth rate of GDP per capita.	WDI database
Inflation rate	Annual percentage change of consumer price index.	
Net Official Development Assistance	Disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent.	
Total Reserves/months of imports	Reserves expressed in terms of the number of months of imports of goods and services they could pay for [Reserves/(Imports/12)].	
Inflows of FDI to GDP	Net inflows (new investment inflows less disinvestment) in a given economy from foreign investors, divided by GDP.	
Age dependency ratio	The ratio of dependent people younger than 15 or older than 64 to the working-age population (aged 15-64), in ratio of dependents per 100 working-age people.	
Urbanization rate	People living in urban areas as defined by national statistical offices, in total population.	
Debt to GDP	Ratio of total debt to GDP.	Reinhart and Rogoff (2008)
Payments default of debt	Dummy equal to 1 if a country did not pay its debt or restructured it with a lost for investors, and 0 if there was no payment default or debt restructuring.	
Terms of Trade	Ratio of export prices index and import prices index, in percentage.	IMF WEO
Net Current spending	Ratio of government current spending, net of interest payments, to total expenditure.	
Public investment	Ratio of government capital spending to total expenditure.	
Total expenditure	Ratio of government total spending to GDP.	
US Treasury bill rate	6-month Treasury bill secondary market rate.	FED database
Crisis	Dummy equal to 1 if year=2008, and to 0 if not.	Authors' calculations
Past defaults	Number of defaults cumulated in the past.	Authors' calculations
Government effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimates give a country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI database
Control of corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Estimates give a country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimates give a country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	

Quality of institutions	A composite measure of the quality of institution, computed as the simple average of government effectiveness, control of corruption, and political stability.	Authors' calculations
Government stability	This is an assessment of both the government's ability to carry out its declared program(s), and its ability to stay in office.	ICRG Database
Internal & external conflict	This is an assessment of political violence in the country and its actual or potential impact on governance. The highest rating is given to those countries where there is no armed or civil opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people. It also includes an assessment both of the risk to the incumbent government from foreign action, ranging from non-violent external pressure (diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, sanctions, etc) to violent external pressure (cross-border conflicts to all-out war).	
Corruption	This is an assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process.	
Military in politics	The military is not elected by anyone. Therefore, its involvement in politics, even at a peripheral level, is a diminution of democratic accountability.	
Religious tensions	Religious tensions may stem from the domination of society and/or governance by a single religious group that seeks to replace civil law by religious law and to exclude other religions from the political and/or social process; the desire of a single religious group to dominate governance; the suppression of religious freedom; the desire of a religious group to express its own identity, separate from the country as a whole.	
Ethnic tensions	This component is an assessment of the degree of tension within a country attributable to racial, nationality, or language divisions. Lower ratings are given to countries where racial and nationality tensions are high because opposing groups are intolerant and unwilling to compromise. Higher ratings are given to countries where tensions are minimal, even though such differences may still exist.	
Democratic accountability	This is a measure of how responsive government is to its people, on the basis that the less responsive it is, the more likely it is that the government will fall, peacefully in a democratic society, but possibly violently in a non-democratic one.	
Index	A composite index of institutions, computed as the simple average of six ICRG indicators (government stability, internal & external conflict, corruption, military in politics, religious & ethnic tensions, and democratic accountability).	
Education spending	Ratio of education expenditure in total expenditure.	IFPRI SPEED database
Health spending	Ratio of health expenditure in total expenditure.	
Social protection	Ratio of social protection expenditure in total expenditure.	
Economic affairs	Ratio of economic affairs expenditure in total expenditure.	
Defense spending	Ratio of defense expenditure in total expenditure.	

APPENDIX A3. DESCRIPTIVE STATISTICS

Variable name	Count	Mean	Sd	Min	Max
Log (embig)	347	5.698198	.8323937	3.250815	8.662101
GDP growth	364	4.509779	3.808713	-14.8	33.73577
Inflation rate	353	.0690067	.0658476	-.0172513	.6734245
Reserves/months	362	5.656501	3.259067	.4167565	19.01295
Terms of trade	378	115.5317	51.25785	76.3327	530.993
Debt to GDP	364	48.28221	30.59699	3.9	181.9
Debt default	364	.0521978	.2227319	0	1
FDI inflows	364	3.760869	3.463629	-2.75744	30.99529
Total expenditure	364	29.29719	8.009214	14.72533	51.12439
Current spending	364	83.60862	9.537809	49.80733	100
Public investment	363	15.30528	9.24079	0	40.69975
Index	420	5.129	.818	2.607	6.609
Government effectiveness	390	-.017	.594	-1.201	1.286
Rule of law	390	-.279	.655	-1.812	1.374
Control of corruption	390	-.274	.62	-1.333	1.573
Quality of institutions	390	-.243	.619	-1.557	1.23
Political stability	390	-.44	.846	-2.806	1.177
Government stability	420	8.213	1.639	4.04	12
Internal & external conflict	420	8.868	1.567	3.42	12
Corruption	420	2.309	.738	1	4.92
Military in politics	420	3.552	1.445	0	6
Religious tensions	420	4.526	1.456	.5	6
Ethnic tensions	420	4.253	1.329	1	6
Democratic accountability	420	4.182	1.506	0	6

APPENDIX A4. UNIT ROOT TESTS

Test / Variable	Levin, Lin & Chu	Im, Pesaran & Shin	ADF-Fisher	PP-Fisher	Integration Order
Log (embig)	-18.3725	-5.63803	115.280	65.9214	I (0)
GDP growth	-11.9862	-7.22417	155.194	152.352	I (0)
Inflation rate	-26.9707	-10.7788	159.705	196.667	I (0)
Reserves months	-3.48995	-1.49833	74.2991	72.5710	I (0)
Terms of trade	-6.97228	-2.42743	76.8109	123.795	I (0)
Debt to GDP	-10.4868	-2.54687	101.944	86.2031	I (0)
Debt default	-3.62094	-3.04151	19.8771	20.2056	I (0)
Government effectiveness	-4.88536	-1.45350	79.0375	68.7527	I (0)
FDI inflows	-7.73394	-5.65667	130.947	141.380	I (0)
Current spending	-6.02245	-2.35588	95.0481	106.240	I (0)
Public investment	-6.85918	-1.13276	76.1460	126.724	I (0)
Total expenditure	-3.68749	-1.24111	82.0980	90.7725	I (0)
Index	-2.52763	-1.87895	86.4975	90.2303	I (0)
Rule of law	-3.18267	-1.32920	75.3331	82.9858	I (0)
Control of corruption	-8.23533	-3.94862	116.171	156.437	I (0)
Quality of institutions	-4.56343	-0.86609	72.0208	116.788	I (0)
Political stability	-3.40939	-1.07909	77.4062	86.3846	I (0)
Government stability	-1.31895	-0.74426	79.3035	87.6267	I (0)
Internal & external conflict	-5.04375	-2.79581	102.486	130.516	I (0)
Corruption	-317.024	-76.1771	113.908	160.403	I (0)
Military in politics	-13.0859	-6.41122	99.8541	120.406	I (0)
Religious tensions	-8.52557	-4.17868	69.0885	96.1276	I (0)
Ethnic tensions	-18.1732	-8.47783	78.3874	89.5681	I (0)
Democratic accountability	-3.73164	0.95133	41.6253	78.7308	I (0)

APPENDIX A5. LIST OF COUNTRIES

Argentina
Brazil
Bulgaria
Chile
China
Colombia
Dominican Republic
Ecuador
Egypt
El Salvador
Hungary
Indonesia
Korea
Lebanon
Malaysia
Mexico
Nigeria
Pakistan
Panama
Peru
Philippines
Poland
Russia
South Africa
Tunisia
Turkey
Ukraine
Uruguay
Venezuela
Vietnam

APPENDIX A6. PAIRWISE CORRELATION BETWEEN BONDS SPREADS AND SELECTED MACROECONOMIC VARIABLES

	Log(embig)	GDP/growth	Inflation	Reserves/months	Debt/GDP	Debt/default	FDI/inflows	Current/Spend.	Public/Invest.	Expenditure
Log(embig)	1									
GDP/growth	-0.2257***	1								
Inflation	0.4777***	-0.0894*	1							
Reserves/months	-0.1260**	-0.0032	-0.0413	1						
Debt/GDP	0.3036***	-0.0537	0.1492***	0.2397***	1					
Debt/default	0.4033***	0.1227**	0.2485***	-0.0096	0.1513***	1				
FDI/inflows	-0.2328***	0.1851***	-0.1211**	0.0772	0.1627***	-0.1412***	1			
Current/Spend.	0.0229	-0.1819***	0.0871*	0.2134***	0.1949***	-0.0758	-0.0773	1		
Public/Invest.	-0.1071**	0.2267***	-0.1179**	-0.2180***	-0.3112***	-0.0058	0.0908*	-0.8673***	1	
Expenditure	0.1247**	-0.1450***	0.1569***	0.1190**	0.2008***	0.0173	0.1134*	0.2079***	-0.2459***	1

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX A7. CHECKING THE ROBUSTNESS USING IV APPROACH

Table 1: The effect of public spending on government bond spreads

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**
Net Current	**0.0204****	**0.0225****	**0.0245***	**0.0180***				
	(0.0102)	**(0.00879)**	**(0.0126)**	**(0.00922)**				
Public investment					**-0.0189****	**-0.0218*****	**-0.0219*****	**-0.0153****
					(0.00848)	**(0.00796)**	**(0.00817)**	**(0.00751)**
GDP growth	-0.0573***	-0.0573***	-0.0547***	-0.0510***	-0.0572***	-0.0541***	-0.0526***	-0.0473***
	(0.00796)	(0.00791)	(0.00818)	(0.00814)	(0.00844)	(0.00871)	(0.00868)	(0.00875)
Debt	0.0251***	0.0238***	0.0233***	0.0230***	0.0180***	0.0161***	0.0168***	0.0161***
	(0.00305)	(0.00286)	(0.00413)	(0.00292)	(0.00284)	(0.00299)	(0.00257)	(0.00322)
Debt default	0.602***	0.622***	0.628***	0.586***	0.561***	0.598***	0.584***	0.535***
	(0.157)	(0.158)	(0.156)	(0.147)	(0.154)	(0.151)	(0.141)	(0.149)
Expenditure	0.0148**	0.0123*	0.0139*	0.0136**	0.0197**	0.0194***	0.0241***	0.0178**
	(0.00706)	(0.00694)	(0.00715)	(0.00678)	(0.00790)	(0.00727)	(0.00748)	(0.00725)
Inflation		2.692***	2.380***	2.501***		2.515***	2.241***	2.050***
		(0.674)	(0.672)	(0.699)		(0.667)	(0.597)	(0.701)
Reserves/months		-0.0538***	-0.0697***	-0.0585***		-0.0563***	-0.0572***	-0.0553***
		(0.0143)	(0.0149)	(0.0148)		(0.0136)	(0.0148)	(0.0144)
Terms of Trade			-0.000840	-0.000887			-0.000569	-0.000673
			(0.000868)	(0.000965)			(0.000825)	(0.000933)
FDI inflows				-0.0150**				-0.0161**
				(0.00755)				(0.00770)
Index				-0.229**				-0.265***
				(0.0899)				(0.0829)
N	360	350	315	311	361	351	311	312
Regressors	5	7	8	10	5	7	8	10
Instruments	6	9	10	11	6	9	10	11
Excluded Instruments	2	3	3	2	2	3	3	2
Cragg-Donald F statistic	52.422	39.010	23.179	38.042	189.947	119.688	104.613	150.296
Hansen J statistic	0.209	0.675	0.144	0.386	0.362	0.115	0.259	0.281

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: The effect of public spending on government bond spreads

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**
Expenditure	**0.0187**	**0.0180**	**-0.0179**	**0.0567**				
	(0.0121)	**(0.0115)**	**(0.0219)**	**(0.0423)**				
Net Expenditure					**0.0108**	**0.0127**	**-0.0129**	**0.0131**
					(0.00995)	**(0.00951)**	**(0.0182)**	**(0.0102)**
GDP Growth	-0.0615***	-0.0626***	-0.0610***	-0.0464***	-0.0607***	-0.0611***	-0.0599***	-0.0509***
	(0.00868)	(0.00892)	(0.00959)	(0.0103)	(0.00837)	(0.00873)	(0.00944)	(0.00875)
Debt	0.0204***	0.0192***	0.0195***	0.0157***	0.0201***	0.0188***	0.0185***	0.0185***
	(0.00267)	(0.00277)	(0.00282)	(0.00389)	(0.00280)	(0.00289)	(0.00309)	(0.00296)
Debt Default	0.604***	0.645***	0.484***	0.610***	0.570***	0.611***	0.492***	0.558***
	(0.151)	(0.151)	(0.156)	(0.174)	(0.154)	(0.154)	(0.151)	(0.150)
Inflation		2.054***	0.584	0.987*		1.977***	0.544	1.960***
		(0.599)	(0.703)	(0.538)		(0.625)	(0.678)	(0.630)
Reserves/months		-0.0570***	-0.0680***	-0.0755***		-0.0555***	-0.0675***	-0.0568***
		(0.0143)	(0.0155)	(0.0167)		(0.0145)	(0.0152)	(0.0151)
Terms of Trade			0.0000944	-0.00211			0.0000360	-0.000549
			(0.000976)	(0.00140)			(0.000956)	(0.000970)
FDI inflows				-0.0176**				-0.0167**
				(0.00843)				(0.00773)
Index				-0.206**				-0.294***
				(0.104)				(0.0879)
N	365	355	335	334	364	354	334	315
Regressors	4	6	7	9	4	6	7	9
Instruments	7	8	9	10	7	8	9	11
Excluded Instruments	4	3	3	2	4	3	3	3
Cragg-Donald F statistic	94.143	121.209	13.953	5.013	139.978	185.836	19.014	142.152
Hansen J statistic	0.123	0.152	0.399	0.136	0.290	0.311	0.346	0.102

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effects of public spending on spreads by subgroups of countries

	Latin America and the Caribbean			Asia and Eastern Europe		
Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
GDP growth	-0.0534***	-0.0412***	-0.0486***	-0.0783***	-0.0699***	-0.0723***
	(0.0192)	(0.0101)	(0.00944)	(0.0159)	(0.0159)	(0.0139)
Inflation	1.671	2.832***	1.253**	3.506***	3.358***	2.740**
	(1.469)	(0.810)	(0.637)	(1.140)	(1.237)	(1.159)
Reserves/months	-0.0243	-0.0732***	-0.0850***	-0.0412**	-0.0172	-0.0155
	(0.0519)	(0.0244)	(0.0197)	(0.0180)	(0.0180)	(0.0171)
Debt	0.0514**	0.00480	0.0130***	0.0323***	0.0231***	0.0301***
	(0.0232)	(0.00489)	(0.00360)	(0.00432)	(0.00534)	(0.00441)
FDI Inflows	0.0845	-0.0120	-0.0368**	-0.0119*	-0.0107*	-0.0110
	(0.0941)	(0.0292)	(0.0164)	(0.00661)	(0.00643)	(0.00675)
Index	-0.101	-0.114	-0.189	-0.112	-0.180	-0.271**
	(0.275)	(0.155)	(0.157)	(0.133)	(0.124)	(0.126)
Terms of Trade	-0.00287	-0.00116	-0.000678	0.00156	-0.00319	0.000270
	(0.00187)	(0.000907)	(0.000906)	(0.00221)	(0.00339)	(0.00230)
Expenditure	0.0298	0.0224	0.00337	-0.0288	-0.00744	0.00499
	(0.0270)	(0.0142)	(0.0107)	(0.0244)	(0.0215)	(0.0307)
Debt default	0.753**	0.641***	0.566***			
	(0.323)	(0.171)	(0.138)			
Net Current	**0.137***			**0.0293****		
	(0.0729)			**(0.0126)**		
Public invest		**-0.0683*****			**-0.0654***	
		(0.0208)			**(0.0369)**	
N	149	147	142	125	125	125
Regressors	10	10	9	9	9	8
Instruments	12	12	10	11	11	9
Excluded Instruments	3	3	2	3	3	2
Cragg-Donald F statistic	1.237	7.414	91.876	32.645	8.916	45.039
Hansen J statistic	0.988	0.466	0.578	0.109	0.042	0.601

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX A8. CHECKING THE ROBUSTNESS USING GMM ESTIMATOR

Table 1: Controlling for base money growth and monetary ratio

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Lag embig	0.597***	0.579***	0.518***	0.667***	0.593***	0.487***
	(0.0930)	(0.0955)	(0.116)	(0.108)	(0.0705)	(0.139)
GDP growth	-0.0577***	-0.0886***	-0.0517***	-0.0739***	-0.0831***	-0.0722***
	(0.0134)	(0.0204)	(0.00829)	(0.0133)	(0.0169)	(0.0134)
Inflation	3.017**	2.073*	3.257***	3.574***	2.488**	1.813
	(1.311)	(1.122)	(0.924)	(1.005)	(1.120)	(1.137)
Reserves/months	-0.0489	-0.0363*	-0.00731	-0.0431*	-0.0413*	-0.0536*
	(0.0319)	(0.0205)	(0.0224)	(0.0248)	(0.0241)	(0.0292)
Debt default	0.775**	0.812***	0.794***	0.683***	0.728***	1.769***
	(0.327)	(0.195)	(0.231)	(0.241)	(0.261)	(0.498)
Debt	0.00788	-0.00247	0.00291	0.00390	-0.00392	0.00216
	(0.00618)	(0.00252)	(0.00345)	(0.00365)	(0.00609)	(0.00581)
FDI Inflows	0.00258	0.00590	0.00178	0.00664	0.00663	-0.00468
	(0.00619)	(0.00445)	(0.00524)	(0.00587)	(0.00565)	(0.00956)
Terms of Trade	-0.0000316	-0.000304	0.00256*	-0.00135	-0.0000761	-0.00212*
	(0.00210)	(0.00116)	(0.00137)	(0.00105)	(0.00117)	(0.00110)
Index	-0.102	-0.123	-0.0998*	-0.0288	-0.0503	-0.0857
	(0.131)	(0.117)	(0.0563)	(0.0944)	(0.141)	(0.159)
Expenditure	-0.0255	-0.00337	-0.00536	-0.0161	-0.00720	0.000920
	(0.0242)	(0.0117)	(0.0113)	(0.0159)	(0.0208)	(0.0172)
Base growth	0.00126	0.00135	-0.0172**			
	(0.00248)	(0.00171)	(0.00826)			
Monetary ratio				0.00246	0.00556	0.0372***
				(0.00532)	(0.00645)	(0.0139)
Net Current	**0.0297****			**0.0261****		
	(0.0141)			**(0.0121)**		
Public Invest		**-0.0301****			**-0.0274****	
		(0.0144)			**(0.0137)**	
Constant	1.245	4.043***	3.229***	0.757	3.595***	3.092*
	(1.151)	(0.926)	(0.861)	(1.367)	(1.026)	(1.641)
N	326	325	326	326	325	326
AR1	0.029	0.006	0.023	0.021	0.008	0.008
AR2	0.239	0.183	0.035	0.260	0.148	0.123
Hansen	0.127	0.184	0.259	0.243	0.269	0.393
N of group	28	28	28	28	28	28
Number of Z	24	25	24	24	27	24

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2: Controlling for international aid and Oil rents

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Lag embig	0.604***	0.561***	0.603***	0.565***	0.697***	0.534***
	(0.128)	(0.107)	(0.116)	(0.103)	(0.0989)	(0.0800)
GDP growth	-0.0885***	-0.0821***	-0.0550***	-0.0850***	-0.0525***	-0.0763***
	(0.0193)	(0.0172)	(0.0102)	(0.0201)	(0.0119)	(0.0196)
Inflation	1.261	3.203***	3.060***	3.115**	3.186*	3.422***
	(1.200)	(1.104)	(1.171)	(1.281)	(1.738)	(1.277)
Reserves/months	-0.0407**	-0.0338	-0.0361**	-0.0293	-0.0345*	-0.0216
	(0.0176)	(0.0209)	(0.0169)	(0.0265)	(0.0209)	(0.0178)
Debt default	0.849***	0.744***	0.499***	0.869***	0.680**	0.720***
	(0.194)	(0.243)	(0.189)	(0.191)	(0.270)	(0.239)
FDI Inflows	0.0861	-0.00722	0.0228	0.00629	0.00300	0.00436
	(0.119)	(0.0305)	(0.0159)	(0.00484)	(0.00389)	(0.00287)
Net ODA	-0.0371	-0.00189	-0.0212			
	(0.0698)	(0.0473)	(0.0411)			
Oil_GDP				0.000586	0.0106	0.00839
				(0.0257)	(0.0158)	(0.0177)
Terms of Trade	0.000422	-0.000841	-0.000649	-0.000200	-0.00121	-0.0000952
	(0.000942)	(0.00101)	(0.000778)	(0.000925)	(0.00126)	(0.000814)
Index	-0.143	-0.0419	-0.117	-0.104	-0.0899	-0.126
	(0.142)	(0.0937)	(0.0863)	(0.167)	(0.115)	(0.0988)
Expenditure	-0.00962	0.000359	0.0191	-0.0138	-0.00317	0.00127
	(0.0118)	(0.0151)	(0.0143)	(0.0170)	(0.0156)	(0.0153)
Public Invest	**-0.0227****			**-0.0174***		
	(0.0107)			**(0.0103)**		
Net Current		**0.0131***			**0.0162***	
		(0.00789)			**(0.00872)**	
Constant	3.776***	2.196**	2.524***	3.883**	0.962	3.093***
	(0.934)	(1.050)	(0.969)	(1.700)	(1.280)	(0.688)
N	282	283	283	275	275	275
AR1	0.015	0.040	0.014	0.013	0.014	0.012
AR2	0.512	0.514	0.163	0.289	0.121	0.313
Hansen	0.145	0.132	0.150	0.299	0.133	0.238
N of group	25	25	25	23	23	23
Number of Z	23	24	22	23	22	22

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: The effect of public spending on government bond spreads: level and composition effects

Bond spreads (embig)	**[1]**	**[2]**	**[3]**	**[4]**
Lag embig	0.494***	0.680***	0.739***	0.608***
	(0.0910)	(0.0917)	(0.141)	(0.0760)
GDP growth	-0.0878***	-0.0546***	-0.0568***	-0.0681***
	(0.0145)	(0.0107)	(0.00788)	(0.0140)
Inflation	2.646***	3.995***	3.473***	3.334***
	(0.997)	(1.063)	(1.006)	(1.233)
Reserves/months	-0.0230	-0.0339*	-0.0421**	-0.0264*
	(0.0188)	(0.0198)	(0.0208)	(0.0147)
Debt default	0.792***	0.590*	0.602**	0.773***
	(0.220)	(0.312)	(0.260)	(0.221)
Debt	0.000723	0.00263	-0.00184	-0.00184
	(0.00265)	(0.00367)	(0.00446)	(0.00604)
FDI inflows	0.00245	0.00620	0.00679	0.00557
	(0.00461)	(0.00456)	(0.00662)	(0.00372)
Terms of trade	0.000579	-0.00124	-0.00142*	-0.000444
	(0.00100)	(0.000828)	(0.000846)	(0.00124)
Index	-0.131**	-0.0551	0.00322	-0.103
	(0.0625)	(0.0635)	(0.127)	(0.0824)
Net Expenditure	-0.00183			
	(0.00845)			
Net Current/Total		**0.0245***		
		(0.0147)		
Current/Total			**0.0475***	
			(0.0268)	
Public Investment/Total				**-0.0388***
				(0.0222)
Net Current/GDP		**-0.0136**		
		(0.0187)		
Current/GDP			**-0.00256**	
			(0.0168)	
Public Investment/GDP				**0.0792**
				(0.0628)
Constant	3.767***	0.670	-2.153	3.272***
	(0.725)	(1.156)	(2.362)	(0.536)
Observations	326	326	326	325
AR1 pvalue	0.008	0.014	0.055	0.004
AR2 pvalue	0.295	0.101	0.502	0.124
Hansen pvalue	0.146	0.152	0.326	0.339
Number of groups	28	28	28	28
Number of instruments	23	25	24	27

Standard errors in brackets * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Controlling for high debt episodes and past defaults

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**
Lag embig	0.624***	0.583***	0.533***	0.583***	0.719***	0.492***
	(0.0927)	(0.0830)	(0.112)	(0.0839)	(0.143)	(0.0954)
GDP growth	-0.0809***	-0.0836***	-0.0762***	-0.0750***	-0.0788***	-0.0872***
	(0.0195)	(0.0167)	(0.0149)	(0.0212)	(0.0131)	(0.0145)
Inflation	1.948*	3.521***	3.118***	2.448**	4.295***	2.811**
	(1.079)	(1.041)	(0.910)	(1.052)	(1.474)	(1.176)
Reserves/months	-0.0358*	-0.0302*	-0.0424*	-0.0341*	-0.0506	-0.0216
	(0.0196)	(0.0155)	(0.0234)	(0.0183)	(0.0332)	(0.0188)
Debt default	0.760***	0.765**	0.779***	0.759***	0.651***	0.693***
	(0.211)	(0.309)	(0.201)	(0.173)	(0.203)	(0.232)
FDI Inflows	0.0142**	0.00465	0.00242	0.00592	0.00923	0.00344
	(0.00603)	(0.00452)	(0.00586)	(0.00493)	(0.00633)	(0.00547)
Terms of Trade	0.000163	-0.000647	-0.0000768	0.000341	-0.00223*	-0.0000933
	(0.00111)	(0.000925)	(0.000718)	(0.00128)	(0.00129)	(0.000819)
Index	-0.126	-0.0614	-0.114	-0.0807	0.0198	-0.128**
	(0.112)	(0.0758)	(0.0723)	(0.108)	(0.121)	(0.0648)
Expenditure	-0.00464	-0.00465	0.00669	-0.00155	-0.0256	0.00135
	(0.0159)	(0.0116)	(0.0126)	(0.0187)	(0.0253)	(0.0116)
High debt	-0.106	0.0505	-0.0302			
	(0.104)	(0.0971)	(0.0858)			
Past defaults				0.0230	0.0749	0.0643
				(0.0818)	(0.0500)	(0.0465)
Public Invest	-0.0302**			-0.0251*		
	(0.0139)			(0.0144)		
Net current		0.0133*			0.0320*	
		(0.00726)			(0.0190)	
Constant	3.674***	2.138**	3.368***	3.393***	0.354	3.737***
	(0.922)	(0.898)	(0.991)	(0.707)	(1.925)	(0.734)
N	325	326	326	325	326	326
AR1	0.006	0.017	0.007	0.009	0.015	0.007
AR2	0.110	0.296	0.272	0.112	0.334	0.284
Hansen	0.180	0.119	0.132	0.317	0.314	0.121
Number of groups	28	28	28	28	28	28
Number of Z	23	24	22	26	23	23

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: High debt is a dummy which equal to 1 if debt is above its median value and 0 otherwise

APPENDIX A9. FUNCTIONAL CLASSIFICATION OF PUBLIC EXPENDITURES

Controlling for 2008 global financial crisis

Bond spreads	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**
Lag embig	0.940***	0.692***	0.824***	0.724***	0.795***
	(0.203)	(0.120)	(0.140)	(0.106)	(0.185)
GDP growth	-0.0387***	-0.0451***	-0.0295***	-0.0449***	-0.0408***
	(0.00927)	(0.0104)	(0.0111)	(0.0123)	(0.0101)
Inflation	-2.913*	-0.0990	-0.556	0.267	0.802
	(1.667)	(0.921)	(1.021)	(1.061)	(1.434)
Reserves/months	-0.0863**	-0.0195	-0.0313	-0.0170	-0.0274
	(0.0357)	(0.0294)	(0.0227)	(0.0194)	(0.0243)
Debt default	0.747***	1.092**	0.578***	0.818***	0.217
	(0.195)	(0.425)	(0.220)	(0.284)	(0.461)
Net ODA	-0.0415	0.00494	0.0211	0.0116	-0.0612
	(0.0553)	(0.0314)	(0.0407)	(0.0433)	(0.0944)
Terms of Trade	0.00142	0.0000994	-0.00248	-0.0000987	-0.000500
	(0.00108)	(0.00134)	(0.00231)	(0.00141)	(0.000927)
Index	-0.0334	-0.0725	-0.522**	-0.190***	-0.544***
	(0.144)	(0.0972)	(0.219)	(0.0720)	(0.163)
FDI inflows	0.0262	-0.00138	-0.0224	0.0328	0.0150
	(0.0208)	(0.0303)	(0.0227)	(0.0799)	(0.0340)
Crisis	0.839***	0.751***	0.870***	0.689***	0.761***
	(0.201)	(0.112)	(0.130)	(0.0924)	(0.122)
Expenditure	0.0513***	0.0205	-0.00319	0.0194	0.0148
	(0.0194)	(0.0184)	(0.0235)	(0.0162)	(0.0198)
Education	-0.0911**				
	(0.0376)				
Health		-0.0401**			
		(0.0204)			
Social protection			0.0377**		
			(0.0182)		
Economic affairs				-0.00270	
				(0.0200)	
Defense					0.0248
					(0.0415)
Constant	0.876	1.944***	3.742***	2.038***	3.613***
	(1.338)	(0.620)	(0.884)	(0.724)	(1.377)
N	217	217	217	215	190
AR1	0.003	0.003	0.001	0.004	0.007
AR2	0.718	0.556	0.110	0.597	0.766
Hansen	0.960	0.102	0.939	0.201	0.486
N of group	24	24	24	24	21
Number of Z	23	24	22	22	19

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

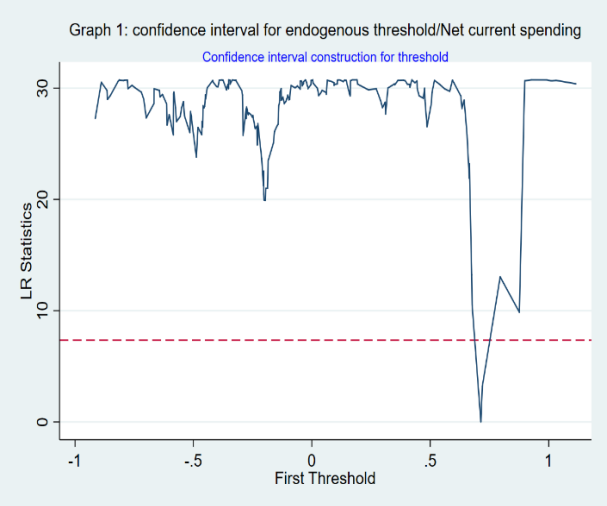
APPENDIX A10. CHECKING THE ROBUSTNESS USING PTR (HANSEN, 1999)

Table 1: Government effectiveness is the threshold variable

	Current spending				Total Expenditure			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Gov effectiveness	**-1.154*** **	**-1.030*** **	**-0.916*** **	**-0.921*** **				
	(0.227)	**(0.227)**	**(0.227)**	**(0.225)**				
Net Current Inf	**-0.00724**	**-0.00308**	**-0.00557**	**-0.00622**				
	(0.00760)	**(0.00760)**	**(0.00752)**	**(0.00747)**				
Net Current Sup	**-0.0219*** **	**-0.0179** **	**-0.0216*** **	**-0.0211** **				
	(0.00822)	**(0.00819)**	**(0.00816)**	**(0.00810)**				
Gov effectiveness					**-1.096*** **	**-1.005*** **	**-0.876*** **	**-0.875*** **
					(0.219)	**(0.217)**	**(0.219)**	**(0.217)**
Expenditure Inf					**0.0170***	**0.0173***	**0.0131**	**0.0131**
					(0.0101)	**(0.00990)**	**(0.00987)**	**(0.00981)**
Expenditure Sup					**-0.00868**	**-0.00860**	**-0.0148**	**-0.0126**
					(0.0110)	**(0.0108)**	**(0.0109)**	**(0.0109)**
GDP growth	-0.0601***	-0.0593***	-0.0653***	-0.0632***	-0.0595***	-0.0593***	-0.0647***	-0.0625***
	(0.00878)	(0.00863)	(0.00875)	(0.00875)	(0.00872)	(0.00854)	(0.00865)	(0.00867)
Debt	0.00933***	0.0115***	0.00858**	0.00838**	0.0109***	0.0123***	0.0100***	0.00996***
	(0.00319)	(0.00322)	(0.00334)	(0.00331)	(0.00281)	(0.00279)	(0.00288)	(0.00286)
Debt default	0.825***	0.838***	0.841***	0.835***	0.853***	0.850***	0.861***	0.858***
	(0.180)	(0.177)	(0.174)	(0.172)	(0.178)	(0.174)	(0.172)	(0.171)
Expenditure	0.0172*	0.0172*	0.0130	0.0131				
	(0.0101)	(0.00991)	(0.00985)	(0.00978)				
Inflation		2.230***	1.989**	2.183***		2.268***	2.083***	2.287***
		(0.778)	(0.769)	(0.770)		(0.764)	(0.755)	(0.758)
Reserves/months			-0.0500***	-0.0519***			-0.0477***	-0.0493***
			(0.0179)	(0.0178)			(0.0178)	(0.0177)
FDI Inflows				-0.00992*				-0.00967*
				(0.00513)				(0.00515)
Constant	5.415***	4.869***	5.679***	5.762***	4.796***	4.584***	5.156***	5.185***
	(0.719)	(0.731)	(0.775)	(0.770)	(0.369)	(0.368)	(0.421)	(0.419)
Number of thresholds	1	1	1	1	1	1	1	1

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Threshold estimator (Th-1, level 99)			Single Threshold effect test		
Variable	**Threshold**	Lower	Upper	Fstat	**Prob**	Crit1
Net current spending	**0.7138**	0.6759	0.6759	32.73	**0.000**	21.85
Total expenditure	**0.7138**	0.6759	0.6759	30.80	**0.000**	24.09



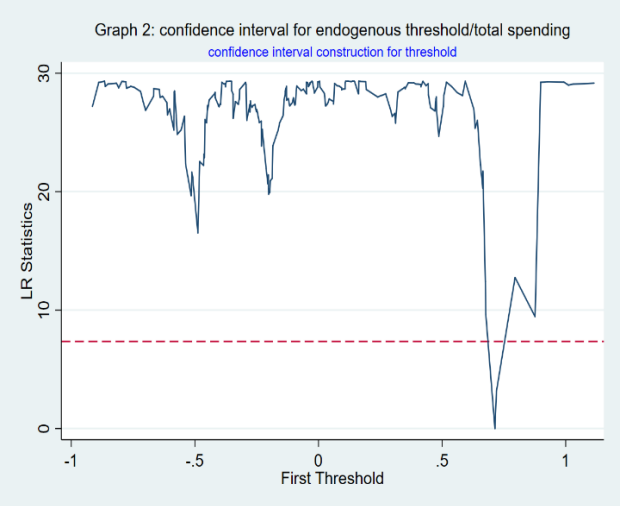
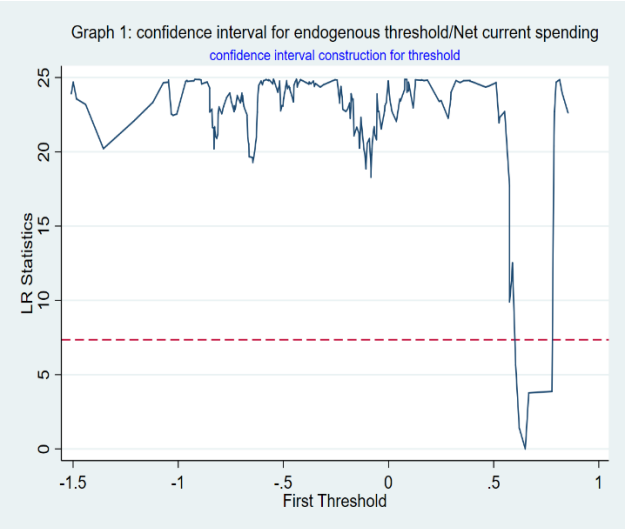


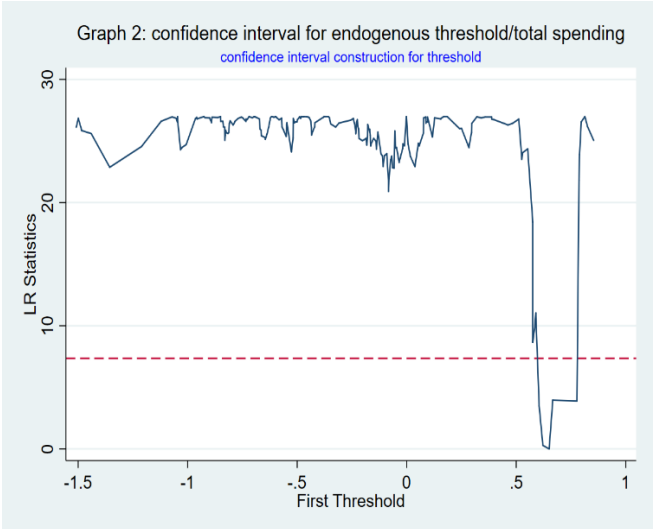
Table 2: Quality[25] is the threshold variable

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Quality	**-1.208*** **	**-1.116*** **	**-1.031*** **	**-1.013*** **				
	(0.221)	**(0.219)**	**(0.218)**	**(0.217)**				
Net Current Inf	**-0.00138**	**0.00200**	**-0.00110**	**-0.00156**				
	(0.00729)	**(0.00725)**	**(0.00722)**	**(0.00718)**				
Net Current Sup	**-0.0136*** **	**-0.0102**	**-0.0143*** **	**-0.0138*** **				
	(0.00785)	**(0.00779)**	**(0.00781)**	**(0.00777)**				
Quality					**-1.204*** **	**-1.125*** **	**-1.027*** **	**-1.009*** **
					(0.219)	**(0.216)**	**(0.215)**	**(0.215)**
Expenditure Inf					**0.0141**	**0.0146**	**0.0105**	**0.0106**
					(0.00994)	**(0.00976)**	**(0.00970)**	**(0.00966)**
Expenditure Sup					**-0.00896**	**-0.00853**	**-0.0143**	**-0.0125**
					(0.0108)	**(0.0106)**	**(0.0106)**	**(0.0106)**
GDP growth	-0.0565***	-0.0558***	-0.0618***	-0.0601***	-0.0560***	-0.0560***	-0.0614***	-0.0597***
	(0.00882)	(0.00866)	(0.00879)	(0.00880)	(0.00868)	(0.00851)	(0.00859)	(0.00862)
Debt	0.00779**	0.00995***	0.00697**	0.00693**	0.00814***	0.00962***	0.00730**	0.00738**
	(0.00320)	(0.00323)	(0.00336)	(0.00334)	(0.00284)	(0.00283)	(0.00291)	(0.00290)
Debt default	0.825***	0.838***	0.840***	0.835***	0.829***	0.829***	0.843***	0.840***
	(0.178)	(0.175)	(0.172)	(0.171)	(0.175)	(0.172)	(0.169)	(0.168)
Expenditure	0.0139	0.0141	0.0103	0.0103				
	(0.01000)	(0.00981)	(0.00975)	(0.00970)				
Inflation		2.205***	1.936**	2.129***		2.183***	1.969***	2.159***
		(0.765)	(0.758)	(0.762)		(0.751)	(0.742)	(0.748)
Reserves/months			-0.0481***	-0.0502***			-0.0479***	-0.0497***
			(0.0176)	(0.0175)			(0.0173)	(0.0172)
FDI Inflows				-0.00888*				-0.00841*
				(0.00510)				(0.00509)
Constant	4.843***	4.370***	5.221***	5.289***	4.712***	4.516***	5.106***	5.132***
	(0.696)	(0.703)	(0.758)	(0.755)	(0.365)	(0.365)	(0.417)	(0.416)
Number of thresholds	1	1	1	1	1	1	1	1

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Threshold estimator (Th-1, level 99)			Single Threshold effect test		
Variable	**Threshold**	Lower	Upper	Fstat	**Prob**	Crit1
Net current spending	**0.6503**	0.6055	0.6669	27.04	0.000	25.03
Total expenditure	**0.6503**	0.6055	0.6669	28.33	0.000	22.44





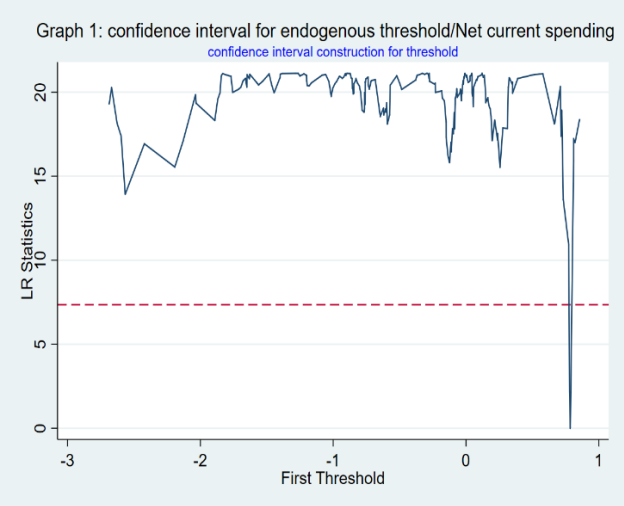
[25] Quality=(control of corruption + government effectiveness + political stability)/3

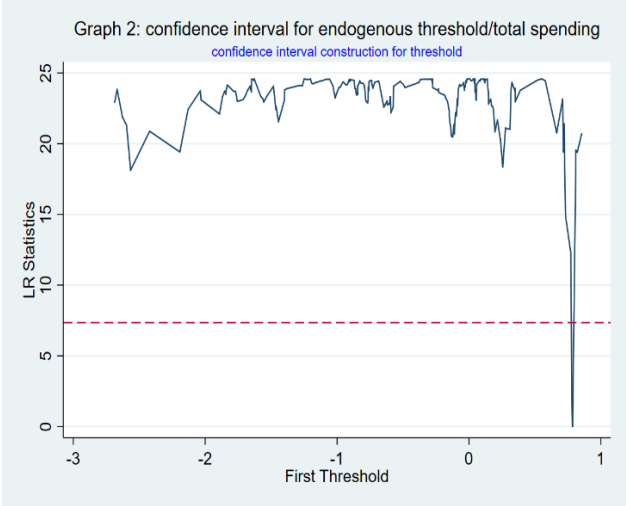
Table 3: Political stability is the threshold variable

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Political stability	**-0.475*** **	**-0.416*** **	**-0.377*** **	**-0.345*** **				
	(0.113)	**(0.113)**	**(0.113)**	**(0.110)**				
Net Current Inf	**0.00167**	**0.00503**	**0.00180**	**0.000177**				
	(0.00771)	**(0.00770)**	**(0.00768)**	**(0.00751)**				
Net Current Sup	**-0.00731**	**-0.00379**	**-0.00788**	**-0.0102**				
	(0.00822)	**(0.00819)**	**(0.00822)**	**(0.00805)**				
Political stability					**-0.476*** **	**-0.424*** **	**-0.379*** **	**-0.345*** **
					(0.112)	**(0.112)**	**(0.111)**	**(0.109)**
Expenditure Inf					**0.0149**	**0.0153**	**0.0110**	**0.0112**
					(0.0105)	**(0.0104)**	**(0.0103)**	**(0.0101)**
Expenditure Sup					**-0.00339**	**-0.00282**	**-0.00866**	**-0.00976**
					(0.0113)	**(0.0112)**	**(0.0112)**	**(0.0109)**
GDP growth	-0.0628***	-0.0621***	-0.0679***	-0.0638***	-0.0627***	-0.0627***	-0.0678***	-0.0633***
	(0.00924)	(0.00910)	(0.00924)	(0.00910)	(0.00906)	(0.00893)	(0.00900)	(0.00887)
Debt	0.0105***	0.0127***	0.00969***	0.00876**	0.0101***	0.0116***	0.00921***	0.00864***
	(0.00336)	(0.00341)	(0.00356)	(0.00348)	(0.00299)	(0.00301)	(0.00309)	(0.00301)
Debt default	0.827***	0.842***	0.844***	0.838***	0.821***	0.822***	0.837***	0.838***
	(0.190)	(0.187)	(0.184)	(0.179)	(0.186)	(0.183)	(0.180)	(0.176)
Expenditure	0.0144	0.0145	0.0105	0.0108				
	(0.0106)	(0.0105)	(0.0104)	(0.0102)				
Inflation		2.199***	1.937**	2.295***		2.100**	1.891**	2.283***
		(0.822)	(0.816)	(0.803)		(0.807)	(0.798)	(0.787)
Reserves/months			-0.0488**	-0.0557***			-0.0495***	-0.0558***
			(0.0188)	(0.0184)			(0.0184)	(0.0180)
FDI Inflows				-0.0172***				-0.0174***
				(0.00524)				(0.00519)
Constant	4.582***	4.113***	4.978***	5.232***	4.709***	4.523***	5.127***	5.239***
	(0.738)	(0.747)	(0.808)	(0.792)	(0.387)	(0.388)	(0.443)	(0.433)
Number of thresholds	1	1	1	1	1	1	1	1

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Threshold estimator (Th-1, level 99)			Single Threshold effect test		
Variable	**Threshold**	Lower	Upper	Fstat	**Prob**	Crit1
Net current spending	**0.7854**	0.7763	0.8100	20.61	0.0067	17.3001
Total expenditure	**0.7854**	0.7763	0.8100	26.95	0.000	19.2915





APPENDIX A11. PANEL SMOOTH TRANSITION REGRESSION (PSTR) METHOD

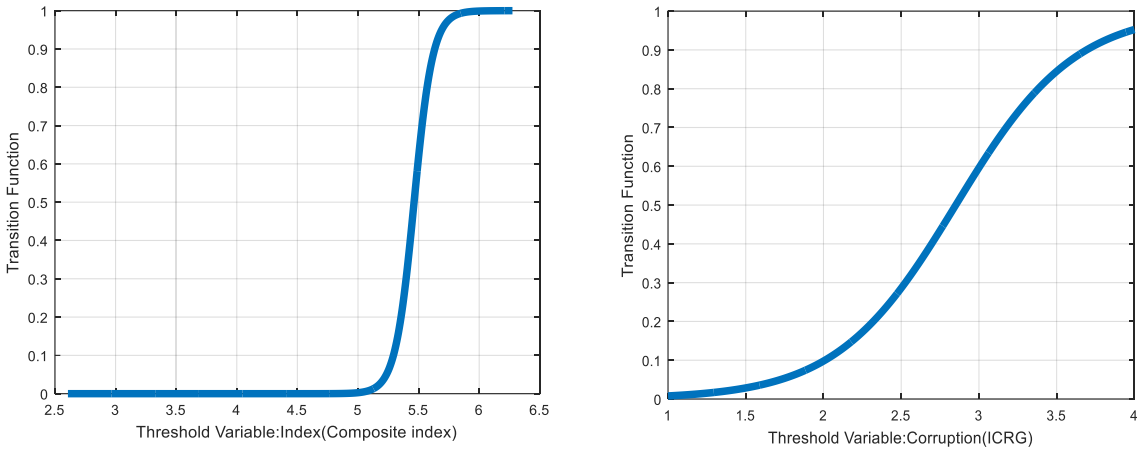


Figure 1: Transition functions

Table: Estimation of parameters for PSTR model [26]

	Net Current spending	Total expenditure
Parameter α_1	0.0153**	0.0681***
Parameter α_2	-0.0009	-0.1536***
Parameter c	5.5687	2.8508
Parameter γ	24.6383	2.6105

Coefficients of control variables:

	Each regime of Net current spending		Each regime of total expenditure	
Variable	Regime 1	Regime 2	Regime 1	Regime 2
GDP growth	-0.0539***	-0.0696***	-0.0482***	-0.0766
Inflation	2.8475***	2.6944	2.9424**	-0.8833
Reserves/months	-0.0770***	0.0190	-0.0857***	0.0363
Debt	0.0051	0.0166**	-0.0025	0.0837***
FDI inflows	-0.0632***	0.0521**	-0.0362**	0.0484**
Debt default	0.4664**	1.0156**	0.0483	2.7950***
Terms of Trade	0.0006	-0.0073	-0.0037	0.0098
LMF tests	2.284[0.023]	2.284[0.023]	4.867[0.000]	4.867[0.000]
LRT Tests	20.198[0.000]	20.198[0.000]	41.016[0.000]	41.016[0.000]
Observations	220	220	220	220

	Net Current spending		Total expenditure	
t-statistics	Regime 1	Regime 2	Regime 1	Regime 2
GDP growth	-6.4109	-3.3054	-4.1478	-1.5716
Inflation	3.2300	1.4923	2.9698	-0.1395
Reserves/months	-4.7461	0.6466	-4.4541	0.6324
debt	1.1352	2.8443	-0.5848	5.5335
FDI inflows	-3.7183	2.8865	-3.0260	1.9653
Debt default	2.6564	2.5559	0.1431	3.5270
Terms of Trade	0.3109	-1.7678	-1.6739	1.5933
Net Current spending	2.3775	-0.1450	5.0861	-4.9801

[26] The threshold variable for current expenditure is a composite index of governance quality while total expenditure varies depending on ICRG index of corruption.

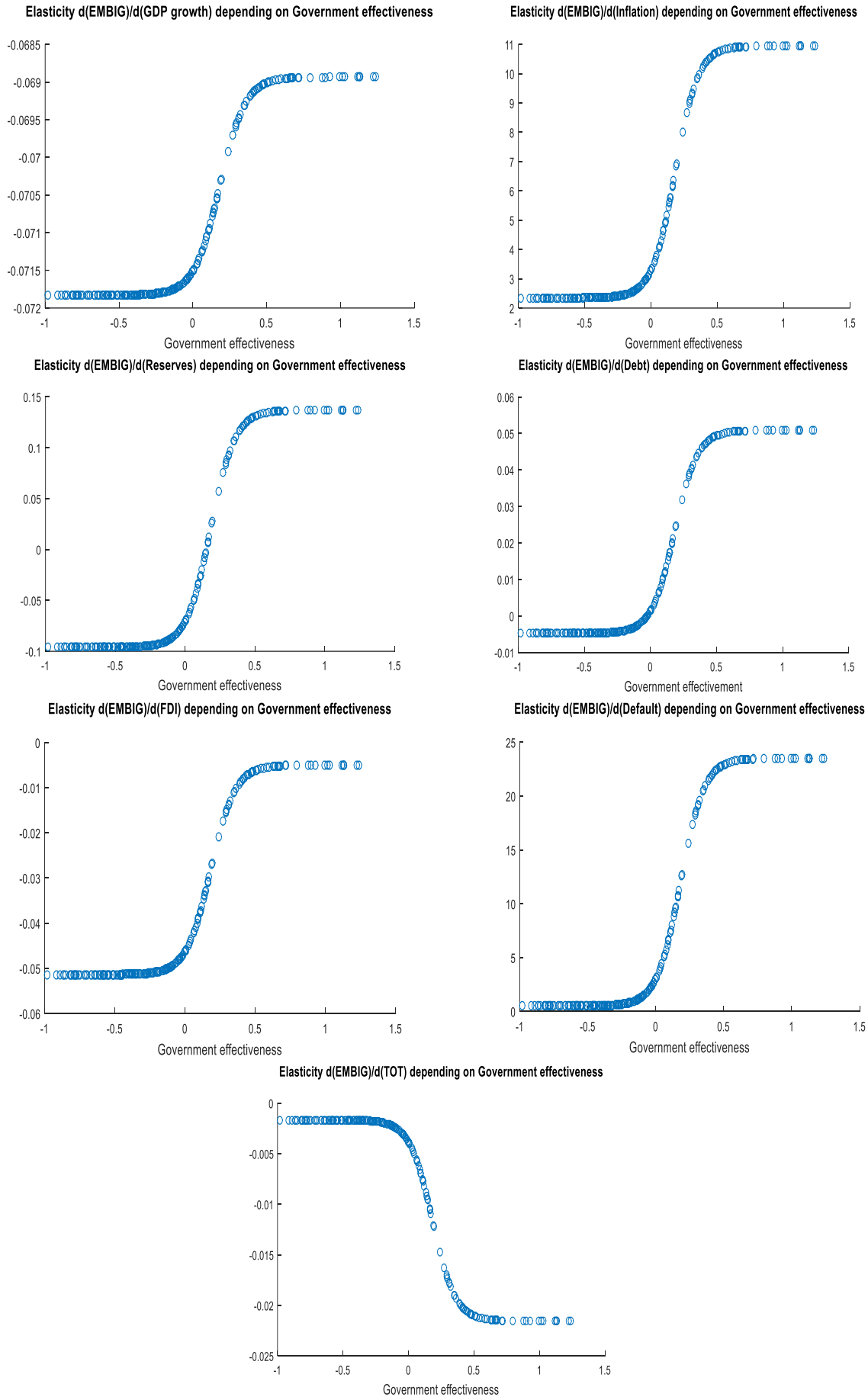


Figure 2: Elasticity of bond spreads in relation to control variables and government effectiveness

Chapter 2

Can fiscal rules improve financial market access for developing countries?

A slightly different version of this chapter is accepted for publication in *Journal of Macroeconomics.*

"It is difficult to judge the counterfactual to fiscal rules. Since, in principle, the same results could have obtained with the implementation of sensible discretionary policy, the question that must be explored is why the latter occurred in so few cases."

Kopits and Symansky (1998, p. 17)

I. Introduction

Fiscal policy is an important instrument which Developing Countries (DCs) can utilize to accelerate their development process by reducing inequalities (Azzimonti et al., 2014; Larch and Turrini, 2010; Milasi, 2013), improving economic growth (Stiglitz, 2015; Summers, 2014), and improving well-being (Bom and Ligthart, 2014; Ganelli and Tervala, 2016). To be more effective in addressing these development challenges, any fiscal policy must be sound (Dabla-Norris et al., 2010; Hameed, 2005; Prakash and Cabezon, 2008, etc.). Mastering debt and sound public finances are key factors in mobilizing financial resources in developing countries (Reinhart et al., 2003; Reinhart and Rogoff, 2010, etc.).

The role of fiscal rules in improving fiscal outcomes has been stressed in the literature (Corbacho and Schwartz, 2007; Debrun et al., 2008; Debrun and Kumar, 2007; Deroose et al., 2006; Guerguil et al., 2017; Kopits, 2004; Schaechter et al., 2012; Tapsoba, 2012). However, few studies have shed light on the link between fiscal rules and financial market access in DCs: examples include (Afonso and Jalles, 2013), and (Thornton and Vasilakis, 2017) who investigate the effects of fiscal rules on risk premiums in a mixed sample of advanced and developing countries. The effects of fiscal rules might be different depending on the type of economy. The originality of our paper is that it extends the literature by exploring both the heterogeneity and the interactive effects of various types of fiscal rules on financial market access in developing countries. It then shows the differences between balanced budget rules, debt rules, expenditure rules, and shows their interactions. It also tackles the self-selection problem by using an effective empirical methodology, namely entropy balancing, and alternative matching.

We consider two measures of financial market access in this paper - sovereign bond spread and sovereign debt rating. Sovereign debt rating is an assessment of credit risk i.e. the possibility that the debtor will not fulfil its obligations in full and on time (Ferrucci, 2003). For sovereign debt the risk of default depends on the fundamental characteristics of the issuer, and the ability of the lender to enforce the contract. Bond spread reflects market risk (the possibility that secondary market bond prices may move against the bondholder), and liquidity risk (the risk that investors will not be able to liquidate their portfolios without depressing secondary market prices). The proponents of the efficient market hypothesis argue that investors are rational and able to exploit all the available information to discriminate among borrowers. (Edwards, 1984) highlights that asset prices always reflect the information publicly available, as evidenced by the yield differential on bonds issued by sovereign borrowers with different credit ratings and macroeconomic characteristics. If the efficient market hypothesis holds,

investors and rating agencies share the same interpretation of the body of public information pertaining to sovereign risks (Cantor and Packer, 1996). However, the opponents of this hypothesis emphasize that market failures and imperfect information lead to distortions in asset pricing (Calvo and Mendoza, 1996; Chari and Kehoe, 1997).

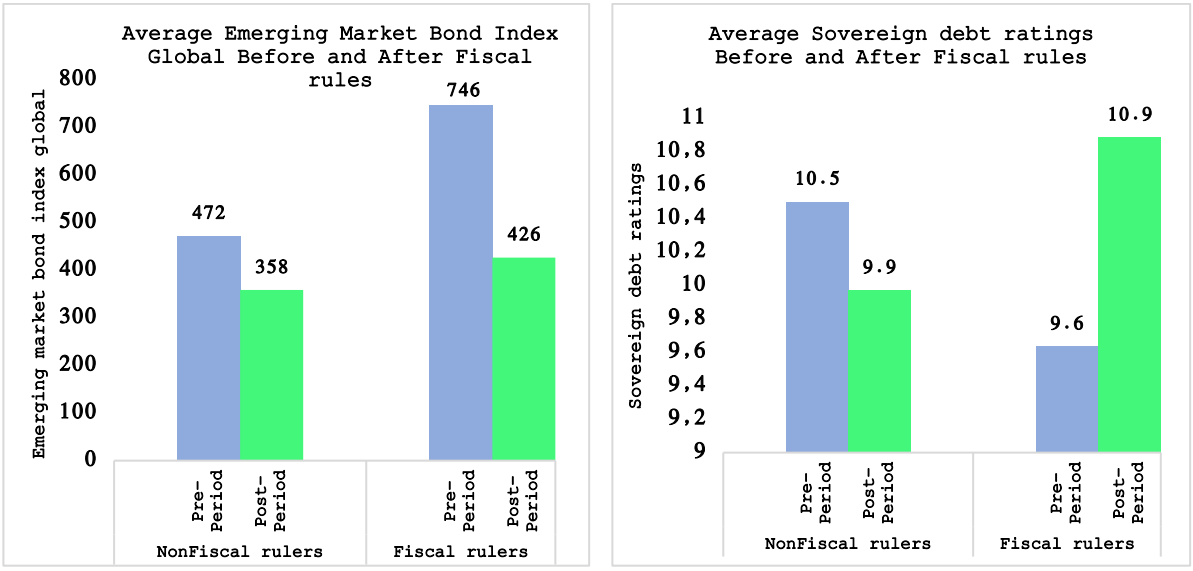


Figure 1: Emerging market bond spreads and sovereign debt rating before and after fiscal rules adoption

Better financial market access leads to lower bond spreads and higher sovereign debt rating.

Figure 1 illustrates the change in the average bond spreads and debt ratings, for countries which have adopted FR compared to Non-FR[27] countries. The evidence is clear, adopting fiscal rules is associated with lower bond spreads and higher debt rating in developing countries.

Our estimates for a panel of 36 emerging markets economies for the period 1993 to 2014 show that the adoption of FR matters for financial market access in DCs. Indeed, countries which have implemented FR show a lower sovereign bond spread and a higher sovereign debt rating. Regarding the types of fiscal rules, we find that Budget Balanced rules (BBR) and Debt Rules (DR) significantly improve financial market access, but Expenditures Rules (ER) worsen this access. We explain this negative effect of the expenditure rule by the fact that ER may constrain government expenditure (Dahan and Strawczynski, 2013; Tapsoba, 2012), including spending that may contribute to reduce bond spreads by improving economic growth. These results are robust to a wide set of alternative specifications of the entropy balancing method, and the alternative matching method.

[27] The cut-off date for Non-FR countries is defined as the mid-year period between the first time that a country adopts a fiscal rule (1993 in our case) and the last sample year (2014) (see Minea and Tapsoba, 2014; Mishkin and Schmidt-Hebbel, 2007). 2003 is the date which separates the pre- and post-fiscal rule periods in the group of Non-FR countries. The cut-off dates for FR countries are the year of adoption of FR.

Our findings suggest that DCs could improve their financial market access by adopting fiscal rules. More specifically they should give more importance to BBR and DR because they are valued by financial markets in terms of lower bond spreads and higher debt rating.

The remainder of the paper is structured as followed. Section 2 discusses the related literature. Section 3 describes the data, provides some stylized facts and details the underlying method. Section 4 summarizes the main econometric results. Section 5 explores their sensitivity. Section 6 concludes with some policy recommendations.

II. Related literature

A fiscal policy rule is a permanent constraint on fiscal policy, expressed as a summary indicator of fiscal performance – for example government budget deficit, borrowing, debt, or a major component thereof (Kopits and Symansky, 1998). (Kopits and Symansky, 1998) identify various rationales for the adoption of fiscal policy rules. Fiscal rules aim to (i) foster macroeconomic stability, (ii) support other financial policies, (iii) maintain fiscal sustainability, (iv) avoid negative spillovers within a currency union[28], (v) ensure the credibility of government policies over time.

(Schaechter et al., 2012) put the emphasis on fiscal responsibility and debt sustainability by arguing that rules aim to correct distorted incentives and control pressures to overspend in good times. Short-term focused governments (Rogoff, 1987) run large budgetary deficits. Also, as noted by (Debrun and Kumar, 2007), the "common pool problem[29]" also leads to large deficits. Overspending in good times could result from a "voracity effect" (Tornell and Lane, 1999) and undermine countercyclical fiscal policy. In currency unions, (Kumar et al., 2009) state that supranational rules are aimed at internalizing the regional costs of fiscal indiscipline and establish a framework for better coordination of the monetary/fiscal policy mix. Moreover, the political economy insight is that political decision-makers' focus on re-election thereby potentially undermining fiscal discipline to the detriment of future generations (Beetsma and Debrun, 2004; Ribeiro and Beetsma, 2008), and the negative impact on growth of fiscal burden (Panizza and Presbitero, 2014) could increase deficits and hamper fiscal responsibility. The proliferation of FR is due to the fact that rising public debt ratios since the 1970s cannot go on indefinitely without raising concerns about the government's capacity to face its obligations in full (i.e. government solvency). From the point of view of (Eyraud et al., 2018), fiscal rules can help to improve the government's fiscal credibility in three possible ways: (i) by tying

[28] See also (Antonakakis and Vergos, 2013) for more evidence.
[29] Since special interest groups or "constituencies" do not internalize the overall budgetary impact of their competing demands.

politicians' hands, (ii) by signaling an intrinsic commitment to fiscal responsibility, (iii) by crystallizing political consensus on a specific standard of fiscal responsibility across political parties. Successful rules reassure economic agents, reduce borrowing costs for policymakers, and provide resources to buffer the economy against shocks or to finance policies which promote long-term growth. Capping government deficits, debts, or expenditure is viewed as a way to deter fiscal profligacy (Eyraud et al., 2018). Fiscal rules aim to obligate the government to be cautious about its finance and prevent policy mistakes that could jeopardize solvency. (Hausmann, 2004) observes that emerging market economies would benefit from fiscal rules that aim not only to eliminate deficits and reduce debt ratios, but also, more importantly, to contain risk in the composition of the debt.

Like in the most comprehensive previous analyses (Debrun et al., 2008; Debrun and Kumar, 2007; Deroose et al., 2006; Schaechter et al., 2012; etc.), we focus in this paper on national fiscal rules. The rationale of this choice is the limited changes in supranational rules over the last two decades, and the bigger role played by national rules. What are the macroeconomic effects of adopting fiscal rules? According to (Kopits and Symansky, 1998), the economic effects of fiscal policy rules are multiple. They influence the level and composition of government expenditure and taxation, inflation, external debt, and economic growth. There is much empirical literature which finds a positive effect of FR on fiscal outcomes, economic growth, and lower interest rates (Afonso and Jalles, 2013; Badinger and Reuter, 2017; Bayoumi et al., 1995; Caselli et al., 2018; Dahan and Strawczynski, 2013; Eyraud et al., 2018; Fabrizio and Mody, 2006; Fatás and Mihov, 2006; Feld et al., 2017; Hallerberg et al., 2009; Heinemann et al., 2018; Iara and Wolff, 2014; Johnson and Kriz, 2005; Kopits, 2004; Kumar et al., 2009; Kydland and Prescott, 1977; Neyapti, 2013; Perry, 2004; Poterba and Rueben, 1999; Tapsoba, 2012; Thornton and Vasilakis, 2017; etc.). For instance, (Badinger and Reuter, 2017) provide evidence that stringent fiscal rules enhance fiscal policy outcomes in terms of lower deficits, lower interest rate and lower output volatility. In the same vein, (Debrun et al., 2008) study the effect of fiscal rules on fiscal policy outcomes (overall and cyclically adjusted primary fiscal balance, and debt level). They use the lagged fiscal rule index and a dummy for the type of fiscal governance (centralized vs. decentralized) as instruments for fiscal rules. They find that FRs significantly increase fiscal performance, and this effect is the same for the least squares and instrumental variable estimates. (Perry, 2004) argues that Latin American economies, which are subject to high macroeconomic volatility, often aggravated by the procyclical stance adopted under various fiscal adjustment programs, ought to follow a rule

that incorporates a countercyclical stance through a structural balance target or a stabilization fund.

The positive effect of FRs on fiscal performance need to be interpreted with some caution since it could reflect the effect of omitted variables (Schaechter et al., 2012). The political commitment to fiscal discipline is a potential omitted variable in the sense that it would trigger both the adoption of fiscal policy rules and better fiscal performance.

In addition, strict application of fiscal rules may be counter-productive in cases where economic policy measures may improve the fiscal stance in the long-term, the short-term fiscal burden notwithstanding. This applies particularly to two instances: First, public investment may stimulate growth and thus improve debt-to-GDP, while giving rise to numerous issues, such as nature, size, and crowding-out (Mourougane et al., 2016). Second, structural reforms are widely claimed to be necessary in order to foster growth (Fiori et al., 2012; Griffith et al., 2007; Griffith and Harisson, 2004), but less attention has been given to the fiscal implications of structural reforms. The reputational cost of breaching rules matters more than the threat of illusory financial sanctions (Eyraud et al., 2018) because: (i) sanctions exacerbate the financial difficulties of already distressed governments, limiting the appropriateness of such sanctions and their credibility in bad times; (ii) markets would be expected to reward, with lower yields, the ability of rules to shape both current and future fiscal behavior (e.g. by the activation of formal enforcement procedures). (Milesi-Ferretti, 2004) investigates the issue of whether fiscal rules lead to genuine fiscal adjustments or simply encourage the use of "creative accounting" (that is to say that compliance with a fiscal rule is just an illusion). To do so, he develops a model in which fiscal rules are imposed on "measured" fiscal variables, which can differ from "true" variables. He finds that rules which are imposed when the budget is not transparent lead to more creative accounting and less fiscal adjustment. Furthermore, fiscal rules may impose severe constraints on governments willing to undertake structural reforms with associated up-front costs. (Beetsma and Debrun, 2004) analyze the trade-off between short-term stabilization and long-term growth in the context of the Euro area's Stability and Growth Pact. They find that sometimes fiscal rules may need to be relaxed for countries which are actively pursuing much-needed structural reforms. In the same vein, (Sajedi and Steinbach, 2019) quantify the short-term costs and long-term fiscal benefits of reforms and find that short-term output losses are alleviated by long-term output gains. They suggest a good design and interpretation of legal fiscal regimes which account for the interdependency between fiscal policy and structural reforms are necessary. Indeed, they argue that institutional arrangements should accept that

enforcement of fiscal adherence should not be pursued as a short-term objective *per se,* but rather incorporate the positive long-term fiscal effects associated with sound structural policies.

The role of compliance has been the subject of many studies. (Schaechter et al., 2012) stress that poor fiscal outcomes can co-exist with the presence of fiscal rules if the rules are not soundly implemented. (Drazen, 2004) examines how properly designed fiscal rules can be a useful means for building reputation and can serve as a disciplining device, if they are accompanied by various procedural rules, including those which prevent creative accounting practices. (Schick, 2004) emphasizes the critical role of political will in the success of any fiscal rule, when supported by appropriate procedural rules. He notes that the literature on fiscal institutions and budgetary processes ignores political will and fails to distinguish between formal rules and informal practices.

III. Data and methodology

1. Data

We use a panel of 36 emerging market economies which are part of the JP Morgan Emerging Markets Bond Index Global. Our study, dictated by data availability, covers the period 1993-2014. The dependent variables in this study comprise bond spreads and sovereign debt rating[30]. Bond spread data are derived from DataStream, and sovereign debt ratings are derived from (Kose et al., 2017). The data on control variables originate from the World Bank's World Development Indicators, (Chinn and Ito, 2006), (Reinhart and Rogoff, 2008), (Ilzetzki et al., 2017), (Dreher et al., 2010, 2008), (Batini et al., 2006), (Balima et al., 2017a), (Roger, 2009), (Rose, 2007), (Minea and Tapsoba, 2014), (Sturm and De Haan, 2001) and (Debrun et al., 2017).

Our treatment variable is a dummy which is set to 1 if a country has adopted a fiscal rule, and 0 otherwise, as per (Schaechter et al., 2012). Our sample has 232 country-year observations with fiscal rules in place (units of analysis or treated units) and 560 country-year observations without fiscal rules in place (units of control). The potential Non-FR control group is 2 times larger than the FR treatment group, which allows us to obtain a weighted control group for our treatment group.

[30] This variable is an annual average of foreign currency long-term sovereign debt ratings by the three most important agencies-Standards and Poor's, Moody's and Fitch Ratings, which are available in Bloomberg on a daily basis (Kose et al., 2017). These ratings are converted to a numerical scaled index. Higher value of the index indicates better rating.

Drawing on the extensive literature about the adoption of fiscal rules and the determinants of bond spreads (Akitoby and Stratmann, 2008; Badinger and Reuter, 2017; Baldacci et al., 2008; Balima et al., 2017a; Bayoumi et al., 1995; Bellas et al., 2010; Edwards, 1984; Eichengreen and Mody, 1998; Eichler, 2014; Feld et al., 2017; Heinemann et al., 2018; Iara and Wolff, 2014; Johnson and Kriz, 2005; Kopits and Symansky, 1998; Kumar et al., 2009; Min, 1998; Poterba and Rueben, 1999; Tapsoba, 2012; etc.) we utilize a group of matching variables which capture factors that influence simultaneously the probability of adopting fiscal rule and bond spreads:

(i) Growth rate of gross domestic product - which controls the economic cycle and monetary conditions. This variable is assumed to have a negative effect on spreads. Indeed, economies with high GDP growth rate can more easily repay their borrowing than countries with low GDP growth rate.

(ii) Inflation rate - which is the basic indicator of macroeconomic stability. It positively affects spreads, because for example, monetary financing of the budget deficit can lead to high levels of inflation, which increases the cost of capital (equipment, etc.).

(iii) Ratio of debt to gross domestic product. It is recognized that as debt ratio increases, all other things being equal, the risk of default and therefore the spreads increase. This can be explained by the fact that a country which is heavily indebted will spend more money on debt service payments[31].

(iv) Payment defaults. This is a dummy variable which is given the value of 1 if a country has failed or restructured its debt (which disadvantages investors) in a given year, and 0 otherwise. According to (Reinhart et al., 2003) a country may be the victim of "debt intolerance[32]" when it defaults on its debt at least once in its history (i.e. a serial defaulter). The lack of payment further weakens its institutions (budgetary and financial institutions) and makes them less able to cope with possible debt problems and future defaults. A country can sustainably emerge from debt intolerance if it reduces both its public and external (public and private) debt (Reinhart and Rogoff, 2008). Defaulting countries are penalized in financial markets by high spreads.

(v) Total of currency reserves expressed as months of imports. This variable is a good indicator of short-term distress for developing economies (Cantor and Packer, 1996). For

[31] Debt service is the total government expenditure on debt repayment (principal + interest), often expressed as a percentage of GDP.

[32] Debt intolerance is the inability of emerging markets to manage levels of external debt that would be manageable for developed countries under the same circumstances (Reinhart et al., 2003).

instance, it is used by the IMF as an appropriate indicator for reserve needs for countries with limited access to capital markets. This variable is expected to negatively affect bond spreads. It measures the country's ability to repay foreign debt denominated in foreign currencies. The higher the ratio of reserves in months of imports is, the lower are bond spreads, *ceteris paribus*.

(vi) FDI net inflows as share of GDP - which measures the capacity of a given country to attract foreign investors. Theoretically, this variable negatively affects sovereign spreads insofar as private investment helps to improve macroeconomic indicators such as employment, growth, and to some extent balance of payments.

(vii) Political risk - which captures governance quality. It is a composite measure of the quality of governance, and is a simple average of ICRG political variables (Arezki et al., 2016). A good score for this variable is assumed to reduce sovereign bond spreads, because sound institutions reinforce investors' confidence in a country.

(viii) Capital openness - which captures the degree of financial openness. The expected effect of this variable is ambiguous. Increased openness could favor market access if it heightens economic growth (Chinn and Ito, 2006). On the contrary, capital openness, by increasing income inequality (Furceri and Loungani, 2018), could reduce financial market access for developing countries. Moreover, capital account openness could make developing countries more shock-prone.

(ix) Migrant remittances - following the recent literature on the determinants of bond spreads (Balima and Combes, 2019), we expect this variable to reduce bond spreads given that it plays an important role in overcoming poverty and improving standards of living in developing countries.

(x) Overall fiscal balance - which is the difference between general government revenue (including grants) and expenditure, as a percentage of GDP. It is expected to reduce bonds spreads when financial markets reward the ability of government to meet its announced fiscal targets.

(xi) Political elections - which captures the electoral cycle. This variable is expected to increase bond spreads in accordance with the literature on political budget cycles (Alesina and Tabellini, 1990; Franzese, 2000; Shi and Svensson, 2006).

(xii) IMF-supported program - which includes a mix of stabilization and structural reform measures aimed at restoring a sustainable balance between aggregate demand and supply, while simultaneously expanding the production of tradables (Wong et al., 2002). This variable is expected to increase bond spreads since these programs are introduced in distressed countries.

(xiii) Fixed exchange rate regime – which could promote trade openness and foster trade integration (Frankel and Rose, 2002). We expect this variable to reduce bond spreads in developing countries.

Tables A1, A2, and A3 in the appendix summarize the different variables used in this paper and lists all the countries studied.

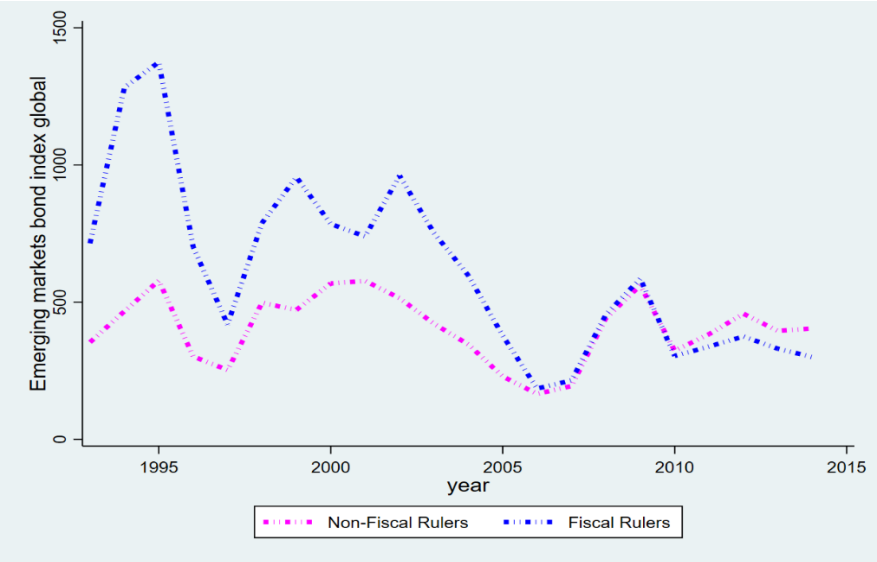


Figure 2 : Changes in bond spreads for FR and Non-FR groups (1993-2014)

Figure 3 : Changes in debt rating for FR and Non-FR groups (1993-2014)

Figure 2 and Figure 3 show the change in bond spreads and debt rating both in our FR and Non-FR groups[33]. A downward trend of bond spreads (upward trend of debt rating) is observed in the FR group over the sample period. A close look at Figure 2 clearly shows that countries with fiscal rules in place faced high bond spreads until 2006. Bond spreads are similar for both groups between 2006 and 2010. However, Fiscal rule countries have a lower bond

[33] The econometric analysis does not show a significant difference between FR and Non-FR for the period 1997-2006.

spreads than Non-fiscal rule countries from 2010 onwards. Indeed, fiscal rule adoption could have a negative effect (positive effect) on bond spreads (sovereign debt rating).

The introduction of fiscal rules has increased since 2000. The number of fiscal rule countries increased by 15 between 2000 and 2010. In our sample, budget balanced rules are more widespread, followed by debt rules and expenditures rules (Figure 4).

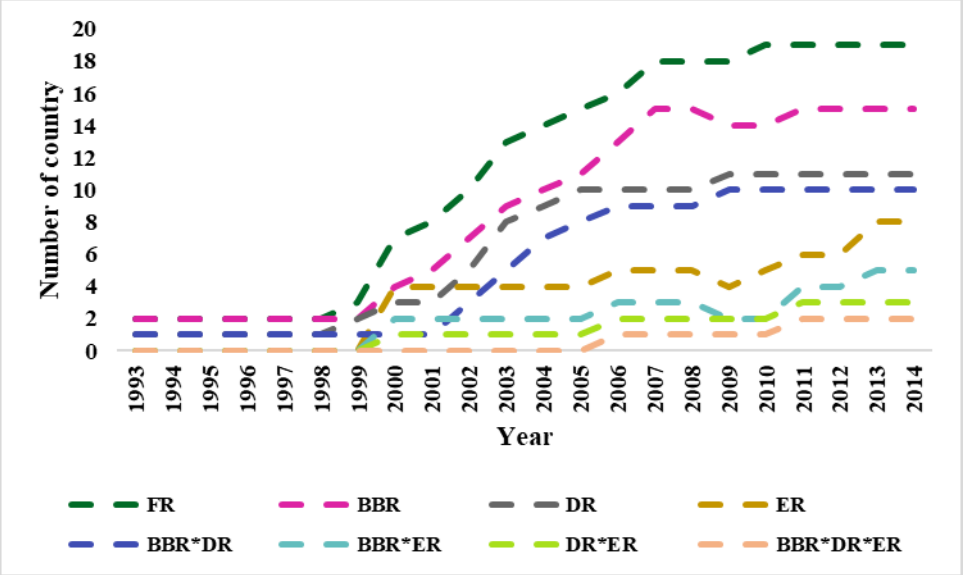


Figure 4 : number of fiscal ruler countries by year

2. Underlying method

Our objective is to analyze whether the adoption of fiscal rules improves financial market access in developing countries. Financial market access is accounted for in this paper by two alternative variables: sovereign bond spreads and sovereign debt rating.

The main challenge in our empirical investigation is to determine a causal relationship between the adoption of FR and the conditions by which developing countries access financial market. The motives for which DCs implement FR (i.e. fiscal profligacy, political risk, lack of liquidity, etc), could be associated with a country's macroeconomic conditions and its political situation. We address this existing endogeneity by using a matching approach (because classical linear regressions are not as reliable).

In our analysis, countries which have adopted FR (fiscal rule countries hereafter) are the treated group. The units of analysis are country-year observations, observations with FR in place constitute the treatment group while observations without FR represent the control group. The average treatment effect on the treated (ATT) is given by:

$$ATT = E[(Y_{i1} - Y_{i0}) \mid FR=1] = E[Y_{i1} \mid FR=1] - E[Y_{i0} \mid FR=1] \qquad Equation\ (1)$$

where FR is the FR dummy variable in country ***i***, Y_{i1} is the value of spreads (debt rating) when country ***i*** has Non-FR and Y_{i0} if it adopt FR, $Y_{i0}|FR=1$ is the spreads (debt rating) value that would have been observed if a Non-FR country had adopted FR and, $Y_{i1}|FR=1$ the spreads (debt rating) actually observed for the same Non-FR country.

Equation (1) means that the comparison between spreads (debt rating) observed in Non-FR countries and spreads (debt rating) observed in the same countries if they had adopted FR would give us an unbiased estimate of the ATT. However, the main difficulty here is that this second term on the right side of this equation is unobservable. We cannot observe spreads or debt rating of a Non-FR country had it adopted FR.

With a random choice of Non-FR, we can simply compare the sample mean of the Non-FR countries and that of FR countries to bypass this difficulty. However, the choice of adopting FR may be dictated by some observable factors (political institutions, macroeconomic conditions, etc.) which also determine spreads and debt rating. This can lead to self-selection. Comparing the mean value of spreads and debt rating between the two samples can generate a "selection on observables" problem, biasing linear regression method (Lin and Ye, 2007).

The estimate of the ATT under unconfoundedness[34] (or conditional independence) is defined as follows:

$$ATT=E[Y_{i1} \mid FR=1, X_i] - E[Y_{i0} \mid FR=0, X_i] \qquad \textit{Equation (2)}$$

where $E[Y_{i0} \mid FR=1, X_i]$ is replaced by $E[Y_{i0} \mid FR=0, X_i]$

Following the recent literature on impact evaluation, we use entropy balancing which was originated by (Hainmueller, 2012) and implemented by (Neuenkirch and Neumeier, 2016) and (Balima, 2017). Entropy balancing consists of two principal steps. The first step requires computation of weights which are assigned to the control units (in this case Non-fiscal rule countries). In the second step, the weights obtained in the first step are used in a regression analysis with the treatment variable (Fiscal rule countries) as explanatory variable[35]. We then balance Fiscal rule countries and Non-fiscal rule countries based on observable characteristics. Thus, the average difference in bond spreads and debt ratings between fiscal rule countries and the "closest" Non-fiscal rule countries should be explained by the adoption of rules.

Entropy balancing has several advantages over other treatment effect estimators because it combines matching and regression analysis. It outperforms the classical regression-based

[34] Unconfoundedness implies that all factors that influence the treatment and the outcome have to be observed by the researcher (Caliendo and Kopeinig, 2008).

[35] It is also possible to include additional control variables used to compute the weights in the first step. As indicated by (Hainmueller, 2012) and (Neuenkirch and Neumeier, 2016), this is similar to including control variables in a randomized experiment and increases estimation efficiency.

approach and matching on the propensity scores methods given that it is non-parametric (there are no concerns regarding mis-specification of the functional form of the model which could bias the results). It also rules out multicollinearity issues as the reweighting mechanism makes the treatment variable orthogonal with respect to the covariates.

In sum, entropy balancing is more effective than other matching methods in balancing the covariate between the treatment group and the control group. For example, in propensity score matching methods, the control group is comprised only of a subset of the units that are not subject to treatment[36] (Diamond and Sekhon, 2013; Hainmueller, 2012; Neuenkirch and Neumeier, 2016). Each untreated unit either receives a weight equal to 0 if it does not represent a best match for a treated unit, or equal to 1 if it represents a best match for one treated unit (Neuenkirch and Neumeier, 2016)[37]. Thus, low covariate balance could bias the treatment effects estimates. However, in the case of entropy balancing, the vector of weights assigned to the units not exposed to treatment can contain any nonnegative values. In this later situation, the constructed control group adequately reflects the treated group[38].

In sum, entropy balancing addresses the panel structure of our data by combining a reweighting scheme with a regression analysis (Neuenkirch and Neumeier, 2016). It is also possible to control for both country- and time-fixed effects in the regression analysis[39]. Including country-fixed effects helps to account for potential unobserved heterogeneity across Non-fiscal rule countries and fiscal rule countries. Fiscal rule countries and Non-fiscal rule countries may differ (beyond the set of factors used to balance them) in terms of their specific structural characteristics. The inclusion of country-fixed effects allows the accounting for of country-specific time-invariant factors that explain differences in terms of financial market access in developing countries.

IV. Empirical results

1. Results

In Table 1, we show the sample means of all matching variables both for FR (column 1) and

[36] For example, with propensity score matching (nearest neighbor matching for example), each treated unit is matched with the one untreated unit that is closest in terms of a metric balancing score.
[37] Note that propensity score matching allows for replacement, meaning that an untreated unit can be used multiple times as a match. It then allows for weights equal to any non-negative integer. However, (Caliendo and Kopeinig, 2008) underscore that matching with replacement improves the quality of the matching in terms of covariate balance, but reduce its efficiency given that the number of observations used to estimate the ATT decreases.
[38] Entropy balancing is viewed as a generalization of conventional matching methods (Neuenkirch and Neumeier, 2016). Using Monte Carlo simulations and empirical applications (Hainmueller, 2012), shows that entropy balancing outperforms other matching methods (e.g. propensity score matching, nearest neighbor matching, and genetic matching), in terms of estimation bias and mean square error.
[39] This is the second step of the entropy balancing method.

Non-FR groups (column 2). The differences in means between these groups and the related t-statistics and p-values are shown in column 3.

The figures reveal that times during which fiscal rules are in place differ from times during which there are no fiscal rules in place. This is valid for almost all relevant pretreatment factors. The political situation and macroeconomic conditions are better in countries with fiscal rules in place than in countries without fiscal rules. Fiscal rule countries experience low inflation, low default, high FDI inflows, and high capital account openness.

Given these descriptive statistics it is crucial to select an adequate control group before estimating the treatment effect when we use matching approach. Otherwise, the estimated treatment effect of fiscal rule on financial market access might be biased.

Table 1: Descriptive statistics

	[1]	[2]	[3]=[1] – [2]		
	Non-FR	**FR**	**Difference**	**t_value**	**p_value**
Lag GDP/growth	4.043	4.128	-0.085	-0.25	0.798
Lag Debt	45.638	50.621	-4.984	-2.1	0.035
Lag FDI/inflows	3.212	4.021	-0.808	-2.5	0.013
Lag Inflation	37.529	5.798	31.732	1.9	0.06
Lag Reserves/months	5.058	5.21	-0.154	-0.55	0.594
Lag Capital openness	-.152	0.555	-0.707	-6.65	0.000
Lag Remittances/GDP	4.023	2.481	1.542	4.25	0.000
Political risk	65.141	64.59	0.551	0.8	0.429
Lag Default	.127	0.073	0.054	2.1	0.033
Lag Fiscal balance	-3.33	-1.579	-1.752	-5.1	0.000
Lag IMF program	0.379	0.405	-0.026	-0.7	0.5
Lag Elections	0.146	0.177	-0.031	-1.35	0.173
Lag Fix regime	0.796	0.87	-0.073	-2.4	0.017
No. of Observations	**386**	**216**			

Notes: This Table presents the pre-weighting sample means of the matching covariates for country-year observations where FR where in place (the treatment group) in column [2] and country-year observations where no FR were in place (the potential control group) in column [1]. Column [3] reports the differences in means between treated and control group, and the corresponding t-test statistics and p-values.

In Table 2, we construct a synthetic control group (column 4) and compare the sample means of all matching covariates across the treatment group (column 2) and that synthetic control group. The differences in means between these two groups are statistically insignificant. As a matter of fact, entropy balancing allows to obtain a perfect control group for our treated units.

Table 2: Covariate balancing

	[1]	[2]	[3]=[1] – [2]		
	Non-FR	**FR**	**Difference**	**t_value**	**p_value**
Lag GDP/growth	4.162	4.128	0.034	0.02	0.983
Lag Debt	51.640	50.621	1.019	0.00	1.000
Lag FDI/inflows	3.990	4.021	-0.031	0.01	0.990
Lag Inflation	6.012	5.798	0.214	-0.09	0.927
Lag Reserves/months	5.160	5.21	-0.05	0.02	0.987
Lag Capital openness	0.610	.555	0.055	0.03	0.974
Lag Remittances/GDP	2.529	2.481	0.048	-0.00	0.998
Political risk	64.474	64.59	-0.116	0.01	0.988
Lag Default	0.074	0.073	0.001	-0.01	0.995
Lag Fiscal balance	-1.842	-1.579	-0.263	0.02	0.984
Lag IMF program	0.408	0.405	0.003	-0.02	0.986
Lag Elections	.1797	0.177	0.0027	0.00	0.998
Lag Fix regime	0.898	0.87	0.028	0.01	0.991
No. of Observations	**216**	**216**			

Notes: This Table presents the sample means matching covariates after weighting across the treated group in column [2] and the synthetic control group obtained from entropy balancing in column [4]. Column [5] shows the differences in means, the t-test statistics and the associated p-values.

Based on the synthetic control group from Table 2, we estimate the effect of fiscal rule adoption on financial market access using weighted least square regressions. We use different specifications and report the results in Table 3. In Table 3 the average treatment effect on the FR countries for sovereign bond spreads obtained from various sets of treatment effect estimates are presented. First, we present in columns 1-4 baseline results highlighting the effect of adopting a fiscal rule on bond spread. Second, we add country fixed effect, time fixed effect and country-time fixed effects. In columns 5-8, we include all control variables in our equation. The adoption of fiscal rule significantly reduces sovereign bond spreads. The effect of fiscal rule adoption on financial markets access is favorable since fiscal rule countries show lower bond spreads. When fiscal rule is in place, the bond spread is approx. 270 basis points lower than country-observations without fiscal rule in place (these two groups of countries are similar in terms of pretreatment factors). This effect is statistically significant at 1%, especially when we include control factors.

Table 3 : The effects of fiscal rules on sovereign bond spreads

Log(EMBIG)	[1] Baseline	[2] Adding Country/FE	[3] Adding Time/FE	[4] Adding Country/Time/FE	[5] Adding Controls	[6] Adding Country/FE	[7] Adding Time/FE	[8] Adding Country/Time/FE
FR dummy	-0.261***	-0.446***	-0.128*	-0.120	-0.285***	-0.341***	-0.205***	-0.310***
	(0.0738)	(0.0951)	(0.0683)	(0.0838)	(0.0549)	(0.0894)	(0.0486)	(0.0720)
Lag GDP/growth					-0.0367***	-0.0321***	-0.0246***	-0.0246***
					(0.00795)	(0.00735)	(0.00761)	(0.00641)
Lag Debt					0.00383***	0.00594***	0.00421***	0.00605***
					(0.00112)	(0.00125)	(0.000945)	(0.000976)
Lag FDI/inflows					-0.00538	0.00492	-0.0137***	-0.00473
					(0.00613)	(0.00526)	(0.00523)	(0.00411)
Lag Inflation					0.0319***	0.0190***	0.0221***	0.0114**
					(0.00616)	(0.00645)	(0.00537)	(0.00516)
Lag Reserves/months					-0.0391***	-0.0805***	-0.0336***	-0.0612***
					(0.00784)	(0.0144)	(0.00670)	(0.0120)
Lag Capital/openness					-0.0120	-0.0747**	0.0137	-0.0790***
					(0.0220)	(0.0344)	(0.0184)	(0.0275)
Lag Remittances/GDP					0.00244	-0.108***	0.0125*	-0.0378**
					(0.00867)	(0.0232)	(0.00729)	(0.0187)
Political/risk					-0.0352***	-0.0375***	-0.0359***	-0.0387***
					(0.00374)	(0.00754)	(0.00323)	(0.00623)
Lag Default					0.676***	0.104	1.115***	0.449***
					(0.148)	(0.134)	(0.136)	(0.111)
Lag Fiscal balance					0.0168*	0.0145	0.000276	-0.00348
					(0.00957)	(0.0104)	(0.00845)	(0.00904)
Lag IMF program					0.350***	0.249***	0.268***	0.204***
					(0.0595)	(0.0564)	(0.0516)	(0.0461)
Lag Elections					0.232**	0.148*	0.316***	0.201***
					(0.0974)	(0.0806)	(0.0817)	(0.0618)
Lag Fix regime					0.0711	0.0743	0.138	0.180
					(0.130)	(0.208)	(0.110)	(0.171)
Constant	5.861***	7.302***	6.866***	7.710***	7.964***	9.699***	8.313***	9.875***
	(0.0532)	(0.143)	(1.112)	(0.710)	(0.293)	(0.591)	(0.831)	(0.763)
N	485	485	485	485	485	485	485	485
R2	0.025	0.546	0.281	0.738	0.486	0.723	0.675	0.853

Notes: This Table presents the effect of fiscal rule adoption on sovereign bond spreads obtained by weighted least squares regressions. The treatment variable is fiscal rule dummy. The outcome variable is sovereign bond spread. The control variables include the lagged values of the growth rate of GDP, external debt, FDI inflows, inflation rate, total reserves in months of imports, capital openness, remittances, the history of payment defaults, and political risk. Standard errors are in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

2. Robustness checks

To test the robustness of our results we use (1) an alternative measure of financial market access - sovereign debt rating, (2) an alternative matching method - propensity score matching. First, regarding sovereign debt ratings, the adoption of fiscal rule seems to significantly increase bond ratings (Table 4). For instance, the Average Treated effect on the Treated (ATT) of fiscal rule adoption is up to 1 grade. This effect is highly significant at the 1% level and holds when we add country fixed effects, time fixed effects, both country and time fixed effects and covariates used to balance the two samples of countries. Second, we check the robustness of our results by using various propensity score matching (i.e. nearest neighbor matching, radius matching, local linear regression and kernel matching). As shown in Table 5, the adoption of fiscal rules significantly reduces bond spreads while their effect on sovereign debt ratings is significantly positive. When it comes to the different types of fiscal policy rules, we find that debt rules and balanced budget rules have an added effect on debt ratings and bond spreads while expenditure rules downgrade sovereign ratings in developing countries (Table 4 & 5).

Table 4 : The effects of fiscal rules on sovereign debt ratings

SOVEREIGN RATING	[1] Baseline	[2] Adding Country/FE	[3] Adding Time/FE	[4] Adding Country/Time/FE	[5] Adding Controls	[6] Adding Country/FE	[7] Adding Time/FE	[8] Adding Country/Time/FE
FR dummy	0.906***	0.674***	0.750**	0.119	1.547***	1.003***	1.581***	0.866***
	(0.285)	(0.246)	(0.293)	(0.244)	(0.188)	(0.202)	(0.194)	(0.193)
N	550	550	550	550	550	550	550	550
R2	0.018	0.808	0.071	0.852	0.609	0.907	0.647	0.929
BBR dummy	1.286***	0.961***	0.979***	0.397*	2.064***	1.148***	2.007***	1.009***
	(0.288)	(0.238)	(0.297)	(0.233)	(0.188)	(0.203)	(0.193)	(0.193)
N	550	550	550	550	550	550	550	550
R2	0.035	0.823	0.101	0.864	0.635	0.912	0.685	0.934
DR dummy	1.406***	1.333***	1.443***	0.742***	1.428***	1.437***	1.466***	1.255***
	(0.295)	(0.229)	(0.306)	(0.240)	(0.164)	(0.195)	(0.170)	(0.192)
N	550	550	550	550	550	550	550	550
R2	0.040	0.816	0.099	0.862	0.724	0.914	0.753	0.931
ER dummy	-0.168	-0.402	-1.071***	-0.806***	-0.100	0.178	-0.699***	-0.0626
	(0.300)	(0.254)	(0.282)	(0.226)	(0.201)	(0.166)	(0.203)	(0.152)
N	550	550	550	550	550	550	550	550
R2	0.001	0.785	0.307	0.885	0.572	0.927	0.680	0.955
BBR*DR	2.059***	1.462***	2.223***	0.999***	2.026***	1.478***	2.176***	1.264***
	(0.301)	(0.206)	(0.316)	(0.209)	(0.144)	(0.163)	(0.155)	(0.173)
N	550	550	550	550	550	550	550	550
R2	0.079	0.834	0.208	0.899	0.804	0.931	0.833	0.946
Covariates	**NO**	**NO**	**NO**	**NO**	**YES**	**YES**	**YES**	**YES**
Time FE	**NO**	**NO**	**YES**	**YES**	**NO**	**NO**	**YES**	**YES**
Country FE	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**

Notes: This Table presents the effect of fiscal rule adoption on sovereign debt ratings obtained by weighted least squares regressions (using entropy balancing). The treatment variable is fiscal rule dummy. The outcome variable is sovereign debt rating. The control variables include the lagged values of the growth rate of GDP, external debt, FDI inflows, inflation rate, total reserves in months of imports, capital openness, remittances, the history of payment defaults, and political risk. Standard errors are in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

The positive effect of debt rules and balanced budget rules are consistent with the extensive empirical literature which highlights that fiscal rules improve fiscal outcomes. Better fiscal outcomes reassure financial markets and investors, reducing borrowing costs for developing countries. Regarding the negative effect of expenditure rules on financial market access, a possible explanation is related to the fact that ER may constrain government expenditure (Dahan and Strawczynski, 2013; Tapsoba, 2012), including spending that may contribute to reduce bond spreads by improving economic growth. For instance, developing countries face large developmental needs, health and education infrastructure for example, even in quiet times. The adoption of expenditure rules could limit spending on such infrastructure. The interaction of fiscal rules is highly beneficial in terms of low borrowing costs. Countries that adopt both BBR and DR rules can more easily access financial markets than others (Table 5)[40].

The standardized bias and its associated p-value (see Caliendo and Kopeinig, 2008; Lechner, 2001; Sianesi, 2004 for more details) confirm that the conditional independence assumption holds. Indeed, for this assumption to hold, the p-value associated with the standardized bias should be above the critical value of 10% (Rosenbaum and Rubin, 1985). Our control variables are also relevant in explaining the probability of adopting a fiscal rule given

[40] The interaction between expenditure rules (ER) and other types of rules yields insignificant results. These results are available upon request.

Table 5 : ATT of fiscal rule adoption using propensity score matching[41]

Treatment Variable	1-Nearest Neighbour Matching	2-Nearest Neighbour Matching	3-Nearest Neighbour Matching	Radius Matching r=0.005	Radius Matching r=0.01	Radius Matching r=0.05	Local Linear Regression Matching	Kernel Matching
DEPENDENT VARIABLE: LOG (EMBIG)								
FR Dummy	-0.254**	-0.199*	-0.211**	-0.194	-0.204*	-0.225***	-0.235***	-0.222***
ATT	(0.118)	(0.111)	(0.106)	(0.120)	(0.105)	(0.0797)	(0.0812)	(0.0857)
Observations Treated/Control	501/195/306	501/195/306	501/195/306	501/195/306	501/195/306	501/195/306	501/195/306	501/195/306
Rosenbaum bounds sensitivity	1.6	1.4	1.5	1.3	1.4	1.6	1.6	1.6
Standardized bias	0.07	0.05	0.06	0.06	0.06	0.05	0.07	0.05
Standardized bias (p-value)	0.006	0.20	0.72	0.81	0.71	0.92	0.006	0.93
Pseudo R2	0.05	0.03	0.01	0.02	0.02	0.01	0.05	0.01
BBR Dummy	-0.447***	-0.422***	-0.375***	-0.434***	-0.400***	-0.324***	-0.330***	-0.327***
ATT	(0.134)	(0.125)	(0.115)	(0.129)	(0.119)	(0.0881)	(0.0973)	(0.0958)
Observations Treated/Control	501/154/347	501/154/347	501/154/347	501/154/347	501/154/347	501/154/347	501/154/347	501/154/347
Rosenbaum bounds sensitivity	2.1	2.1	2	2.1	2	2	2	2
Standardized bias	0.09	0.09	0.08	0.07	0.06	0.08	0.09	0.08
Standardized bias (p-value)	0. 33	0.30	0.33	0.78	0.93	0.58	0. 33	0.60
Pseudo R2	0.03	0.03	0.03	0.02	0.01	0.02	0.03	0.02
DR Dummy	-0.488***	-0.371***	-0.305**	-0.245**	-0.216*	-0.251**	-0.258***	-0.243**
ATT	(0.151)	(0.138)	(0.150)	(0.124)	(0.117)	(0.0983)	(0.0975)	(0.0952)
No. of Observations Treated/Control	501/122/379	501/122/379	501/122/379	501/122/379	501/122/379	501/122/379	501/122/379	501/122/379
Rosenbaum bounds sensitivity	1.8	1.8	1.5	1.3	1.2	1.4	1.4	1.4
Standardized bias	0.1	0.06	0.05	0.04	0.03	0.04	0.1	0.04
Standardized bias (p-value)	0.57	0.89	0.97	0.99	0.99	0.99	0.57	0.99
Pseudo R2	0.03	0.02	0.01	0.01	0.006	0.005	0.03	0.006
ER Dummy	0.0951	0.0414	-0.0512	0.0794	0.0471	-0.0665	-0.0803	-0.0633
ATT	(0.179)	(0.159)	(0.158)	(0.192)	(0.159)	(0.128)	(0.124)	(0.130)
Observations Treated/Control	501/76/425	501/76/425	501/76/425	501/76/425	501/76/425	501/76/425	501/76/425	501/76/425
Rosenbaum bounds sensitivity	1	1	1.1	1	1	1.1	1.1	1.1
Standardized bias	0.14	0.09	0.04	0.1	0.07	0.08	0.14	0.07
Standardized bias (p-value)	0.12	0.88	0.98	0.94	0.99	0.98	0.12	0.99
Pseudo R2	0.08	0.03	0.01	0.04	0.01	0.02	0.08	0.01
BBR*DR Dummy	-0.407**	-0.438***	-0.450***	-0.283*	-0.252*	-0.322***	-0.406***	-0.309***
ATT	(0.164)	(0.158)	(0.153)	(0.164)	(0.136)	(0.110)	(0.113)	(0.114)
No. of Observations/ Treated/Control	501/99/402	501/99/402	501/99/402	501/99/402	501/99/402	501/99/402	501/99/402	501/99/402
Rosenbaum bounds sensitivity	1.6	1.7	1.8	1.3	1.3	1.6	1.8	1.5
Standardized bias	0.14	0.12	0.12	0.07	0.06	0.06	0.14	0.06
Standardized bias (p-value)	0. 004	0. 15	0.19	0. 98	0. 97	0. 98	0. 004	0.97
Pseudo R2	0.11	0.06	0.06	0.02	0.02	0.01	0.11	0.01
DEPENDENT VARIABLE: SOVEREIGN DEBT RATINGS								
FR Dummy	0.884*	1.048**	0.927**	0.985**	1.087***	1.022***	1.041***	1.036***
ATT	(0.453)	(0.417)	(0.400)	(0.460)	(0.375)	(0.315)	(0.296)	(0.298)
No. of Observations/Treated/Control	572/214/358	572/214/358	572/214/358	572/214/358	572/214/358	572/214/358	572/214/358	572/214/358
Rosenbaum bounds sensitivity	1.3	1.5	1.4	1.4	1.5	1.6	1.6	1.6
Standardized bias	0.1	0.08	0.08	0.05	0.03	0.06	0.1	0.06
Standardized bias (p-value)	0.011	0.10	0.15	0.92	0.99	0.62	0.011	0.60
Pseudo R2	0.04	0.03	0.03	0.01	0.006	0.01	0.04	0.01
BBR Dummy	1.621***	1.661***	1.670***	1.695***	1.701***	1.354***	1.347***	1.326***
ATT	(0.512)	(0.464)	(0.432)	(0.500)	(0.419)	(0.361)	(0.350)	(0.358)
No. of Observations/ Treated/Control	572/173/399	572/173/399	572/173/399	572/173/399	572/173/399	572/173/399	572/173/399	572/173/399
Rosenbaum bounds sensitivity	1.7	1.8	1.9	1.8	1.9	1.7	1.7	1.7
Standardized bias	0.09	0.09	0.09	0.03	0.04	0.07	0.09	0.08
Standardized bias (p-value)	0.08	0.12	0.12	0.99	0.98	0.43	0.08	0.28
Pseudo R2	0.04	0.04	0.04	0.01	0.01	0.02	0.04	0.03
DR Dummy	1.475***	1.364***	1.213***	0.584	0.705*	1.104***	1.220***	1.067***
ATT	(0.540)	(0.478)	(0.445)	(0.457)	(0.395)	(0.351)	(0.345)	(0.340)
No. of Observations/ Treated/Control	572/127/425	572/127/425	572/127/425	572/127/425	572/127/425	572/127/425	572/127/425	572/127/425
Rosenbaum bounds sensitivity	1.6	1.6	1.6	1	1.2	1.5	1.5	1.5
Standardized bias	0.09	0.07	0.07	0.03	0.02	0.05	0.09	0.05
Standardized bias (p-value)	0.16	0.83	0.93	0.99	0.99	0.99	0.16	0.98
Pseudo R2	0.05	0.02	0.01	0.008	0.004	0.01	0.05	0.01
ER Dummy	0.392	0.192	0.180	-0.780	-0.389	-0.125	-0.169	-0.138
ATT	(0.799)	(0.758)	(0.688)	(0.747)	(0.713)	(0.519)	(0.539)	(0.565)
No. of Observations/ Treated/Control	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468
Rosenbaum bounds sensitivity	1	1	1	1	1	1	1	1
Standardized bias	0.1	0.08	0.08	0.06	0.05	0.04	0.1	0.04
Standardized bias (p-value)	0.078	0.71	0.82	0.99	0.99	0.99	0.078	0.99
Pseudo R2	0.09	0.04	0.03	0.01	0.01	0.01	0.09	0.01
BBR*DR Dummy	1.444**	1.429***	1.589***	0.895	0.986**	1.198***	1.590***	1.215***
ATT	(0.562)	(0.551)	(0.507)	(0.547)	(0.461)	(0.390)	(0.375)	(0.382)
No. of Observations/ Treated/Control	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468	572/104/468
Rosenbaum bounds sensitivity	1.5	1.6	1.8	1.2	1.3	1.5	1.8	1.5
Standardized bias	0.12	0.1	0.12	0.09	0.05	0.06	0.12	0.06
Standardized bias (p-value)	0. 13	0.40	0. 33	0. 61	0. 98	0. 94	0. 13	0. 96
Pseudo R2	0.06	0.04	0.05	0.04	0.01	0.02	0.06	0.02

Notes: This table presents the average treatment effect of the treated (ATT) of fiscal rule adoption on sovereign bond spreads (top panel of Table 5) and sovereign debt ratings (lower panel of Table 5) using propensity scores matching method. Bootstrapped standard errors based on 500 replications are reported in brackets. Standard errors are in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01.

[41] See Table A13 & A14 for additional robustness check (when altering the sample). We check the robustness of the ATT with respect to the exclusion of the crisis year (2009 global recession), former USSR countries, high indebtedness, high inflation episodes and countries belonging to monetary unions.

the "fairly low" value of the pseudo R2 after matching (Caliendo and Kopeinig, 2008; Sianesi, 2004). Finally, our results do not suffer from a hidden bias as confirmed by the (Rosenbaum, 2002) sensitivity test. Our results are robust to the use of alternative measure of financial markets access and the use of alternative econometric method.

V. Sensitivity analysis: the role of structural factors

Considering heterogeneities in the macroeconomic conditions and the political situations in developing countries which are highlighted in the empirical literature (Acemoglu et al., 2019, 2014, 2003, 2001; Balima et al., 2017b; Easterly, 2002; Hameed, 2005; Lin and Ye, 2009; Minea and Tapsoba, 2014; Wei, 2006; etc.), we explore the sensitivity of our results with regards to these factors.

The idea here is that structural factors can magnify or alleviate the effect of FR on financial market access. We follow the literature on impact evaluation (Guerguil et al., 2017; Lin and Ye, 2009; Tapsoba, 2012; etc.) and assess the effects of such heterogeneities. We report the results for bond spreads in Table 6a & 6b below[42]. Column 1 and 2 show the results of a simple OLS linking FR adoption to sovereign bond spreads while accounting for the estimated propensity score. A statistically significant coefficient of the propensity score means that there is self-selectivity in the model. The variable named FR dummy catches the mean difference in bond spreads between countries with FR and those without. This coefficient is negative in all columns. However, the coefficient is not significant when some structural factors are controlled for. Columns 3 and 4 introduce in the OLS regressions the mean propensity score and the time length since a fiscal rule adoption. The next columns show the coefficients of the interactive term between a FR and a given structural factor[43].

Potential sources of heterogeneity from a macroeconomic perspective include the position in the business cycle (captured by a dummy for which equals 1 if GDP growth is above its mean value and 0 otherwise), the fiscal policy stance (dummy equals 1 if the ratio of external debt stocks to GDP is above its mean value and 0 otherwise), macroeconomic stability (standard deviation of the output gap), FDI inflows, government size, human capital (captured by the level of education), international trade and capital account openness, inflation targeting, central bank independence, and exchange rate regime. The results indicate that FRs are more effective in reducing bond spreads in countries which have them, especially when: (i) FDI inflows are

[42] See Table A11 & A12 in the appendix for the results regarding sovereign debt ratings.
[43] We introduce (in equation related to Table 6a & 6b) each structural factor in isolation (without interacting with FR) on top of the interactive terms. However, we do not report these coefficients here for the sake of space.

high, (ii) trade openness is high, (iii) macroeconomic stability is low, (iv) the level of education is high, (v) natural resources are abundant. More specifically, the effect of FR in reducing spreads is higher for resource-rich countries. Fiscal behavior is fundamentally different in resource-rich developing countries than their non-resource peers[44]. As highlighted in the literature on natural resource curse (James and Aadland, 2011; Papyrakis and Gerlagh, 2007; Sachs and Warner, 1999, 2001, 1995), high levels of natural resource rents can trigger loose fiscal and monetary policies, impeding economic growth. Adopting fiscal rules allows these countries to deter fiscal profligacy, enhance the credibility of fiscal policy, and reduce borrowing costs.

The impact of fiscal rules on bond spreads appears to be insignificant when we account for the other types of macroeconomic factors. This suggests that the effects of fiscal rules on bond spreads are sensitive, to some extent, to the macroeconomic conditions.

From the political standpoint, we account for government stability, internal and external conflict, corruption, investment profile, law and order, and ethnic tensions. Apart from the investment profile and law and order variables, the impact of fiscal rules on bond spreads is insignificant with respect to the political factors. Indeed, the effects of fiscal rules on bond spreads are unclear in countries which show an apparent government instability, higher level of conflict (internal and external), higher level of corruption, and higher ethnic tensions.

Finally, the design of fiscal rules includes the formal enforcement procedure and the monitoring process. Although the effects of fiscal rules on bond spreads is moderate, they remain significant when we account for the design of fiscal rule. The interactive effect of enforcement procedure, monitoring process, and fiscal rule is positive and not significant. Countries with high scores for enforcement procedure and monitor process show a higher borrowing cost (in terms of higher bond spreads). A possible explanation of this result is that the mere existence of FR (*de jure*) is not enough to improve access to financial markets, irrespective of the strength of its supportive implementation mechanisms[45]. For instance, as highlighted by (Schaechter et al., 2012), a high score of effective enforcement and accountability does not necessarily imply that it is also soundly implemented. To account for the strength of the supportive implementation mechanisms associated with FR adoption, we follow (Combes et al., 2018) and compute an Index of Fiscal Rule Strength(IFRS). It is a composite index which captures fiscal rule strength through information about the number of fiscal rules, the ratio of national to total fiscal rules, legal basis, coverage, enforcement,

[44] We thank an anonymous Referee for suggesting this investigation.
[45] We thank an anonymous Referee for suggesting this further investigation.

flexibility features, and supporting procedures for monitoring of compliance and enforcement. Our results show that the interactive effect of FR and its strength reduces bond spreads in developing countries. This result supports (Combes et al., 2018) who show that it is not just the mere existence of a rule that matters but also whether it has been designed to tie policymakers' hands or as a pure ornament.

In total, our results are sensitive to many structural characteristics. The effect of fiscal policy rule adoption is unclear in some circumstances, mainly related to the macroeconomic conditions and the political situations.

Table 6a : Exploring the heterogeneity

Log (EMBIG)	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**	**[9]**	**[10]**	**[11]**	**[12]**	**[13]**	**[14]**	**[15]**	**[16]**
FR Dummy	-0.202**	-0.162*	-0.171*	0.182	-0.164	-0.489***	-0.0795	0.0971	-0.240*	0.0507	-0.0182	-0.130	-0.0495	-0.177*	-0.792**	-0.116
	(0.0834)	(0.0913)	(0.0958)	(0.153)	(0.133)	(0.169)	(0.100)	(0.108)	(0.122)	(0.128)	(0.102)	(0.123)	(0.117)	(0.0956)	(0.352)	(0.106)
PSCORE		-0.175	-0.214	-0.171	-0.217	-0.198	-0.194	-0.0248	-0.123	-0.136	-0.0558	-0.0738	-0.117	-0.126	-0.0809	-0.170
		(0.192)	(0.246)	(0.193)	(0.188)	(0.191)	(0.194)	(0.183)	(0.193)	(0.195)	(0.190)	(0.212)	(0.184)	(0.186)	(0.169)	(0.188)
FR*PSM			0.112													
			(0.397)													
FR*Time Length				-0.136***												
				(0.0198)												
Macroeconomic Factors																
FR*Good/time					0.0427											
					(0.165)											
FR*Strong/stance						0.494***										
						(0.186)										
FR*Macro/instability							-0.00000743**									
							(0.00000325)									
FR*FDI/inflows								-0.641***								
								(0.152)								
FR*Government/size									0.139							
									(0.168)							
FR*Secondary										-0.292*						
										(0.166)						
FR*Trade											-0.548***					
											(0.167)					
FR*Capital/openness												-0.0871				
												(0.167)				
FR*IT/conservative													0.0173			
													(0.159)			
FR*CBI/irregular														-0.125		
														(0.277)		
FR*Fix/regime															0.677*	
															(0.362)	
FR*Resource/Rich																-0.726***
																(0.221)
Constant	5.810***	5.861***	5.872***	5.840***	6.110***	6.193***	5.798***	5.915***	5.985***	5.734***	5.884***	5.855***	5.976***	5.758***	6.910***	5.777***
	(0.0515)	(0.0788)	(0.0915)	(0.0791)	(0.0998)	(0.102)	(0.0802)	(0.0880)	(0.0809)	(0.100)	(0.0866)	(0.0872)	(0.0849)	(0.0783)	(0.133)	(0.0780)
N/R2	494/0.012	494/0.013	494/0.013	494/0.042	494/0.065	494/0.052	494/0.033	494/0.118	494/0.033	494/0.018	494/0.069	494/0.017	494/0.092	487/0.064	494/0.101	494/0.060

Note: Bootstrapped standard errors (with 500 replications) in brackets, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Vector X variables in isolation (without interaction with FR) are included but not reported for the sake of space.

Table 6b : Exploring the heterogeneity cont.

Log (EMBIG)	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**	**[9]**	**[12]**
FR Dummy	-0.210*	-0.0973	-0.0733	-0.115	0.159	-0.134	-0.205	-0.256**	-0.212**	-0.435**
	(0.125)	(0.136)	(0.126)	(0.108)	(0.139)	(0.0988)	(0.125)	(0.111)	(0.103)	(0.221)
PSCORE	-0.190	-0.188	-0.163	-0.163	-0.130	-0.266	-0.162	-0.161	-0.171	-0.300
	(0.195)	(0.197)	(0.188)	(0.195)	(0.170)	(0.189)	(0.190)	(0.195)	(0.193)	(0.199)
Political Factors										
FR*Government/stability	0.0393									
	(0.174)									
FR*External/conflict		-0.122								
		(0.169)								
FR*Internal/conflict			-0.252							
			(0.166)							
FR*Corruption				-0.175						
				(0.180)						
FR*Investment/profile					-0.406**					
					(0.166)					
FR*Law/order						-0.293*				
						(0.160)				
FR*Ethnic/tensions							-0.0155			
							(0.178)			
Design										
FR*Enforcement								0.185		
								(0.133)		
FR*Monitoring									0.112	
									(0.137)	
FR*IFRSM[46]										-0.441*
Constant	5.962***	5.853***	6.033***	5.814***	6.138***	6.148***	5.975***	5.857***	5.860***	5.893***
	(0.101)	(0.0968)	(0.101)	(0.0853)	(0.0985)	(0.0827)	(0.103)	(0.0795)	(0.0789)	(0.0793)
N/ R2	494/0.020	494/0.014	494/0.065	494/0.017	494/0.164	494/0.128	494/0.023	494/0.017	494/0.015	494/0.054

Note: Bootstrapped standard errors (with 500 replications) in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01. Vector X variables in isolation (without interaction with FR) are included but not reported for the sake of space.

[46] IFSRM is a dummy variable equal to 1 when the IFRS is greater or equal to the mean of the entire panel distribution. Indeed, combining the FR dummy with the continuous IFRS variable yields an interaction term that is highly collinear with the IFRS itself.

VI. Conclusions and policy implications

In this paper we explore the capacity of fiscal rules to improve financial market access for developing countries via the reduction of their borrowing costs. We consider a sample of 36 countries for the period 1993 to 2014. In total, 232 country-year observations are associated with a fiscal rule in place (FR group) and 560 country-year observations are not associated with a fiscal rule in place (Non-FR group). We use the entropy balancing method to construct a weighted synthetic group for our FR group, accounting for differences in countries' macroeconomic conditions and political situation. Our results contribute to the literature in a number of ways.

First, we find a causal effect between the adoption of fiscal rules and low bond spreads and high sovereign rating. Fiscal rule adoption lowers bond spreads by around 270 basis points while it increases sovereign debt ranking by up to more than 1 grade.

Second, we show that the effect of fiscal rule adoption on financial market access depends on the type of rule. Budget balanced rules (BBR) and debt rules (DR) significantly improve financial markets access while expenditures rules (ER) worsen this access. This latter effect can be explained by the fact that ER may constrain government expenditure (Dahan and Strawczynski, 2013; Tapsoba, 2012), including spending that may contribute to reducing bond spreads by improving economic growth.

Finally, we find that the interaction of fiscal rules is highly beneficial in terms of low borrowing costs. Countries that adopt both BBR and DR rules can more easily access financial markets than others.

These results are robust to a wide set of alternative specifications of the entropy balancing method, and the use of alternative matching method (namely propensity score matching).

Our findings suggest that developing countries could improve their financial market access by adopting fiscal rules. More specifically they should give more importance to balanced budget rules and debt rules because they are valued by financial markets in terms of lower bond spreads and higher debt ratings.

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APPENDIX:

Table A1 : Descriptive Statistics

Variable	Obs	Mean	Std.Dev.	Min	Max
Log (EMBIG)	576	5.765	.9	-.02	8.662
Sovereign rating	679	10.319	3.282	1.333	18
FR dummy	792	.293	.455	0	1
BBR dummy	792	.241	.428	0	1
DR dummy	792	.179	.384	0	1
ER dummy	792	.096	.295	0	1
GDP growth	792	4.022	4.144	-22.934	33.736
Debt/GDP	752	47.355	29.453	.633	274.951
Political risk	765	64.974	8.861	38.79	86.58
FDI inflows	785	3.463	4.026	-15.989	50.505
Default dummy	728	.11	.313	0	1
Inflation	772	26.66	207.246	-7.114	4734.915
Reserves/months	769	5.129	3.603	.027	25.676
Capital openness	785	.065	1.379	-1.904	2.374
Remittances/GDP	741	3.568	4.522	0	26.683
IT conservative date	792	.212	.409	0	1
IT default date	792	.222	.416	0	1
CBI irregular turnover	778	.135	.342	0	1
CBI regular turnover	778	.051	.221	0	1
Trade	788	72.535	36.228	15.636	220.407
Broad money growth	764	28.092	142.974	-50.812	3280.653
Fix exchange regime	704	.922	.269	0	1
Float exchange regime	704	.067	.25	0	1
Goverment stability	765	8.113	1.714	3.33	12
Corruption	765	2.534	.894	1	5
Internal conflict	765	9.026	1.772	.42	12
External conflict	765	10.216	1.33	2.58	12
Law and order	765	3.387	1.084	1	6
Ethnic tensions	765	4.256	1.325	1	6
Output gap	792	0	25211.43	-289000	368000
Government size	792	13.634	4.1	4.483	32.284
Secondary education	792	6.261	.858	4	8
Enforcement	792	.116	.321	0	1
Monitoring	792	.11	.313	0	1
Time length	792	2.288	4.343	0	22
Overall fiscal balance	713	-2.784	4.266	-28.724	11.132
Elections	792	.158	.289	0	1
IMF program	792	.379	.485	0	1
Resource rich dummy	792	.222	.416	0	1
IFRS	792	.545	1.032	0	3.984

Table A2. Definition and sources of variables

Variables	Descriptions	Sources
Sovereign bond spreads	It covers all sovereign foreign debt instruments issued by emerging countries, including international borrowings denominated in US dollars such as Brady bonds, loans, and Eurobonds with a face value of at least US$ 500 million and a maturity of 12 years.	JP Morgan, Datastream
Sovereign debt rating	Foreign currency long-term sovereign debt ratings (index ranging from 1 to 21, higher value means better rating).	Kose et al. (2017)
Debt/GDP	Total external debt stocks, % of GDP (External public and private sector debt)	
Overall fiscal balance	Fiscal balance, % of GDP (government debt sustainability)	
IT default date	Binary variable taking the value 1 if in a given year a country operates informally under IT, zero otherwise. When we use the default starting dates of IT, we refer to soft IT.	Rose, 2006; Minea & Tapsoba, 2014; Roger, 2009
IT conservative date	Binary variable taking the value 1 if in a given year a country operates formally under IT, zero otherwise. When we use the conservative starting dates of IT, we refer to full-fledged IT.	
CBI regular	Central banks governor's regular turnover dummy. It is equal to 1 if the change of governor take place at the end of the official mandate and 0 otherwise. This is proxy of central bank independence.	Dreher et al., 2008, 2010; Sturm and de Haan (2001)
CBI irregular	Central banks governor's irregular turnover dummy. It is equal to 1 if the change of governor take place in an irregular manner and 0 otherwise. This is proxy of central bank independence.	
Political risk	It is a composite measure of the quality of governance. It represents a simple average of ICRG political variables. Higher value indicates low political risk.	Author calculation based on ICRG data
Debt default	Dummy equal to 1 if a country did not pay its debt or restructured it with a lost for investors, and 0 if there was no payment default or debt restructuring.	Reinhart & Rogoff (2009)
Capital openness	It captures the degree of financial openness.	Chinn-Ito (2006)
Fix regime	Dummy equal to 1 if ER_Fine is classified as fix regime and 0 if not	Author construction based on Ilzetzki et al. (2017)
Floating regime	Dummy equal to 1 if ER_Fine is classified as floating regime and 0 if not	
FR	Dummy equal to 1 if there is a fiscal rule in place and 0 if not	IMF Fiscal Rules Dataset, 2016
BBR	Dummy equal to 1 if there is a balanced budget rule in place and 0 if not	
DR	Dummy equal to 1 if there is a debt rule in place and 0 if not	
ER	Dummy equal to 1 if there is an expenditure rule in place and 0 if not	
Enforcement	Dummy which equals 1 if there is a national formal enforcement procedure in place and 0 otherwise.	
Monitoring	Dummy which equals 1 if there is a national monitoring of compliance outside government in place, 0 if no and 0.5 if non independent.	
Resource rich dummy	Dummy which equals 1 if a given country is a resource rich country and 0 otherwise	
IFRS	Composite index capturing fiscal rules strength through information regarding the number of fiscal rules, the ratio of national to total fiscal rules, legal basis, coverage, enforcement, flexibility features and supporting procedures for monitoring of compliance and enforcement	
FDI Inflows	Net inflows (new investment inflows less disinvestment) in a given economy from foreign investors, divided by GDP.	WDI
Trade	Sum of exports and imports of goods and services, % of GDP.	
Secondary education	Secondary duration refers to the number of grades (years) in secondary school.	
Government size	General government final consumption expenditure, % of GDP.	
Inflation rate	Annual percentage change of consumer price index	
Reserves/Months	Reserves expressed in terms of the number of months of imports of goods and services they could pay for [Reserves/(Imports/12)].	
Remittances/GDP	This variable comprises personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities.	
Broad money/GDP	Sum of currency outside banks, demand deposits other than those of the central government, the time, savings, and foreign currency deposits of resident sectors other than the central government, bank and traveler's checks, and other securities such as certificates of deposit and commercial paper, % of GDP	
GDP growth	Annual percentage growth rate of GDP	
Investment profile	The risk to investment computed as the sum of contract viability/expropriation, profits repatriation, and payment delays. A higher value signals a lower risk.	
Government stability	This is an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office.	

Corruption	This is an assessment of corruption within the political system. Such corruption is a threat to foreign investment for several reasons: it distorts the economic and financial environment; it reduces the efficiency of government and business by enabling people to assume positions of power through patronage rather than ability; and, last but not least, introduces an inherent instability into the political process.	ICRG database
Internal conflict	Political violence and its actual or potential impact on governance. The highest (lowest) score signals no armed or civil opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people (a country embroiled in an on-going civil war).	
Law and order	Composed of two elements that are assessed separately, namely law (the strength and impartiality of the legal system) and order (popular observance of the law). A higher value signals high degrees of law and/or order.	
Ethnic tensions	The degree of tension within a country attributable to racial, nationality, or language divisions. Higher values signal minimal tensions.	
Time length	It captures the time length since fiscal rule adoption	
Good time	Dummy equal to 1 if the growth rate of GDP is above tit's mean value and 0 otherwise	Author construction
Strong stance	Dummy equal to 1 if total external debt stocks (% of GDP) is above its mean value and 0 otherwise	
Macroeconomic instability	Standard deviation of output gap	
Elections	Dummy which equals 1 if a presidential election held in a given year and 0 otherwise. Following MacKie and Rose (1991) and Franzese (2000), we create a variable summing to one over the year preceding an election in order to examine the electoral budget-cycles. This variable named $Elections_t$= M/12 in election year t (with M the complete months before the elections) and (1 – M/12) in the year before the election.	Database on Political Institutions (DPI)
IMF program	Dummy which equals 1 if a country is under a IMF program and 0 otherwise	Dreher (2006)

Table A3 : Sample of countries (all fiscal rules)

Non-FR	FR	Year of adoption
Belize	Argentina	2000
China	Brazil	2000
Dominican Republic	Bulgaria	2003
Egypt	Chile	2001
El Salvador	Colombia	2000
Ghana	Ecuador	2003
Lebanon	Gabon	2002
Morocco	Hungary	2004
Philippines	Indonesia	1993
South Africa	Jamaica	2010
South Korea	Malaysia	1993
Tunisia	Mexico	2006
Turkey	Nigeria	2007
Ukraine	Pakistan	2005
Uruguay	Panama	2002
Venezuela	Peru	2000
Vietnam	Poland	1999
	Russia	2007
	Sri Lanka	2003
Total 17	Total 19	

Table A4 : BBR

Non-FR	FR	Year
Belize	Argentina	2000
Brazil	Bulgaria	2006
China	Chile	2001
Dominican Republic	Colombia	2011
Egypt	Ecuador	2003
El Salvador	Gabon	2002
Ghana	Hungary	2004
Lebanon	Jamaica	2010
Morocco	Mexico	2006
Philippines	Nigeria	2007
South Africa	Pakistan	2005
South Korea	Panama	2002
Tunisia	Peru	2000
Turkey	Poland	2004
Ukraine	Russia	2007
Uruguay	Sri Lanka	2003
Venezuela	Indonesia	1993
Vietnam	Malaysia	1993
Total 18	Total 18	

Table A5: DR

Non-FR	FR	Year
Argentina	Brazil	2000
Belize	Bulgaria	2003
Chile	Ecuador	2003
China	Gabon	2002
Colombia	Hungary	2004
Dominican Republic	Indonesia	2004
Egypt	Jamaica	2010
El Salvador	Malaysia	1993
Ghana	Pakistan	2005
Lebanon	Panama	2002
Mexico	Poland	1999
Morocco	Sri Lanka	2003
Nigeria		
Peru		
Philippines		
Russia		
South Africa		
South Korea		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 24	Total 12	

Table A6 : ER

Non-FR	FR	Year
Belize	Argentina	2000
Chile	Brazil	2000
China	Bulgaria	2006
Dominican Republic	Colombia	2000
Egypt	Ecuador	2010
El Salvador	Hungary	2010
Gabon	Mexico	2013
Ghana	Peru	2000
Indonesia	Poland	2011
Jamaica	Russia	2013
Lebanon		
Malaysia		
Morocco		
Nigeria		
Pakistan		
Panama		
Philippines		
South Africa		
South Korea		
Sri Lanka		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 26	Total 10	

Table A7 : BBR*DR

Non-FR	FR	Year
Argentina	Bulgaria	2006
Belize	Ecuador	2003
Brazil	Gabon	2002
Chile	Hungary	2004
China	Indonesia	2004
Colombia	Jamaica	2010
Dominican Republic	Pakistan	2005
Egypt	Panama	2002
El Salvador	Poland	2004
Ghana	Sri Lanka	2003
Lebanon	Malaysia	1993
Mexico		
Morocco		
Nigeria		
Peru		
Philippines		
Russia		
South Africa		
South Korea		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 25	Total 11	

Table A8 : BBR*ER

Non-FR	FR	Year
Belize	Argentina	2000
Brazil	Bulgaria	2006
Chile	Colombia	2011
China	Hungary	2010
Dominican Republic	Mexico	2013
Ecuador	Peru	2000
Egypt	Poland	2011
El Salvador		
Gabon		
Ghana		
Indonesia		
Jamaica		
Lebanon		
Malaysia		
Morocco		
Nigeria		
Pakistan		
Panama		
Philippines		
Russia		
South Africa		
South Korea		
Sri Lanka		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 29	Total 7	

Table A9 : DR*ER

Non-FR	FR	Year
Argentina	Brazil	2000
Belize	Bulgaria	2006
Chile	Hungary	2010
China	Poland	2011
Colombia		
Dominican Republic		
Ecuador		
Egypt		
El Salvador		
Gabon		
Ghana		
Indonesia		
Jamaica		
Lebanon		
Malaysia		
Mexico		
Morocco		
Nigeria		
Pakistan		
Panama		
Peru		
Philippines		
Russia		
South Africa		
South Korea		
Sri Lanka		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 32	Total 4	

Table A10 : BBR*DR*ER

Non-FR	FR	Year
Argentina	Bulgaria	2006
Belize	Hungary	2010
Brazil	Poland	2011
Chile		
China		
Colombia		
Dominican Republic		
Ecuador		
Egypt		
El Salvador		
Gabon		
Ghana		
Indonesia		
Jamaica		
Lebanon		
Malaysia		
Mexico		
Morocco		
Nigeria		
Pakistan		
Panama		
Peru		
Philippines		
Russia		
South Africa		
South Korea		
Sri Lanka		
Tunisia		
Turkey		
Ukraine		
Uruguay		
Venezuela		
Vietnam		
Total 33	Total 3	

Table A11 : Exploring the heterogeneity

Sovereign rating	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**	**[9]**	**[10]**	**[11]**	**[12]**	**[13]**	**[14]**	**[15]**	**[16]**
FR Dummy	0.773**	0.394	0.428	-0.695	0.577	1.633**	-0.106	-1.050**	0.651	-0.0933	-0.513	0.103	-0.489	0.415	-0.562	0.614
	(0.324)	(0.371)	(0.398)	(0.453)	(0.548)	(0.641)	(0.401)	(0.452)	(0.509)	(0.509)	(0.405)	(0.467)	(0.452)	(0.384)	(0.929)	(0.429)
PSCORE		1.624**	1.813**	1.502**	1.665**	1.553**	1.838***	1.158*	1.364**	1.543**	1.137	1.553**	1.239*	1.595**	1.060	1.784***
		(0.683)	(0.800)	(0.679)	(0.683)	(0.709)	(0.672)	(0.659)	(0.668)	(0.705)	(0.703)	(0.773)	(0.632)	(0.664)	(0.667)	(0.676)
FR*PSM			-0.498													
			(1.485)													
FR*Time Length				1.179***												
				(0.109)												
Macroeconomic Factors																
FR*Good/time					-0.356											
					(0.658)											
FR*Strong/stance						-										
						1.816***										
						(0.702)										
FR*Macro/instability							0.0000537***									
							(0.00000978)									
FR*FDI/inflows								3.629***								
								(0.590)								
FR*government/size									-0.387							
									(0.630)							
FR*Secondary										0.795						
										(0.654)						
FR*trade											3.193***					
											(0.632)					
FR*Capital/openness												0.714				
												(0.654)				
FR*IT/conservative													0.881			
													(0.610)			
FR*CBI/irregular														0.733		
														(1.054)		
FR*Fix/regime															1.150	
															(0.975)	
FR*Resource/Rich																0.0177
																(0.893)
Constant	10.15***	9.693***	9.640***	9.808***	9.412***	8.768***	9.939***	9.899***	9.115***	9.451***	9.855***	9.812***	9.213***	9.979***	7.183***	9.714***
	(0.181)	(0.260)	(0.281)	(0.259)	(0.311)	(0.323)	(0.268)	(0.276)	(0.291)	(0.358)	(0.303)	(0.284)	(0.269)	(0.269)	(0.440)	(0.261)
N/R2	484/0.013	484/0.022	484/0.022	484/0.083	484/0.025	484/0.046	484/0.054	484/0.121	484/0.054	484/0.032	484/0.094	484/0.024	484/0.176	477/0.058	484/0.082	484/0.030

Note: Bootstrapped standard errors (with 500 replications) in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01. Vector X variables in isolation (without interaction with FR) are included but not reported for the sake of space.

Table A12 : Exploring the heterogeneity cont.

Sovereign debt rating	**[1]**	**[2]**	**[3]**	**[4]**	**[5]**	**[6]**	**[7]**	**[8]**	**[9]**	**[12]**
FR Dummy	0.636	-0.134	-0.226	0.161	-1.755***	-0.150	-0.332	0.695	0.193	0.644
	(0.500)	(0.536)	(0.465)	(0.421)	(0.505)	(0.381)	(0.497)	(0.447)	(0.414)	(0.521)
PSCORE	1.710**	1.799**	1.580**	1.430**	1.224**	1.949***	1.624**	1.576**	1.639**	2.515***
	(0.688)	(0.697)	(0.678)	(0.668)	(0.616)	(0.646)	(0.690)	(0.687)	(0.686)	(0.697)
Political Factors										
FR*Government/stability	-0.127									
	(0.655)									
FR*External/conflict		0.931								
		(0.644)								
FR*Internal/conflict			1.525**							
			(0.617)							
FR*Corruption				0.677						
				(0.693)						
FR*Investment/profile					3.213***					
					(0.606)					
FR*Law/order						2.455***				
						(0.575)				
FR*Ethnic/tensions							1.657**			
							(0.694)			
Design										
FR*Enforcement								-0.593		
								(0.539)		
FR*Monitoring									0.446	
									(0.557)	
FR*IFRSM										3.725***
										(0.685)
Constant	9.123***	9.625***	9.124***	9.659***	9.059***	8.604***	9.875***	9.707***	9.689***	9.462***
	(0.330)	(0.351)	(0.307)	(0.292)	(0.353)	(0.281)	(0.387)	(0.261)	(0.260)	(0.257)
N/ R2	484/0.038	484/0.030	484/0.088	484/0.031	484/0.208	484/0.217	484/0.038	484/0.025	484/0.023	484/0.105

Note: Bootstrapped standard errors (with 500 replications) in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01. Vector X variables in isolation (without interaction with FR) are included but not reported for the sake of space.

Supplementary robustness checks

TABLE A13 :

Treatment Variable	**1-Nearest Neighbor Matching**	**2-Nearest Neighbor Matching**	**3-Nearest Neighbor Matching**	**Radius Matching**			**Local Linear Regression Matching**	**Kernel Matching**
FR Dummy				**r=0.005**	**r=0.01**	**r=0.05**		
DEPENDENT VARIABLE: LOG (EMBIG)								
ATT	-0.250*	-0.196*	-0.213**	-0.114	-0.154	-0.216**	-0.230***	-0.214**
Dropping 2009	(0.129)	(0.116)	(0.104)	(0.123)	(0.111)	(0.0926)	(0.0839)	(0.0918)
Treated/Control/Total obs.	181/288/469	181/288/469	181/288/469	181/288/469	181/288/469	181/288/469	181/288/469	181/288/469
Rosenbaum bounds sensitivity	1.5	1.4	1.5	1.1	1.3	1.6	1.6	1.6
Standardized bias	0.09	0.07	0.06	0.07	0.06	0.04	0.09	0.04
Standardized bias (p-value)	0.12	0.44	0.63	0.69	0.58	0.93	0.12	0.94
Pseudo R2	0.03	0.02	0.02	0.02	0.02	0.01	0.03	0.01
ATT	-0.345***	-0.224*	-0.217*	-0.228*	-0.238*	-0.198**	-0.201**	-0.193**
Dropping Ex USSR	(0.131)	(0.115)	(0.113)	(0.131)	(0.122)	(0.0917)	(0.0865)	(0.0970)
Treated/Control/Total obs.	191/278/469	191/278/469	191/278/469	191/278/469	191/278/469	191/278/469	191/278/469	191/278/469
Rosenbaum bounds sensitivity	1.7	1.5	1.5	1.4	1.5	1.5	1.5	1.5
Standardized bias	0.06	0.04	0.05	0.03	0.03	0.06	0.06	0.06
Standardized bias (p-value)	0.56	0.78	0.63	0.98	0.99	0.47	0.56	0.53
Pseudo R2	0.02	0.01	0.02	0.01	0.007	0.02	0.02	0.02
ATT	-0.342***	-0.246**	-0.204*	-0.219*	-0.192*	-0.235***	-0.233***	-0.234***
Dropping High debt	(0.122)	(0.116)	(0.110)	(0.124)	(0.0997)	(0.0843)	(0.0782)	(0.0883)
Treated/Control/Total obs.	168/302/470	168/302/470	168/302/470	168/302/470	168/302/470	168/302/470	168/302/470	168/302/470
Rosenbaum bounds sensitivity	1.8	1.6	1.5	1.5	1.5	1.7	1.7	1.7
Standardized bias	0.07	0.05	0.05	0.04	0.04	0.04	0.07	0.04
Standardized bias (p-value)	0.71	0.79	0.92	0.99	0.97	0.97	0.71	0.98
Pseudo R2	0.02	0.01	0.01	0.008	0.01	0.01	0.02	0.009
ATT	-0.308**	-0.223**	-0.241**	-0.206	-0.192*	-0.222***	-0.235***	-0.220***
Dropping Hyperinflation	(0.123)	(0.111)	(0.0992)	(0.128)	(0.110)	(0.0828)	(0.0861)	(0.0785)
Treated/Control/Total obs.	195/293/488	195/293/488	195/293/488	195/293/488	195/293/488	195/293/488	195/293/488	195/293/488
Rosenbaum bounds sensitivity	1.6	1.5	1.6	1.3	1.4	1.6	1.6	1.6
Standardized bias	0.07	0.07	0.07	0.06	0.06	0.05	0.07	0.05
Standardized bias (p-value)	0.14	0.23	0.46	0.82	0.62	0.92	0.14	0.93
Pseudo R2	0.03	0.03	0.02	0.01	0.02	0.01	0.03	0.01
ATT	-0.254**	-0.199*	-0.211**	-0.194	-0.204*	-0.225***	-0.235***	-0.222***
Dropping Monetary Unions	(0.118)	(0.111)	(0.106)	(0.120)	(0.105)	(0.0797)	(0.0812)	(0.0857)
Treated/Control/Total obs.	195/306/501	195/306/501	195/306/501	195/306/501	195/306/501	195/306/501	195/306/501	195/306/501
Rosenbaum bounds sensitivity	1.6	1.4	1.5	1.3	1.4	1.6	1.6	1.6
Standardized bias	0.07	0.05	0.06	0.06	0.06	0.05	0.07	0.05
Standardized bias (p-value)	0.006	0.20	0.72	0.81	0.70	0.92	0.006	0.93
Pseudo R2	0.05	0.03	0.01	0.02	0.02	0.01	0.05	0.01

Note: Bootstrapped standard errors (with 500 replications) in brackets, * p < 0.10, ** p < 0.05, *** p < 0.01

TABLE A14 :

Treatment Variable FR Dummy	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching r=0.005	Radius Matching r=0.01	Radius Matching r=0.05	Local Linear Regression Matching	Kernel Matching
DEPENDENT VARIABLE: SOVEREIGN DEBT RATINGS								
ATT	0.839*	0.980**	1.055***	1.131**	0.966**	0.860***	0.944***	0.874**
Dropping 2009	(0.479)	(0.422)	(0.408)	(0.488)	(0.387)	(0.332)	(0.312)	(0.342)
Treated/Control/Total obs.	199/339/538	199/339/538	199/339/538	199/339/538	199/339/538	199/339/538	199/339/538	199/339/538
Rosenbaum bounds sensitivity	1.3	1.5	1.6	1.6	1.4	1.4	1.5	1.4
Standardized bias	0.11	0.07	0.07	0.04	0.05	0.06	0.11	0.06
Standardized bias (p-value)	0.05	0.70	0.31	0.99	0.97	0.72	0.05	0.71
Pseudo R2	0.04	0.01	0.02	0.007	0.01	0.01	0.04	0.01
ATT	0.951**	1.066***	0.873**	0.939**	1.001**	1.014***	0.950***	1.018***
Dropping Ex USSR	(0.454)	(0.394)	(0.399)	(0.477)	(0.402)	(0.341)	(0.312)	(0.332)
Treated/Control/Total obs.	210/328/538	210/328/538	210/328/538	210/328/538	210/328/538	210/328/538	210/328/538	210/328/538
Rosenbaum bounds sensitivity	1.4	1.7	1.5	1.4	1.5	1.6	1.5	1.6
Standardized bias	0.06	0.06	0.07	0.07	0.04	0.07	0.06	0.07
Standardized bias (p-value)	0.47	0.40	0.28	0.65	0.98	0.41	0.47	0.46
Pseudo R2	0.02	0.02	0.02	0.02	0.009	0.02	0.02	0.02
ATT	0.866*	0.944**	0.940**	0.907*	1.034**	1.017***	1.032***	1.011***
Dropping High debt	(0.471)	(0.420)	(0.417)	(0.471)	(0.419)	(0.331)	(0.306)	(0.329)
Treated/Control/Total obs.	186/354/540	186/354/540	186/354/540	186/354/540	186/354/540	186/354/540	186/354/540	186/354/540
Rosenbaum bounds sensitivity	1.3	1.4	1.4	1.3	1.5	1.5	1.6	1.5
Standardized bias	0.06	0.08	0.06	0.04	0.05	0.06	0.06	0.06
Standardized bias (p-value)	0.54	0.64	0.83	0.99	0.94	0.94	0.54	0.94
Pseudo R2	0.02	0.02	0.01	0.008	0.01	0.01	0.02	0.01
ATT	1.128**	1.151**	1.120***	1.009**	1.104***	1.031***	1.029***	1.064***
Dropping Hyperinflation	(0.445)	(0.454)	(0.389)	(0.454)	(0.393)	(0.332)	(0.315)	(0.323)
Treated/Control/Total obs.	213/345/558	213/345/558	213/345/558	213/345/558	213/345/558	213/345/558	213/345/558	213/345/558
Rosenbaum bounds sensitivity	1.5	1.6	1.6	1.4	1.5	1.6	1.6	1.6
Standardized bias	0.09	0.07	0.08	0.06	0.05	0.06	0.09	0.06
Standardized bias (p-value)	0.02	0.39	0.20	0.93	0.88	0.67	0.002	0.59
Pseudo R2	0.04	0.02	0.02	0.01	0.01	0.01	0.04	0.01
ATT	0.884**	1.048**	0.927**	0.985**	1.087***	1.022***	1.041***	1.036***
Dropping Monetary Unions	(0.451)	(0.431)	(0.378)	(0.445)	(0.384)	(0.316)	(0.300)	(0.310)
Treated/Control/Total obs.	214/358/572	214/358/572	214/358/572	214/358/572	214/358/572	214/358/572	214/358/572	214/358/572
Rosenbaum bounds sensitivity	1.3	1.5	1.4	1.4	1.5	1.6	1.6	1.6
Standardized bias	0.1	0.08	0.08	0.05	0.03	0.06	0.1	0.06
Standardized bias (p-value)	0.01	0.10	0.15	0.92	0.99	0.62	0.01	0.60
Pseudo R2	0.04	0.03	0.03	0.01	0.006	0.01	0.04	0.01

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Part 2: How developing countries could internally finance their development?

Chapter 3

Can fiscal rules curb income inequality? Evidence from developing countries

This chapter is joint work with Jean-Louis Combes, Alexandru Minea and Cezara Vinturis.

"The high and growing inequality in the United States is a result of its policies and politics."
(Stiglitz, Finance and Development, September 2014, Volume 51, Number 3, p.18)

I. Introduction

Income inequality (IQ) trends are periodically scrutinized by economists (see e.g. Anand and Segal, 2008; Piketty, 2014; Alvaredo et al., 2017), probably due to the large consequences of IQ—see e.g. Wilkinson and Pickett (2009) *The Spirit Level: Why More Equal Societies Almost Always Do Better?*, Stiglitz (2012) *The Price of Inequality: How Today's Divided Society Endangers Our Future*, or Atkinson (2015) *Inequality: What Can Be Done?*. From a macroeconomic perspective, the literature devoted to IQ focuses on mainly three issues.

A first strand of literature, capitalizing on the pioneering work of Kuznets (1955), looks at the determinants of IQ; prominent determinants include international factors, such as globalization or trade (e.g. Dollar and Kraay, 2004; Goldberg and Pavcnik, 2007; Dreher and Gaston, 2008; Ezcurra and Rodriguez-Pose, 2013; Kanbur, 2015), financial factors (e.g. Claessens and Perotti, 2007; Demirguc-Kunt and Levine, 2009; Kim and Lin, 2011), technological change (e.g. Galor and Moav, 2000; Acemoglu, 2002; Jovanovic, 2009), institutions (e.g. Chong and Gradstein, 2007; Acemoglu et al., 2015; Lin and Fu, 2016), inflation (e.g. Romer and Romer, 1999; Bulir, 2001; Albanesi, 2007); or natural resources (e.g. Gylfason and Zoega, 2002; Fum and Hodler, 2010; Parcero and Papyrakis, 2016).

Second, IQ is regularly pointed out as a major source of various macroeconomic imbalances; for example, IQ is found to reduce economic growth[47] (e.g. Alesina and Rodrik, 1994; Persson and Tabellini, 1994; Ostry et al., 2014; Berg et al., 2018; and possibly contribute to the secular stagnation, see Auclert and Rognlie, 2018) or the quality of the institutions (Alesina and Perotti, 1996), to increase inflation (Beetsma and van der Ploeg, 1996) and poverty (Ravallion, 1997), and to contribute to underdevelopment (Easterly, 2007) and even crises, including the recent Great Recession (Rajan, 2010; Reich, 2010).

Third, given these detrimental effects, a wide variety of policies were imagined to bring down IQ. Such policies may be related with e.g. trade (UNCTAD, 2019), FDI (Figini and Gorg, 2011), human capital (Goldin and Katz, 2009), finance (Brei et al., 2018), technology (UNESCAP, 2018, chapter 4), or the labor market (Berg, 2015).

Belonging to the latter strand of literature, this paper asks the following question: can fiscal rules (FR) curb income inequality (IQ)?[48] Such a question is legitimate since FR affect

[47] However, some early 2000s studies reported that IQ may sometimes increase growth (e.g. Forbes, 2000).

[48] Nowadays, FR—defined as permanent constraints on fiscal policy, expressed in terms of a summary indicator of fiscal performance (Kopits and Symansky, 1998)—became a popular tool for conducting fiscal policy (in more than 90 countries according to the 2015 IMF Fiscal Rules Dataset), despite a certain lack of consensus regarding their macroeconomic performances, with mostly pros—FR may e.g. improve fiscal discipline (Debrun et al.,

various dimensions of the fiscal policy, which received by far the greatest attention among all policies aiming at reducing IQ both from international institutions (e.g. OECD, 2015, chapters 3 and 7; or IMF, 2017) and academia—for recent surveys, see e.g. Bastagli et al. (2012), Heshmati and Kim (2014), Clements et al. (2015), or Anderson et al. (2017). In light of this literature, the potential effect of FR on IQ can transit through at least three channels.

First, and most importantly, by affecting the fiscal balance (e.g. Debrun et al., 2008; Tapsoba, 2012; Combes et al., 2018), FR most likely influence both government spending and revenues. While more recently e.g. Joumard et al. (2012), Martinez-Vazquez et al. (2012), or Higgins and Lustig (2016) discuss the effect of taxes on IQ, the meta-analysis of Anderson et al. (2017) performed on 84 studies reports mitigated findings for the government spending-IQ link: while total government spending present a moderate positive relationship with IQ, some types of government spending, including social or consumption spending, present a moderate negative relationship with IQ.

Second, following the Great Recession many countries enacted FR together with fiscal consolidation programs, in accordance with previous evidence supporting a key role of FR for fiscal consolidations (e.g. Guichard et al., 2007). In turn, recent studies suggest that fiscal consolidations may be associated with higher IQ particularly when based on spending cuts (e.g. Ball et al., 2013; Woo et al., 2013; Agnello and Sousa, 2014), while the opposite may arise for tax-based fiscal consolidations (Ciminelli et al., 2019).

Third, by affecting in particular fiscal policy cyclicality (e.g. Debrun et. al. 2008; Bova et al., 2014; Combes et al., 2017; Guerguil et. al., 2017) and government borrowing costs (e.g. Badinger and Reuter, 2017; Thornton and Vasilakis, 2018), FR are likely to influence fiscal policy equally in the medium-run, for example in terms of public debt dynamics and fiscal policy credibility. In turn, credibility may affect IQ for example through capital flows (Jaumotte et al., 2013), while there seems to be a positive link between public debt and IQ, particularly in OECD (e.g. Azzimonti et al., 2014; Arawatari and Ono, 2017).

To explore the relationship between FR and IQ, we draw upon the propensity scores-matching (PSM) method that properly overcomes the selection bias related with the adoption of FR.[49] We aim at estimating potential differences in IQ between countries that adopted FR

2008), make fiscal policy more countercyclical (Combes et al., 2017), or reduce inflation (Combes et al., 2018); and some cons—FR may make public investment more procyclical (Dessus et al., 2016).

[49] Initially employed in macroeconomics to analyze inflation targeting adoption (e.g. Lin and Ye, 2007; Minea and Tapsoba, 2014), PSM is equally used to estimate the effect of FR (e.g. Tapsoba, 2012; Guerguil et al., 2017).

and that did not adopt FR but present a comparable probability of adopting FR conditional on a set of covariates, i.e. comparable propensity scores (Rosenbaum and Rubin, 1983).

Our analysis conducted on wide panel of 84 developing countries over the period 1990-2015 reveals the following. First, countries that adopted FR experience a significant decrease in their IQ with respect to comparable countries that did not adopt FR. All the more that IQ is most likely not the primary goal that motivates the adoption of FR, this favorable effect is economically meaningful as it ranges between 18% and 30% of the standard deviation of our measure of IQ. The strength of our finding is confirmed by a rich robustness analysis that includes an alternative IQ measure, additional control variables, the entropy balancing method as an alternative to the PSM method, or different samples—and in particular the inclusion of developed countries.

Second, since not all FR are alike, we explore possible heterogeneities in their effect on IQ. On the one hand, we find that contrary to the favorable effect of balanced budget rules (BBR) and debt rules (DR) on IQ, the presence of expenditure rules (ER) strongly *increases* IQ; a possible explanation is related to the fact that ER may constrain government expenditure (e.g. Tapsoba, 2012; Dahan and Strawczinski, 2013), including spending that may contribute to reduce IQ. On the other hand, when combining these rules two by two, we reveal complementarities in the favorable effect of BBR and DR on IQ, as well as a neutralization of the *unfavorable* effect of ER on IQ in the presence of BBR or DR.

Third, switching to the control function regression method, we explore possible heterogeneities driven by various economic and structural factors in the relationship between FR and IQ. On the one hand, considering FR altogether, we reveal that the favorable effect of FR alone on IQ can be amplified in a context of deteriorated fiscal space (for example, a higher public debt); when combined with FR, higher trade further supports the favorable effect of FR on IQ; better political stability reduces IQ when combined with FR; and that education (economic growth or mineral rents) reduces (*increase*) IQ when combined with FR. On the other hand, combining various FR and various economic and structural variables reveals additional heterogeneities. Compared with findings for all FR, the interactive effect may become significant or—on the contrary—turn into not significant; the interactive effect of some variables may differ across the various types of FR; and some variables may weaken the unfavorable effect of ER on IQ illustrated in the benchmark estimations.

Consequently, in light of our analysis, the adoption of FR mostly reduces IQ. However, not only the magnitude of this effect may vary with the precise type of FR, but some FR—and in particular ER—are found to significantly *increase* IQ. In addition, the effect of various types

of FR on IQ may be subject to important heterogeneities, related to a wide set of fiscal, monetary, international, political, or structural factors. Given the importance of IQ in developing countries and its upward trend in many advanced countries (see e.g. IMF, 2017), our results showing not only that FR are not neutral for IQ, but also identifying cases in which various FR may curb or on the contrary increase IQ, may provide insightful evidence for governments aiming at adopting FR.

The paper is organized as follows. Section 2 presents the data and the methodology, section 3 reports our main results, section 4 assesses their robustness, section 5 investigates the impact of various types of FR on IQ, section 6 explores heterogeneities in the effect of FR on IQ related with various economic and structural factors, and section 7 concludes.

II. Data and methodology

We explore the effect of FR on IQ using a yearly panel of 84 developing countries over the period 1990-2015, selected mainly on two grounds. On the one hand, in the developing world the presence of trustworthy fiscal data begins in the 1990s. On the other hand, to ensure the comparability between the groups of FR and non-FR countries, i.e. for the control group to be a good counterfactual for the treatment group, we exclude from the group of non-FR countries those with a real per capita GDP lower than that of the poorest FR country, and a smaller population than that of the smallest FR country.

Our main variables are IQ and FR. Following previous studies (e.g. Afesorgbor and Mahadevan, 2016), we measure IQ by the Gini index of the disposable net income extracted from the Standardized World Income Inequality Database (SWIID) developed by Solt (2016), which provides comparable data across countries. We capture FR by a dummy variable equal to 1 if for a given country in a given year a fiscal rule is at work and to 0 otherwise, using the IMF Fiscal Rules Dataset. Appendix A in the Online Supplementary Material presents the list of countries and the year of FR adoption.

The presentation of the methodology is standard and follows the existing work (e.g. Lin and Ye, 2007; Tapsoba, 2012). The average treatment effect of the treated (ATT) equals the average difference between IQ in countries that adopted FR ($FR=1$), namely IQ^1, and the IQ they would have had in the absence of FR, namely IQ^0

$$ATT = E\left[\left(IQ_i^1 - IQ_i^0\right)|FR_i = 1\right] = E\left[IQ_i^1|FR_i = 1\right] - E\left[IQ_i^0|FR_i = 1\right]. \quad (1)$$

Unfortunately, the latter term is not observable, and a solution would be to simply compare the average IQ in countries that adopted FR and countries that did not. However, this would lead

to biased results, given that the adoption of FR (i.e. the treatment) is most likely not random but correlated with a set of observable variables that may equally affect IQ (i.e. the "self-section" problem, see e.g. Heckman et al., 1998, and Dehejia and Wahba, 2002). Instead, under the conditional independence assumption (namely, conditional to a set of observed variables X, IQ^1 and IQ^0 are independent of the FR adoption), we can replace the last term of (1) by the IQ in countries that did not adopt FR but present comparable values of the variables X

$$ATT = E\left[IQ_i^1 \middle| FR_i = 1, X_i\right] - E\left[IQ_i^0 \middle| FR_i = 0, X_i\right]. \quad (2)$$

Although the last term of (2) is observable, matching countries on a large set of variables could raise practical issues. Therefore, we follow Rosenbaum and Rubin (1983), and concentrate the information from set X into the variable $p_{X_i} = \Pr\left[FR_i = 1 \middle| X_i\right]$, which provides, conditional on the set X, the probability of adopting FR. Assuming, for each country that adopted FR, the existence of comparable countries that did not adopt FR (i.e. the common support assumption), the ATT finally rewrites as

$$ATT = E\left[IQ_i^1 \middle| FR_i = 1, p_{X_i}\right] - E\left[IQ_i^0 \middle| FR_i = 0, p_{X_i}\right]. \quad (3)$$

When estimating (3), we follow the existing literature (e.g. Lin and Ye 2007; Minea & Tapsoba, 2014), and draw upon a large variety of propensity scores-matching methods. First, the nearest neighbor matches each FR country with the non-FR countries with the closest propensity score (we consider up to 3 nearest neighbors). Second, to mitigate a potential risk of poor matching, the radius matches each FR with all non-FR countries whose propensity scores are within a radius (following the literature, we consider a small , a medium , and a large radius). Third, following Heckman et al. (1998), the regression-adjusted local linear matches—using local linear regression weights—covariates-adjusted outcomes of each FR country with the corresponding covariates-adjusted outcomes for the non-FR countries. Finally, Kernel matches each FR country with a weighted average of all non-FR countries, with weights inversely proportional to the distance between the PS of the FR and non-FR countries. Following the literature (Dehejia and Wahba, 2002), we compute bootstrapped standard errors based on 500 replications.

III. Results

3.1. The estimation of the propensity scores

We estimate the propensity scores using a probit model with the FR dummy as the dependent variable. To account for macroeconomic and political factors related to the adoption of FR, we

draw upon the existing literature on FR (e.g. Debrun and Kumar, 2007; Tapsoba, 2012; Combes et al., 2017; or Eyraud et al., 2018), and use a wide range of control variables (see Appendix A for the description and sources of variables, and for descriptive statistics).

First, since FR are most likely to be introduced in countries with good macroeconomic performances (e.g. IMF, 2009; Tapsoba, 2012), higher economic growth (measured by the real GDP per capita growth) is expected to increase the probability of FR adoption. Although the same may hold for external debt (in ratio of GDP), FR may equally be adopted to stabilize a large indebtedness, making uncertain the overall effect of debt on the likelihood of FR adoption. Second, given their higher demand for social spending, countries with higher population dependency ratio will have a lower likelihood of FR adoption, facing more difficulties to introduce fiscal discipline (Calderón and Schmidt-Hebbel, 2008). Third, as emphasized by e.g. Kose et al. (2009), a larger capital openness (that we measure using the Chinn and Ito, 2008, index) fosters a more efficient allocation of capital, which may stimulate economic growth and constitute a prerequisite for the adoption of FR. Fourth, since the adoption of inflation targeting often went along with the establishment of FR and other fiscal reforms (e.g. fiscal responsibility laws, fiscal transparency, fiscal accountability) to ensure fiscal discipline (e.g. Minea and Tapsoba, 2014; Combes et al., 2018), we expect a positive link with FR adoption. At the same time, a higher inflation—measured as log(1+inflation)—may signal a poor quality of monetary institutions, and is expected to negatively affect the likelihood of FR. Fifth, following e.g. Tapsoba (2012), we account for political factors. On the one hand, a high political risk usually signals poor institutions (including fiscal institutions that should guarantee the respect of FR), and should negatively affect the probability of FR adoption. On the other hand, since the government fractionalization may raise public spending pressures (e.g. Perotti and Kontopoulos, 2002), voters may support the establishment of strengthened fiscal frameworks to offset them, thereby increasing the need for FR.

Table 1 reports the probit estimates of the PS. As shown by column [1], coefficients of most variables are significant and confirm our expectations. Among the significant effects, GDP per capita growth, the presence of an inflation targeting regime, and government fractionalization increase the probability of FR adoption, with opposite effects for the dependency ratio, inflation, and political risks.

Table 1: The estimation of propensity scores

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
L.Real gdppc growth	0.00815*	0.00811*	0.00816*	0.00880*	0.00917*	0.0115**	0.00874*	0.00817*
	(0.00478)	(0.00480)	(0.00480)	(0.00489)	(0.00493)	(0.00561)	(0.00481)	(0.00478)
L.Debt	0.00154	0.00154	0.00154	0.00216*	0.00226*	0.00388***	0.00192	0.00155
	(0.00116)	(0.00116)	(0.00116)	(0.00118)	(0.00118)	(0.00119)	(0.00118)	(0.00116)
L.Dependency ratio	-0.00619**	-0.00619**	-0.00619**	-0.00667**	-0.00654**	-0.00685**	-0.00669***	-0.00626**
	(0.00259)	(0.00259)	(0.00259)	(0.00268)	(0.00270)	(0.00283)	(0.00259)	(0.00259)
L.Capital openness	0.0971***	0.0968***	0.0971***	0.0748**	0.0755**	0.0921***	0.0865***	0.0967***
	(0.0292)	(0.0292)	(0.0292)	(0.0296)	(0.0296)	(0.0310)	(0.0290)	(0.0292)
L.Inflation	-5.574***	-5.551***	-5.580***	-5.389***	-5.417***	-5.588***	-5.938***	-5.603***
	(0.914)	(0.947)	(0.943)	(0.915)	(0.922)	(1.062)	(0.926)	(0.917)
IT_conservative	0.636***	0.635***	0.636***	0.629***	0.635***	0.641***	0.567***	
	(0.116)	(0.116)	(0.116)	(0.118)	(0.118)	(0.122)	(0.116)	
L.Political risk	-0.0164***	-0.0163***	-0.0164***	-0.0159***	-0.0159***	-0.0212***	-0.0133**	-0.0164***
	(0.00568)	(0.00569)	(0.00569)	(0.00572)	(0.00572)	(0.00600)	(0.00578)	(0.00568)
L.Gov fractionalization	0.430***	0.430***	0.430***	0.422***	0.426***	0.452***	0.452***	0.432***
	(0.152)	(0.152)	(0.152)	(0.155)	(0.155)	(0.159)	(0.153)	(0.152)
Fix regime		0.0564						
		(0.302)						
Floating regime			0.0147					
			(0.309)					
CBI_regular				-0.0982				
				(0.234)				
CBI_irregular					0.137			
					(0.124)			
Debt default						-0.658***		
						(0.162)		
Resource-Rich							0.368***	
							(0.0893)	
IT_default								0.625***
								(0.115)
Observations/Pseudo-R2	1234/0.141	1234/0.141	1234/0.141	1189/0.134	1189/0.135	1151/0.170	1234/0.152	1234/0.141

Note: standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3.2. The results of matching on propensity scores

Using estimated PS, we match countries that adopted FR with comparable countries that did not, drawing upon four popular matching methods. First, the nearest-neighbor matches each FR country with the non-FR countries with the closest PS (we retain up to $n=3$ neighbors). Second, the radius matches each FR with all non-FR countries with PS within a radius (we retain a small $R=0.005$, a medium $R=0.01$, and a large $R=0.05$ radius). Third, the local linear regression (Heckman et al., 1998) matches covariates-adjusted outcomes of each FR country with the corresponding ones of non-FR countries. Fourth, Kernel matches each FR country with a weighted-average of all non-FR countries (weights are inversely proportional to the gap between the PS of the FR and non-FR countries). Since the matching estimator has no analytical variance, we compute bootstrapped standard errors (Dehejia and Wahba, 2002).

Before discussing the main results, we report that statistical tests support the quality of our estimations. First, following Sianesi (2004), the pseudo-R2 test analyzes the common support assumption by estimating the PS on matched and non-matched observations to contrast their fit before and after matching. Pseudo-R2 reported in Table 2 are fairly close to zero (i.e. always below 0.01), suggesting that the matching provided balanced scores. Consequently, our estimations are robust with regard to the common support hypothesis.

Second, we explore the conditional independence assumption in two ways. Regarding unobservables, the lower bound of the Rosenbaum (2002) sensitivity test, conducted at the usual 5% significance level under the assumption of an underestimated ATT, is around 1.4 (see Table 2), comparable with existing studies (e.g. around 1.2 in Guerguil et al., 2017). Regarding observables (see Rosenbaum, 2002), the p-values of the equality test of the mean difference (standardized bias) between the characteristics of countries that adopted and did not adopt FR supports the absence of statistical differences after matching (see Table 2). Thus, estimations are equally robust with respect to the conditional independence assumption.

Given these diagnostic tests, using estimated PS from column [1] of Table 1, our benchmark results are reported on line [1] of Table 2. Irrespective of the matching method, the estimated ATT is negative and statistically significant: with respect to comparable countries that did not adopt FR, countries that adopted FR experience a significant IQ reduction. In absolute value, the estimated decrease in IQ ranges between 0.0135 (radius $r=0.01$) and 0.0217 (neighbor $n=2$), depending on the retained specification. Since they represent between 18% and 30% of the standard deviation of our IQ variable (equal to 0.073, see Appendix A), these numbers are economically meaningful, all the more that IQ is most likely not the primary goal that motivates the adoption of FR.

Table 2: Matching results

Treatment Variable: FR	**1-Nearest Neighbor Matching**	**2-Nearest Neighbor Matching**	**3-Nearest Neighbor Matching**	**Radius Matching**			**Local Linear Regression Matching**	**Kernel Matching**
				r=0.005	**r=0.01**	**r=0.05**		
				Dependent variable: Gini Index				
[1] ATT: Differences in Inequality	-0.0195**	-0.0217***	-0.0211***	-0.0135**	-0.0144**	-0.0174***	-0.0171***	-0.0175***
	(0.00916)	(0.00778)	(0.00731)	(0.00681)	(0.00615)	(0.00534)	(0.00540)	(0.00570)
Number of observations, of which:	1192	1192	1192	1192	1192	1192	1192	1192
- treated observations	291	291	291	291	291	291	291	291
- control observations	901	901	901	901	901	901	901	901
				Quality of the matching				
Pseudo-R2	0.004	0.005	0.005	0.003	0.002	0.002	0.004	0.002
Rosenbaum bounds sensitivity test	1.8	1.5	1.5	1.1	1.4	1.5	1.3	1.5
Standardized bias (p-value)	0.88	0.79	0.80	0.96	0.86	0.98	0.88	0.98

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

IV. Robustness

This section investigates the robustness of the favorable effect of FR adoption on IQ.

4.1. An alternative measure of inequality

Our main IQ measure is the Gini index based on the net income from Solt (2016). We consider an alternative IQ measure, from the United Nation University World Institute for Development Economics Research (UNU-WIDER). Given data availability and for consistency with our main measure, we focus on IQ based on equivalized household disposable (post-tax, post-transfer) income. The results of the matching using PS from column [1] in Table 1 are reported in Table 3. Our usual tests support the quality of the matching. Moreover, all ATTs are negative and significant, suggesting that the decrease in IQ following the adoption of FR does not change with the IQ measure. Finally, the estimated decrease in IQ varies in absolute value between 0.0236 and 0.0458 (namely, between 25% and 48% of the standard deviation), a magnitude somewhat higher compared with our benchmark findings.

4.2. Additional controls

We augment the benchmark probit model (column [1] in Table 1) with several additional variables, namely: the exchange rate regime (we distinguish corner, i.e. fixed and floating regimes); the central bank independence (the regular and irregular change in central banks' governor turnover); debt default experiences; natural resources endowment (signaling resource-rich countries); and the presence of a default (instead of a conservative) inflation targeting regime (Appendix A provides definitions, sources, and descriptive statistics).

According to columns [2]-[8] in Table 1, most additional variables do not have a significant effect, confirming the robustness of our benchmark model. Whenever significant, their effect is consistent with what one may expect; in particular, countries with a history of debt default are less likely to adopt FR, which requires fiscal institutions inconsistent with default, while being a resource-rich country may generate additional fiscal revenues that relax the government's budget constraint and may support its capacity to respect the FR.

Based on PS computed using Table 1, lines [1]-[7] in Table 4 report the ATT. Corroborating our benchmark results, the ATTs are significant and negative irrespective of the considered specification. In addition, the size of the effect is equally consistent with our benchmark findings, ranging (in absolute value) between 0.0140 (neighbor $n=1$, line [5]) and 0.0257 (neighbor $n=1$, line [7]). Overall, accounting for additional control variables confirms the significant reduction of IQ in countries that adopted FR.

Table 3: Matching results: Robustness—Inequality measured using the UNU-WIDER database

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Dependent variable: Gini Index								
[1] ATT: Differences in Inequality	-0.0427***	-0.0362**	-0.0305**	-0.0458***	-0.0378***	-0.0236**	-0.0250**	-0.0244**
	(0.0162)	(0.0145)	(0.0141)	(0.0161)	(0.0143)	(0.0115)	(0.0121)	(0.0116)
Observations/treated observations	447/125							
Quality of the matching								
Pseudo-R2	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.01
Rosenbaum bounds sensitivity test	1.7	1.6	1.4	2	1.8	1.4	1.5	1.5
Standardized bias (p-value)	0.46	0.46	0.45	0.97	0.90	0.84	0.46	0.84

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Table 4: Matching results: Robustness—Additional controls

Treatment Variable: FR ATT: Differences in Inequality	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Robustness checks								
[1] Adding Fix exchange regime	-0.0206**	-0.0156**	-0.0173**	-0.0186***	-0.0165***	-0.0171***	-0.0167***	-0.0170***
	(0.00853)	(0.00791)	(0.00718)	(0.00691)	(0.00591)	(0.00511)	(0.00549)	(0.00538)
[2] Adding Floating exchange regime	-0.0197**	-0.0164**	-0.0188***	-0.0179***	-0.0165***	-0.0158***	-0.0158***	-0.0156***
	(0.00870)	(0.00767)	(0.00713)	(0.00643)	(0.00611)	(0.00566)	(0.00536)	(0.00549)
[3] Adding CBI regular turnover	-0.0163*	-0.0185**	-0.0162**	-0.0190***	-0.0179***	-0.0183***	-0.0186***	-0.0185***
	(0.00922)	(0.00815)	(0.00766)	(0.00678)	(0.00618)	(0.00551)	(0.00548)	(0.00577)
[4] Adding CBI irregular turnover	-0.0169*	-0.0162**	-0.0167**	-0.0184***	-0.0165***	-0.0172***	-0.0179***	-0.0170***
	(0.00874)	(0.00752)	(0.00726)	(0.00679)	(0.00621)	(0.00558)	(0.00548)	(0.00558)
[5] Adding Debt default dummy	-0.0140*	-0.0146*	-0.0143**	-0.0180***	-0.0166***	-0.0172***	-0.0176***	-0.0173***
	(0.00848)	(0.00750)	(0.00721)	(0.00656)	(0.00627)	(0.00554)	(0.00505)	(0.00539)
[6] Adding Resource-Rich country dummy	-0.0249***	-0.0192**	-0.0221***	-0.0245***	-0.0223***	-0.0248***	-0.0254***	-0.0247***
	(0.00963)	(0.00888)	(0.00780)	(0.00737)	(0.00670)	(0.00625)	(0.00622)	(0.00615)
[7] Using IT Default date	-0.0257***	-0.0220***	-0.0186***	-0.0161**	-0.0169***	-0.0171***	-0.0169***	-0.0171***
	(0.00848)	(0.00757)	(0.00714)	(0.00646)	(0.00628)	(0.00534)	(0.00563)	(0.00529)

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

4.3. An alternative estimation method

To check if our main results based on PSM still hold when using an alternative technique, we draw upon the entropy balancing method of Hainmueller (2012)—see Neuenkirch and Neumeier (2016) and Balima et al. (2018) for a presentation of the method. Table 5a shows that a simple comparison of main control variables' averages in countries that adopted FR (column [1]) and that did not adopt FR (column [2]) reveals statistically-significant differences for almost all variables (column [4]). To neutralize the potential influence of such differences on the treatment effect, we compute a synthetic control group by applying weights to non-FR observations such as the average of variables in this group (column [5]) is not statistically different from their average in the FR group (column [2]), as in column [7].

Table 5a: Building the synthetic control group

Variables	[1] Non-FR	[2] FR	[3]=[1]-[2] difference	[4] p_value	[5] W_Non-FR	[6]=[5]-[2] difference	[7] p_value
L.real gdppc growth	-7.427	2.319	-9.746	0.000	2.963	0.644	0.738
L.debt	60.867	53.697	7.17	0.034	56.32	2.623	0.873
L.dependency ratio	70.262	66.65	3.611	0.001	66.69	0.04	0.882
L.capital openness	-.248	.05	-.297	0.000	.151	0.101	0.928
L.inflation	.166	.047	.118	0.000	.0510	0.004	0.347
IT_conservative	.058	.226	-.168	0.000	.266	0.04	0.889
L.political risk	60.769	62.652	-1.883	0.001	62.439	-0.213	0.898
L.gov fractionalization	.195	.263	-.069	0.000	.273	0.01	0.955
Observations	807	285			285		

Table 5b: Robustness—Entropy balancing estimations

	[1] Baseline (Only FR)	[2] Country-FE (CFE)	[3] Time-FE (TFE)	[4] CFE & TFE (CTFE)	[5] Main Controls (MC)	[6] MC and CFE	[7] MC and TFE	[8] MC and CTFE
FR	-0.0162***	-0.0116***	-0.0122***	-0.0069***	-0.0170***	-0.0097***	-0.0074*	-0.0069***
	(0.00420)	(0.00208)	(0.00442)	(0.00235)	(0.00385)	(0.00218)	(0.00399)	(0.00242)
Obs.	1142							

Note: Unreported constant included. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Using these weights, Table 5b reports weighted least squares estimations. Column [1] shows that countries that adopted FR present significantly lower IQ with respect to comparable countries that did not adopt FR (and the magnitude of the estimated coefficient is close to our findings based on the PSM method). Next, we take advantage of the possibility of modeling the panel dimension with the entropy balancing method, and include country-fixed effects (CFE), time-fixed effects (TFE), and both CFE and TFE. According to columns [2]-[4], the decrease of IQ remains significant in the presence of fixed effects. Moreover, a significant effect is still at work when we add in column [5] the set of eight main control variables used in our PSM benchmark estimation. Finally, comparable results arise when combining the main control

variables with different fixed effects in columns [6]-[8]. Consequently, the use of an alternative method, i.e. entropy balancing, allowing controlling for unobservables through both country and time fixed effects confirms our previous conclusion based on the PSM of a favorable impact of FR on IQ.

4.4. Alternative samples

We now look at the robustness of our benchmark findings when changing the sample. First, we drop former Soviet Union countries due to their particular structural characteristics. Second, we abstract of post-Cold War years (1990-1995) during which many countries experienced particular dynamics of their economies. Third, we look if our results still hold when abstracting of fuel exporter countries. Fourth, we drop hyperinflation episodes, defined by annual inflation rates above 40%. Fifth, we ignore the recent financial crisis years (2008-2009). Sixth, we extend our sample to include the group of developed countries. As illustrated by ATTs reported on lines [1]-[6] in Table 6a, the effect of FR adoption on IQ is significant and in some cases of a higher magnitude compared with our benchmark findings. In addition, Table 6b shows that these results remain robust in the presence of additional control variables, since at least 6 out of 8 ATTs are significant (at least at the 10% significance level) in each set of estimated ATTs (i.e. except for two sets when dropping post-Cold War years), namely in 40 out of the 42 sets of estimated ATTs.[50] Altogether, these results support the robustness of our main findings.

[50] To save space, full results are reported in the Appendix B.

Table 6a: Matching results: Robustness—Alternative samples

Treatment Variable: FR ATT: Differences in Inequality	**1-Nearest Neighbor Matching**	**2-Nearest Neighbor Matching**	**3-Nearest Neighbor Matching**	**Radius Matching**			**Local Linear Regression Matching**	**Kernel Matching**
				r=0.005	**r=0.01**	**r=0.05**		
				Dependent variable: Gini Index				
[1] Dropping former Soviet Union countries	-0.0195**	-0.0173**	-0.0166**	-0.0166**	-0.0184***	-0.0227***	-0.0233***	-0.0228***
	(0.00877)	(0.00822)	(0.00734)	(0.00692)	(0.00680)	(0.00574)	(0.00580)	(0.00582)
[2] Dropping post-Cold War years	-0.0150*	-0.0148*	-0.0143*	-0.0138**	-0.0134**	-0.0100*	-0.0112**	-0.0101*
	(0.00856)	(0.00827)	(0.00764)	(0.00667)	(0.00624)	(0.00528)	(0.00560)	(0.00557)
[3] Dropping fuel exporters countries	-0.0252***	-0.0221***	-0.0267***	-0.0279***	-0.0247***	-0.0235***	-0.0242***	-0.0236***
	(0.00879)	(0.00770)	(0.00769)	(0.00692)	(0.00630)	(0.00559)	(0.00530)	(0.00563)
[4] Dropping hyperinflation countries	-0.0119	-0.0152*	-0.0173**	-0.0159**	-0.0162***	-0.0156***	-0.0157***	-0.0158***
	(0.00878)	(0.00788)	(0.00743)	(0.00640)	(0.00612)	(0.00567)	(0.00558)	(0.00529)
[5] Dropping financial crisis years	-0.0198**	-0.0182**	-0.0173**	-0.0188***	-0.0157**	-0.0176***	-0.0177***	-0.0179***
	(0.00996)	(0.00870)	(0.00796)	(0.00722)	(0.00694)	(0.00654)	(0.00606)	(0.00612)
[6] Including developed countries	-0.0392***	-0.0406***	-0.0434***	-0.0396***	-0.0382***	-0.0359***	-0.0354***	-0.0361***
	(0.0130)	(0.0126)	(0.0121)	(0.00734)	(0.00856)	(0.00963)	(0.0106)	(0.00980)

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Table 6b: Matching results: Robustness—Alternative samples & Additional Controls

Treatment Variable: FR Number of significant ATT coefficients (out of 8)	**Fix Exchange Regime**	**Floating Exchange Regime**	**CBI Regular Turnover**	**CBI Irregular Turnover**	**Debt Default Dummy**	**Resource Rich Countries**	**IT Default Dummy**
[1] Dropping former Soviet Union countries	8	8	8	8	8	8	8
[2] Dropping post-Cold War years	2	1	6	6	7	8	7
[3] Dropping fuel exporters countries	8	8	8	8	8	8	8
[4] Dropping hyperinflation countries	7	8	8	7	7	8	6
[5] Dropping financial crisis years	6	8	8	7	8	8	7
[6] Including developed countries	8	8	8	8	8	8	8

Note: reported ATT coefficients are significant at least at the 10% significance level.

V. Heterogeneity: the type of fiscal rule

The previous section confirmed that the favorable effect of FR adoption on IQ is robust. We now investigate possible sources of heterogeneity in this effect, related to the type of fiscal rule (this section), and the economic and structural environment (the next section).

As previously emphasized, the effect of FR on IQ transits through the way they affect government spending and revenues, fiscal consolidations, and fiscal aggregates. However, these variables may be affected in different ways by different FR; for example, according to e.g. Tapsoba (2012) or Combes et al. (2018), fiscal aggregates may respond differently in the presence of balanced budget rules (BBR), debt rules (DR), or expenditure rules (ER). Therefore, we look in the following if the effect of FR on IQ differs among these FR.[51]

5.1. Balanced budget rules (BBR)

Usually defined in relation with the overall balance, the structural balance, or the balance "over the cycle", BBR are aimed to ensure a sound and sustainable public finance by setting a numerical ceiling or target on the government budget balance.[52] Using the dummy variable BBR equal to 1 if a country has a BBR and to 0 otherwise, based on PS from Table C1a in Appendix C we report the ATT in Table 7a. ATTs are significant irrespective of the matching method, and the favorable effect on IQ is estimated to be up to -0.0214 (neighbor $n=2$).

We assess the robustness of these findings using the additional control variables from our benchmark analysis. All ATT in lines [2]-[8] in Table 7a are significant and, consistent with results on line [1], IQ decreases by up to 0.0294 (neighbor $n=1$, line [8]). Consequently, the favorable effect of BBR on IQ is slightly stronger (in absolute value) compared with that of all FR taken together. A possible explanation is that BBR may not affect total government spending (e.g. Dahan & Strawczinski, 2013) but mainly public investment (e.g. Guerguil et al., 2017), possibly leaving more room for spending that may be used to reduce IQ.

5.2. Debt rules (DR)

By setting an explicit limit on the stock of public debt (for example, the 60% debt/GDP ceiling of the SGP), DR are designed to ensure the convergence to a debt target. Although DR should provide an easy-to-communicate anchor to debt sustainability, they do not ensure a clear short-

[51] The low number of countries that adopted revenue rules does not allow investigating their impact.
[52] Examples of BBRs include (see e.g. IMF, 2009) the well-known 3% deficit-to-GDP ratio rule embodied in the Stability and Growth Pact (SGP); limits on structural deficits in line with the "fiscal compact" for EU countries; or the "over-the-cycle" rule that targets the average budget balance over the cycle (e.g. the UK).

run operational guidance for policymakers. While BBR and ER are more dominant in advanced and emerging countries, DR are the prevailing national rules in low-income countries (Schaechter et al., 2012).[53] Based on estimated PS (see Table C1b in Appendix C), line [1] in Table 7b reports the ATT. Similar to BBR, all eight ATTs are significant, but the size of the decrease in IQ is higher compared with BBR (up to -0.0279, neighbor $n=1$).

These strong effects are confirmed when accounting for additional variables in lines [2]-[8] of Table 7b: all estimated ATT are significant, and the favorable effect of DR on IQ is reinforced, namely up to -0.0418 (neighbor $n=1$, line [5]). Consequently, the effect of DR on IQ is of a stronger magnitude than that of BBR or all FR together. This may be because even if DR place a limit on public finance, this limit is ultimately not that tight and may leave enough room for public spending that are favorable for reducing IQ, while still providing an anchor for reducing the probability of fiscal consolidations that may be detrimental for IQ.

5.3. Expenditure rules (ER)

ER are aimed to limit the total, primary, or current spending, by setting a ceiling on their growth rate or as a ratio of GDP. The most important feature of ER is that they can directly target the government size (Schaechter et al., 2012).[54] Using the dummy variable ER, equal to 1 for countries that have adopted ER and to 0 otherwise, we use PS (from Table C1c in Appendix C) to estimate the ATT of ER adoption on IQ in Table 7c. Contrary to results for all FR, BBR, and DR, the positive (and significant in 7 out of 8 cases) ATTs suggesting that ER adoption *increases* IQ. The magnitude of this effect is fairly strong, between 0.0359 (neighbor $n=0.1$) and 0.0413 (Kernel matching).

When accounting for additional variables, ATTs in Table 7c are significant in at least 5 out of 8 cases for each of the lines [2]-[8] (except on line [7]), and the detrimental effect of ER adoption on IQ may climb up to almost 0.06 (neighbor $n=1$, line [3]). This harmful impact may be related to the fact that, not only ER do not affect taxes (which may be increased under BBR or DR, with favorable effects on IQ in the presence of progressive taxes), but they directly constrain government spending (Tapsoba, 2012), whose reduction may directly affect spending designed to reduce IQ.

[53] To balance flexibility and sustainability, some countries (e.g. Mauritius) included formal escape clause provisions that allow for temporary deviations from their debt rule. Furthermore, to avoid missing the target, some countries (e.g. Slovakia) include automatic correction mechanisms that take effect when the debt-to-GDP ratio reaches a certain level below the target.

[54] Examples of ER include a nominal expenditure ceiling for the central government (e.g. Sweden), or public expenditure levels below 30% of GDP (e.g. Namibia).

Table 7a: Matching results—BBR dummy as the treatment variable

Treatment Variable: BBR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Dependent variable: Gini Index								
[1] ATT: Differences in Inequality	-0.0183**	-0.0214***	-0.0205***	-0.0210***	-0.0196***	-0.0195***	-0.0201***	-0.0195***
	(0.00878)	(0.00763)	(0.00720)	(0.00588)	(0.00561)	(0.00536)	(0.00526)	(0.00507)
Observations/treated observations	1152/245							
Quality of the matching								
Pseudo-R2	0.006	0.006	0.005	0.001	0.001	0.001	0.006	0.001
Rosenbaum bounds sensitivity test	1.3	1.5	1.6	1.7	1.6	1.6	1.7	1.6
Standardized bias (p-value)	0.83	0.83	0.89	0.99	0.99	0.99	0.83	0.99
Robustness checks								
[2] Adding Fix exchange regime	-0.0189**	-0.0233***	-0.0240***	-0.0204***	-0.0202***	-0.0196***	-0.0201***	-0.0196***
	(0.00926)	(0.00821)	(0.00750)	(0.00652)	(0.00537)	(0.00501)	(0.00550)	(0.00512)
[3] Adding Floating exchange regime	-0.0156*	-0.0164**	-0.0202***	-0.0202***	-0.0204***	-0.0196***	-0.0201***	-0.0196***
	(0.00855)	(0.00753)	(0.00735)	(0.00606)	(0.00554)	(0.00548)	(0.00539)	(0.00511)
[4] Adding CBI regular turnover	-0.0200**	-0.0233***	-0.0224***	-0.0219***	-0.0217***	-0.0199***	-0.0212***	-0.0202***
	(0.00865)	(0.00775)	(0.00748)	(0.00579)	(0.00580)	(0.00517)	(0.00545)	(0.00569)
[5] Adding CBI irregular turnover	-0.0157*	-0.0163**	-0.0184**	-0.0198***	-0.0213***	-0.0210***	-0.0219***	-0.0211***
	(0.00952)	(0.00774)	(0.00725)	(0.00623)	(0.00592)	(0.00529)	(0.00526)	(0.00533)
[6] Adding Debt default dummy	-0.0247***	-0.0239***	-0.0207***	-0.0216***	-0.0217***	-0.0214***	-0.0212***	-0.0212***
	(0.00859)	(0.00761)	(0.00703)	(0.00650)	(0.00550)	(0.00529)	(0.00507)	(0.00532)
[7] Adding Resource-Rich country dummy	-0.0261***	-0.0220***	-0.0257***	-0.0285***	-0.0277***	-0.0249***	-0.0259***	-0.0253***
	(0.00895)	(0.00836)	(0.00835)	(0.00689)	(0.00642)	(0.00624)	(0.00680)	(0.00639)
[8] Using IT Default date	-0.0294***	-0.0277***	-0.0230***	-0.0186***	-0.0197***	-0.0194***	-0.0201***	-0.0195***
	(0.00828)	(0.00802)	(0.00705)	(0.00594)	(0.00552)	(0.00547)	(0.00530)	(0.00503)

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Table 7b: Matching results—DR dummy as the treatment variable

Treatment Variable: DR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Dependent variable: Gini Index								
[1] ATT: Differences in Inequality	-0.0279***	-0.0218**	-0.0237***	-0.0220***	-0.0267***	-0.0261***	-0.0261***	-0.0258***
	(0.00980)	(0.00904)	(0.00825)	(0.00695)	(0.00691)	(0.00621)	(0.00600)	(0.00582)
Observations/treated observations	1152/205							
Quality of the matching								
Pseudo-R2	0.008	0.003	0.003	0.001	0.002	0.002	0.008	0.002
Rosenbaum bounds sensitivity test	1.6	1.4	1.5	1.6	1.9	1.9	2	1.9
Standardized bias (p-value)	0.75	0.97	0.98	0.99	0.99	0.98	0.75	0.99
Robustness checks								
[2] Adding Fix exchange regime	-0.0180*	-0.0200**	-0.0240***	-0.0218***	-0.0249***	-0.0264***	-0.0271***	-0.0256***
	(0.0104)	(0.00901)	(0.00802)	(0.00731)	(0.00669)	(0.00595)	(0.00626)	(0.00629)
[3] Adding Floating exchange regime	-0.0188*	-0.0201**	-0.0193**	-0.0208***	-0.0268***	-0.0261***	-0.0271***	-0.0257***
	(0.00979)	(0.00871)	(0.00818)	(0.00742)	(0.00680)	(0.00644)	(0.00663)	(0.00588)
[4] Adding CBI regular turnover	-0.0192*	-0.0261***	-0.0253***	-0.0262***	-0.0236***	-0.0264***	-0.0271***	-0.0265***
	(0.0105)	(0.00944)	(0.00852)	(0.00726)	(0.00676)	(0.00612)	(0.00634)	(0.00667)
[5] Adding CBI irregular turnover	-0.0418***	-0.0300***	-0.0294***	-0.0276***	-0.0256***	-0.0280***	-0.0273***	-0.0270***
	(0.0105)	(0.00949)	(0.00855)	(0.00746)	(0.00745)	(0.00654)	(0.00657)	(0.00638)
[6] Adding Debt default dummy	-0.0271***	-0.0216**	-0.0221**	-0.0253***	-0.0245***	-0.0264***	-0.0264***	-0.0261***
	(0.00962)	(0.00875)	(0.00862)	(0.00710)	(0.00706)	(0.00620)	(0.00592)	(0.00594)
[7] Adding Resource-Rich country dummy	-0.0162*	-0.0191**	-0.0224***	-0.0241***	-0.0232***	-0.0253***	-0.0266***	-0.0251***
	(0.00943)	(0.00873)	(0.00847)	(0.00726)	(0.00660)	(0.00597)	(0.00656)	(0.00624)
[8] Using IT Default date	-0.0314***	-0.0232**	-0.0223***	-0.0209***	-0.0265***	-0.0261***	-0.0260***	-0.0258***
	(0.0103)	(0.00934)	(0.00829)	(0.00718)	(0.00617)	(0.00628)	(0.00607)	(0.00640)

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Table 7c: Matching results—ER dummy as the treatment variable

Treatment Variable: ER	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Dependent variable: Gini Index								
[1] ATT: Differences in Inequality	0.0362*	0.0362*	0.0359**	0.0241	0.0405**	0.0412***	0.0365**	0.0413**
	(0.0194)	(0.0197)	(0.0183)	(0.0268)	(0.0203)	(0.0154)	(0.0150)	(0.0169)
Observations/treated observations	619/53							
Quality of the matching								
Pseudo-R2	0.10	0.06	0.04	0.008	0.03	0.03	0.10	0.03
Rosenbaum bounds sensitivity test	1.8	1.5	1.5	1.1	1.4	1.5	1.3	1.5
Standardized bias (p-value)	0.07	0.28	0.59	0.99	0.90	0.79	0.07	0.81
Robustness checks								
[2] Adding Fix exchange regime	0.0507**	0.0446**	0.0426**	0.0193	0.0226	0.0437***	0.0388**	0.0436***
	(0.0211)	(0.0203)	(0.0185)	(0.0248)	(0.0216)	(0.0152)	(0.0160)	(0.0149)
[3] Adding Floating exchange regime	0.0597***	0.0418**	0.0430**	0.00268	0.0224	0.0435***	0.0385***	0.0438***
	(0.0212)	(0.0193)	(0.0173)	(0.0271)	(0.0225)	(0.0162)	(0.0146)	(0.0161)
[4] Adding CBI regular turnover	0.0409	0.0539***	0.0528***	0.00899	0.0253	0.0479***	0.0457***	0.0489***
	(0.0252)	(0.0208)	(0.0193)	(0.0303)	(0.0251)	(0.0177)	(0.0159)	(0.0170)
[5] Adding CBI irregular turnover	0.0491**	0.0436**	0.0412**	-0.0106	0.0125	0.0484***	0.0437***	0.0450**
	(0.0249)	(0.0214)	(0.0190)	(0.0282)	(0.0221)	(0.0171)	(0.0163)	(0.0178)
[6] Adding Debt default dummy	0.0430**	0.0474**	0.0447***	0.0347	0.0340	0.0446***	0.0439***	0.0445***
	(0.0214)	(0.0191)	(0.0161)	(0.0282)	(0.0231)	(0.0154)	(0.0154)	(0.0150)
[7] Adding Resource-Rich country dummy	0.0462*	0.0413*	0.0313	-0.0152	0.000196	0.0297	0.0342*	0.0278
	(0.0276)	(0.0234)	(0.0215)	(0.0264)	(0.0224)	(0.0197)	(0.0190)	(0.0189)
[8] Using IT Default date	0.0497**	0.0383*	0.0401**	0.0299	0.0393*	0.0410**	0.0364**	0.0419***
	(0.0239)	(0.0196)	(0.0174)	(0.0262)	(0.0210)	(0.0169)	(0.0146)	(0.0142)

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

5.4. Combined types of fiscal rules

The trend of the last decade is for countries to adopt multiple FR, and particularly combine BBR with DR or ER (Eyraud et al., 2018). We analyze such combined effects of our three FR on IQ using three combinations of two rules (considering all three rules together leads to too few—eleven—treated observations for robust statistical inference). In each case, the treatment variable is a dummy variable equal to 1 if both rules are adopted, and to 0 if not (i.e. if none or only one rule is adopted). Matching results in Table 8 show the following.

First, the joint presence of BBR and DR significantly reduces IQ (line [1]), confirming individual results for BBR and DR. The magnitude of this favorable effect is slightly stronger than that of BBR or DR alone (up to -0.0312), suggesting some complementarities between them for reducing IQ. Second, the joint effect of DR and ER is not significant (line [2]), which may reproduce the conflicting effects of DR alone (decrease) and ER alone (increase) on IQ. Third, the joint influence of BBR and ER is equally mostly not significant (line [3]), reflecting yet again the conflicting effects of BBR and ER alone.

Altogether, these results (which are robust in the presence of additional control variables in Tables C2a-b-c in Appendix C) show that combining different FR should be done with caution in terms of IQ. On the one hand, the detrimental effect of ER adoption on IQ can be neutralized by the presence of either BBR or DR; and the presence of both BBR and DR reduces IQ by more compared to their individual effect. However, on the other hand, the adoption of ER reduces the favorable effects of BBR or DR alone.

Table 8: Matching results—combined types of FR

	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
				Dependent variable: Gini index				
Treatment Variable: BBR*DR Dummy	-0.0231**	-0.0312***	-0.0295***	-0.0275***	-0.0260***	-0.0242***	-0.0226***	-0.0239***
[1] ATT: Differences in Inequality	(0.0108)	(0.00987)	(0.00898)	(0.00755)	(0.00823)	(0.00743)	(0.00706)	(0.00660)
Observations/treated observations				1152/173				
Treatment Variable: DR*ER Dummy	-0.0359	-0.0130	-0.00410	0.00159	-0.00368	-0.000283	0.00316	0.00121
[2] ATT: Differences in Inequality	(0.0279)	(0.0252)	(0.0226)	(0.0337)	(0.0291)	(0.0171)	(0.0154)	(0.0178)
Observations/treated observations				979/27				
Treatment Variable: BBR*ER Dummy	0.0530	0.0625*	0.0517	-0.0152	0.0168	0.0592*	0.0464	0.0576*
[3] ATT: Differences in Inequality	(0.0375)	(0.0357)	(0.0325)	(0.0397)	(0.0381)	(0.0346)	(0.0338)	(0.0344)
Observations/treated observations				934/26				

Note: standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

VI. Heterogeneity: different economic and structural environments

The previous section revealed that the effect of FR adoption on IQ varies with the type of FR. At the same time, to account for possible differences among the countries in our sample, we consider a large set of potential sources of heterogeneity related to fiscal, monetary, international, political, and other structural variables. We explore such heterogeneities using a control function regression approach (e.g. Tapsoba, 2012)

$$IQ_{it} = \alpha + \beta FR_{it} + \gamma PScore_{it} + \delta X_{it} + \phi FR_{it} X_{it} + \varepsilon_{it}, \quad (4)$$

with $PScore$ the estimated PS from the benchmark model, and X the vector of variables that may be a source of heterogeneity. A significant coefficient of interest ϕ signals the presence of heterogeneity in the treatment effect. We look at all FR together and then at each rule.

6.1. All fiscal rules

Column [1] in Table 9 shows that FR significantly decrease IQ on average by 0.0164, comparable with our benchmark results. From column [2] onwards we report only estimations in which the interactive effect between the considered variables and FR (i.e. the coefficient ϕ) is significant at least at the 10% significance level.

First, columns [2]-[4] show that all fiscal variables significantly reduce IQ when combined with FR, suggesting that the favorable effects of FR on IQ may be amplified when FR are in place in a deteriorated fiscal space. Second, regarding monetary variables, columns [5]-[6] reveal that the favorable effect of FR alone on IQ is enforced in the presence of floating exchange rates (while mitigated under fixed exchange rates), suggesting that floating exchange rates may better absorb various types of shocks that could lower the favorable effect of FR on IQ. Third, among international variables, higher trade combined with FR significantly reduces IQ (column [7]), as access to international markets for goods and services may foster the efficiency of spending designed to reduce IQ within FR-based fiscal policy frameworks. Fourth, all political environment variables, namely the degree of political stability, the absence of internal conflicts, and the absence of ethnic tensions, reduce IQ when combined with FR (columns [8]-[10]), possibly because better political conditions may support more stable fiscal institutions in which the compliance with FR can be combined with more judicious spending policies, including in terms of distributional goals.

Table 9: Heterogeneity in the treatment effect—all FR

	[1]	[2]	[3]	[4]	[5]	[6]	[7]
FR	-0.0164***	-0.0194***	-0.00317	-0.0114**	-0.0191***	-0.0556***	0.00794
	(0.00469)	(0.00507)	(0.00660)	(0.00580)	(0.00486)	(0.0166)	(0.0121)
PSCORE		0.0340**	0.0285**	0.0167	0.0425***	0.0418***	0.0211
		(0.0134)	(0.0135)	(0.0136)	(0.0139)	(0.0140)	(0.0134)
Debt default		0.0163***					
		(0.00534)					
FR*Debt default		-0.0492***					
		(0.00995)					
Gross debt			0.0179***				
			(0.00498)				
FR*Gross debt			-0.0351***				
			(0.00952)				
Short term debt				0.0182***			
				(0.00490)			
FR*ST debt				-0.0180*			
				(0.00980)			
Floating regime					0.0414***		
					(0.00870)		
FR*Float. regime					-0.0409**		
					(0.0173)		
Fix regime						-0.0369***	
						(0.00864)	
FR*Fix regime						0.0366**	
						(0.0173)	
Trade							-0.0206***
							(0.00646)
FR*Trade							-0.0323**
							(0.0127)
Observations	1185	1146	1185	1185	1185	1185	1185

Table 9 (continued): Heterogeneity in the treatment effect—all FR

	[8]	[9]	[10]	[11]	[12]	[13]	[14]
FR	0.00176	-0.00770	-0.00837	-0.0495***	0.0381	-0.0235***	-0.0310***
	(0.00707)	(0.00693)	(0.00637)	(0.00778)	(0.0234)	(0.00512)	(0.00587)
PSCORE	0.0213	0.0190	0.0219	0.0252*	0.147***	0.0172	0.0252*
	(0.0139)	(0.0135)	(0.0134)	(0.0134)	(0.0273)	(0.0137)	(0.0133)
Political stability	0.00410						
	(0.00509)						
FR*Pol. stability	-0.0359***						
	(0.00923)						
Internal conflict		-0.00713					
		(0.00474)					
FR*Int. conflict		-0.0198**					
		(0.00918)					
Ethnic tensions			0.00408				
			(0.00477)				
FR*Eth. tensions			-0.0229**				
			(0.00942)				
GDP growth				-0.00175***			
				(0.000666)			
FR*GDP growth				0.00683***			
				(0.00134)			
Sec. education					-0.00716		
					(0.0125)		
FR*Sec. educ.					-0.00142***		
					(0.000425)		
Mineral rents						-0.0000119	
						(0.000694)	
FR*Min. rents						0.00274**	
						(0.00109)	
Saving glut							-0.0112**
							(0.00526)
FR*Saving glut							0.0291***
							(0.00975)
Observations	1185	1185	1185	1185	216	1185	1185

Notes: unreported constant included. Standard errors in parentheses. *p<0.10, **p<0.05, ***p<0.01.

Finally, our last set of variables captures other structural characteristics. Column [11] shows that higher economic growth mitigates the favorable effect of FR on IQ, to the point where above a certain growth rate FR increase IQ probably due to poor redistribution. Next, despite relatively few available observations, education is found to reduce IQ when combined with FR (column [12]), since a more educated population could sustain government policies incorporating public spending designed for combating IQ. Moreover, the interactive term between mineral rents and FR is positive (column [13]), suggesting that in our sample of developing countries important mineral rents may increase IQ when combined with FR, possibly echoing the famous "Dutch disease". Lastly, column [14] indicates that the favorable effect of FR on IQ was mitigated during the saving glut (2000-06), possibly due to a shortage of public spending aimed at reducing IQ.

6.2. Different types of fiscal rules

We now look at heterogeneities for each type of FR. To save space (see APPENDIX D for the whole results), Table 10 reports only the coefficient of the interactive term between each variable and each FR, namely significant (at least at the 10% level) & positive (+), significant & negative (–), or not significant (NS).

Table 10. Heterogeneity by type of fiscal rule

	[1] All FR	**[2] BBR**	**[3] DR**	**[4] ER**
Fiscal variables				
Debt default	–	–	NS	NS
Gross debt	–	–	NS	–
Short term debt	–	NS	–	–
Government size	NS	–	–	NS
Monetary variables				
Inflation rate	NS	NS	NS	NS
Broad money	NS	+	+	–
Floating regime	–	NS	+	+
Fix regime	+	NS	–	–
International variables				
Trade	–	NS	NS	–
FDI Inflows	NS	NS	NS	NS
Capital openness	NS	NS	NS	–
Political variables				
Political stability	–	–	NS	–
Internal conflict	–	NS	NS	–
Ethnic tensions	–	NS	–	NS
Other structural variables				
Growth rate of GDP	+	+	+	+
Secondary education	–	–	–	–
Mineral rents	+	+	–	+
Post crisis	NS	NS	NS	–
Saving glut	+	+	NS	+
Time	NS	NS	NS	+

Note: the interaction term between each variable and the corresponding type of fiscal rule can be +, –, or NS, namely significant (at least at the 10% level) & positive, significantly & negative, and not significant.

Table 10 shows that whenever significant the coefficient of the interaction term between FR and fiscal variables is negative, similar to FR altogether (column [1]). However, in addition to the fiscal stance, the type of FR is of crucial importance: except for short term debt, all other fiscal variables reduce IQ when combined with BBR; only when combined with larger short term debt and higher government size do DR significantly reduce IQ; and a larger government size contributes to the IQ reduction triggered by all FR, except ER. Next, a larger broad money ratio decreases the favorable (unfavorable) effect of BBR and DR (ER) on IQ; however, the interactive term between the exchange rate regimes and BBR is not significant, contrary to their significant impact when combined with DR and ER. Moreover, irrespective of the considered international variable, its interaction with BBR and DR does not significantly affect IQ; on the contrary, both trade and capital openness reduce the positive effect of ER on IQ, and may even turn it into negative for large enough values of these variables. Furthermore, whenever significant, the interactive coefficient between political variables and the various types of FR is negative; in particular, higher political stability and lower internal conflicts significantly reduce the unfavorable effect of ER on IQ, to the point where, for good enough political conditions, the overall effect of ER may turn into negative. Finally, the influence of the other structural variables mostly echoes the results obtained for all FR; in particular, when combined with various FR, higher economic growth rates and mineral rents, and the saving glut period are detrimental for IQ (except in some cases for DR), while the opposite holds for the secondary education. Nevertheless, although the harmful effect of ER on IQ increases with the time since the ER was adopted, during the post crisis period (from 2008 onwards) ER have been less detrimental for IQ.

Altogether, the type of FR is crucial when assessing the effect of different variables on IQ: compared with results for all FR, in some cases the interactive effect may become significant, or, on the contrary, turn into not significant. Moreover, important heterogeneities are at work across various FR for most of the considered variables. Finally, the damaging effect of ER on IQ is weakened when combined with some of the considered variables.

VII. Conclusion

This paper asked if fiscal rules can curb inequality. Estimations performed in a large sample of developing countries revealed that FR adoption significantly reduces IQ. This economically meaningful effect is robust across multiple alternative specifications. However, the type of FR matters, since only some budget balance and debt rules reduce IQ, while expenditure rules *increase* it. Finally, important heterogeneities were unveiled in the significance, sign, and magnitude of the effect of FR on IQ, depending on various factors.

Consequently, our analysis contributes to the literature devoted to identifying policies that may reduce IQ. Even if FR may not be originally designed to fight IQ, the important side effect we unveiled suggests that they should not be treated as neutral in terms of IQ. Instead, we provide several insights that may contribute to the design and implementation of appropriate FR with the goal of curbing IQ. Through extending our analysis to include the effect of FR on economic growth, future research could explore the way various types of FR may deal with the famous equality-efficiency tradeoff suggested by Okun (1975).

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APPENDICES

APPENDIX A. DESCRIPTIVE STATISTICS

Table A1. The list of countries, and the starting dates of FR

a. List of Fiscal Rules (FR) and Non-FR countries

Non-FR	FR
Albania	Argentina
Algeria	Armenia
Belarus	Benin
Bolivia	Brazil
Cambodia	Bulgaria
China	Burkina Faso
Djibouti	Burundi
Dominican Republic	Cabo Verde
Egypt, Arab Rep.	Cameroon
El Salvador	Chile
Ethiopia	Colombia
Fiji	Costa Rica
Ghana	Cote d'Ivoire
Guatemala	Croatia
Guinea	Ecuador
Honduras	Equatorial Guinea
Jordan	Guinea-Bissau
Kazakhstan	Hungary
Kyrgyz Republic	India
Lao PDR	Indonesia
Lebanon	Iran, Islamic Rep.
Macedonia, FYR	Malaysia
Madagascar	Mali
Malawi	Mauritius
Mauritania	Mexico
Moldova	Mongolia
Morocco	Namibia
Nicaragua	Niger
Philippines	Pakistan
Qatar	Panama
Sierra Leone	Paraguay
South Africa	Peru
Tajikistan	Poland
Thailand	Romania
Tunisia	Russian Federation
Turkey	Rwanda
Ukraine	Senegal
Venezuela, RB	Sri Lanka
Vietnam	Tanzania
Yemen, Rep.	Togo
Zambia	Uganda
Zimbabwe	Uruguay

b. Year of adoption of Fiscal Rules

FR	Year
Argentina	2000
Armenia	2008
Benin	2000
Brazil	2000
Bulgaria	2003
Burkina Faso	2000
Burundi	2013
Cabo Verde	1998
Cameroon	2002
Chile	2001
Colombia	2000
Costa Rica	2001
Cote d'Ivoire	2000
Croatia	2009
Ecuador	2003
Equatorial Guinea	2002
Guinea-Bissau	2000
Hungary	2004
India	2004
Indonesia	1990
Iran, Islamic Rep.	2010
Malaysia	1990
Mali	2000
Mauritius	2008
Mexico	2006
Mongolia	2013
Namibia	2001
Niger	2000
Pakistan	2005
Panama	2002
Paraguay	2015
Peru	2000
Poland	1999
Romania	2007
Russian Federation	2007
Rwanda	2013
Senegal	2000
Sri Lanka	2003
Tanzania	2013
Togo	2000
Uganda	2013
Uruguay	2006

Table A2. Description of variables, and sources

Variables	Descriptions	Sources
Gini index (SWIID)	Estimate of Gini index of inequality in equivalized (square root scale) household disposable (post-tax, post-transfer) income, using Luxembourg Income Study data as the standard.	Standardized World Income Inequality Database (SWIID)
Gini UNU-WIDER	Estimate of Gini index of inequality based on disposable income.	World Income Inequality Database (WIID)
IT default date	Binary variable taking the value 1 if in a given year a country operates informally under IT, zero otherwise. When we use the default starting dates of IT, we refer to soft IT.	Roger and Stone (2005); Roger (2009)
IT conservative date	Binary variable taking the value 1 if in a given year a country operates formally under IT, zero otherwise. When we use the conservative starting dates of IT, we refer to full-fledged IT.	
CBI regular turnover	Central banks governor's regular turnover dummy. It is equal to 1 if the change of governor takes place at the end of the official mandate and 0 otherwise. This is proxy of central bank independence.	Dreher et al. (2008, 2010); Sturm and de Haan (2001)
CBI irregular turnover	Central banks governor's irregular turnover dummy. It is equal to 1 if the change of governor takes place in an irregular manner and 0 otherwise. This is proxy of central bank independence.	
Political risk	It is a composite measure of the quality of governance. It represents a simple average of ICRG political variables. Higher value indicates low political risk.	Authors' calculations based on ICRG data
Debt default	Dummy equal to 1 if a country did not pay its debt or restructured it with a lost for investors, and 0 if there was no payment default or debt restructuring.	Reinhart and Rogoff (2009)
Capital openness	It captures the degree of financial openness.	Chinn and Ito (2006)
Fix regime	Dummy equal 1 if ER_Fine is classified as fix regime and 0 if not	Authors' construction based on Ilzetzki et al. (2017)
Floating regime	Dummy equal 1 if ER_Fine is classified as floating regime and 0 if not	
Real GDP pc growth	Annual growth rate of real output per capita.	World Economic Outlook.
Resource-rich country	Dummy equal to 1 if a country is a resource-rich one and 0 if not	IMF Fiscal Monitor
Gross debt/GDP	General government gross debt, % of GDP (Government debt sustainability)	Kose et al. (2017)
External debt/GDP	Total external debt stocks, % of GDP (External public and private sector debt)	
Short term debt/Total debt	Short term external debt stocks, % of total (External and private sector debt)	
Government fractionalization	Index measuring the probability that two deputies picked at random among from the government parties will be of different parties.	World Bank DPI database
FDI inflows	Net inflows (new investment inflows less disinvestment) in a given economy from foreign investors, divided by GDP.	World Development Indicators (WDI)
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimates give a country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Trade	Sum of exports and imports of goods and services, % of GDP.	
Secondary education	Secondary duration refers to the number of grades (years) in secondary school.	
Mineral rents	The difference between the value of production for minerals at world prices and their total costs of production. Minerals included in the calculation are tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate.	
Government size	General government final consumption expenditure, % of GDP.	
Inflation	Annual percentage change of consumer price index	
Broad money/GDP	Sum of currency outside banks, demand deposits other than those of the central government, the time, savings, and foreign currency deposits of resident sectors other than the central government, bank and traveler's checks, and other securities such as certificates of deposit and commercial paper, % of GDP	

Dependency ratio	The ratio of dependent people younger than 15 or older than 64 to the working-age population (aged 15-64), in ratio of dependents per 100 working-age people.	
GDP growth	Annual percentage growth rate of GDP	
Internal conflict	Political violence and its actual or potential impact on governance. The highest (lowest) score signals no armed or civil opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people (a country embroiled in an on-going civil war).	
Ethnic tensions	The degree of tension within a country attributable to racial, nationality, or language divisions. Higher values signal lower tensions.	
Post crisis	Dummy equal to 1 for the period from 2008 onwards.	Authors' construction
Saving glut	Dummy equal to 1 for the period 2000-2006.	
Time	It captures the time length since fiscal rule adoption	

Table A3. Descriptive statistics of variables

Variable	Obs	Mean	Std.Dev.	Min	Max
Gini index	1950	.408	.073	.203	.587
Real GDP pc growth	2112	-5.273	19.1	-98.193	110.785
External Debt/GDP	2022	57.888	44.035	.493	583.866
Dependency ratio	2184	69.073	19.708	16.453	119.139
Capital openness	2066	-.172	1.396	-1.904	2.374
Inflation	1953	15.615	53.813	-8.484	951.962
IT conservative date	2184	.097	.295	0	1
Political risk	1740	61.233	9.765	10.33	86.58
Government fractionalization	1788	.209	.268	0	.893
Fix regime	2184	.89	.313	0	1
Floating regime	2184	.099	.299	0	1
CBI regular turnover	1925	.041	.197	0	1
CBI irregular turnover	1924	.141	.348	0	1
Debt default	1625	.215	.411	0	1
Resource-rich country	2184	.286	.452	0	1
IT default date	2184	.101	.302	0	1
Gini index UNU-WIDER	591	.419	.096	.196	.771
Gross debt/GDP	1612	54.091	35.732	.089	260.964
Short term debt/Total Debt	2023	13.531	13.502	0	98.994
Government size	2068	14.368	5.949	2.047	88.983
Broad money/GDP	2060	62.78	563.598	4.894	18347.09
Trade	2112	75.124	39.884	13.753	531.737
FDI inflows	2101	3.566	6.08	-15.989	161.824
Political stability	1428	-.381	.781	-2.81	1.261
Internal conflict	1740	8.615	1.983	0	12
Ethnic tensions	1740	3.982	1.302	0	6
GDP growth	2146	4.096	6.569	-50.248	149.973
Secondary education	347	53.797	23.979	2.036	99.341
Mineral rents	2164	1.491	3.946	0	44.644
Post-crisis	2184	.308	.462	0	1
Saving glut	2184	.269	.444	0	1
Time	2184	1.855	4.162	0	26

APPENDIX B. ROBUSTNESS—Table B1-B6 (full results—related to Table 6b)

Table B1. Matching results—Dropping former Soviet Union countries

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0195**	-0.0173**	-0.0166**	-0.0166**	-0.0184***	-0.0227***	-0.0233***	-0.0228***
Differences in Inequality	(0.00877)	(0.00822)	(0.00734)	(0.00692)	(0.00680)	(0.00574)	(0.00580)	(0.00582)
Number of observations, of which	1071	1071	1071	1071	1071	1071	1071	1071
- treated observations	284	284	284	284	284	284	284	284
- control observations	787	787	787	787	787	787	787	787
	Quality of the matching							
Pseudo R2	0.01	0.008	0.009	0.004	0.006	0.003	0.01	0.003
Rosenbaum bounds sensitivity tests	1.4	1.3	1.4	1.5	1.5	1.8	1.8	1.8
Standardized biases (p-value)	0.36	0.61	0.47	0.89	0.71	0.96	0.36	0.95
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.0163*	-0.0178**	-0.0190**	-0.0166**	-0.0191***	-0.0221***	-0.0227***	-0.0223***
	(0.00842)	(0.00761)	(0.00745)	(0.00673)	(0.00642)	(0.00560)	(0.00555)	(0.00565)
[3] Adding Float Exchange Regime	-0.0195**	-0.0191**	-0.0173**	-0.0174***	-0.0196***	-0.0218***	-0.0225***	-0.0219***
	(0.00839)	(0.00784)	(0.00734)	(0.00676)	(0.00627)	(0.00561)	(0.00560)	(0.00569)
[4] Adding CBI regular turnover	-0.0261***	-0.0243***	-0.0232***	-0.0253***	-0.0220***	-0.0237***	-0.0248***	-0.0241***
	(0.00844)	(0.00790)	(0.00744)	(0.00722)	(0.00655)	(0.00618)	(0.00567)	(0.00556)
[5] Adding CBI irregular turnover	-0.0192**	-0.0246***	-0.0266***	-0.0242***	-0.0240***	-0.0230***	-0.0239***	-0.0233***
	(0.00871)	(0.00760)	(0.00723)	(0.00732)	(0.00696)	(0.00554)	(0.00559)	(0.00585)
[6] Adding Debt default dummy	-0.0251***	-0.0214***	-0.0202***	-0.0230***	-0.0229***	-0.0214***	-0.0217***	-0.0215***
	(0.00788)	(0.00824)	(0.00689)	(0.00647)	(0.00629)	(0.00543)	(0.00545)	(0.00538)
[7] Adding Resource-Rich country dummy	-0.0390***	-0.0305***	-0.0328***	-0.0341***	-0.0297***	-0.0314***	-0.0321***	-0.0313***
	(0.0100)	(0.00952)	(0.00872)	(0.00738)	(0.00721)	(0.00630)	(0.00684)	(0.00680)
[8] Using IT Default date	-0.0155*	-0.0203***	-0.0189**	-0.0156**	-0.0187***	-0.0227***	-0.0232***	-0.0227***
	(0.00820)	(0.00775)	(0.00738)	(0.00709)	(0.00652)	(0.00563)	(0.00554)	(0.00556)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B2. Matching results—Dropping post-Cold War years

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0150*	-0.0148*	-0.0143*	-0.0138**	-0.0134**	-0.0100*	-0.0112**	-0.0101*
Differences in Inequality	(0.00856)	(0.00827)	(0.00764)	(0.00667)	(0.00624)	(0.00528)	(0.00560)	(0.00557)
Number of observations, of which	940	940	940	940	940	940	940	940
- treated observations	279	279	279	279	279	279	279	279
- control observations	661	661	661	661	661	661	661	661
Quality of the matching								
Pseudo R2	0.008	0.002	0.001	0.002	0.001	0.001	0.008	0.001
Rosenbaum bounds sensitivity tests	1.2	1.2	1.2	1.3	1.3	1.2	1.2	1.2
Standardized biases (p-value)	0.61	0.97	0.99	0.99	0.99	0.99	0.61	0.99
Robustness checks								
[2] Adding Fix Exchange Regime	-0.00585	-0.00529	-0.00589	-0.00746	-0.0102	-0.00947	-0.0104*	-0.00915*
	(0.00892)	(0.00822)	(0.00771)	(0.00706)	(0.00642)	(0.00581)	(0.00537)	(0.00556)
[3] Adding Float Exchange Regime	-0.0134	-0.00936	-0.00804	-0.0103	-0.00912	-0.00917	-0.00999*	-0.00882
	(0.00857)	(0.00821)	(0.00719)	(0.00707)	(0.00606)	(0.00577)	(0.00540)	(0.00564)
[4] Adding CBI regular turnover	-0.0115	-0.0135	-0.0151**	-0.0158**	-0.0134**	-0.0125**	-0.0138**	-0.0124**
	(0.00927)	(0.00829)	(0.00756)	(0.00736)	(0.00620)	(0.00552)	(0.00564)	(0.00589)
[5] Adding CBI irregular turnover	-0.00400	-0.00988	-0.0130*	-0.0127*	-0.0160**	-0.0118**	-0.0127**	-0.0117**
	(0.00911)	(0.00841)	(0.00771)	(0.00706)	(0.00683)	(0.00568)	(0.00586)	(0.00528)
[6] Adding Debt default dummy	-0.0116	-0.0152*	-0.0179**	-0.0151**	-0.0126**	-0.0129**	-0.0138***	-0.0131**
	(0.00865)	(0.00778)	(0.00776)	(0.00706)	(0.00611)	(0.00540)	(0.00513)	(0.00563)
[7] Adding Resource-Rich country dummy	-0.0198**	-0.0225**	-0.0216**	-0.0257***	-0.0230***	-0.0210***	-0.0190***	-0.0210***
	(0.0101)	(0.00908)	(0.00844)	(0.00808)	(0.00744)	(0.00702)	(0.00702)	(0.00673)
[8] Using IT Default date	-0.0143	-0.0152*	-0.0141*	-0.0145**	-0.0115*	-0.0100*	-0.0112*	-0.0101*
	(0.00882)	(0.00793)	(0.00732)	(0.00702)	(0.00625)	(0.00576)	(0.00586)	(0.00546)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B3. Matching results—Dropping fuel exporters countries

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0252***	-0.0221***	-0.0267***	-0.0279***	-0.0247***	-0.0235***	-0.0242***	-0.0236***
Differences in Inequality	(0.00879)	(0.00770)	(0.00769)	(0.00692)	(0.00630)	(0.00559)	(0.00530)	(0.00563)
Number of observations, of which	1012	1012	1012	1012	1012	1012	1012	1012
- treated observations	263	263	263	263	263	263	263	263
- control observations	749	749	749	749	749	749	749	749
	Quality of the matching							
Pseudo R2	0.006	0.004	0.004	0.006	0.001	0.001	0.006	0.001
Rosenbaum bounds sensitivity tests	1.6	1.6	1.8	2	1.9	1.8	1.9	1.9
Standardized biases (p-value)	0.75	0.91	0.90	0.99	0.99	0.99	0.75	0.99
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.0316***	-0.0253***	-0.0281***	-0.0283***	-0.0252***	-0.0234***	-0.0242***	-0.0236***
	(0.00844)	(0.00795)	(0.00806)	(0.00676)	(0.00629)	(0.00536)	(0.00560)	(0.00583)
[3] Adding Float Exchange Regime	-0.0333***	-0.0262***	-0.0274***	-0.0274***	-0.0252***	-0.0235***	-0.0241***	-0.0236***
	(0.00844)	(0.00856)	(0.00751)	(0.00718)	(0.00612)	(0.00562)	(0.00557)	(0.00551)
[4] Adding CBI regular turnover	-0.0339***	-0.0292***	-0.0260***	-0.0273***	-0.0263***	-0.0242***	-0.0251***	-0.0239***
	(0.00915)	(0.00803)	(0.00768)	(0.00702)	(0.00641)	(0.00569)	(0.00548)	(0.00555)
[5] Adding CBI irregular turnover	-0.0175*	-0.0201***	-0.0213***	-0.0244***	-0.0228***	-0.0244***	-0.0252***	-0.0244***
	(0.00921)	(0.00773)	(0.00752)	(0.00685)	(0.00646)	(0.00570)	(0.00579)	(0.00549)
[6] Adding Debt default dummy	-0.0258***	-0.0199***	-0.0228***	-0.0258***	-0.0238***	-0.0241***	-0.0242***	-0.0242***
	(0.00883)	(0.00754)	(0.00727)	(0.00659)	(0.00619)	(0.00541)	(0.00521)	(0.00556)
[7] Adding Resource-Rich country dummy	-0.0381***	-0.0383***	-0.0366***	-0.0362***	-0.0364***	-0.0359***	-0.0390***	-0.0362***
	(0.0103)	(0.00975)	(0.00863)	(0.00771)	(0.00714)	(0.00706)	(0.00714)	(0.00711)
[8] Using IT Default date	-0.0205**	-0.0218***	-0.0217***	-0.0241***	-0.0237***	-0.0233***	-0.0241***	-0.0235***
	(0.00898)	(0.00825)	(0.00754)	(0.00678)	(0.00651)	(0.00563)	(0.00568)	(0.00544)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B4. Matching results—Dropping hyperinflation countries

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0119	-0.0152*	-0.0173**	-0.0159**	-0.0162***	-0.0156***	-0.0157***	-0.0158***
Differences in Inequality	(0.00878)	(0.00788)	(0.00743)	(0.00640)	(0.00612)	(0.00567)	(0.00558)	(0.00529)
Number of observations, of which	1093	1093	1093	1093	1093	1093	1093	1093
- treated observations	290	290	290	290	290	290	290	290
- control observations	803	803	803	803	803	803	803	803
	Quality of the matching							
Pseudo R2	0.007	0.004	0.005	0.003	0.004	0.003	0.007	0.004
Rosenbaum bounds sensitivity tests	1.2	1.3	1.4	1.4	1.4	1.4	1.5	1.4
Standardized biases (p-value)	0.68	0.87	0.85	0.96	0.90	0.92	0.68	0.92
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.0116	-0.0153*	-0.0180**	-0.0178***	-0.0170***	-0.0156***	-0.0156***	-0.0159***
	(0.00838)	(0.00799)	(0.00733)	(0.00688)	(0.00594)	(0.00552)	(0.00517)	(0.00580)
[3] Adding Float Exchange Regime	-0.0197**	-0.0186**	-0.0168**	-0.0190***	-0.0166***	-0.0152***	-0.0153***	-0.0156***
	(0.00841)	(0.00774)	(0.00709)	(0.00683)	(0.00640)	(0.00542)	(0.00540)	(0.00532)
[4] Adding CBI regular turnover	-0.0209**	-0.0185**	-0.0188**	-0.0185***	-0.0170***	-0.0174***	-0.0176***	-0.0174***
	(0.00876)	(0.00821)	(0.00750)	(0.00697)	(0.00638)	(0.00550)	(0.00530)	(0.00546)
[5] Adding CBI irregular turnover	-0.0148	-0.0163**	-0.0173**	-0.0166**	-0.0169***	-0.0171***	-0.0177***	-0.0170***
	(0.00911)	(0.00811)	(0.00716)	(0.00669)	(0.00619)	(0.00557)	(0.00561)	(0.00589)
[6] Adding Debt default dummy	-0.0114	-0.0143*	-0.0171**	-0.0152**	-0.0172***	-0.0167***	-0.0172***	-0.0168***
	(0.00829)	(0.00754)	(0.00726)	(0.00652)	(0.00589)	(0.00543)	(0.00542)	(0.00534)
[7] Adding Resource-Rich country dummy	-0.0167*	-0.0186**	-0.0202**	-0.0244***	-0.0256***	-0.0242***	-0.0253***	-0.0245***
	(0.00920)	(0.00854)	(0.00815)	(0.00737)	(0.00651)	(0.00575)	(0.00645)	(0.00620)
[8] Using IT Default date	-0.0138	-0.0101	-0.0145**	-0.0141**	-0.0152**	-0.0156***	-0.0158***	-0.0158***
	(0.00893)	(0.00769)	(0.00725)	(0.00632)	(0.00624)	(0.00517)	(0.00528)	(0.00518)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B5. Matching results—Dropping financial crisis years

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0198**	-0.0182**	-0.0173**	-0.0188***	-0.0157**	-0.0176***	-0.0177***	-0.0179***
Differences in Inequality	(0.00996)	(0.00870)	(0.00796)	(0.00722)	(0.00694)	(0.00654)	(0.00606)	(0.00612)
Number of observations, of which	1029	1029	1029	1029	1029	1029	1029	1029
- treated observations	239	239	239	239	239	239	239	239
- control observations	790	790	790	790	790	790	790	790
	Quality of the matching							
Pseudo R2	0.01	0.007	0.007	0.004	0.004	0.002	0.001	0.002
Rosenbaum bounds sensitivity tests	1.3	1.3	1.3	1.5	1.4	1.5	1.5	1.5
Standardized biases (p-value)	0.48	0.76	0.78	0.92	0.92	0.98	0.48	0.99
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.00928	-0.0138	-0.0153*	-0.0143*	-0.0151**	-0.0165***	-0.0166***	-0.0167***
	(0.00971)	(0.00862)	(0.00818)	(0.00746)	(0.00688)	(0.00617)	(0.00580)	(0.00619)
[3] Adding Float Exchange Regime	-0.0167*	-0.0164*	-0.0152*	-0.0152**	-0.0161**	-0.0156***	-0.0165***	-0.0159**
	(0.00980)	(0.00866)	(0.00840)	(0.00697)	(0.00690)	(0.00583)	(0.00585)	(0.00616)
[4] Adding CBI regular turnover	-0.0199**	-0.0197**	-0.0213***	-0.0203***	-0.0199***	-0.0188***	-0.0195***	-0.0187***
	(0.00947)	(0.00945)	(0.00793)	(0.00735)	(0.00751)	(0.00594)	(0.00607)	(0.00619)
[5] Adding CBI irregular turnover	-0.0180*	-0.0180**	-0.0121	-0.0194**	-0.0185***	-0.0176***	-0.0187***	-0.0177***
	(0.00972)	(0.00880)	(0.00846)	(0.00752)	(0.00698)	(0.00609)	(0.00604)	(0.00594)
[6] Adding Debt default dummy	-0.0272***	-0.0232***	-0.0197**	-0.0210***	-0.0183***	-0.0164***	-0.0175***	-0.0164***
	(0.00959)	(0.00889)	(0.00827)	(0.00769)	(0.00665)	(0.00601)	(0.00578)	(0.00593)
[7] Adding Resource-Rich country dummy	-0.0316***	-0.0265***	-0.0249***	-0.0246***	-0.0268***	-0.0251***	-0.0270***	-0.0252***
	(0.0107)	(0.00958)	(0.00860)	(0.00809)	(0.00765)	(0.00726)	(0.00686)	(0.00699)
[8] Using IT Default date	-0.0219**	-0.0198**	-0.0173**	-0.00800	-0.0138*	-0.0177***	-0.0177***	-0.0178***
	(0.00972)	(0.00849)	(0.00830)	(0.00739)	(0.00726)	(0.00602)	(0.00627)	(0.00628)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B6. Matching results—Including developed countries

Treatment Variable: FR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
FR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0392***	-0.0406***	-0.0434***	-0.0396***	-0.0382***	-0.0359***	-0.0354***	-0.0361***
Differences in Inequality	(0.0130)	(0.0126)	(0.0121)	(0.00734)	(0.00856)	(0.00963)	(0.0106)	(0.00980)
Number of observations, of which	1493	1493	1493	1493	1493	1493	1493	1493
- treated observations	591	591	591	591	591	591	591	591
- control observations	902	902	902	902	902	902	902	902
	Quality of the matching							
Rosenbaum bounds sensitivity tests	2.1	2.5	2.9	2.3	2.4	2.6	2.7	2.7
Standardized biases (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pseudo R2	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.02
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.0324**	-0.0392***	-0.0443***	-0.0352***	-0.0379***	-0.0371***	-0.0360***	-0.0375***
	(0.0136)	(0.0121)	(0.0119)	(0.00728)	(0.00814)	(0.00976)	(0.0105)	(0.00958)
[3] Adding Float Exchange Regime	-0.0421***	-0.0427***	-0.0425***	-0.0328***	-0.0393***	-0.0372***	-0.0363***	-0.0379***
	(0.0124)	(0.0122)	(0.0119)	(0.00759)	(0.00781)	(0.00990)	(0.0104)	(0.00990)
[4] Adding CBI regular turnover	-0.0302**	-0.0357***	-0.0386***	-0.0311***	-0.0358***	-0.0354***	-0.0354***	-0.0355***
	(0.0133)	(0.0120)	(0.0127)	(0.00727)	(0.00858)	(0.00987)	(0.0111)	(0.0105)
[5] Adding CBI irregular turnover	-0.0423***	-0.0418***	-0.0438***	-0.0382***	-0.0407***	-0.0353***	-0.0350***	-0.0353***
	(0.0141)	(0.0118)	(0.0123)	(0.00745)	(0.00783)	(0.00947)	(0.0105)	(0.00998)
[6] Adding Debt default dummy	-0.0292***	-0.0283***	-0.0259***	-0.0273***	-0.0269***	-0.0243***	-0.0219***	-0.0241***
	(0.00969)	(0.00897)	(0.00826)	(0.00709)	(0.00669)	(0.00665)	(0.00788)	(0.00708)
[7] Adding Resource-Rich country dummy	-0.0305***	-0.0332***	-0.0317***	-0.0303***	-0.0351***	-0.0310***	-0.0298***	-0.0312***
	(0.0110)	(0.0110)	(0.00984)	(0.00799)	(0.00840)	(0.00768)	(0.00823)	(0.00833)
[8] Using IT Default date	-0.0392***	-0.0402***	-0.0423***	-0.0409***	-0.0385***	-0.0367***	-0.0360***	-0.0367***
	(0.0134)	(0.0126)	(0.0124)	(0.00744)	(0.00835)	(0.00932)	(0.0104)	(0.00969)

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX C. HETEROGENEITY: DIFFERENT TYPES OF FISCAL RULES

Table C1a. Probit estimates of the propensity score—Budget Balance Rule

BBR	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
L.Real GDP growth	0.0109**	0.0106**	0.0107**	0.0113**	0.0118**	0.0144**	0.0115**	0.0109**
	(0.00534)	(0.00533)	(0.00533)	(0.00545)	(0.00551)	(0.00621)	(0.00535)	(0.00534)
L.Debt	0.00226*	0.00227*	0.00226*	0.00260**	0.00272**	0.00416***	0.00250**	0.00226*
	(0.00116)	(0.00117)	(0.00117)	(0.00119)	(0.00119)	(0.00119)	(0.00119)	(0.00116)
L.Dependency ratio	0.00257	0.00269	0.00268	0.00211	0.00225	0.0000458	0.00225	0.00253
	(0.00268)	(0.00267)	(0.00267)	(0.00277)	(0.00278)	(0.00289)	(0.00268)	(0.00268)
L.Capital openness	0.109***	0.107***	0.108***	0.0939***	0.0944***	0.122***	0.100***	0.108***
	(0.0295)	(0.0296)	(0.0296)	(0.0301)	(0.0301)	(0.0314)	(0.0291)	(0.0295)
L.Inflation	-5.656***	-5.523***	-5.549***	-5.541***	-5.575***	-5.594***	-5.997***	-5.671***
	(1.037)	(1.075)	(1.071)	(1.045)	(1.054)	(1.176)	(1.039)	(1.038)
IT_conservative	0.296**	0.292**	0.293**	0.312***	0.319***	0.231*	0.209*	
	(0.116)	(0.116)	(0.116)	(0.118)	(0.118)	(0.122)	(0.116)	
L.Political risk	-0.00603	-0.00555	-0.00560	-0.00644	-0.00643	-0.0132**	-0.00272	-0.00602
	(0.00593)	(0.00592)	(0.00593)	(0.00596)	(0.00596)	(0.00615)	(0.00609)	(0.00593)
L.Gov. fractionalization	0.134	0.135	0.135	0.151	0.153	0.208	0.147	0.136
	(0.160)	(0.160)	(0.160)	(0.162)	(0.162)	(0.165)	(0.160)	(0.160)
Fix regime		0.405						
		(0.355)						
Float regime			-0.351					
			(0.362)					
CBI regular				-0.106				
				(0.233)				
CBI irregular					0.163			
					(0.128)			
Default						-0.582***		
						(0.170)		
Resource-Rich							0.380***	
							(0.0918)	
IT_default								0.288**
								(0.115)
Constant	-0.336	-0.780	-0.371	-0.299	-0.341	0.233	-0.620	-0.332
	(0.482)	(0.606)	(0.483)	(0.488)	(0.489)	(0.501)	(0.496)	(0.482)
Observations	1194	1194	1194	1153	1153	1113	1194	1194
Pseudo R2	0.112	0.113	0.112	0.108	0.109	0.135	0.124	0.111

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C1b. Probit estimates of the propensity score—Debt Rule

DR	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
L.Real GDP growth	0.0131***	0.0127***	0.0128***	0.0137***	0.0143***	0.0189***	0.0131***	0.0131***
	(0.00466)	(0.00466)	(0.00466)	(0.00478)	(0.00478)	(0.00515)	(0.00465)	(0.00466)
L.Debt	0.00451***	0.00451***	0.00448***	0.00516***	0.00529***	0.00749***	0.00442***	0.00450***
	(0.00122)	(0.00123)	(0.00122)	(0.00125)	(0.00125)	(0.00137)	(0.00121)	(0.00122)
L.Dependency ratio	0.00205	0.00219	0.00219	0.00156	0.00173	0.00189	0.00219	0.00204
	(0.00281)	(0.00282)	(0.00282)	(0.00293)	(0.00294)	(0.00300)	(0.00280)	(0.00281)
L.Capital openness	-0.0613*	-0.0632**	-0.0627**	-0.0903***	-0.0897***	-0.103***	-0.0589*	-0.0613*
	(0.0319)	(0.0319)	(0.0319)	(0.0326)	(0.0327)	(0.0349)	(0.0319)	(0.0319)
L.Inflation	-7.085***	-6.907***	-6.945***	-6.697***	-6.769***	-7.109***	-7.057***	-7.088***
	(0.954)	(0.980)	(0.978)	(0.935)	(0.945)	(1.010)	(0.963)	(0.954)
IT_conservative	0.100	0.0969	0.0972	0.0740	0.0799	0.0637	0.117	
	(0.127)	(0.126)	(0.126)	(0.129)	(0.129)	(0.134)	(0.129)	
L.Political risk	-0.00709	-0.00647	-0.00649	-0.00513	-0.00510	-0.0109	-0.00813	-0.00708
	(0.00622)	(0.00623)	(0.00623)	(0.00626)	(0.00624)	(0.00679)	(0.00626)	(0.00622)
L.Gov. fractionalization	0.903***	0.907***	0.906***	0.877***	0.882***	0.938***	0.904***	0.904***
	(0.165)	(0.165)	(0.165)	(0.168)	(0.168)	(0.175)	(0.165)	(0.165)
Fix regime		0.638						
		(0.445)						
Float regime			-0.575					
			(0.453)					
CBI regular				-0.107				
				(0.252)				
CBI irregular					0.170			
					(0.136)			
Default						-0.835***		
						(0.187)		
Resource-Rich							-0.110	
							(0.101)	
IT_default								0.0982
								(0.126)
Constant	-0.575	-1.263*	-0.622	-0.708	-0.753	-0.449	-0.490	-0.574
	(0.527)	(0.684)	(0.530)	(0.534)	(0.534)	(0.573)	(0.533)	(0.527)
Observations	1194	1194	1194	1153	1153	1113	1194	1194
Pseudo R2	0.153	0.155	0.154	0.151	0.152	0.190	0.154	0.153

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C1c. Probit estimates of the propensity score—Expenditure Rule

ER	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
L.Real GDP growth	-0.0142*	-0.0145*	-0.0141	-0.0136	-0.0128	-0.0137	-0.0134	-0.0142*
	(0.00834)	(0.00874)	(0.00862)	(0.00865)	(0.00851)	(0.00871)	(0.00828)	(0.00837)
L.Debt	0.00277	0.00275	0.00278	0.00443	0.00435	0.00435	0.00673**	0.00279
	(0.00311)	(0.00310)	(0.00310)	(0.00298)	(0.00296)	(0.00320)	(0.00313)	(0.00312)
L.Dependency ratio	-0.0613***	-0.0615***	-0.0613***	-0.0588***	-0.0586***	-0.0628***	-0.0627***	-0.0618***
	(0.0104)	(0.0105)	(0.0105)	(0.0104)	(0.0103)	(0.0107)	(0.0103)	(0.0104)
L.Capital openness	0.471***	0.472***	0.470***	0.434***	0.435***	0.523***	0.433***	0.472***
	(0.103)	(0.104)	(0.104)	(0.101)	(0.102)	(0.110)	(0.0985)	(0.104)
L.Inflation	-3.759**	-3.654*	-3.780*	-3.607**	-3.478**	-4.228**	-4.387***	-3.852**
	(1.708)	(2.026)	(1.984)	(1.718)	(1.696)	(2.114)	(1.701)	(1.719)
IT_conservative	1.689***	1.690***	1.689***	1.716***	1.716***	1.656***	1.711***	
	(0.230)	(0.231)	(0.231)	(0.245)	(0.237)	(0.230)	(0.250)	
L.Political risk	-0.0653***	-0.0652***	-0.0653***	-0.0618***	-0.0625***	-0.0782***	-0.0573***	-0.0656***
	(0.0116)	(0.0117)	(0.0116)	(0.0114)	(0.0116)	(0.0130)	(0.0119)	(0.0117)
L.Gov. fractionalization	1.037***	1.042***	1.036***	0.970***	0.988***	1.182***	1.368***	1.042***
	(0.336)	(0.341)	(0.339)	(0.343)	(0.344)	(0.350)	(0.362)	(0.337)
Fix regime		0.0945						
		(0.639)						
Float regime			0.0209					
			(0.644)					
CBI regular				-0.410				
				(0.641)				
CBI irregular					0.134			
					(0.305)			
Default						-1.301*		
						(0.677)		
Resource-Rich							0.648***	
							(0.178)	
IT_default								1.686***
								(0.231)
Constant	5.081***	4.984***	5.081***	4.657***	4.643***	5.939***	4.090***	5.129***
	(1.068)	(1.252)	(1.067)	(1.045)	(1.030)	(1.169)	(1.077)	(1.065)
Observations	621	621	621	613	613	604	621	621
Pseudo R2	0.411	0.411	0.411	0.411	0.410	0.425	0.431	0.411

Standard errors in parentheses* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2a. Matching results with BBR*DR as the treatment variable

Treatment Variable: BBR*DR	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
BBR*DR Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0231**	-0.0312***	-0.0295***	-0.0275***	-0.0260***	-0.0242***	-0.0226***	-0.0239***
Differences in Inequality	(0.0108)	(0.00987)	(0.00898)	(0.00755)	(0.00823)	(0.00743)	(0.00706)	(0.00660)
Number of observations, of which	1152	1152	1152	1152	1152	1152	1152	1152
- treated observations	173	173	173	173	173	173	173	173
- control observations	979	979	979	979	979	979	979	979
	Quality of the matching							
Pseudo R2	0.01	0.01	0.01	0.004	0.006	0.004	0.01	0.004
Rosenbaum bounds sensitivity tests	1.3	1.9	1.8	1.8	1.7	1.8	1.7	1.6
Standardized biases (p-value)	0.56	0.34	0.73	0.98	0.95	0.97	0.56	0.97
	Robustness checks							
[2] Adding Fix Exchange Regime	-0.0244**	-0.0284***	-0.0279***	-0.0260***	-0.0263***	-0.0246***	-0.0225***	-0.0238***
	(0.0111)	(0.00986)	(0.00874)	(0.00785)	(0.00707)	(0.00686)	(0.00760)	(0.00738)
[3] Adding Float Exchange Regime	-0.0319***	-0.0316***	-0.0317***	-0.0276***	-0.0259***	-0.0241***	-0.0227***	-0.0239***
	(0.0109)	(0.00968)	(0.00921)	(0.00823)	(0.00702)	(0.00750)	(0.00742)	(0.00694)
[4] Adding CBI regular turnover	-0.0346***	-0.0282***	-0.0279***	-0.0246***	-0.0250***	-0.0249***	-0.0237***	-0.0249***
	(0.0105)	(0.00983)	(0.00932)	(0.00765)	(0.00721)	(0.00695)	(0.00743)	(0.00731)
[5] Adding CBI irregular turnover	-0.0196*	-0.0267***	-0.0248***	-0.0244***	-0.0245***	-0.0242***	-0.0236***	-0.0246***
	(0.0103)	(0.00995)	(0.00923)	(0.00780)	(0.00777)	(0.00733)	(0.00748)	(0.00693)
[6] Adding Debt default dummy	-0.0252**	-0.0230**	-0.0210**	-0.0236***	-0.0243***	-0.0225***	-0.0195***	-0.0215***
	(0.0102)	(0.00906)	(0.00893)	(0.00788)	(0.00750)	(0.00708)	(0.00691)	(0.00675)
[7] Adding Resource-Rich country dummy	-0.0198**	-0.0230**	-0.0264***	-0.0235***	-0.0215***	-0.0240***	-0.0224***	-0.0238***
	(0.00999)	(0.00946)	(0.00873)	(0.00802)	(0.00729)	(0.00711)	(0.00748)	(0.00742)
[8] Using IT Default date	-0.0240**	-0.0288***	-0.0298***	-0.0276***	-0.0261***	-0.0242***	-0.0226***	-0.0238***
	(0.0103)	(0.00930)	(0.00871)	(0.00798)	(0.00694)	(0.00760)	(0.00724)	(0.00711)

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2b. Matching results with DR*ER as the treatment variable

Treatment Variable: DR*ER	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
DR*ER Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	-0.0359	-0.0130	-0.00410	0.00159	-0.00368	-0.000283	0.00316	0.00121
Differences in Inequality	(0.0279)	(0.0252)	(0.0226)	(0.0337)	(0.0291)	(0.0171)	(0.0154)	(0.0178)
Number of observations, of which	979	979	979	979	979	979	979	979
- treated observations	27	27	27	27	27	27	27	27
- control observations	952	952	952	952	952	952	952	952
Quality of the matching								
Pseudo R2	0.06	0.04	0.04	0.04	0.05	0.02	0.06	0.02
Rosenbaum bounds sensitivity tests	1.3	1	1	1	1	1	1	1
Standardized biases (p-value)	0.75	0.91	0.92	0.95	0.84	0.97	0.75	0.98
Robustness checks								
[2] Adding Fix Exchange Regime	0.0157	-0.000172	0.0107	0.0101	0.00125	0.00329	0.00667	0.00405
	(0.0299)	(0.0259)	(0.0224)	(0.0362)	(0.0287)	(0.0190)	(0.0174)	(0.0179)
[3] Adding Float Exchange Regime	0.0167	0.0105	0.00597	0.0231	0.0134	0.00522	0.00645	0.00373
	(0.0281)	(0.0253)	(0.0240)	(0.0328)	(0.0259)	(0.0186)	(0.0174)	(0.0191)
[4] Adding CBI regular turnover	-0.0244	0.00546	0.00919	0.00103	0.00649	-0.000846	0.00646	0.000381
	(0.0329)	(0.0304)	(0.0276)	(0.0539)	(0.0430)	(0.0248)	(0.0239)	(0.0249)
[5] Adding CBI irregular turnover	0.0263	0.00882	0.00473	0.0197	0.0231	0.0100	0.00960	0.00920
	(0.0338)	(0.0304)	(0.0287)	(0.0586)	(0.0446)	(0.0242)	(0.0230)	(0.0251)
[6] Adding Debt default dummy	0.00700	0.00975	0.00869	-0.00246	0.000167	-0.00374	-0.0102	-0.00525
	(0.0309)	(0.0281)	(0.0265)	(0.0356)	(0.0297)	(0.0222)	(0.0219)	(0.0217)
[7] Adding Resource-Rich country dummy	-0.0127	0.00203	0.00609	0.00117	0.000438	-0.000318	0.0115	0.00245
	(0.0290)	(0.0250)	(0.0237)	(0.0364)	(0.0274)	(0.0193)	(0.0186)	(0.0189)
[8] Using IT Default date	-0.0352	-0.0159	-0.00359	0.00580	-0.00669	-0.0000829	0.00316	0.00125
	(0.0295)	(0.0233)	(0.0227)	(0.0372)	(0.0294)	(0.0174)	(0.0159)	(0.0177)

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table C2c. Matching results with BBR*ER as the treatment variable

Treatment Variable: BBR*ER	1-Nearest Neighbor Matching	2-Nearest Neighbor Matching	3-Nearest Neighbor Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
BBR*ER Dummy	**Dependent variable: Gini index**							
[1] Average Treatment on the Treated (ATT)	0.0530	0.0625*	0.0517	-0.0152	0.0168	0.0592*	0.0464	0.0576*
Differences in Inequality	(0.0375)	(0.0357)	(0.0325)	(0.0397)	(0.0381)	(0.0346)	(0.0338)	(0.0344)
Number of observations, of which	934	934	934	934	934	934	934	934
- treated observations	26	26	26	26	26	26	26	26
- control observations	934	934	934	934	934	934	934	934
	Quality of the matching							
Pseudo R2	0.23	0.16	0.07	0.04	0.03	0.06	0.23	0.07
Rosenbaum bounds sensitivity tests	1.5	1.6	1.3	1	1	1.3	1.3	1.3
Standardized biases (p-value)	0.03	0.15	0.72	0.98	0.99	0.81	0.03	0.78
	Robustness checks							
[2] Adding Fix Exchange Regime	0.0568	0.0625*	0.0515	-0.0150	0.0170	0.0593*	0.0449	0.0579*
	(0.0391)	(0.0369)	(0.0330)	(0.0391)	(0.0360)	(0.0319)	(0.0319)	(0.0323)
[3] Adding Float Exchange Regime	0.0568	0.0625*	0.0515	-0.0150	0.0170	0.0593*	0.0448	0.0579*
	(0.0399)	(0.0369)	(0.0351)	(0.0397)	(0.0367)	(0.0349)	(0.0326)	(0.0333)
[4] Adding CBI regular turnover	0.0512	0.0478	0.0447	-0.00356	0.00352	0.0595*	0.0465	0.0567
	(0.0381)	(0.0366)	(0.0338)	(0.0401)	(0.0365)	(0.0331)	(0.0326)	(0.0352)
[5] Adding CBI irregular turnover	0.0480	0.0561	0.0480	-0.0210	0.0142	0.0615**	0.0471	0.0594*
	(0.0366)	(0.0342)	(0.0320)	(0.0391)	(0.0346)	(0.0307)	(0.0294)	(0.0305)
[6] Adding Debt default dummy	0.0663	0.0647*	0.0642*	-0.00824	0.00579	0.0702*	0.0546	0.0705*
	(0.0418)	(0.0351)	(0.0367)	(0.0493)	(0.0435)	(0.0366)	(0.0370)	(0.0368)
[7] Adding Resource-Rich country dummy	0.0365	0.0198	0.00267	0.00511	0.0166	0.0107	0.0113	0.0131
	(0.0386)	(0.0337)	(0.0308)	(0.0436)	(0.0410)	(0.0290)	(0.0290)	(0.0302)
[8] Using IT Default date	0.0569	0.0625*	0.0503	-0.0152	0.0170	0.0515	0.0448	0.0575
	(0.0370)	(0.0361)	(0.0348)	(0.0379)	(0.0380)	(0.0331)	(0.0328)	(0.0355)

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

APPENDIX D: HETEROGENEITY: DIFFERENT ECONOMIC AND STRUCTURAL ENVIRONMENTS

Table D2 : Heterogeneity in the treatment effect-BBR

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
BBR	-0.0179***	-0.0195***	0.00751	-0.0220***	0.0455***	-0.0209***	-0.0437***	-0.0191***	-0.0326	-0.0503***	-0.0203***
	(0.00477)	(0.00516)	(0.00816)	(0.00658)	(0.0159)	(0.00601)	(0.00605)	(0.00490)	(0.0199)	(0.0101)	(0.00629)
PSCORE		0.0223	0.0733***	0.0106	0.0351**	0.0227	0.0161	0.0467**	0.0458**	0.0324*	0.0284
		(0.0172)	(0.0207)	(0.0175)	(0.0177)	(0.0180)	(0.0179)	(0.0187)	(0.0189)	(0.0178)	(0.0177)
Debt default		0.0187***									
		(0.00571)									
BBR*default		-0.0500***									
		(0.0103)									
Gross debt			0.000101								
			(0.0000807)								
BBR* Gross debt			-0.000390***								
			(0.000113)								
Short term debt				0.000504**							
				(0.000230)							
BBR*ST debt				0.000364							
				(0.000414)							
Government size					-0.00171***						
					(0.000471)						
BBR*Government					-0.00512***						
					(0.00118)						
Inflation						0.0000273***					
						(0.00000777)					
BBR*Inflation						0.000302					
						(0.000600)					
Broad money							0.00000425***				
							(0.000000227)				
BBR*Broad/money							0.000493***				
							(0.0000768)				
Float regime								0.0409***			
								(0.00913)			
BBR*Float_regime								-0.0179			
								(0.0204)			
Fix_regime									-0.0363***		
									(0.00905)		
BBR*Fix_regime									0.0135		
									(0.0204)		
Trade										-0.000458***	
										(0.0000820)	
BBR*Trade										0.000398***	
										(0.000127)	
FDI inflows											-0.00266***
											(0.000653)
BBR*FDI											0.00113
											(0.00109)
Constant	0.424***	0.422***	0.394***	0.415***	0.442***	0.419***	0.421***	0.412***	0.449***	0.452***	0.428***
	(0.00243)	(0.00418)	(0.00727)	(0.00482)	(0.00674)	(0.00425)	(0.00427)	(0.00464)	(0.00795)	(0.00629)	(0.00444)
N	1151	1112	906	1151	1113	1151	1136	1151	1151	1125	1130

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D3 : Heterogeneity in the treatment effect-BBR

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
BBR	-0.0222***	-0.0185***	-0.0136**	-0.0446*	-0.0204	-0.0510***	-0.00756	-0.0240***	-0.0200***	-0.0263***
	(0.00759)	(0.00453)	(0.00664)	(0.0270)	(0.0130)	(0.00896)	(0.0267)	(0.00520)	(0.00597)	(0.00610)
PSCORE	0.0143	-0.0666***	0.0725***	0.0124	0.0136	0.0179	0.174***	0.00968	0.0201	0.0187
	(0.0176)	(0.0190)	(0.0224)	(0.0172)	(0.0177)	(0.0177)	(0.0409)	(0.0176)	(0.0177)	(0.0175)
BBR*Time	0.000421									
	(0.000668)									
Capital openness		0.0148***								
		(0.00177)								
BBR* Capital		-0.00107								
		(0.00340)								
Political stability			-0.0141***							
			(0.00499)							
BBR*Stability			0.00374							
			(0.00740)							
Internal conflict				-0.00617***						
				(0.00116)						
BBR*Internal_conflict				0.00304						
				(0.00303)						
Ethnic tensions					0.000334					
					(0.00179)					
BBR*Ethnic_tensions					0.000414					
					(0.00340)					
GDP growth_						-0.00149**				
						(0.000707)				
BBR*GDP growth						0.00698***				
						(0.00158)				
Sec. education							-0.000674**			
							(0.000304)			
BBR*Sec. educ.							-0.000555			
							(0.000505)			
Mineral rents								-0.0000898		
								(0.000693)		
BBR*Min. rents								0.00291***		
								(0.00109)		
Post crisis									-0.0243***	
									(0.00605)	
BBR*Post crisis									0.0126	
									(0.0104)	
Saving glut										-0.00803
										(0.00545)
BBR*Saving glut										0.0183*
										(0.00995)
Constant	0.422***	0.440***	0.395***	0.476***	0.421***	0.428***	0.434***	0.423***	0.426***	0.423***
	(0.00419)	(0.00413)	(0.00616)	(0.0105)	(0.00786)	(0.00497)	(0.0200)	(0.00426)	(0.00408)	(0.00431)
N	1151	1151	788	1151	1151	1151	223	1151	1151	1151

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D4 : Heterogeneity in the treatment effect-DR

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
DR	-0.0385***	-0.0294***	-0.0301***	-0.0228***	0.0238	-0.0316***	-0.0528***	-0.0285***	0.00851	-0.0603***	-0.0223***
	(0.00516)	(0.00621)	(0.00834)	(0.00737)	(0.0178)	(0.00779)	(0.00669)	(0.00588)	(0.00823)	(0.0114)	(0.00701)
PSCORE		-0.0757***	-0.0792***	-0.0765***	-0.0528***	-0.0716***	-0.0740***	-0.0676***	-0.0693***	-0.0627***	-0.0746***
		(0.0159)	(0.0187)	(0.0154)	(0.0164)	(0.0162)	(0.0159)	(0.0162)	(0.0163)	(0.0164)	(0.0163)
Debt default		0.0119**									
		(0.00550)									
DR*default		-0.0136									
		(0.0106)									
Gross debt			0.0000271								
			(0.0000743)								
DR* Gross debt			0.000141								
			(0.000111)								
Short term debt				0.000484**							
				(0.000223)							
DR*ST debt				-0.000334							
				(0.000537)							
Government size					-0.00138***						
					(0.000382)						
DR*Government					-0.00373***						
					(0.00127)						
Inflation						0.0000212***					
						(0.00000540)					
DR*Inflation						0.000666					
						(0.00121)					
Broad money							0.00000360***				
							(0.000000284)				
DR*Broad money							0.000469***				
							(0.0000853)				
Float regime								0.0176**			
								(0.00866)			
DR*Float_regime								0.0329***			
								(0.00958)			
Fix_regime									-0.0133		
									(0.00852)		
DR*Fix_regime									-0.0370***		
									(0.00944)		
Trade										-0.000407***	
										(0.0000843)	
DR*Trade										0.000402***	
										(0.000135)	
FDI inflows											-0.00172***
											(0.000555)
DR*FDI											-0.000936
											(0.000847)
Constant	0.428***	0.441***	0.432***	0.432***	0.455***	0.438***	0.439***	0.436***	0.450***	0.468***	0.445***
	(0.00231)	(0.00315)	(0.00542)	(0.00435)	(0.00520)	(0.00315)	(0.00314)	(0.00331)	(0.00789)	(0.00609)	(0.00357)
N	1151	1112	906	1151	1113	1151	1136	1151	1151	1125	1130

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D5 : Heterogeneity in the treatment effect-DR

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
DR	-0.0360***	-0.0290***	-0.0275***	-0.0363	0.0306**	-0.0597***	-0.0310	-0.0265***	-0.0197***	-0.0350***
	(0.00956)	(0.00582)	(0.00739)	(0.0332)	(0.0138)	(0.00873)	(0.0232)	(0.00625)	(0.00746)	(0.00706)
PSCORE	-0.0770***	-0.0775***	-0.0726***	-0.0821***	-0.0766***	-0.0732***	0.117***	-0.0764***	-0.0831***	-0.0796***
	(0.0157)	(0.0150)	(0.0200)	(0.0155)	(0.0156)	(0.0158)	(0.0386)	(0.0158)	(0.0159)	(0.0158)
DR*Time	0.00113									
	(0.000934)									
Capital openness		0.0124***								
		(0.00148)								
DR* Capital		-0.0120***								
		(0.00423)								
Political stability			-0.0122***							
			(0.00454)							
DR*Stability			-0.00535							
			(0.00782)							
Internal conflict				-0.00559***						
				(0.00106)						
DR*Internal_conflict				0.00128						
				(0.00371)						
Ethnic tensions					0.00240					
					(0.00158)					
DR*Ethnic_tensions					-0.0169***					
					(0.00361)					
GDP growth_						-0.00125*				
						(0.000648)				
DR*GDP growth						0.00734***				
						(0.00148)				
Sec. education							-0.000559*			
							(0.000313)			
DR*Sec. educ.							-0.000700*			
							(0.000412)			
Mineral rents								0.000573		
								(0.000568)		
DR*Min. rents								-0.00179**		
								(0.000869)		
Post crisis									-0.0166***	
									(0.00568)	
DR*Post crisis									-0.00915	
									(0.0110)	
Saving glut										-0.00105
										(0.00506)
DR*Saving glut										0.0169
										(0.0106)
Constant	0.439***	0.440***	0.428***	0.488***	0.430***	0.445***	0.456***	0.439***	0.444***	0.440***
	(0.00310)	(0.00300)	(0.00442)	(0.00939)	(0.00720)	(0.00416)	(0.0167)	(0.00320)	(0.00323)	(0.00339)
N	1151	1151	788	1151	1151	1151	223	1151	1151	1151

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D6 : Heterogeneity in the treatment effect-ER

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
ER	0.0263**	0.0140	0.0280	0.110***	0.113***	0.0154	0.129***	0.00783	0.0381***	0.0956***	0.0122
	(0.0121)	(0.0157)	(0.0334)	(0.0241)	(0.0399)	(0.0258)	(0.0228)	(0.0152)	(0.0122)	(0.0133)	(0.0236)
PSCORE		0.0467**	0.0704***	0.0348	0.0582***	0.0577**	0.0517**	0.0648***	0.0674***	0.0336*	0.0573***
		(0.0226)	(0.0247)	(0.0223)	(0.0213)	(0.0232)	(0.0212)	(0.0233)	(0.0233)	(0.0196)	(0.0217)
Debt default		0.0455***									
		(0.00750)									
ER*default		-0.0400**									
		(0.0172)									
Gross debt			0.0000207								
			(0.000103)								
ER* Gross debt			-0.000279								
			(0.000722)								
Short term debt				0.00119***							
				(0.000223)							
ER*ST debt				-0.00689***							
				(0.00116)							
Government size					-0.00501***						
					(0.000808)						
ER*Government					-0.00587**						
					(0.00286)						
Inflation						0.0000254***					
						(0.00000703)					
ER*Inflation						-0.00127					
						(0.00422)					
Broad money							-0.000160**				
							(0.0000636)				
ER*Broad money							-0.00250***				
							(0.000540)				
Float regime								0.0348***			
								(0.00898)			
ER*Float_regime								0.0354**			
								(0.0138)			
Fix_regime									-0.0398***		
									(0.00882)		
ER*Fix_regime									-0.0303**		
									(0.0137)		
Trade										-0.000326***	
										(0.0000763)	
ER*Trade										-0.00158***	
										(0.000156)	
FDI inflows											-0.00314***
											(0.000591)
ER*FDI											-0.000292
											(0.00327)
Constant	0.430***	0.425***	0.414***	0.408***	0.495***	0.426***	0.436***	0.423***	0.462***	0.453***	0.438***
	(0.00304)	(0.00343)	(0.00709)	(0.00507)	(0.0101)	(0.00327)	(0.00496)	(0.00348)	(0.00812)	(0.00656)	(0.00365)
N	619	602	473	619	619	619	610	619	619	617	619

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table D6 : Heterogeneity in the treatment effect-ER

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
ER	-0.0220	0.0347***	-0.0118	0.167***	0.0900***	-0.0290	0.192***	-0.000577	0.0421***	-0.0333**
	(0.0246)	(0.0133)	(0.0130)	(0.0354)	(0.0344)	(0.0227)	(0.0301)	(0.0176)	(0.0162)	(0.0166)
PSCORE	0.0386*	0.0402*	0.0255	0.0273	0.0424*	0.0464*	0.0471	0.0514**	0.0623***	0.0557**
	(0.0232)	(0.0232)	(0.0208)	(0.0198)	(0.0231)	(0.0237)	(0.0390)	(0.0233)	(0.0230)	(0.0225)
ER*Time	0.00630**									
	(0.00267)									
Capital openness		0.00392*								
		(0.00222)								
ER* Capital		-0.0262***								
		(0.00839)								
Political stability			-0.0170***							
			(0.00539)							
ER*Stability			-0.0520***							
			(0.0103)							
Internal conflict				-0.00764***						
				(0.00150)						
ER*Internal_conflict				-0.0189***						
				(0.00463)						
Ethnic tensions					-0.00575***					
					(0.00192)					
ER*Ethnic_tensions					-0.0203**					
					(0.0102)					
GDP growth_						-0.0000804				
						(0.000860)				
ER*GDP growth						0.0102**				
						(0.00415)				
Sec. education							-0.000527			
							(0.000418)			
ER*Sec. educ.							-0.00330***			
							(0.000436)			
Mineral rents								-0.000709		
								(0.000541)		
ER*Min. rents								0.00512**		
								(0.00214)		
Post crisis									-0.0257***	
									(0.00739)	
ER*Post crisis									-0.0553***	
									(0.0205)	
Saving glut										-0.0202***
										(0.00669)
ER*Saving glut										0.106***
										(0.0186)
Constant	0.428***	0.427***	0.414***	0.496***	0.452***	0.428***	0.460***	0.428***	0.432***	0.434***
	(0.00327)	(0.00337)	(0.00440)	(0.0136)	(0.00862)	(0.00531)	(0.0223)	(0.00337)	(0.00350)	(0.00372)
N	619	619	416	619	619	619	156	619	619	619

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Chapter 4

Assessing the effects of combating illicit financial flows on domestic tax revenue mobilization in developing countries

This chapter is joint work with Jean-Louis Combes and Alexandru Minea.

"Sunlight is said to be the best of disinfectants; electric light the most efficient policeman."
(Brandeis, 1914, p. 92)

I. Introduction

Illicit financial flows (IFFs) are viewed as "funds that are illegally earned, transferred, or utilized" (Global Financial Integrity, 2015). This definition[55] is broader than an earlier operational and circumscribed (Ajayi & Ndikumana, 2015) description by (Kar, 2011) who defines illicit financial flows as "the cross-border transfer of the proceeds of corruption, trade in contraband goods, criminal activities, and tax evasion". That said, they stem from various sources including corruption (embezzlement, bribery and theft), criminal activities (drug and human smuggling, bootlegging, etc.) and international trade[56] (export under-invoicing and import over-invoicing). The measurement of IFFs remains an important issue for empirical studies. Indeed, an examination of money laundering process and the global efforts to address it leads (Buchanan, 2004) to say that there is not still a specific methodology to estimate the impact of money laundering. In fact, different authors use various sources and analytical methodologies to estimates the value of IFFs from developing countries (IMF; World bank; UN COMTRADE; US Department of Commerce; European Statistics(Kar & Cartwright-Smith, 2008; Kar & Cartwright-Smith, 2010; Kar & Freitas, 2011; Ndikumana & Boyce, 2011)).

IFFs constitute a potential source of loss of domestic revenue mobilization for developing countries by reducing the tax base (Kar & Cartwright-Smith, 2010; Kar & LeBlanc, 2013; Ndikumana & Boyce, 2012). Over the period 2004 to 2013, estimates show that developing countries have illicitly lost around $800 billion per year (Kar & Spanjers, 2015). At the same time, the net inflows of total foreign direct investment (FDI) is estimated to nearly $650 billion/year. Moreover, the annual flows of remittances are approximately evaluated to around $350 billion. While the total annual amount of official development assistance (ODA) is slightly equal $82 billion in these countries. Altogether, the annual amount of IFFs ($800 billion) surpasses the cumulated amount of FDI and ODA (around $692). Furthermore, the amount of IFFs goes well beyond the amount of remittances in the developing world[57]. Nethertheless, several developing countries tend to be trapped in poverty due to structural factors including inequalities, epidemics, low productivity, exclusion from financial markets and high exposure to crises and natural disasters (UN, 2013; IMF, 2014).

[55] Defining IFFs is not straightforward as indicates the existing debate around this concept ((Reuter & Truman, 2004); (Baker, 2005); (Kar, 2011); African Tax Administration Forum, 2015; Global Financial Integrity(GFI), 2015; High Panel on Illicit Financial Flows from Africa, 2015; Inter-Agency Task Force on Financing for Development, 2017; OECD, 2015; United Nations, 2016a, 2016b; World Bank, 2016). However, all these definitions converge on the concept of *financial transfers across borders* (Forstater, 2018).

[56] Trade mis-invoicing is used to evade taxes by circumventing customs duties, goods & services taxes, VAT, excise taxes, income taxes, etc.

[57] Sources: UNCTAD, OECD, IMF.

To improve economic growth and reduce dependency on official development assistance, DCs need to bridge their infrastructure gap in many areas such as education, health, electricity, roads, ports, highways, etc. (Arezki & Sy, 2016; Calderón & Servén, 2004). They also need to practice sound macroeconomic policies. Domestic resources' mobilization could therefore help these countries to face these development challenges. Analyzing the pathways through which tackling IFFs foster tax revenue mobilization is an important question in developing countries. Indeed, IFFs represent funds that would be used to face development challenges[58] such as inequalities, infrastructure gap, etc. in these countries. They contribute to worsen macroeconomic conditions (investment, growth, public debt) given that they reduce the economic performance. Consequently, they jeopardize the mobilization of internal resources. Moreover, public tax compliance will be considerably eroded if agents are aware of the existence of large IFFs.

The objective of this paper is to evaluate the effects of combating IFFs on domestic tax revenue mobilization in developing countries. Combating IFFs requires compliance with international standards. The originality of this paper is that it assesses the effects of conforming with the Financial Action Task Force[59] (FATF) Recommendations on domestic tax revenue mobilization. Its Recommendations[60] formulate a comprehensive and consistent regulatory framework for anti-money laundering and combating the financing of terrorism, as well as the financing of proliferation of weapons of mass destruction. The lack of compliance with these recommendations is considered as the treatment variable in an impact assessment. More precisely, using propensity score matching, we find that, on average, non-compliance with international standards have a negative and significant impact on domestic tax revenue mobilization. Specifically, the adverse effect of Non-Cooperation in terms of tax revenue is around 2 percentage points of GDP. Moreover, the extent of this adverse impact depends on tax components: goods and services taxes are more affected followed by VAT and excise taxes.

[58] This is in line with the 2030 Agenda for Sustainable Development (SDGs, 2015). In fact, the 16th goal ("Promote Just, Peaceful and Inclusive Societies") targets to **"Significantly reduce illicit financial and arms flows, strengthen the recovery and return of stolen assets and combat all forms of organized crime by 2030"**(fourth target) and to **"Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime"** (eleventh target).

[59] The Financial Action Task Force (FATF) is an international institution, created in 1989, that develops and promotes policies to protect the global financial system against money laundering, terrorist financing and the financing of proliferation of weapons of mass destruction (FATF, 2012).

[60] Since 2003, these Recommendations have been endorsed and recognized by over 180 countries as the international standard for anti-money laundering and countering the financing of terrorism (AML/CFT).

The policy implications of this paper are that developing countries could improve their domestic revenue mobilization by combating IFFs. This is possible if they implement policies to impede IFFs such as compliance vis-à-vis international standards in terms of anti-money laundering and combating the financing of terrorism. They need also to establish sound institutions if they really aim to enhance domestic tax revenue mobilization.

The rest of the paper is organized as follows. Section 2 discusses the related literature. Section 3 details the data and highlights key stylized facts. Section 4 describes the methodological approach. Section 5 discusses the main results. Section 6 explores their sensitivity. Section 7 concludes the paper and draws some policy implications.

II. Literature review

According to the neoclassical theory, financial movements are the results of rational portfolio decision by economic agents (Collier, Hoeffler, & Pattillo, 2004). This decision is explained by macroeconomic conditions such as exchange rate duality, public sector indebtedness and political stability (Dooley, 1988). However, the (Outlook, 2013) criticizes the orthodox view and stresses out that it misses an important component namely outflows resulting on illicit appropriation (theft, plundering of public resources, corruption and trade mispricing). In fact, capital leakages have some consequences on economic development (Fofack & Ndikumana, 2009). These authors clearly demonstrate that the gain from capital repatriation surpasses the expected benefits from other sources such as debt relief. Empirical studies identify many factors which explain financial flows from developing countries (DCs). These factors include macroeconomic environment (Boyce, 1992; Brada, Kutan, & Vukšić, 2013; Cuddington, 1986, 1987; Dooley, 1988; Hermes & Lensink, 2000; Lensink, Hermes, & Murinde, 1998; Mikkelsen, 1991; Ndikumana & Boyce, 2003; Olopoenia, 2000; Pastor Jr, 1990) and political situation (Alesina & Tabellini, 1989; Christensen, 2009; Cuddington, 1986; Khan & Haque, 1985).

Investigation on the illicit part of financial transfers has been a subject matter of several researches. For example, (Kar, 2011) argues that IFFs are determined by macroeconomic factors (fiscal deficits, exchange rate, inflation, real GDP growth, negative real rate of return, external debt), structural factors ("un"-inclusive growth, international trade without control, and reforms without regulation) and institutional factors (corruption, informal economy, business environment, and political instability). According to (Holzenthal, 2017), financial crime increases on the aftermath of political as well as economic change. He then predicts that 2017 will be a risky year vis-à-vis the compliance because of various events around the world (Brexit,

the US elections, revolution in the Islamic world, etc.). (Pérez, Brada, & Drabek, 2012) investigate the role of FDI in facilitating money laundering and illegal capital flight in transitions economies and find that illicit money flows explain FDI outflows in the sample studied. The extend of these effects is 6-10% of the total FDI outflows and 20% of FDI directed towards countries supposed to be money laundering centers. For (Kar & Freitas, 2011), the 2008 global financial crisis explains the decrease of IFF from DCs at the decade ending 2009 via the breakdown of international trade. (Ndikumana & Boyce, 2012) underscore that capital stock of African continent would increase by 60 per cent if funds were not leave illicitly and that GDP per capita would increase by 15 per cent in the same assumption. Also, IFFs contribute to worsen inequalities by many conduits (taxes, services delivery, etc.). African governments have more difficulties to provide social services over the continent as their economies are gloomy. The African forum for Tax Administration shows that one third of Africa's wealth is held abroad and then, tax authorities are deprived by resources that would be used to reduce inequalities over the continent. In sum, (Quirk, 1997) investigates the macroeconomic implications of money laundering and shows that it significantly affects currency and money balances and may reduce economic growth. (Zoromé, 2007) proposes a definition of Offshore Financial Centers (OFCs) based on countries macroeconomic conditions rather than a subjective analysis of their regulatory framework.

The role of sound institutions in curtailing IFFs is stresses in the literature. Thus, (Ajayi & Ndikumana, 2015) postulate that, although rooted in governance, the persistence of illicit financial flows depends on both domestic and international actors, and therefore on international political economy, in addition to the structure and functioning of global (financial, legal, and political) organizations. Grand corruption is essential in the nexus between illicit financial flows and governance. It corrodes governance, which in turn engenders opportunistic crimes (Ajayi & Ndikumana, 2015). An analysis of (Tanzi, 1996) shows that money laundering affects both the international allocation of resources and the stability of the international financial system. (Riechel, 2001) discusses issues of financial sector regulation and supervision in small pacific island countries and advocates stronger cooperation in these countries. He also calls for more financial and technical assistance. (Buchanan, 2004) exposes a clinical examination of money laundering process as well as the extend of the problem and global efforts to combat it. Money laundering is viewed as a financial crime. (Verdugo Yepes, 2011) assesses country compliance with anti-money Laundering and Combating the Financing of Terrorism (AML/CFT) and highlights a low overall compliance, undermining financial transparency. She also makes evidence that financial and economic development, governance

and FDI are positively related to compliance with AML/CFT standard while the performance of banking systems and M2/GDP reduce compliance.

A substantial literature on the determinants of tax revenue mobilization point out several factors (Agbeyegbe et al., 2006; Becker and Fuest, 2010; Benon et al., 2002; Bird et al., 2008; Chelliah, 1971; Chelliah et al., 1975; Clausing, 2007; Devarajan et al., 2002; Eltony, 2002; Exbrayat and Geys, 2014; Ghura, 1998; Gupta, 2007; Keen and Mansour, 2010; Leuthold, 1991; Lotz and Morss, 1967; Mahdavi, 2008; Mao and Wu, 2019; Stotsky and WoldeMariam, 1997; Tait et al., 1979; Tanzi, 1992, 1991; Tanzi and Aguirre, 1981; Tanzi and Zee, 2000). According to this literature, the main determinants of tax revenue are per capita income, international trade, agriculture share, natural resources, foreign debt, corruption, rule of law, etc. Current literature on the issue point out institutions and good governance as the most important factors which affect tax revenue in DCs. In a recent study, (Aaskoven, 2018) investigate the effects of budget institutions on taxation in 15 EU countries and finds that the centralization of budget process raises the level of taxation. He further indicates that centralizing budget process reduce government debt and deficits by increasing public revenues (taxation as share of GDP) and moderating public spending. Corruption is also identified as an important determinant of tax revenue in many developing countries (Flatters and MacLeod, 1995; Friedman et al., 2000; Imam and Jacobs, 2014; Tanzi and Davoodi, 1998). For example, (Imam & Jacobs, 2014) highlight the negative effect of corruption on tax revenue mobilization in MENA countries. They show that this effect depends on tax categories: international trade tax is more affected than the other types of taxes[61].

III. Data and stylized facts

1. Data

We work on 58 developing and emerging countries from 2004 to 2013. This sample period is determined by the availability of IFFs' data. Our data on tax revenue stem from the International Centre for Tax and Development's (ICTD) Government Revenue Dataset (GRD) and The IMF's tax revenue dataset. The data on the treatment variable are drawn from the Financial Action Task Force (FATF). The remaining variables come from various sources including the World Bank Group (World Development Indicators & Worldwide Governance Indicators), the IMF World Economic Outlook (WEO) data, Global financial integrity (GFI) data, ICRG,

[61] This is because trade tax collection involves more interaction between government officials and taxpayers (Imam & Jacobs, 2014).

(Kose, Kurlat, Ohnsorge, & Sugawara, 2017) and (Chinn & Ito, 2006) 's index of capital openness.

The sample include 17 Non-Cooperative countries and 41 Cooperative countries. The number of Non-Cooperative countries has evolved over time. In fact, the FATF has identified 10 countries in 2004 as Non-Cooperative. This number evolved to 11 countries in 2008 with the inclusion of Iran. In 2011, Sri Lanka and Turkey expand the list to 13 countries. The last country to be listed as Non-Cooperative in our sample is Algeria in 2013. The list of cooperative and non-cooperative countries is given in the appendix (table A6).

2. Stylized facts

Figure 1 shows that IFFs are important in Asia's countries in comparison with other regions around the world. They also increase over time in DCs from 3.6 to 8.2 billion dollars between 2004 and 2013 (Figure 2). Table A1 (in the appendix) presents descriptive statistics of the main variables used in this paper.

Figure 1: Average annual illicit financial flows from DCs by region from 2004 to 2013

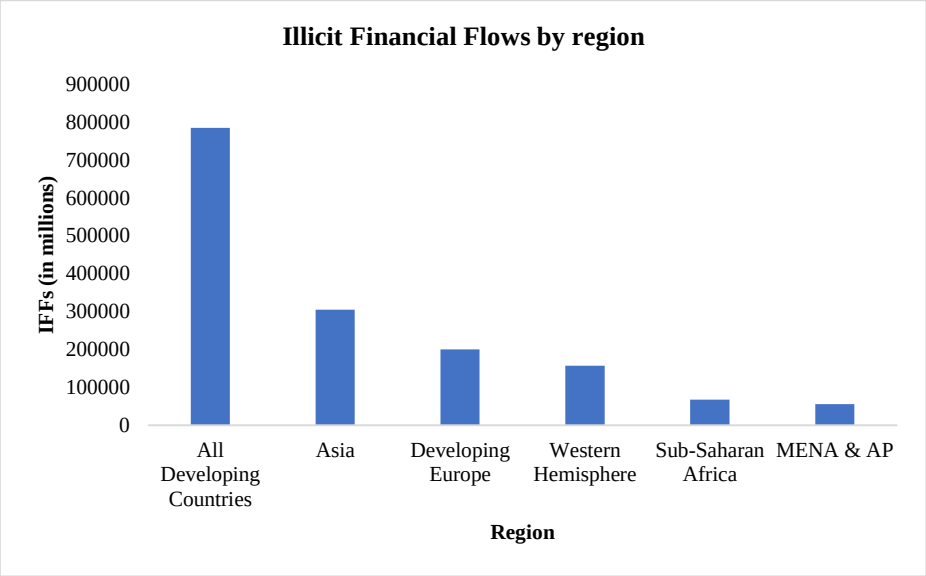


Figure 3 highlights that the value of tax revenue is higher in Non-cooperative countries (18.23% of GDP) in the pre-treatment period, compared to Cooperative countries (16.08% of GDP). However, this value decreases in Non-cooperatives countries after the treatment (13.94% of GDP) while it slightly increases in Cooperatives countries in this post-treatment period (16.16% of GDP).

Finally, figure A1 (in the appendix) indicates that the mean value of tax revenue is lower in Non-cooperatives countries over the sample period of this study. These graphic representations

(figure 3 & A1) show that Cooperation with international standard in terms of combating IFFs may influence domestic revenue mobilization in developing countries[62].

Figure 2 : The evolution of IFFs from 2004 to 2013

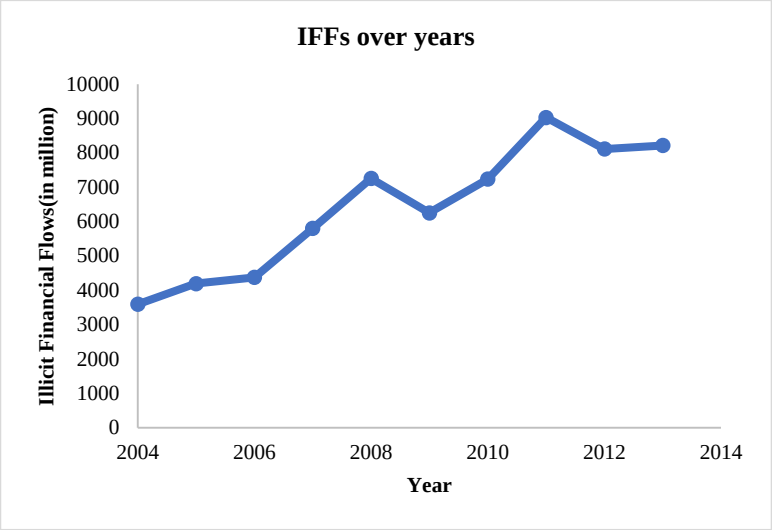
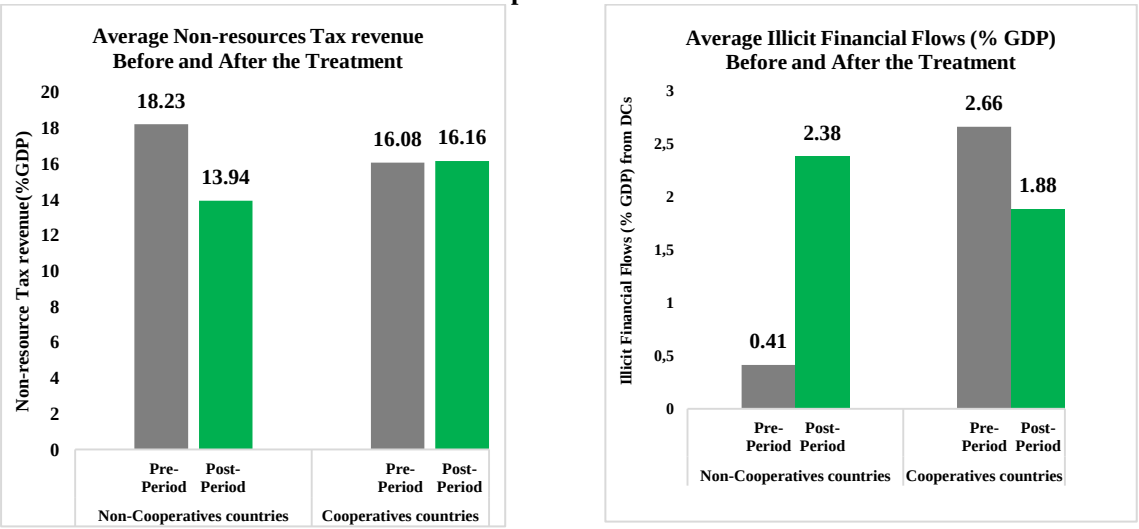


Figure 3: Tax revenue and IFFs flows from DCs Before versus After inclusion in FATF list of Non-Cooperative countries



Note : The cut-off date for cooperative countries is define as the mid-year period between the first time that FATF lists a country as Non-Cooperative (2004 in our case) and the sample end-year (2013) see (Minea & Tapsoba, 2014; Miskin & Schmidt-Hebbel, 2007). The cut-off dates for Non-Cooperative countries are the years of their inclusion in the FATF list.

IV. Econometric method

We aim to evaluate the treatment effect of Non-Cooperation on tax revenue. Then, we consider (following the literature on impact evaluation) Non-Cooperation with international rules as treatment variable. We refer to countries which do not comply with Financial Action Task Force

[62] Given that comparing the mean value of tax revenue between treated and control group can be biased by the *"selection on observables"* problem, these stylized facts simple show some correlations.

(FATF) rules (i.e. Non-cooperative countries) as treated group and countries which comply with those rules as control group (Cooperative countries).

The Average Treatment on the Treated (ATT) is estimated based on the following equation:

$$\begin{aligned} \boldsymbol{ATT} &= \boldsymbol{E}[(\boldsymbol{Y_{i1}} - \boldsymbol{Y_{i0}})|\boldsymbol{NonCoop} = \mathbf{1}] \\ &= \boldsymbol{E}[\boldsymbol{Y_{i1}}|\boldsymbol{NonCoop} = \mathbf{1}] - \boldsymbol{E}[\boldsymbol{Y_{i0}}|\boldsymbol{NonCoop} = \mathbf{1}] \qquad (\mathbf{1}) \end{aligned}$$

where $\boldsymbol{NonCoop}$ is the Non-Cooperation dummy variable in country $\boldsymbol{i}$, $\boldsymbol{Y_{i1}}$ is the value of tax revenue when country $\boldsymbol{i}$ has Non-cooperative behavior and $\boldsymbol{Y_{i0}}$ if it Cooperates, $\boldsymbol{Y_{i0}}|\boldsymbol{NonCoop} = \mathbf{1}$ is tax revenue value that would have been observed if Non-cooperative country had Cooperative with FATF rules and, $\boldsymbol{Y_{i1}}|\boldsymbol{NonCoop} = \mathbf{1}$ the tax revenue value really observed on the same Non-cooperative country.

Equation (1) means that the comparison between tax revenue value observed in Non-cooperative countries and tax revenue value observed in the same countries if they had Cooperatives would give us an unbiased estimate of the ATT. However, the main difficulty here is that the second term on the right side of this equation is unobservable. We cannot observe tax revenue value of Non-cooperative country had it Cooperate.

With a random choice of Non-Cooperation, we can simply compare the sample mean of the Non-cooperative countries and that of Cooperative countries to bypass this difficulty. However, the choice of cooperating or not with FATF rules may be dictated by some observable factors (political institutions, macroeconomic conditions, etc.) that also determine tax revenue mobilization. This can lead to self-selection. Then, comparing the mean value of tax revenue between the two samples can generate a "selection on observables" problem, biasing linear regression method (Lin & Ye, 2007).

1. Matching on propensity scores

We follow the empirical literature (Guerguil, Mandon, & Tapsoba, 2017; Lin & Ye, 2007; Minea & Tapsoba, 2014; Tapsoba, 2012) and address the "selection on observables" problem by using various PSM methods[63]. PSM consist here to compare Non-cooperative and Cooperative countries based on their observable characteristics. The difference of tax revenue value of the two groups of countries is supposed to be the effect of Non-Cooperation. A crucial assumption to address the selection problem when applying matching method is unconfoundedness (or conditional independence). This identifying assumption is expressed as

[63] We implement alternative PSM methods including Nearest-Neighbor (NN) matching, Radius matching within a Radius (or caliper) of length r (large radius r=0.05, medium radius r=0.01 and small radius r=0.005), regression-adjusted Local Linear matching (LLR) coined by (Heckman, Ichimura, & Todd, 1998) and Kernel matching.

$(\boldsymbol{Y_0, Y_1} \perp \boldsymbol{NonCoop|X})$ and requires that conditional to a set of observable factors (X), the outcome (tax revenue) be independent of the treatment variable[64].

Under unconfoundedness, Equation (1) can be rewritten as:

$$\mathbf{ATT} = \boldsymbol{E[Y_{i1}|NonCoop = 1,\ X_i] - E[Y_{i0}|NonCoop = 0,\ X_i]} \qquad (\mathbf{2})$$

where we have replaced $\boldsymbol{E[Y_{i0}|NonCoop = 1,\ X_i]}$ with $\boldsymbol{E[Y_{i0}|NonCoop = 0,\ X_i]}$

Then, each matching method would be to match the treated units to the control units with similar values of X. but given that the number of covariates in X increases, it would be difficult to implement a matching on X. (Rosenbaum & Rubin, 1983), in order to bypass this difficulty, suggest matching the two groups based on their propensity score-PS (instead of X). The propensity score here is the probability of being Non-cooperative conditional to the observable (X). That is:

$$\boldsymbol{p(X_i) = E[NonCoop|X_i] = \Pr(NonCoop = 1|X_i)} \quad (\mathbf{3})$$

Another assumption which is important for the application of PSM is the common support assumption. This assumption ($\boldsymbol{p(X_i < 1)}$) requires the existence of comparable control units for each treated unit and vis-versa.

The ATT when using PSM under the common support assumption is:

$$\mathbf{ATT} = \boldsymbol{E[Y_{i1}|NonCoop = 1,\ p(X_i)\ ] - E[Y_{i0}|NonCoop = 0,\ \ p(X_i)]} \qquad (\mathbf{4})$$

2. Estimating the Propensity Score

Table 1 shows our estimates of propensity score using a probit model[65]. We explain the probability of Non-compliance with FATF Recommendations, controlling for various factors. As a matter of fact, countries which record high amounts of illicit financial flows in the past are expected to ignore international standards for combatting IFFs. This variable can also affect tax revenue. We then expect a positive sign between past IFFs and the probability of being Non-Cooperative. The effects of macroeconomic policies are captured by inflation rate. Worse macroeconomic situation leads to lower tax revenues (Imam & Jacobs, 2014; Tanzi, 1977). This variable is also expected to positively affect the probability of Non-Cooperation. We also control for international trade. This factor is expected to reduce the probability of Non-Cooperation as more open economies can face important sanctions if they do not comply with international standards. Countries which record high public debt are exposed to "debt

[64] Unconfoundedness implies that all factors that influence the treatment and the outcome have to be observed by the researcher (Caliendo & Kopeinig, 2008).

[65] (Caliendo & Kopeinig, 2008) argue that for the binary treatment case, logit and probit models usually yield similar results. The choice is not too critical, even though the logit distribution has more density mass in the bounds. Our results are unchanged when we use a logit model.

intolerance" (Reinhart, Rogoff, & Savastano, 2003). These countries are less predisposed to comply with international standards given their fiscal profligacy. In the same vein, debt service is expected to increase the probability of Non-Cooperation because high debt service can lead a country to a debt overhang problem. While one would have expected economic growth to reduce the probability of non-compliance, this is not the case since the variable is not significant. We expect FDI inflows to increases compliance with FATF standards. This could be explained by the evidence that capital is usually invested in sound economies (Verdugo Yepes, 2011). In sum, the share of agriculture in the GDP is viewed as a proxy for economic development. It could positively affect Non-Cooperation. However, the effect of this variable is insignificant. Finally, the sign of natural resource rents (as share of GDP) is a priori ambiguous. Indeed, countries which record high natural resource revenue have necessary resources to establish sound institutions and to support their economic activity as well (Brunnschweiler & Bulte, 2008). This could increase their compliance vis-à-vis FATF Recommendations on AML/CFT. In contrast, high level of natural resource rents can trigger loose fiscal and monetary policies, impeding economic growth (James & Aadland, 2011; Papyrakis & Gerlagh, 2007; Sachs & Warner, 1999; Sachs & Warner, 1995, 2001). Resource-rich countries generally show a high level of corruption. In this latter case, natural resource rents reduce compliance with international standards. Moreover, the quality of governance is supposed to reduce the probability of Non-Cooperation. Well governed countries generally meet their commitments regarding international cooperation against IFFs.

The overall fit of the regression is reasonable with pseudo R^2 around 0.3.

Table 7 : Probit estimates of the propensity score

	[1]	[2]	[3]	[4]	[5]	[6]
Dependent variable: Dummy=1 if a country is Non-Cooperative and 0 otherwise						
Lag (IFFs)	0.421***	0.415***	0.434***	0.359***	0.413***	0.375***
	(0.0682)	(0.0703)	(0.0729)	(0.0662)	(0.0655)	(0.0681)
L.inflation	0.0229*	0.0211*	0.0204	0.0309**	0.0270**	0.0224*
	(0.0128)	(0.0125)	(0.0133)	(0.0126)	(0.0134)	(0.0118)
Trade	-0.00508*	-0.00634**	-0.00793**	-0.00411	-0.00446	-0.00650**
	(0.00290)	(0.00306)	(0.00369)	(0.00270)	(0.00279)	(0.00304)
L.Public debt	0.00422*	0.00292	0.00417*	0.00253	0.00420*	0.00432**
	(0.00221)	(0.00216)	(0.00229)	(0.00238)	(0.00217)	(0.00216)
L.debt service	0.0644***	0.0652***	0.0741***	0.0638***	0.0648***	0.0639***
	(0.0176)	(0.0173)	(0.0193)	(0.0174)	(0.0172)	(0.0170)
L.GDP growth	0.0171	0.0187	0.0185	0.0183	0.0149	0.0215
	(0.0196)	(0.0200)	(0.0197)	(0.0206)	(0.0201)	(0.0200)
L.FDI	-0.121***	-0.105***	-0.103***	-0.0875**	-0.129***	-0.118***
	(0.0405)	(0.0397)	(0.0384)	(0.0354)	(0.0455)	(0.0400)
L.agriculture	0.0267**	0.0239**	0.0291***	0.0160	0.0328***	0.0131
	(0.0127)	(0.0113)	(0.0102)	(0.0132)	(0.0109)	(0.0132)
L.natural_rents	0.0457***	0.0399***	0.0351**	0.0399***	0.0509***	0.0380***
	(0.0118)	(0.0119)	(0.0142)	(0.0112)	(0.0123)	(0.0117)
Effectiveness	-0.214					
	(0.258)					
Law		-0.557**				
		(0.273)				
Voice			-0.401*			
			(0.229)			
Stability				-0.441***		
				(0.153)		
Regulatory					0.0686	
					(0.203)	
Corruption						-0.801**
						(0.327)
Constant	-5.102***	-5.094***	-5.112***	-4.788***	-5.094***	-4.771***
	(0.717)	(0.743)	(0.722)	(0.706)	(0.703)	(0.725)
N	419	419	419	419	419	419
Pseudo R2	0.300	0.312	0.309	0.315	0.298	0.318

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

3. Results from propensity score

In Table 2, we present the matching results. It then reports the average treatment effect on the treated (ATT) on domestic tax revenue. The first three columns show the results from nearest neighbor matching (with n=1,2,3). The next three columns report results from radius matching, with radii ranging from 0.005 to 0.05. Finally, we report local linear matching and kernel matching in the last two columns.

All the results are negative and statistically significant at the 1% level. The adverse effect of Non-Cooperation in terms of tax revenue is ranging from 2.061% of GDP to 2.778% of GDP.

We based on (Rosenbaum & Rubin, 1985)'s suggestion and compute standardized bias. It's an indicator which assesses the distance in marginal distribution of our control variables (see

(Caliendo & Kopeinig, 2008; Lechner, 2001; Sianesi, 2004) for more detail)[66]. The p-value of the standardized bias allow to verify if the conditional independence assumption hold. For this assumption to hold, the p-value associated with the standardized bias should be above the critical value of 10 per cent (Rosenbaum & Rubin, 1985).

We also report the pseudo R^2 (estimated on the matching sample i.e. on the common support) after matching (see (Sianesi, 2004)). It evaluates the performance of our control variables in term of explaining the probability of complying with FATF standards. After matching, the pseudo R^2 should be "fairly low" (Caliendo & Kopeinig, 2008).

Finally, we check whether or not the matching estimators are affected by an eventual hidden bias (Rosenbaum, 2002). For example, our results could be biased if similar countries in terms of observed factors differ in terms of unobserved factors. We then implement the test of (Rosenbaum, 2002) which check whether unobserved factors could alter the effect of compliance on domestic tax revenue mobilization. It appears that our estimates do not suffer of a hidden bias.

4. Effects on tax components

In the previous section, we show that tackling IFFs significantly affect domestic tax revenue mobilization. Nevertheless, this effect could be different on countries' tax components. Table 3 sheds light on the fact that the effect of complying or not with FATF standard depends on the type of taxes. We only focus on indirect taxes given that in developing countries, tax revenues derive much less from direct taxes such as income or corporate taxes, and much more from indirect taxes than in developed countries (Stiglitz et al., 2006). The ATT is higher for goods and services taxes (around -2.5% of GDP), followed by VAT (-1.5% of GDP) and excise taxes (-0.7% of GDP slightly). This result can be explained by the fact that over 83% of IFFs from DCs stem from trade mis-invoicing (Global Financial Integrity, 2015). Then, export under-invoicing and import over-invoicing cost a lot of amounts for DCs in terms of tax revenue, especially goods and services taxes, VAT and excise taxes.

5. Robustness checks

We check the sensitivity of our results with respect to country's other tax components (Table A4) and the combination of control variables (Table 2, line [2]-[6]). Furthermore, the results are unchanged after different heterogeneities tests (the time length of Non-cooperation, the amount of funds that leave illicitly, institutional quality and the level of public debt) (Table 4,

[66] They argue that a standardized bias below 5% after matching is sufficient in many empirical works.

Table A7-A8). They still hold when we consider the existing endogeneity between IFFs and tax revenue (by running Blundell-Bond method) (Table A9). We also check the sensitivity of the results to alternative specifications (Table A10). They remained unchanged. Finally, our results are unchanged when we use alternative matching methods to estimates the treatment effect of Non-cooperating with international standards in terms of combating IFFs in developing countries (Table A5).

In brief, the results are not sensitives to the set wide of robustness tests. Countries' non-compliance with international standards have, on average, significant negative effects on their domestic tax revenue mobilization in our sample of 58 developing countries.

Table 2: Matching results (with Non-Cooperative Countries Dummy as Treatment Variable)

Treatment Variable	**1-Nearest Neighbour Matching**	**2-Nearest Neighbour Matching**	**3-Nearest Neighbour Matching**	**Radius Matching**			**Local Linear Regression Matching**	**Kernel Matching**
				r=0.005	**r=0.01**	**r=0.05**		
Non-Cooperatives countries	**Dependent variable: Tax revenue (% of GDP)**							
[1] Average Treatment on the Treated (ATT) Using Government Effectiveness	-2.181* (1.164)	-2.066** (0.979)	-2.061** (0.968)	-2.260** (0.893)	-2.382*** (0.836)	-2.508*** (0.742)	-2.778*** (0.795)	-2.495*** (0.760)
Number of observations	513	513	513	513	513	513	513	513
Number of Treated observations	104	104	104	104	104	104	104	104
Number of Control observations	409	409	409	409	409	409	409	409
	Robustness checks:							
[2] Using Rule of Law	-2.364** (1.201)	-2.779** (1.139)	-2.840** (1.129)	-3.062*** (0.838)	-3.068*** (0.870)	-2.784*** (0.802)	-2.968*** (0.759)	-2.779*** (0.812)
[3] Using Voice and Accountability	-2.032* (1.064)	-2.162** (0.981)	-2.333** (0.961)	-2.484*** (0.843)	-2.450*** (0.773)	-2.484*** (0.711)	-2.751*** (0.739)	-2.492*** (0.702)
[4] Using Control of Corruption	-3.589*** (1.213)	-3.355*** (1.125)	-2.928*** (1.108)	-2.763*** (0.964)	-2.849*** (0.798)	-2.570*** (0.753)	-2.778*** (0.865)	-2.586*** (0.807)
[5] Using Regulatory Quality	-2.718** (1.211)	-2.463** (1.000)	-2.313** (1.079)	-2.508*** (0.909)	-2.564*** (0.822)	-2.625*** (0.767)	-2.831*** (0.776)	-2.587*** (0.751)
[6] Using Political Stability	-2.612** (1.237)	-2.556** (1.112)	-2.812** (1.151)	-2.956*** (0.904)	-2.901*** (0.865)	-2.871*** (0.858)	-2.892*** (0.911)	-2.847*** (0.834)
Rosenbaum bounds sensitivity tests	**1.2**	**1.3**	**1.3**	**1.5**	**1.6**	**1.7**	**1.9**	**1.7**
Standardized biases (p-value)	**0.21**	**0.33**	**0.56**	**0.76**	**0.78**	**0.94**	**0.21**	**0.94**
Pseudo R2	**0.04**	**0.03**	**0.02**	**0.01**	**0.01**	**0.01**	**0.04**	**0.01**

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ **Bootstrap replications=500**

Note: All these specifications refer to the different columns of Table 1.

Table 3: Matching results for tax components

Treatment Variable	1-Nearest Neighbour Matching	2-Nearest Neighbour Matching	3-Nearest Neighbour Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Non-Cooperatives countries	**Dependent variable: General Goods & Services Taxes (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-2.181***	-2.639***	-2.593***	-2.511***	-2.489***	-2.608***	-2.659***	-2.581***
Using Government Effectiveness	(0.671)	(0.622)	(0.546)	(0.528)	(0.471)	(0.391)	(0.406)	(0.401)
Number of observations	483	483	483	483	483	483	483	483
Number of Treated observations	105	105	105	105	105	105	105	105
Number of Control observations	378	378	378	378	378	378	378	378
Rosenbaum bounds sensitivity tests	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**	**2.5**
Standardized biases (p-value)	**0.87**	**0.68**	**0.72**	**0.95**	**0.96**	**0.97**	**0.87**	**0.97**
Pseudo R2	**0.01**	**0.02**	**0.02**	**0.01**	**0.09**	**0.07**	**0.01**	**0.07**
Non-Cooperatives countries	**Dependent variable: VAT Revenue (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-1.595***	-1.586***	-1.593***	-1.646***	-1.549***	-1.635***	-1.648***	-1.615***
Using Government Effectiveness	(0.574)	(0.484)	(0.486)	(0.546)	(0.446)	(0.408)	(0.418)	(0.415)
Number of observations	411	411	411	411	411	411	411	411
Number of Treated observations	84	84	84	84	84	84	84	84
Number of Control observations	327	327	327	327	327	327	327	327
Rosenbaum bounds sensitivity tests	**1.8**	**2**	**2**	**2.1**	**2.1**	**2.3**	**2.4**	**2.3**
Standardized biases (p-value)	**0.60**	**0.79**	**0.70**	**0.56**	**0.77**	**0.91**	**0.60**	**0.90**
Pseudo R2	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**	**0.01**	**0.03**	**0.01**
Non-Cooperatives countries	**Dependent variable: Excises Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-0.780**	-0.725***	-0.650**	-0.705**	-0.662***	-0.522***	-0.504***	-0.503***
Using Government Effectiveness	(0.336)	(0.269)	(0.272)	(0.293)	(0.248)	(0.178)	(0.178)	(0.173)
Number of observations	425	425	425	425	425	425	425	425
Number of Treated observations	81	81	81	81	81	81	81	81
Number of Control observations	344	344	344	344	344	344	344	344
Rosenbaum bounds sensitivity tests	**1.8**	**1.9**	**2.1**	**2.4**	**2.4**	**1.8**	**2**	**1.8**
Standardized biases (p-value)	**0.78**	**0.90**	**0.96**	**0.99**	**0.93**	**0.99**	**0.78**	**0.99**
Pseudo R2	**0.02**	**0.01**	**0.01**	**0.008**	**0.01**	**0.002**	**0.02**	**0.002**

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01 **Bootstrap replications=500**

V. Exploring the heterogeneity in the treatment effects

Developing countries generally show notable heterogeneity in their macroeconomic conditions and their institutional framework e.g. (Acemoglu, Gallego, & Robinson, 2014; Acemoglu, Johnson, Robinson, & Thaicharoen, 2003; Acemoglu, Johnson, & Robinson, 2005; Acemoglu, Naidu, Restrepo, & Robinson, 2019; Balima, Combes, & Minea, 2017; Hameed, 2005; Lin & Ye, 2009; Minea & Tapsoba, 2014; Wei, 2006). It is then important to explore the heterogeneity feature (Lin & Ye, 2009) of an effective compliance with international standards in terms of combating money laundering and the financing of terrorism.

Following (Lin & Ye, 2009), we explore some possible sources of heterogeneity (five in total) employing control function approach. We first examine if countries which meet the preconditions of compliance with standards show better performance in terms of tax revenue mobilization (column 2). Secondly, we see if the time length since the identification as non-cooperative country mostly affect tax revenue mobilization (column 4). Thirdly, we check if the amount of IFFs from a country magnify the negative effect of non-compliance on tax revenue (column 5). Fourth, we are considering whether the country's fiscal space matter in the effectiveness of compliance on tax revenue mobilization (column 12). Last but not least, we examine the effects of institutional and governance quality on the link between compliance and tax revenue mobilization (column 6-11 and column 13).

The estimated treatment effect on tax revenue mobilization (based on control function approach[67]) is reported in Table 4 below. We report an OLS regression of tax revenue on compliance dummy within the common support. The estimated coefficient represents the mean difference between Non-cooperative and Cooperative countries in terms of tax revenue value. The negative and significant sign indicates that Non-cooperative countries collect less tax revenue than Cooperatives countries. In the second column, we add the estimated propensity score obtained from our baseline probit model as a control function (see (Lin & Ye, 2009)). The statistically significant coefficient of the propensity score means that there is self-selectivity in the model. The estimated coefficient after controlling for self-selectivity (coefficient of the compliance dummy) is around -2 and is closer to the ATT resulting from various matching methods.

The last twelve columns highlight the heterogeneity feature of our treatment effect. We include an interaction term of the compliance dummy and the difference between the estimated propensity score and its sample average (third column). A statistically significant interaction

[67] See (Wooldridge, 2015) for more details.

term indicates, among others, the presence of heterogeneity[68]. As we can observe, the ATT at mean propensity score is negative and statistically significant. Non-cooperatives countries collect less tax revenue (-2.6% of GDP) than Cooperatives countries. The interaction term is not statistically significant, meaning that there is no evidence that tax revenue mobilization is more effective in countries that meet the preconditions of compliance with international standards. We also find no evidence of effective tax revenue mobilization regarding the time length since the identification of a country as Non-cooperative by FATF.

We further investigate the effect of fiscal space in affecting the effectiveness of tax revenue mobilization (column 12). The positive and significant interaction term show that high indebted countries are subject to broaden their tax base and collect more revenue. The following columns (5-13) underscore the effect of institutional and governance variables in improving tax collection in developing countries. Some interaction terms are positive and significant. This gives an evidence of heterogeneity: countries with sound institutions and high quality of governance can mobilize more domestic tax revenue. This positive effect varies from +1.7% (low political stability) to +2.9% (high regulatory quality) of GDP.

Finally, we explore whether the level of income influence the effectiveness of domestic tax revenue mobilization. The last column of Table 4 indicates that middle-income countries are less predisposed to collect more tax revenue in comparison with low income countries (negative and significant interaction term). This result could be explained by the fact that middle-income countries are less sensitive to comply with FATF Recommendations as they have relatively better institutions.

As we have shown in previous section, Non-Cooperation vis-à-vis FATF Recommendations stifles tax revenue mobilization in DCs. We explore the sensitivity of this result to several additional structural characteristics (Table A9 & Table A10 in the Appendix). In this line, we first account for the phase of the business cycle (whether it is good or bad). This is explained by the fact that the impact of Non-Cooperation on tax revenue mobilization could depend of the business cycle (Corsetti, Meier, & Müller, 2012; Debrun & Kinda, 2016; Giambattista & Pennings, 2017; Giavazzi, Jappelli, & Pagano, 2000; Ilzetzki, Mendoza, & Végh, 2013; Woodford, 2011). The effect of Non-Cooperation on tax revenue is not altered by the phase of the business cycle. Secondly, we account for the fiscal policy stance, following the empirical literature (Ostry & Abiad, 2005; Reinhart & Rogoff, 2010; Sargent & Wallace, 1981; Sutherland, 1997). Our results are not sensitive to the fiscal policy stance. Thirdly, we consider

[68] The coefficient of the compliance dummy is the ATT at the mean propensity score.

the saving glut period (Balima et al., 2017) and our results still are unchanged. Fourthly, our results are not sensitive when we account for debt intolerance (Reinhart et al., 2003), original sin (Eichengreen, Hausmann, & Panizza, 2003; Ho & McCauley, 2003). and currency mismatch (Goldstein & Turner, 2004). Fifth, our results still hold when we consider episodes of high inflation (Tanzi, 1977), natural resource curse (Bornhorst, Gupta, & Thornton, 2009; Gupta, 2007; Tanzi, 1992), financial development (Brada et al., 2013), government size (Chen, Yao, Hu, & Lin, 2017; Kotera & Okada, 2017; Martins & Veiga, 2014) and external financing such as FDI inflows (Demir, 2016) and official development assistance (Burnside & Dollar, 2000; Chauvet & Guillaumont, 2009; Collier & Dollar, 2002; Easterly, 2002); etc.

Tableau 4: Exploring the heterogeneity in the treatment effect on tax revenue mobilization

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
Dependent Variable:	**Tax revenue**													
Impact	-2.040***	-2.764***	-2.628***	-3.498***	-0.506	-2.766***	-2.267***	-2.752***	-2.355***	-2.742***	-1.351*	-10.31***	-9.696**	-1.947*
	(0.729)	(0.712)	(0.701)	(1.239)	(2.566)	(0.663)	(0.705)	(0.605)	(0.610)	(0.693)	(0.692)	(0.931)	(4.769)	(1.125)
PSCORE		10.42***	10.79***	10.39***	17.02***	5.615**	8.886***	8.990***	8.399***	8.354***	11.93***	18.82***	10.36***	15.11***
		(2.342)	(2.418)	(2.351)	(3.809)	(2.551)	(2.380)	(2.371)	(2.500)	(2.294)	(2.159)	(2.226)	(2.621)	(2.398)
Impact*(PS-$\overline{PS}$)			-2.142											
			(7.499)											
Impact*time				0.157										
				(0.220)										
Illicit					-0.507*									
					(0.267)									
Impact*illicit					-0.278									
					(0.352)									
Effectiveness						3.723***								
						(0.629)								
Impact*effectiveness						0.314								
						(1.248)								
Law							2.488***							
							(0.577)							
Impact*law							1.133							
							(1.116)							
Voice								3.190***						
								(0.480)						
Impact*voice								1.340						
								(0.856)						
Regulatory									2.563***					
									(0.636)					
Impact*regulatory									2.903***					
									(1.063)					
Corruption										3.240***				
										(0.492)				
Impact*corruption										-0.526				
										(0.990)				
Stability											2.447***			
											(0.361)			
Impact*stability											1.728**			
											(0.694)			
External debt												0.0604***		
												(0.0105)		
Impact*debt												0.163***		
												(0.0183)		
Political risk													0.254***	
													(0.0420)	
Impact*political													0.108	
													(0.0774)	
Log (ngdp)														-0.490***
														(0.109)
Impact*Log(ngdp)														-0.0759
														(0.140)
Constant	17.06***	15.14***	15.08***	15.15***	17.71***	16.80***	16.09***	15.84***	15.70***	16.37***	15.45***	10.90***	-1.444	17.60***
	(0.286)	(0.500)	(0.509)	(0.501)	(1.487)	(0.564)	(0.536)	(0.467)	(0.516)	(0.498)	(0.470)	(0.694)	(2.564)	(0.763)
N	504	504	504	504	504	504	504	504	504	504	504	434	422	504
R2	0.018	0.051	0.052	0.052	0.062	0.165	0.127	0.220	0.163	0.157	0.208	0.296	0.228	0.126

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.0$

VI. Concluding Remarks

Our objective was to assess the macroeconomic impact of tackling illicit financial flows (IFFs) on domestic tax revenue mobilization in developing countries. We exploit a sample of 58 developing countries and use propensity score matching to achieve this objective. Then we implement various matching method, namely nearest neighbor matching, radius matching, kernel matching, and local linear matching proposed in the literature.

We find a causal effect of combating IFFs on domestic tax revenue mobilization in developing countries. Cooperative countries outperform Non-Cooperative countries in terms of tax revenue mobilization. Indeed, we find a significant difference between countries which comply with international standards in comparison to countries which do not comply. Specifically, tackling IFFs improve domestic revenue mobilization by around 2 percentage points of GDP in a given country. We also shed light on the fact that the negative effect of Non-compliance with FATF Recommendations depends on tax components. Indeed, this effect is higher for goods and services taxes, followed by VAT and excise taxes, respectively.

Our results are robust to a set wide of alternative specifications. Furthermore, they still hold when we explore their sensitivity regarding several countries' structural macroeconomic conditions (business cycle, fiscal policy stance, debt intolerance, original sin, currency mismatch, natural resources, government size, saving glut, high inflation and external financing) and political situations (corruption, political stability, political risk, government effectiveness, regulatory quality, rule of law and voice and accountability).

At least two policy implications arise from this study. First and foremost, developing countries could mobilize more domestic tax revenue by combating IFFs. This is possible if they implement policies to impede IFFs such as compliance vis-à-vis international standards in terms of anti-money laundering and combating the financing of terrorism. Last but not least, they should establish sound institutions if they really aim to enhance domestic tax revenue mobilization.

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APPENDIX:

Table A1. Descriptive Statistics

Descriptive Statistics: All sample

Variable	Obs	Mean	Std.Dev.	Min	Max
Impact	580	.205	.404	0	1
Tax revenue	536	16.793	6.038	2.002	31.055
Illicit flows	580	7289.98	16894.02	0	184000
Inflation	580	6.766	5.845	-7.114	59.22
Effectiveness	580	-.191	.537	-1.356	1.286
Trade	580	80.153	30.109	22.106	168.213
Public debt	569	47.108	32.583	.474	342.666
GDP growth	580	4.681	4.281	-14.8	34.5
FDI inflows	578	4.812	5.059	-16.091	50.785
Agriculture	574	12.606	8.767	1.116	41.547
GDP pc growth	580	3.383	4.306	-14.421	33.03
Rule of law	580	-.278	.579	-1.533	1.374
Voice & accountability	580	-.126	.69	-1.77	1.244
Political stability	580	-.317	.81	-2.298	1.413
Regulatory quality	580	-.088	.572	-1.73	1.547
Goods & services taxes	503	6.371	3.549	.018	25.878
VAT	430	6.105	2.81	0	14.458
Excises tax	444	2.264	1.719	.038	21.89
Income tax	504	5.6	3.132	.488	27.269
Corporate tax	470	3.017	2.574	.004	25.506
Individual tax	444	2.363	1.684	0	8.234
Payroll tax	136	.465	.525	0	3.147
Property tax	436	.598	.672	0	3.266
Social contribution	299	4.521	4.572	0	13.292

Figure A1. Non-resources tax revenue in Cooperatives and Non-cooperatives countries

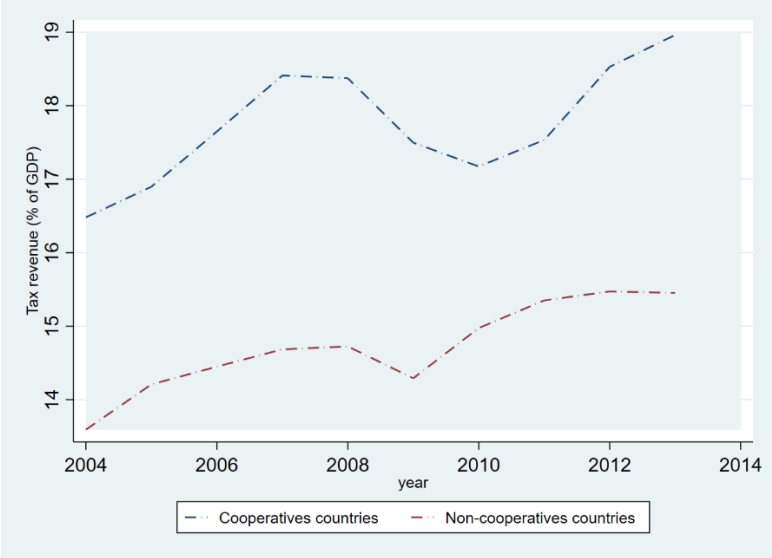

Figure A2 : graphic representation of the common support

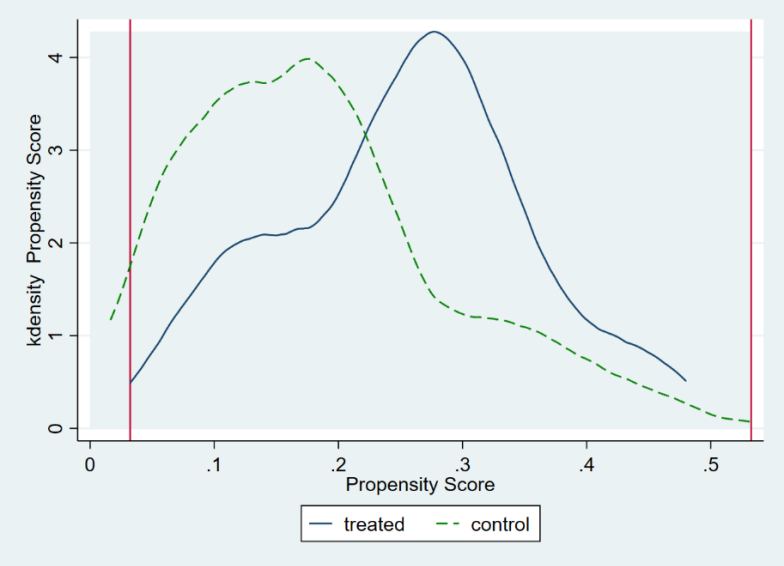

Table A2: Pairwise correlation between tax revenue and selected macroeconomic and political variables

	Tax	Inflation	Effectiveness	Trade	Public debt	Debt service	GDP growth	FDI	Natural rents	Agriculture
Tax	1									
Inflation	-0.0812	1								
Effectiveness	0.3583***	-0.2763***	1							
Trade	0.3063***	-0.0323	0.0816	1						
Public debt	-0.0098	-0.0240	-0.1229**	0.0628	1					
Debt service	0.4032***	-0.0894	0.1617***	0.2983***	0.1557***	1				
GDP growth	-0.1360**	0.1134*	-0.1753***	-0.0246	-0.0729	-0.1920***	1			
FDI	0.1167*	0.0020	0.0999	0.3194***	-0.0359	0.1774***	0.2274**	1		
Natural rent	-0.4990***	0.1363**	-0.0986	-0.1413***	-0.1984***	-0.2341***	0.2000**	0.0684	1	
Agriculture	-0.4209***	0.1066	-0.5800***	-0.1197**	0.0540	-0.2356***	0.1767**	-0.0776	-0.0904	1

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3 : Definition and sources of variables

Variables	Descriptions	Sources
Tax revenue	Total non-resource tax revenue, excluding social contributions. Calculated as "Taxes excluding social contributions" minus "resource taxes". This is the variable recommended for econometric analysis, as it is most complete and consistent across countries.	ICTD Government Revenue Dataset (GRD)
Income Tax	Income Tax Revenue as a % of GDP	IMF Revenue Database (2016)
Individual Tax	Individual Income Tax Revenue as a % of GDP	
Corporate Tax	Corporate Income Tax Revenue as a % of GDP	
Payroll Tax	Taxes on Payroll and Workforce Revenue as a % of GDP	
Property Tax	Property Tax Revenue as a % of GDP	
General Goods & Services Tax	General Goods and Services Tax Revenue as a % of GDP	
VAT Revenue	VAT Revenue as a % of GDP	
Excises Tax	Excise Tax Revenue as a % of GDP	
Social Contributions	Social Contribution as a % of GDP	
Illicit financial flows	Total illicit financial flows from Developing Countries. It is calculated as the sum of illicit Hot Money Narrow Outflows (HMN) and Trade Mis-invoicing Outflows (GER) (IFFs= HMN + GER)	Global Financial Integrity
Impact	Dummy equal 1 if a country is classified as Non-cooperatives by FATF and 0 otherwise.	Financial Action Task Force
Growth rate of GDP	Annual percentage growth rate of GDP per capita	WDI database
Inflation rate	Annual percentage change of consumer price index	
Agriculture GDP	Agriculture includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources.	
Debt service	Debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term obligations of public debtors and long-term private obligations guaranteed by a public entity.	
Inflows of FDI to GDP	Net inflows (new investment inflows less disinvestment) in a given economy from foreign investors and is divided by GDP.	
Public debt	General government debt as % of GDP (measure debt sustainability)	Kose et al. (2017)
Government effectiveness	Government Effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Control of corruption	Control of Corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	

	Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	WGI database
Political stability	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Voice and accountability	Voice and Accountability captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Rule of law	Rule of Law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Regulatory quality	Regulatory Quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.	
Political risk	It is a composite measure of the quality of governance. It represents a simple average of ICRG political variables. Higher value indicates low political risk.	Author calculations based on ICRG data

Table A4: Matching results with alternative tax revenue variables

Treatment Variable	1-Nearest Neighbour Matching	2-Nearest Neighbour Matching	3-Nearest Neighbour Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Non-Cooperatives countries	**Dependent variable: Income Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-0.617	-0.371	-0.437	-0.304	-0.329	-0.413	-0.469	-0.412
Using Government Effectiveness	(0.585)	(0.497)	(0.502)	(0.419)	(0.372)	(0.295)	(0.291)	(0.302)
Number of observations	484	484	484	484	484	484	484	484
Number of Treated observations	100	100	100	100	100	100	100	100
Number of Control observations	384	384	384	384	384	384	384	384
Rosenbaum bounds sensitivity tests	**1**	**1**	**1**	**1**	**1**	**1.1**	**1.2**	**1.1**
Standardized biases (p-value)	**0.73**	**0.99**	**0.99**	**0.99**	**0.99**	**0.99**	**0.73**	**0.99**
Pseudo R2	**0.02**	**0.005**	**0.005**	**0.005**	**0.005**	**0.004**	**0.02**	**0.004**
Non-Cooperatives countries	**Dependent variable: Individual Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-0.482	-0.566*	-0.391	-0.303	-0.248	-0.168	-0.114	-0.182
Using Government Effectiveness	(0.350)	(0.330)	(0.296)	(0.261)	(0.240)	(0.213)	(0.216)	(0.233)
Number of observations	424	424	424	424	424	424	424	424
Number of Treated observations	86	86	86	86	86	86	86	86
Number of Control observations	338	338	338	338	338	338	338	338
Rosenbaum bounds sensitivity tests	**1.2**	**1.3**	**1.2**	**1.2**	**1.1**	**1**	**1**	**1.1**
Standardized biases (p-value)	**0.82**	**0.99**	**0.98**	**0.99**	**0.99**	**0.99**	**0.82**	**0.99**
Pseudo R2	**0.02**	**0.004**	**0.008**	**0.005**	**0.005**	**0.004**	**0.02**	**0.004**
Non-Cooperatives countries	**Dependent variable: Property Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	-0.0613	-0.0669	-0.0764	-0.119	-0.136	-0.0864	-0.0967	-0.0923
Using Government Effectiveness	(0.134)	(0.115)	(0.109)	(0.0962)	(0.0866)	(0.0719)	(0.0743)	(0.0768)
Number of observations	426	426	426	426	426	426	426	426
Number of Treated observations	96	96	96	96	96	96	96	96
Number of Control observations	330	330	330	330	330	330	330	330
Rosenbaum bounds sensitivity tests	**1**	**1**	**1.2**	**1.3**	**1.6**	**1.3**	**1.5**	**1.4**
Standardized biases (p-value)	**0.43**	**0.92**	**0.97**	**0.81**	**0.98**	**0.99**	**0.43**	**0.99**
Pseudo R2	**0.03**	**0.01**	**0.008**	**0.01**	**0.006**	**0.002**	**0.03**	**0.002**

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01 **Bootstrap replications=500**

Table A4: Matching results with alternative tax revenue variables (cont.)

Treatment Variable	1-Nearest Neighbour Matching	2-Nearest Neighbour Matching	3-Nearest Neighbour Matching	Radius Matching			Local Linear Regression Matching	Kernel Matching
				r=0.005	r=0.01	r=0.05		
Non-Cooperatives countries	**Dependent variable: Corporate Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	0.225	0.278	0.189	0.0440	0.124	0.0260	0.0345	0.0430
Using Government Effectiveness	(0.606)	(0.497)	(0.397)	(0.375)	(0.362)	(0.256)	(0.249)	(0.265)
Number of observations	450	450	450	450	450	450	450	450
Number of Treated observations	86	86	86	86	86	86	86	86
Number of Control observations	364	364	364	364	364	364	364	364
Rosenbaum bounds sensitivity tests	**1.2**	**1.3**	**1.2**	**1**	**1**	**1**	**1**	**1**
Standardized biases (p-value)	**0.85**	**0.94**	**0.98**	**0.99**	**0.99**	**0.99**	**0.85**	**0.99**
Pseudo R2	**0.01**	**0.01**	**0.008**	**0.004**	**0.003**	**0.003**	**0.01**	**0.003**
Non-Cooperatives countries	**Dependent variable: Payroll Tax (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	0.339	0.195	0.198	-0.216	-0.210	-0.0921	0.313	-0.178
Using Government Effectiveness	(0.389)	(0.358)	(0.353)	(0.449)	(0.422)	(0.340)	(0.350)	(0.332)
Number of observations	132	132	132	132	132	132	132	132
Number of Treated observations	23	23	23	23	23	23	23	23
Number of Control observations	109	109	109	109	109	109	109	109
Rosenbaum bounds sensitivity tests	**1**	**1**	**1**	**1.1**	**1.1**	**1**	**1**	**1**
Standardized biases (p-value)	**0.03**	**0.54**	**0.49**	**0.55**	**0.55**	**0.55**	**0.03**	**0.81**
Pseudo R2	**0.53**	**0.22**	**0.24**	**0.41**	**0.41**	**0.41**	**0.53**	**0.21**
Non-Cooperatives countries	**Dependent variable: Social Contributions (% of GDP)**							
[1] Average Treatment on the Treated (ATT)	4.519***	4.151***	4.429***	4.484***	4.424***	4.280***	4.206***	4.346***
Using Government Effectiveness	(1.554)	(1.408)	(1.283)	(1.416)	(1.292)	(1.083)	(1.066)	(1.053)
Number of observations	287	287	287	287	287	287	287	287
Number of Treated observations	42	42	42	42	42	42	42	42
Number of Control observations	245	245	245	245	245	245	245	245
Rosenbaum bounds sensitivity tests	**2.5**	**2.5**	**2.5**	**2.5**		**2.5**	**2.5**	**2.5**
Standardized biases (p-value)	**0.08**	**0.47**	**0.71**	**0.71**	**0.81**	**0.72**	**0.08**	**0.71**
Pseudo R2	**0.13**	**0.07**	**0.05**	**0.08**	**0.05**	**0.05**	**0.13**	**0.05**

Standard errors in parentheses * p < 0.10, ** p < 0.05, *** p < 0.01 **Bootstrap replications=500**

Table A5: Matching results using alternative matching estimator

Treatment Variable: Non-Cooperation	Propensity Score Matching	Nearest Neighbor Matching	Augmented Inverse-Probability Weighting	Inverse-Probability Weighted Regression Adjustment	Inverse-Probability Weighting	Regression Adjustment	Caliper (0.5)
Average Treatment on the Treated (ATT)	-2.614***	-2.408***	-2.492***	-2.445***	-2.366***	-2.113***	-2.193***
	(0.767)	(0.459)	(0.553)	(0.672)	(0.713)	(0.647)	(0.539)
Number of observations	513	513	513	513	513	513	513
Number of observations for Control group	409	409	409	409	409	409	409
Number of observations for Treated group	104	104	104	104	104	104	104
	Robustness Checks						
[1] Using Rule of Law	-3.193***	-1.841***	-2.805***	-2.335***	-2.183***	-1.987***	-2.005***
	(0.687)	(0.482)	(0.549)	(0.674)	(0.711)	(0.635)	(0.710)
[2] Using Control of Corruption	-2.808***	-2.361***	-2.530***	-2.235***	-2.172***	-1.935***	-2.572***
	(0.911)	(0.460)	(0.533)	(0.701)	(0.735)	(0.659)	(0.622)
[3] Using Regulatory Quality	-2.059***	-2.647***	-2.687***	-2.278***	-2.118***	-1.910***	-2.079***
	(0.754)	(0.449)	(0.598)	(0.670)	(0.701)	(0.632)	(0.383)
[4] Using Political Stability	-2.101**	-1.937***	-2.355***	-1.745***	-1.692**	-1.665***	-2.308***
	(0.868)	(0.537)	(0.636)	(0.669)	(0.690)	(0.611)	(0.489)
[5] Using Voice and Accountability	-2.843***	-2.524***	-3.002***	-2.357***	-2.430***	-2.089***	-2.085***
	(0.793)	(0.495)	(0.560)	(0.620)	(0.667)	(0.615)	(0.436)

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Figure A3 : Geographic repartition of countries in terms of cooperation with FATF standards

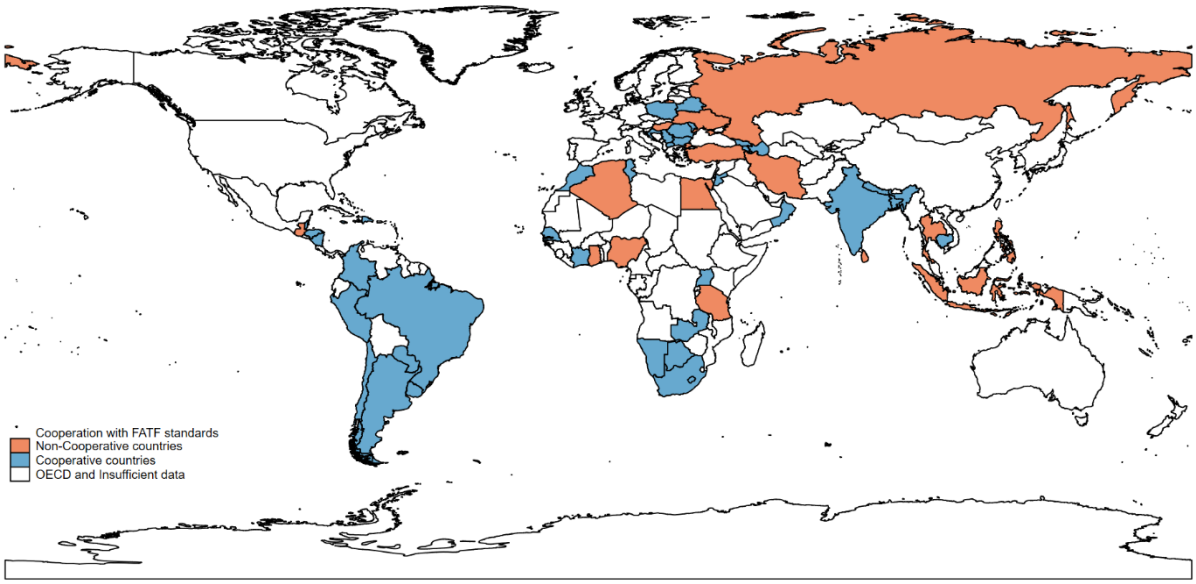

Figure A4 : Evolution of the number of Non-Cooperative countries from 2004 to 2013

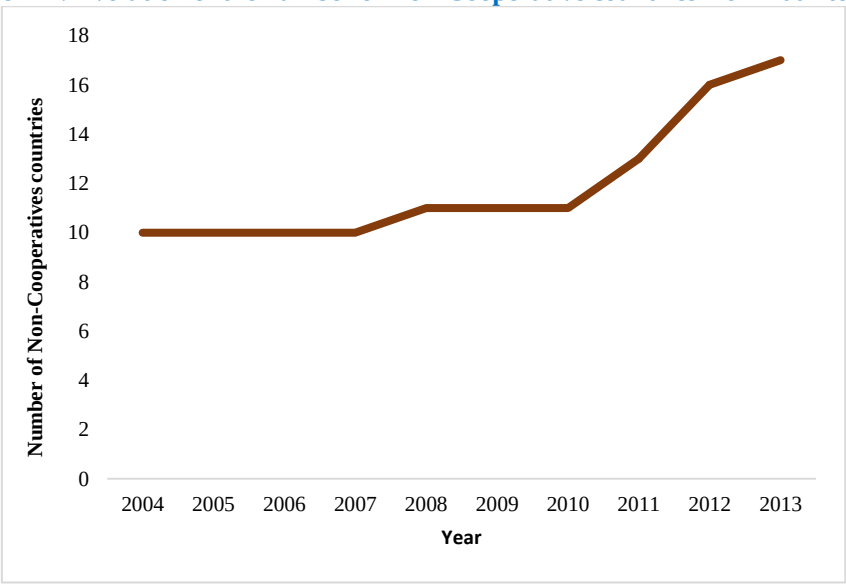

Table A6 : Sample of countries used in this paper

a. List of Cooperative and Non-Cooperative countries in the sample

Cooperative countries	Non-Cooperative countries
Argentina	Algeria
Armenia, Republic of	Bahamas, The
Azerbaijan, Republic of	Egypt
Bangladesh	Ghana
Belarus	Grenada
Belize	Guatemala
Botswana	Hungary
Brazil	Indonesia
Bulgaria	Iran, Islamic Republic of
Cabo Verde	Nigeria
Cambodia	Philippines
Chile	Russian Federation
Colombia	Sri Lanka
Cote d'Ivoire	Tanzania
Croatia	Thailand
Dominican Republic	Turkey
Gambia, The	Ukraine
Georgia	
Honduras	
India	
Jamaica	
Jordan	
Macedonia, FYR	
Moldova	
Morocco	
Namibia	
Nepal	
Nicaragua	
Oman	
Paraguay	
Peru	
Poland	
Romania	
Senegal	
Serbia, Republic of	
South Africa	
Tunisia	
Uganda	
Uruguay	
Vanuatu	
Zambia	
Total = 41	Total=17

b. Year of inclusion in FATF list of Non-Cooperative countries

Non-Cooperative countries	Year
Algeria	2013
Bahamas, The	2004
Egypt	2004
Ghana	2012
Grenada	2004
Guatemala	2004
Hungary	2004
Indonesia	2004
Iran, Islamic Republic	2008
Nigeria	2004
Philippines	2004
Russian Federation	2004
Sri Lanka	2011
Tanzania	2012
Thailand	2012
Turkey	2011
Ukraine	2004

Note: No country was able to change its situation (becoming Cooperative) after it was identified as Non-Cooperative during our study period.

Table A7: Exploring the heterogeneity in the treatment effect on tax revenue mobilization

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Dependent variable : Tax revenue											
Impact	-2.271**	-3.383***	-5.806***	-0.271	-3.468***	-6.672***	-3.282***	-2.432***	-4.867***	-3.880***	-3.850***
	(0.957)	(1.066)	(0.908)	(1.005)	(0.928)	(1.620)	(0.844)	(0.760)	(1.346)	(0.816)	(0.888)
PSCORE	10.02***	10.02***	11.90***	11.90***	8.348***	13.33***	10.05***	12.06***	5.902**	10.28***	10.27***
	(2.377)	(2.377)	(2.263)	(2.263)	(2.474)	(2.570)	(2.359)	(2.446)	(2.939)	(2.369)	(2.337)
Good/Time	-0.605										
	(0.566)										
Impact*Good	-1.112										
	(1.445)										
Bad/Time		0.605									
		(0.566)									
Impact*Bad		1.112									
		(1.445)									
Strong/Stance			-1.396**								
			(0.582)								
Impact*Strong			5.536***								
			(1.368)								
Loose/Stance				1.396**							
				(0.582)							
Impact*Loose				-5.536***							
				(1.368)							
Debt/service					3.377***						
					(0.551)						
Impact*debt service					1.189						
					(1.344)						
Interest						3.262***					
						(0.532)					
Impact*interest						1.766					
						(1.301)					
Saving/glut							-0.557				
							(0.613)				
Impact*saving/glut							1.788				
							(1.600)				
Debt/crisis								2.764***			
								(0.722)			
Impact*debt/crisis								-5.538***			
								(1.009)			
Debt/Foreign									-2.716***		
									(0.702)		
Impact* Debt/Foreign									3.090*		
									(1.604)		
Debt/Reserves (short term)										1.904***	
										(0.565)	
Impact* Debt/Reserves										2.547*	
										(1.411)	
Terms of trade (pc)											-1.175**
											(0.564)
Impact* Terms of trade											2.371
											(1.480)
Constant	15.53***	14.92***	15.46***	14.06***	13.87***	13.29***	15.39***	14.57***	18.10***	14.28***	15.75***
	(0.597)	(0.556)	(0.502)	(0.640)	(0.489)	(0.508)	(0.557)	(0.555)	(0.949)	(0.532)	(0.579)
N	504	504	504	504	504	434	504	504	504	504	504
R2	0.057	0.057	0.084	0.084	0.142	0.215	0.054	0.068	0.074	0.098	0.061

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Exploring the heterogeneity in the treatment effect on tax revenue mobilization

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
Dependent variable : Tax revenue											
Impact	-2.139**	-4.313***	-2.667***	-2.610***	-4.356***	-3.498***	-4.271***	-3.915***	-3.388***	-5.046***	-3.147***
	(0.854)	(1.265)	(0.810)	(0.717)	(0.765)	(1.141)	(0.787)	(0.876)	(1.283)	(0.738)	(0.808)
PSCORE	11.14***	10.74***	9.368***	15.04***	7.762***	7.093***	8.070***	10.98***	12.03***	7.954***	9.991***
	(2.345)	(2.362)	(2.394)	(2.099)	(2.301)	(2.389)	(2.299)	(2.148)	(2.379)	(2.334)	(2.578)
High/inflation	-0.617										
	(0.601)										
Impact*high/inflation	-1.350										
	(1.467)										
Education		0.796									
		(0.656)									
Impact*Education		1.707									
		(1.497)									
Mineral/rents			1.612**								
			(0.634)								
Impact*mineral/rents			0.101								
			(1.711)								
Natural/rents				-6.419***							
				(0.613)							
Impact*natural/rents				1.171							
				(1.526)							
Credit/private					3.187***						
					(0.558)						
Impact* Credit/private					2.948**						
					(1.287)						
Credit/financial						3.810***					
						(0.555)					
Impact*Credit/financial						0.261					
						(1.445)					
Credit/bank							3.089***				
							(0.558)				
Impact*credit/bank							2.447*				
							(1.298)				
Government/size								3.406***			
								(0.548)			
Impact*Government/size								1.807			
								(1.280)			
FDI inflows									1.681***		
									(0.574)		
Impact*FDI inflows									0.172		
									(0.208)		
ODA										-2.259***	
										(0.578)	
Impact*ODA										5.507***	
										(1.410)	
Default											-1.672**
											(0.808)
Impact*Default											2.275
											(3.927)
Constant											
Impact	15.25***	14.42***	14.94***	15.75***	14.25***	14.11***	14.22***	12.75***	14.15***	16.38***	15.41***
	(0.511)	(0.736)	(0.511)	(0.477)	(0.498)	(0.482)	(0.501)	(0.565)	(0.567)	(0.550)	(0.580)
N	504	504	504	504	504	504	504	504	504	504	389
R2	0.058	0.057	0.065	0.243	0.155	0.149	0.143	0.142	0.077	0.089	0.075

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Checking the sensitivity using alternative estimator: Blundell-Bond GMM System

Table A9 : IFFs and tax revenue in DCs

	[1]	[2]	[3]	[4]	[5]	[6]
Non-resource tax revenue						
Lag (tax)	0.789***	0.814***	0.856***	0.805***	0.817***	0.831***
	(0.198)	(0.132)	(0.129)	(0.130)	(0.150)	(0.134)
Illicit Financial Flows	-0.766**	-0.753**	-0.891***	-0.678**	-0.641**	-0.733**
	(0.379)	(0.336)	(0.312)	(0.305)	(0.317)	(0.313)
Trade	0.0527**	0.0473***	0.0508***	0.0406***	0.0474***	0.0452***
	(0.0215)	(0.0159)	(0.0171)	(0.0153)	(0.0136)	(0.0156)
Public debt	-0.000796	-0.00793	-0.00629	-0.00658	-0.00883	-0.00584
	(0.0109)	(0.00707)	(0.00747)	(0.00686)	(0.00771)	(0.00750)
Debt service	0.0523	0.0670	0.0563	0.0548	0.0629	0.0582
	(0.0694)	(0.0474)	(0.0564)	(0.0403)	(0.0404)	(0.0504)
GDP growth	0.0781**	0.0553**	0.0677**	0.0585**	0.0546**	0.0609**
	(0.0344)	(0.0268)	(0.0309)	(0.0283)	(0.0275)	(0.0293)
Inflation	0.0120	0.00424	0.00752	0.00899	-0.000730	0.00912
	(0.0323)	(0.0213)	(0.0230)	(0.0210)	(0.0197)	(0.0227)
Impact	2.070	0.844	0.935	0.919	0.858	0.799
	(1.590)	(0.786)	(0.821)	(0.675)	(0.527)	(0.691)
Effectiveness	0.410					
	(1.239)					
Corruption		0.200				
		(0.886)				
Law			-0.0467			
			(0.849)			
Voice				0.697		
				(0.597)		
Stability					-0.297	
					(0.577)	
Regulatory						0.348
						(0.826)
Constant	4.420	5.093*	4.909*	5.254**	4.020	4.688
	(5.966)	(2.619)	(2.784)	(2.430)	(2.694)	(2.902)
N	485	485	485	485	485	485
AR1	0.050	0.063	0.060	0.064	0.067	0.061
AR2	0.746	0.740	0.829	0.721	0.670	0.766
Hansen	0.645	0.708	0.732	0.726	0.804	0.666
N of group	57	57	57	57	57	57
Number of Z	34	43	43	43	43	43

Standard errors in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10 : Additional robustness analysis[69]

Treatment Variable Non-Cooperative Dummy	1-Nearest Neighbour Matching	2-Nearest Neighbour Matching	3-Nearest Neighbour Matching	Radius Matching r=0.005	Radius Matching r=0.01	Radius Matching r=0.05	Local Linear Regression Matching	Kernel Matching
DEPENDENT VARIABLE: TAX REVENUE								
ATT	-2.905**	-2.459**	-2.804***	-2.612***	-2.580***	-2.387***	-2.681***	-2.418***
Dropping 2009	(1.140)	(1.167)	(1.087)	(0.961)	(0.864)	(0.829)	(0.814)	(0.844)
Treated/Control/Total obs.	94/364/458	94/364/458	94/364/458	94/364/458	94/364/458	94/364/458	94/364/458	94/364/458
Rosenbaum bounds sensitivity	1.6	1.6	1.8	1.6	1.7	1.7	1.8	1.7
Standardized biases (p-value)	0.23	0.41	0.52	0.77	0.82	0.84	0.23	0.84
Pseudo R2	0.04	0.03	0.02	0.02	0.01	0.01	0.04	0.01
ATT	-3.423***	-3.267***	-2.657**	-3.095***	-2.582**	-2.806***	-2.880***	-2.829***
Dropping Saving glut period	(1.289)	(1.241)	(1.122)	(1.143)	(1.040)	(0.879)	(0.929)	(0.915)
Treated/Control/Total obs.	75/276/351	75/276/351	75/276/351	75/276/351	75/276/351	75/276/351	75/276/351	75/276/351
Rosenbaum bounds sensitivity	1.4	1.8	1.9	1.7	1.6	1.9	1.9	1.9
Standardized biases (p-value)	0.58	0.95	0.96	0.74	0.88	0.97	0.58	0.97
Pseudo R2	0.03	0.01	0.01	0.02	0.01	0.01	0.03	0.01
ATT	-5.241***	-5.266***	-5.153***	-4.762***	-4.561***	-4.644***	-4.837***	-4.695***
Dropping Ex-Communist	(1.251)	(1.202)	(1.059)	(1.096)	(0.962)	(0.854)	(0.787)	(0.846)
Treated/Control/Total obs.	76/371/447	76/371/447	76/371/447	76/371/447	76/371/447	76/371/447	76/371/447	76/371/447
Rosenbaum bounds sensitivity	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Standardized biases (p-value)	0.22	0.71	0.70	0.97	0.99	0.99	0.22	0.99
Pseudo R2	0.05	0.02	0.02	0.01	0.05	0.05	0.05	0.05
ATT	-5.120***	-4.421***	-4.343***	-4.131***	-4.086***	-4.048***	-4.214***	-4.077***
Dropping Ex URSS	(1.071)	(1.019)	(0.955)	(0.856)	(0.758)	(0.727)	(0.723)	(0.661)
Treated/Control/Total obs.	85/361/446	85/361/446	85/361/446	85/361/446	85/361/446	85/361/446	85/361/446	85/361/446
Rosenbaum bounds sensitivity	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Standardized biases (p-value)	0.81	0.82	0.76	0.71	0.72	0.91	0.81	0.91
Pseudo R2	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01
ATT	-3.504***	-3.397***	-3.025***	-3.421***	-3.746***	-3.429***	-3.390***	-3.446***
Dropping Fuel exporters	(0.949)	(0.825)	(0.792)	(0.741)	(0.718)	(0.578)	(0.584)	(0.601)
Treated/Control/Total obs.	84/370/454	84/370/454	84/370/454	84/370/454	84/370/454	84/370/454	84/370/454	84/370/454
Rosenbaum bounds sensitivity	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Standardized biases (p-value)	0.97	0.92	0.98	0.99	0.99	0.99	0.97	0.99
Pseudo R2	0.01	0.01	0.007	0.003	0.003	0.006	0.01	0.006
ATT	-3.392***	-3.888***	-3.759***	-3.448***	-3.371***	-3.471***	-3.693***	-3.521***
Dropping High External debt	(1.228)	(1.172)	(1.109)	(1.027)	(0.906)	(0.886)	(0.835)	(0.801)
Treated/Control/Total obs.	82/325/407	82/325/407	82/325/407	82/325/407	82/325/407	82/325/407	82/325/407	82/325/407
Rosenbaum bounds sensitivity	1.9	2.5	2.5	2.4	2.4	2.5	2.5	2.5
Standardized biases (p-value)	0.28	0.46	0.68	0.90	0.97	0.98	0.28	0.98
Pseudo R2	0.04	0.03	0.02	0.01	0.01	0.008	0.04	0.009
ATT	-2.190*	-2.474**	-2.534***	-2.120**	-2.418***	-2.312***	-2.498***	-2.319***
Dropping Hyperinflation	(1.146)	(0.988)	(0.955)	(0.912)	(0.768)	(0.735)	(0.694)	(0.712)
Treated/Control/Total obs.	104/406/510	104/406/510	104/406/510	104/406/510	104/406/510	104/406/510	104/406/510	104/406/510
Rosenbaum bounds sensitivity	1.4	1.8	1.9	1.7	1.6	1.9	1.9	1.9
Standardized biases (p-value)	0.53	0.88	0.87	0.94	0.96	0.97	0.53	0.97
Pseudo R2	0.02	0.01	0.01	0.01	0.008	0.007	0.02	0.008
ATT	-2.266**	-2.905***	-3.037***	-2.318**	-2.565***	-3.187***	-3.249***	-3.172***
Dropping Monetary Unions	(1.073)	(1.043)	(0.964)	(0.983)	(0.883)	(0.761)	(0.803)	(0.790)
Treated/Control/Total obs.	95/379/474	95/379/474	95/379/474	95/379/474	95/379/474	95/379/474	95/379/474	95/379/474
Rosenbaum bounds sensitivity	1.4	1.8	1.9	1.7	1.6	1.9	1.9	1.9
Standardized biases (p-value)	0.96	0.99	0.98	0.99	0.99	0.98	0.96	0.98
Pseudo R2	0.009	0.006	0.007	0.005	0.005	0.007	0.009	0.006

[69] We explore some additional robustness checks in this table. Thus, we assess the robustness of the ATT with respect to the exclusion of the crisis year (2009 global recession), the saving glut period (before 2006), former communist countries, former USSR countries, fuel exporters, high external indebtedness, high inflation episodes and countries belonging to monetary unions.

General Conclusion

"The world is (almost) always second-best; ignore it at your peril."
(Rodrik, 2015, p. 213)
"If you think all economists think alike, do attend one of their seminars."
(Rodrik, 2015, p. 215)

The importance of fiscal policy in financing development is crucial, particularly in a context that domestic revenues are limited in many developing countries and below the level of 20% of GDP that should allow to achieve development goals (UNDP, 2010). Fiscal policy lacks credibility in many developing countries. It is then important to explore the sources of this lack of credibility to improve their effectiveness in terms of mobilizing resources. This dissertation analyzed how fiscal policy can be an asset for development finance. The dissertation addressed empirically four main questions: Does government spending matter for sovereign bonds spreads in developing countries? Can fiscal rules improve financial market access for developing countries? Does combating illicit financial flows foster tax revenues in developing countries? Can fiscal rules curb income inequality in developing countries?

The first part of the dissertation addresses the issue of external resources mobilization in developing countries. It focuses on the effectiveness of the composition of government spending and the adoption of fiscal policy rules in terms of improving financial markets access. The second part of the dissertation focuses on what developing countries could do to improve internal resources mobilization through two chapters. The first chapter assess the effects of tackling illicit financial flows on domestic tax revenue mobilization. The second chapter examines the effects of adopting fiscal rules on income inequality.

The investigation on the effects of government spending on sovereign bond spreads (Chapter 1) shows that public investment reduces bond spreads while current spending increase spreads in developing countries. We also find evidence that financial markets' reaction to public expenditures depends on the quality of institutions. The policy messages are that developing countries could have a better access to international financial market by supporting public investment and reducing current spending. They should also improve the quality of governance since financial markets award well governed countries with better borrowing conditions.

Fiscal rules are effective in terms of improving financial markets access for developing countries (Chapter 2). In this analysis, we find that the adoption of fiscal rules reduces sovereign bond spreads and consequently improve financial market access. Indeed, this result is explained by the credibility of fiscal policy channel: more credible governments are rewarded in the international financial markets with low sovereign bond spreads and high sovereign debt ratings. Our finding confirm that the adoption of fiscal rules is a substantial instrument for policy makers to improve developing countries' financial markets access.

The examination of the effects of combating illicit financial flows on domestic tax revenue mobilization (Chapter 3) highlights that countries which cooperate with international standards for anti-money laundering and combating the financing of terrorism (AML/CFT) are

more able to mobilize tax revenue than countries which do not cooperate. Consequently, developing countries could mobilize more domestic tax revenue by implementing policies to curtail illicit financial flows. They should establish sound institutions.

Finally, we explore the relationship between fiscal rules and inequality (Chapter 4) and find that fiscal rules adoption contributes to reduce inequality in developing countries. The policy implication is that developing countries could finance their development in a sustainable way (via the reduction of inequalities) by adopting fiscal rules.

To summarize, this dissertation has showed that in order to mobilize more resources, developing countries should support public investment and reduce current spending. This implies that they should rather increase and prioritize growth-enhancing expenditures. They should pay particular attention to the quality of their governance since financial markets' reaction to public expenditures depends on the quality of institutions. Given their effectiveness in terms of improving financial market access, developing countries should adopt and soundly implement fiscal policy rules. Developing countries should implement policies to curtail illicit financial flows if they really need to mobilize more domestic tax revenue. They should also establish sound institutions. Since fiscal rules are not neutral for income inequality, developing countries may finance their development in a sustainable way - via the reduction of inequalities- by adopting fiscal rules.

Our study shows some limitations since that we did not account empirically for structural fiscal reforms (e.g., public financial management reforms), which also affect fiscal policy credibility and its effectiveness, and hence government's borrowing costs.

Fiscal policy will certainly be of major importance in the context of the ongoing COVID-19 pandemic (Baldwin and di Mauro, 2020). In an effort to create significant fiscal space to respond to the crisis, we see several developments of our work. First, given that public investment was found to decrease government bond spreads, it would be interesting to further investigate other variables that may foster this favorable effect, all the more given that the quality of institutions was not found to be such a driver. Second, one could explore spillovers in the effect of public spending in one country on spreads in other countries. Third, our findings may provide additional motivation for future research to explore the effect of investment-friendly fiscal rules on financial market access in developing countries. Fourth, through extending our analysis to include the effect of FR on economic growth, future research could explore the way various types of FR may deal with the famous equality-efficiency tradeoff suggested by Okun (1975). Fifth, with the development of reliable IFFs cross-country data, it would be interesting to analyze possibly-complex non-linearities in the relationship between

IFFs and tax revenues. Sixth, a cost-benefit analysis that would compare the cost of fighting IFFs with the extra tax resources they engender would be of equally importance. Finally, in addition to their effect on taxes, the effect of IFFs on other economic variables—such as growth or investment—would also be worthwhile. We leave such topics for future research.

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Summary in French

Thèse: Politique budgétaire et financement du développement dans les pays en développement

Le financement du développement est la principale préoccupation aussi bien au sein des institutions internationales (Banque Mondiale, Fonds Monétaire International, Banque Africaine de Développement, Organisation des Nations Unies, etc.) qu'à l'intérieur même des pays en développement. En effet, les pays en développement font face à de nombreux défis de développement tels que la mauvaise gouvernance, l'insuffisance des infrastructures routières, la fuite illégale des capitaux, les catastrophes naturelles, l'insécurité alimentaire, la corruption, etc. Le Rapport de la Conférence internationale sur le financement du développement de Monterrey en 2002 souligne l'importance d'une dette maitrisée et des finances publiques saines comme des facteurs clés pour la mobilisation des ressources financières dans les pays en développement.

Suivant Wong et al. (2002), nous définissons la politique budgétaire comme *"l'ensemble les mesures prises par le gouvernement pour orienter et contrôler les dépenses et la fiscalité"*. L'efficacité de la politique budgétaire repose sur l'existence d'une marge de manœuvre budgétaire, à savoir l'espace budgétaire. L'espace budgétaire peut être défini de nombreuses façons. La définition existante dans la littérature insiste dans une certaine mesure sur la viabilité budgétaire. Conformément à Ostry et al. (2010) et Ghosh et al. (2013), nous définissons l'espace budgétaire comme *la différence entre le niveau actuel de la dette publique et la limite de la dette indiquée par le bilan historique du pays en matière d'ajustement budgétaire.* La limite de la dette est le ratio d'endettement au-delà duquel la dynamique de la dette devient explosive. La littérature relative à l'espace budgétaire dans les pays développés est importante (e.g. Bohn, 1998, 2007; Heller, 2006; Williams and Hay, 2005; Schick, 2009; Escolano, 2010; Ostry et al., 2010; Novignon and Novignon, 2015; Saxegaard, 2014; Hulbert and Vammalle, 2014; Kim, 2015; Reinhart and Rogoff, 2008; Roy and Heuty, 2012; Mendoza and Ostry, 2008; Ostry and Abiad, 2005; Aizenman and Jinjarak, 2010; Aizenman et al., 2013; Ghosh et al., 2013; Ostry et al., 2015; Kim and Ostry, 2018). Par exemple, Ostry et al. (2010) et Ghosh et al. (2013) se sont basés sur les antécédents historiques en matière d'ajustement et ont constaté que de nombreux pays développés n'ont que très peu ou pas de marge de manœuvre budgétaire supplémentaire. Dans le même ordre d'idées, Ostry et al. (2015) ont trouvé des preuves que vivre avec une dette plus élevée pourrait être la meilleure politique lorsque les pays disposent d'une marge de

manœuvre budgétaire et n'ont aucune perspective réelle de crise souveraine. En fait, le coût de la réduction de la dette est susceptible de dépasser le bénéfice d'assurance contre la crise dans ces conditions. En ce qui concerne les pays en développement, la littérature sur l'espace budgétaire est plutôt rare (Adedeji et al., 2016 ; Baum et al., 2017). Par exemple, Adedeji et al. (2016) étudient la relation entre la dynamique de la dette et la distribution probabiliste du solde primaire et du taux d'intérêt effectif. Leur approche est particulièrement utile dans les pays en développement où le manque de données pertinentes rend difficile l'estimation de fonctions de réaction budgétaire détaillées. Ils constatent qu'environ 60 % de ces pays disposent d'une marge de manœuvre budgétaire pour faire face aux chocs négatifs, sous réserve de la disponibilité de financements intérieurs et extérieurs. Cependant, Baum et al. (2017) montrent que même dans des conditions favorables, l'espace budgétaire disponible dans les pays à faible revenu est probablement insuffisant pour entreprendre les dépenses nécessaires à la réalisation des objectifs de développement durable (ODD). Ils recommandent aux pays en développement d'améliorer l'efficacité des investissements publics et la mobilisation des recettes intérieures afin de créer une plus grande marge de manœuvre budgétaire. Plusieurs relations macroéconomiques liées à l'espace budgétaire sont sous-explorées dans ces pays (règles budgétaires & inégalités, flux financiers illicites & recettes fiscales, composition des dépenses publiques & coût de l'accès aux marchés financiers, règles budgétaires & accès aux marchés financiers). Nous contribuons à la littérature en examinant ces relations.

En s’appuyant sur les trois principales fonctions de la politique budgétaire (l'allocation, la distribution et la stabilisation) définies dans le papier fondateur de Musgrave (1959), cette thèse examine les voies par lesquelles le gouvernement pourrait mobiliser davantage de ressources dans les pays en développement pour atteindre ces objectifs et financer leur développement. Plus précisément, il se concentre sur les trois principaux instruments de la politique budgétaire - la politique fiscale, la politique des dépenses et la politique budgétaire globale - et tente d'étudier la manière dont ils pourraient servir à des fins de financement du développement. Plusieurs études montrent que la politique budgétaire est un élément clé pour améliorer la performance budgétaire (Corbacho et Schwartz, 2007 ; Debrun et al., 2008 ; Debrun et Kumar, 2007 ; Deroose et al., 2006 ; Guerguil et al., 2017 ; Kopits, 2004 ; Schaechter et al, 2012 ; Tapsoba, 2012), réduire les inégalités (Azzimonti et al., 2014 ; Larch et Turrini, 2010 ; Milasi, 2013), renforcer la croissance économique (Devarajan et al., 1996 ; Schclarek, 2007 ; Stiglitz, 2015 ; Summers, 2014) et accroître le bien-être (Bom et Ligthart, 2014 ; Ganelli et Tervala, 2016).

Selon le PNUD (2010), les recettes intérieures sont limitées dans de nombreux pays en développement et inférieures au niveau de 20 % du PIB qui devrait leur permettre d'atteindre les objectifs de développement. Les pays en développement doivent trouver des financements (nationaux et internationaux) afin de poursuivre le financement de leur développement économique et d'atteindre les objectifs de développement durable. Plusieurs facteurs expliquent le faible niveau de recouvrement des recettes dans les pays en développement. Stiglitz et al. (2006) affirment que *"l'assiette fiscale est presque toujours beaucoup plus étroite dans les pays en développement, et la conformité fiscale est nettement plus faible (en partie en raison de l'évasion et de la fraude fiscales, mais aussi du manque d'informations pouvant être utilisées pour contrôler la conformité fiscale)"*. Par conséquent, on peut observer que dans les pays en développement, les recettes fiscales proviennent moins des impôts directs tels que l'impôt sur le revenu ou sur les sociétés, mais beaucoup plus des impôts indirects par rapport aux pays développés (Stiglitz et al., 2006). Dans cette situation, les gouvernements de ces pays peuvent plus facilement augmenter les cotisations sociales, évincer l'investissement privé et réduire la possibilité de stimuler l'économie par des réductions d'impôts.

L'accroissement des inégalités de revenus est un problème mondial, incluant les pays développés, émergents et en développement. C'est pourquoi une littérature abondante et croissante donne un large aperçu de ce sujet (voir par exemple Anand et Segal, 2008 ; Piketty, 2014 ; Alvaredo et al., 2017 ; Wilkinson et Pickett, 2009 ; Stiglitz, 2012 ; Atkinson, 2015). Notre analyse soutient le 10ème objectif de développement durable (inégalités réduites) visant à : *" d'ici à 2030, faire en sorte, au moyen d'améliorations progressives, que les revenus des 40 pour cent les plus pauvres de la population augmentent plus rapidement que le revenu moyen national, et ce de manière durable"* (première cible) et *" adopter des politiques, notamment sur les plans budgétaire, salarial et dans le domaine de la protection sociale, et parvenir progressivement à une plus grande égalité"* (quatrième cible). Il contribue à la littérature consacrée à l'identification des politiques susceptibles de réduire l'inégalité des revenus. On entend par règles budgétaires des contraintes numériques sur les agrégats comme le déficit ou la dette publique. Plusieurs raisons justifiant l'adoption de règles budgétaires sont mentionnées (Kopits et Symansky, 1998). Les règles budgétaires visent à (i) favoriser la stabilité macroéconomique, (ii) soutenir d'autres politiques financières, (iii) maintenir la viabilité budgétaire, (iv) éviter les retombées négatives au sein d'une union monétaire, (v) assurer la crédibilité des politiques gouvernementales dans le temps. À la lumière de ces objectifs, les règles budgétaires affectent diverses dimensions de la politique budgétaire, qui ont reçu de loin la plus grande attention parmi toutes les politiques visant à réduire les inégalités, tant de la part

des institutions internationales (par exemple, OCDE, 2015, chapitres 3 et 7 ; ou FMI, 2017) que des milieux universitaires - pour des enquêtes récentes, voir par exemple Bastagli et al. (2012), Heshmati et Kim (2014), Clements et al. (2015) ou Anderson et al. (2017). Même si les règles budgétaires ne sont peut-être pas conçues à l'origine pour lutter contre les inégalités, l'important effet secondaire que nous avons dévoilé suggère qu'elles ne devraient pas être considérées comme neutres en termes de lutte contre les inégalités. Nous fournissons plusieurs aperçus qui peuvent contribuer à la conception et à la mise en œuvre de règles budgétaires appropriées dans le but de réduire les inégalités.

Pendant ce temps, les pays en développement n'ont pas accès aux marchés financiers à moindre coût, car les notations de la dette souveraine (taux d'intérêts sur les emprunts souverains) sont faibles (élevés) dans ces pays. Toutefois, l'accès aux capitaux sur les marchés financiers internationaux est nécessaire pour les pays en développement dans la perspective de la réalisation des objectifs de développement durable. Par exemple, la collecte de ces ressources peut apporter une solution contre les mauvaises infrastructures, les inégalités, les catastrophes naturelles, l'insécurité alimentaire, etc., conformément à l'engagement actuel de réaliser le programme de développement durable à l'horizon 2030 en réduisant la pauvreté, en augmentant la prospérité et en promouvant le développement durable. Plusieurs études ont examiné les déterminants de l'accès aux marchés financiers dans les pays en développement (par exemple, Edwards, 1984 ; Martinez et al., 2013 ; Min, 1998 ; Fouejieu et Scott, 2013 ; Balima et al., 2017 ; Rowland et Torres, 2004 ; Borio et Packer, 2004 ; Bellas et al., 2010 ; Ferrucci, 2003 ; Eichengreen et Mody, 1998 ; Eichler, 2014 ; Gupta et al., 2008 ; Arbatli et Escolano, 2012 ; Glennerster et Shin, 2008 ; Block et Vaaler, 2004 ; Afonso et Jalles, 2013 ; Badinger et Reuter, 2017 ; Bayoumi et al., 1995 ; Heinemann et al., 2018 ; Iara et Wolff, 2014 ; Thornton et Vasilakis, 2017). Nous contribuons à cette littérature de différentes manières. Tout d'abord, nous examinons l'effet de la composition des dépenses publiques sur les écarts de taux d'intérêt pour l'emprunteur souverain. Pour mieux saisir les effets de composition des dépenses publiques, nous rapportons chaque type de dépense sur les dépenses publiques totales. Cette variable reflète le mieux les décisions du gouvernement en matière de politique économique. Deuxièmement, nous élargissons la littérature en explorant à la fois l'hétérogénéité et les effets interactifs de divers types de règles budgétaires sur l'accès aux marchés financiers dans les pays en développement. Ce faisant, nous révélons des différences importantes entre les règles de budget équilibré, les règles d'endettement, les règles de dépenses et leurs interactions.

En outre, les flux financiers illicites augmentent dans le monde en développement. Cependant, ces flux constituent une source potentielle de perte de mobilisation des recettes

intérieures pour les pays en développement en réduisant l'assiette fiscale (Kar & Cartwright-Smith, 2010 ; Kar & LeBlanc, 2013 ; Ndikumana & Boyce, 2012). Ce phénomène, combiné à la mauvaise qualité des institutions, pourrait nuire la capacité de ces pays à mobiliser les ressources nécessaires pour financer leur développement. En fait, plusieurs pays en développement ont tendance à être piégés dans la pauvreté en raison de facteurs structurels tels que les inégalités, les épidémies, la faible productivité, l'exclusion des marchés financiers et une forte exposition aux crises et aux catastrophes naturelles (ONU, 2013 ; FMI, 2014). Les pays en développement doivent combler leur déficit d'infrastructures dans de nombreux domaines tels que l'éducation, la santé, l'électricité, les routes, les ports, les autoroutes, etc. (Arezki & Sy, 2016 ; Calderón & Servén, 2004) afin d'améliorer la croissance économique et de réduire la dépendance à l'égard de l'aide publique au développement. Selon le Global Financial Integrity (2015), les économies en développement et émergentes ont perdu 7800 milliards de dollars US à cause des flux financiers illicites de 2004 à 2013, les sorties illicites augmentant à un taux moyen de 6,5 % par an, soit presque deux fois plus vite que le produit intérieur brut (PIB) mondial. Les implications de ce phénomène pour le développement mondial sont significatives. Au total, le montant annuel des flux financiers illicites en 2013 (1,1 trillion de dollars US) dépasse le montant cumulé des investissements directs étrangers (IDE) et de l'aide publique au développement (APD) nette que ces économies ont reçus. À titre d'illustration, les fonds qui ont quitté illicitement les pays en développement représentaient environ 1,3 fois les 858 milliards de dollars US d'investissements directs étrangers total, et ils étaient 11,1 fois les 99,3 milliards de dollars US d' aide publique au développement que ces économies ont reçu en 2013. La lutte contre les flux financiers illicites est probablement l'une des questions les plus importantes dans les pays en développement (Ajayi & Ndikumana, 2015 ; Tanzi, 1996 ; Buchanan, 2004).

"Que signifie 1 000 millions ou 1 milliard de dollars d'argent public volé pour le forgeron du village qui moule des houes de ferme ou sarcle des couteaux dans un village d'un pays pauvre en développement ? Pas grand-chose. […]. En revanche, le calcul des coûts et des bénéfices qui suit ne manquera pas d'attirer l'attention du forgeron : *La somme d'argent qu'un émir dépense pour un seul voyage en Europe pour un contrôle médical permettrait de construire une clinique assez grande pour servir une communauté de 5000 personnes ; le montant des devises étrangères qu'un haut fonctionnaire paie chaque année pour éduquer un seul enfant à l'étranger permettrait de construire une école primaire capable de fournir une éducation de base à des centaines d'élèves ; la somme d'argent qu'un homme politique dépense pour parrainer les voyages de ses femmes et de ses enfants en Arabie saoudite pour un pèlerinage*

de moindre importance, à Dubaï pour faire des achats et en Europe pour des vacances annuelles suffit à créer des banques communautaires et à donner accès au capital à des milliers de petites entreprises ou à financer des projets de lutte contre la pauvreté dans plusieurs communautés" Ajayi et Ndikumana (2015).

En s'appuyant sur la littérature populaire sur les déterminants de la mobilisation des recettes fiscales (voir par exemple Agbeyegbe et al, 2006 ; Becker et Fuest, 2010 ; Benon et al, 2002 ; Bird et al, 2008 ; Chelliah, 1971 ; Chelliah et al, 1975 ; Clausing, 2007 ; Devarajan et al, 2002 ; Eltony, 2002 ; Exbrayat et Geys, 2014 ; Ghura, 1998 ; Gupta, 2007 ; Keen et Mansour, 2010 ; Leuthold, 1991 ; Lotz et Morss, 1967 ; Mahdavi, 2008 ; Mao et Wu, 2019 ; Stotsky et WoldeMariam, 1997 ; Tait et al, 1979 ; Tanzi, 1992, 1991 ; Tanzi et Aguirre, 1981 ; Tanzi et Zee, 2000), la nouveauté de cette thèse est donnée par l'évaluation des effets de la lutte contre les flux financiers illicites sur la mobilisation des recettes fiscales intérieures dans les pays en développement. En fait, l'analyse des voies par lesquelles la lutte contre les flux financiers illicites favorise la mobilisation des recettes fiscales est une question importante dans les pays en développement puisque les flux financiers illicites représentent des fonds qui seraient utilisés pour faire face aux défis du développement (tels que les inégalités, le déficit d'infrastructures, etc.) dans ces pays. Ils contribuent à la détérioration des conditions macroéconomiques (investissement, croissance, dette publique) étant donné qu'ils réduisent les performances économiques. Par conséquent, ils compromettent la mobilisation des ressources internes. En outre, le civisme fiscal sera considérablement érodé si les agents sont au courant de l'existence de flux financiers illicites importants.

Enfin et surtout, la qualité des institutions est faible dans les pays en développement (Kaufmann et al., 2011 ; Acemoglu, Gallego, & Robinson, 2014 ; Acemoglu, Johnson, Robinson, & Thaicharoen, 2003 ; Acemoglu, Johnson, & Robinson, 2005 ; Acemoglu, Naidu, Restrepo, & Robinson, 2019). En accord avec Brandeis (1914) qui précise que *"la lumière du jour est considérée comme le meilleur des désinfectants ; la lumière électrique comme le policier le plus efficace"*, nous pensons que la transparence et de bonnes institutions sont fondamentales pour une bonne mise en œuvre de la politique budgétaire dans les pays en développement (voir par exemple Prakash et Cabezon, 2008 ; Dabbla-Norris et al., 2010). Par conséquent, cette thèse met un accent particulier sur la qualité des institutions. Nous examinons ainsi l'effet de la politique budgétaire sur l'accès aux marchés financiers, conditionnellement à la qualité des institutions. En effet, la littérature sur les fondements politiques de la politique budgétaire souligne que la bonne gouvernance améliore la transparence budgétaire, renforce la crédibilité de la politique budgétaire et limite les cycles politico-budgétaires, ce qui conduit à

de meilleures notations (Arbatli et Escolano, 2015) et à des taux d'intérêts plus faibles (voir par exemple Ciocchini et al., 2003 ; Glennerster et Shin, 2008). En outre, les institutions influent également sur la nature des dépenses publiques d'un pays : Rajkumar et Swaroop (2008) montrent que les bonnes institutions ont un impact positif sur l'efficacité de l'investissement public, ce qui peut expliquer leur effet favorable sur les taux d'intérêts (voir par exemple Martinez et al., 2013 ; Eichler, 2014). Par conséquent, les institutions peuvent influencer l'effet de la politique budgétaire sur l'accès aux marchés financiers.

Les fondements théoriques de cette thèse sont multiples. Tout d'abord, nous nous appuyons sur les théories (néo)classiques et (néo)keynésiennes relatives à l'efficacité de la politique budgétaire (par exemple Keynes, 1936 ; Domar, 1944 ; Samuelson, 1958 ; Phelps, 1961, 1965 ; Diamond, 1965 ; Sargent et Wallace, 1976 ; Sargent et Wallace, 1981 ; Lucas Stokey, 1983 ; Long et Plosser, 1983 ; Aschauer, 1989 ; Barro, 1990 ; Romer, 1990 ; Bohn, 1998, 2007 ; Woodford, 2001 ; Stiglitz, 2002 ; Alesina et al, 2002 ; Ostry et al., 2010 ; Stiglitz, 2012). Certains chercheurs constatent que les dépenses publiques ne sont pas efficaces pour améliorer la croissance économique (Long et Plosser, 1983 ; Lucas Stokey, 1983 ; Samuelson, 1958) tandis que d'autres affirment que les dépenses publiques peuvent être très efficaces grâce au multiplicateur budgétaire (Keynes, 1936 ; Stiglitz, 2012). Selon Stiglitz (2012), les dépenses publiques peuvent être encore plus efficaces lorsqu'elles soutiennent des investissements à productivité élevées (y compris ceux qui facilitent la restructuration de l'économie), car ces investissements produisent non seulement des rendements directs élevés, mais aussi stimulent les investissements privés. Par conséquent, non seulement le déficit est réduit à moyen terme, mais la consommation peut également être stimulée (les consommateurs réalisent que leur charge fiscale future sera inférieure à ce qu'elle aurait pu être et peuvent donc consommer davantage aujourd'hui). En outre, les dépenses publiques consacrées aux réformes structurelles contribuent à déplacer les ressources des secteurs traditionnels moins compétitifs vers de nouveaux secteurs et stimulent donc l'économie (Stiglitz, 2012). Ensuite, nous nous appuyons sur la théorie du cycle politico-économique (Wicksell, 1958 ; Nordhaus, 1975, Buchanan et Wagner, 1977 ; Hibbs, 1977 ; Weingast et al, 1981 ; Persson et Persson, 1987 ; Rogoff et Sibert, 1988 ; Persson et Svensson, 1989 ; Alesina et Tabillini, 1990 ; Aghion et Bolton, 1990 ; Alesina et Rosenthal, 1995 ; Lane et Tornell, 1996 ; Velasco, 2000 ; Persson et Tabellini, 2002 ; Talvi et Vegh, 2005 ; Alesina et Tabillini, 2005 ; Persson et al., 2006). Selon cette théorie, le biais du déficit (qui peut conduire à une politique budgétaire sous-optimale) est le résultat de la "myopie" des gouvernements, du problème de "bien commun" ou du problème de "incohérence temporelle". Par exemple, les gouvernements pourraient réaliser des déficits excessifs afin de

rester au pouvoir le plus longtemps possible (comportement opportuniste) ou de réduire la marge de manœuvre de leurs successeurs ayant une idéologie politique différente (conflits d'intérêts). Pour remédier à cette sous-optimalité, un appel croissant à la mise en œuvre de règles budgétaires est lancé (voir par exemple von Hagen et Harden, 1995 ; Hallerberg et von Hagen, 1999 ; Beetsma et Uhlig, 1999 ; Krogstrup et Wyplosz, 2010). Enfin, nous nous appuyons sur la théorie des institutions (North, 1991 ; Stiglitz, 2002) qui soutient que les institutions économiques (par exemple, budgétaires, monétaires, droits de propriété, institutions commerciales) jouent un rôle majeur dans la réduction des coûts de transaction et la facilitation des échanges. Par exemple, (North, 1991) montre que la qualité des institutions est une solution aux défaillances du marché en distinguant les institutions formelles (constitution, lois, règlements) et les institutions informelles (sanctions, coutumes, traditions et codes de conduite).

Cette thèse se pose la question de savoir comment la politique budgétaire pourrait être utilisée à des fins de financement du développement et quel est le rôle que joue la qualité de la gouvernance dans ce lien entre politique budgétaire et financement du développement. Cette question est importante dans un contexte où les pouvoirs publics doivent assurer les conditions permettant à ces pays de s'installer durablement dans la croissance. A l'aide de méthodes analytiques et économétriques adéquates, la présente thèse identifie et explore les canaux par lesquels les pays en développement peuvent efficacement mobiliser les ressources (internes et externes) pour le financement du développement. Aussi, évalue-t-elle l'ampleur de ces effets. Pour cela, nous conduisons des recherches axées sur les politiques économiques (en utilisant des outils statistiques et économétriques appropriés) et nous formulons des recommandations de politiques économiques aux pays en développement. Les décideurs publics peuvent se focaliser sur plusieurs canaux pour financer de façon durable et soutenable leur développement. Ces canaux sont par exemple : les investissements publics, la réduction des inégalités, la bonne gouvernance, la lutte contre les flux financiers illicites, etc. Elle met un accent particulier sur la qualité de la gouvernance du fait que dans les pays en développement l'instabilité économique, politique et les conflits demeurent de graves problèmes.

La première partie de cette thèse s'intéresse à la question du financement externe dans les pays en développement (Chapitre 1 et Chapitre 2).

Dans le Chapitre 1, nous analysons les effets des dépenses publiques sur les écarts de taux d'intérêt pour l'emprunteur souverain dans les pays émergents. En effet, l'accès aux capitaux sur les marchés financiers internationaux est nécessaire pour les pays en développement. Toutefois, à la suite des crises des dettes souveraines, les investisseurs ont exigé des rendements plus élevés pour la détention des obligations. Ces comportements peuvent s'interpréter comme

la recherche d'une prime de risque. Il existe une vaste littérature qui analyse les déterminants du coût des emprunts souverains. Cependant, les contributions se focalisant sur les effets de la politique budgétaire sont plutôt rares. Les premiers travaux ne parviennent pas à établir une relation entre la dépense publique et les taux d'intérêt auxquels les pays sont confrontés sur les marchés internationaux. Mais cette absence de résultat peut être expliquée par la non prise en compte de la composition de la dépense publique. En effet, la théorie économique distingue les dépenses productives des dépenses improductives. Concernant ces dernières, cela ne signifie pas qu'elles sont inutiles pour les ménages mais plutôt qu'elles contribuent, dans une moindre mesure, à une amélioration de la productivité des facteurs et à l'accumulation productive. De plus, ces dépenses improductives sont particulièrement sensibles à des considérations d'économie politique et, en particulier, au cycle politico-budgétaire qui caractérise la plupart des pays en développement et qui génère des distorsions importantes. Nous considérons dans cet article comme dépenses productives les dépenses en investissement et, comme dépenses improductives, les dépenses courantes. L'hypothèse principale est de considérer que les investisseurs internationaux vont davantage valoriser les dépenses d'investissement et que le coût de l'emprunt souverain sera par conséquent plus élevé pour les pays consacrant une part significative de leurs ressources fiscales et non fiscales aux dépenses courantes. Plus précisément, nous travaillons avec un panel de 30 pays émergents sur la période 2000-2013. Les données financières sont issues du JP Morgan Emerging Market Bond Index Global. Les instruments financiers pris en compte dans l'analyse comprennent les emprunts internationaux libellés en dollars américains, tels que les obligations Brady, les prêts et les euro-obligations d'une valeur nominale d'au moins 500 millions de dollars américains et d'une durée de 12 ans. De façon usuelle, l'écart de taux d'intérêt est calculé par rapport aux titres publics américains qui sont considérés comme sans risque. L'estimateur mobilisé corrige le biais d'endogénéité qui peut être particulièrement sévère. En effet un pays peut modifier ses dépenses publiques en réaction à un changement des conditions de financement sur les marchés internationaux. Les principaux résultats, toutes choses égales par ailleurs, sont les suivants : i) la dépense publique totale n'affecte pas le coût de l'emprunt sur les marchés internationaux ; ii) une augmentation de la part des dépenses publiques courantes majore les taux d'intérêt ; iii) à l'inverse une augmentation de la part des dépenses d'investissement est interprétée comme un signal positif par les marchés. Autrement dit, lorsque l'on considère à la fois un effet de niveau et un effet de composition de la dépense publique, seul ce dernier s'avère significatif sur les taux d'intérêt. Un autre résultat important de l'article est la mise en évidence d'effets non linéaires. Ainsi il apparaît que le caractère pénalisant des dépenses courantes est étroitement relié à la qualité

institutionnelle. C'est dire que pour des pays caractérisés par de bonnes institutions, l'impact des dépenses courantes sur les taux d'intérêt est beaucoup plus favorable. Nous avons également distingué les différentes catégories de dépenses publiques par fonction. Il apparaît en particulier que les dépenses d'éducation et de santé ont des effets favorables sur les conditions d'emprunt. En effet, elles contribuent à une augmentation du capital humain. A l'inverse, certaines catégories de dépenses, comme par exemple les dépenses militaires, majorent les taux d'intérêt auxquels les emprunteurs publics sont confrontés. Ces résultats s'avèrent remarquablement robustes aux méthodes d'estimation, aux spécifications retenues et aux échantillons considérés. Par conséquent, la promotion de l'investissement public et la réduction des dépenses courantes peuvent être, malgré leur coût politique de court terme important, un moyen vertueux de permettre aux pays émergents de lever des fonds internationaux à moindre coût. La recherche de faible taux d'intérêt de long terme peut donc exiger des sacrifices dans le court terme.

Nous examinons, dans le Chapitre 2, la force des règles budgétaires en termes d'amélioration de l'accès des marchés financiers internationaux par les pays en développement. La politique budgétaire est un instrument puissant pour réguler l'activité économique afin de faire face aux nombreux défis de développement et promouvoir des conditions macroéconomiques saines dans les pays en développement. De nombreux travaux soulignent que l'adoption des règles budgétaires améliore les performances budgétaires. Cependant, il y a très peu de recherches concernant les effets de l'adoption des règles budgétaires sur l'accès aux marchés financiers par les pays en développement. Nous considérons dans cet article deux mesures de l'accès au marché financier à savoir les écarts de taux d'intérêt pour l'emprunteur souverain et la notation de la dette souveraine. La notation de la dette souveraine est une évaluation du risque de crédit, c'est-à-dire la possibilité que le débiteur ne remplisse pas ses obligations en totalité et à temps. Pour la dette souveraine, le risque de défaillance dépend des fondamentaux macroéconomiques de l'émetteur et de la capacité du prêteur à faire respecter le contrat. Les écarts de taux d'intérêt pour l'emprunteur souverain reflètent le risque de marché (la possibilité que les prix des obligations sur le marché secondaire évoluent à l'encontre du détenteur), et le risque de liquidité (le risque que les investisseurs ne puissent pas liquider leurs portefeuilles sans faire baisser les prix sur le marché secondaire). Les partisans de l'hypothèse de l'efficience du marché soutiennent que les investisseurs sont rationnels et capables d'exploiter toutes les informations disponibles pour opérer une discrimination entre les emprunteurs. Toutefois, les opposants à cette hypothèse soulignent que les défaillances du marché et l'imperfection de l'information entraînent des distorsions dans l'évaluation des actifs. L'hypothèse principale est que les pays

qui adoptent des règles budgétaires sont plus crédibles du point de vue de la conduite de leur politique budgétaire et par conséquent peuvent accéder aux marchés financiers internationaux à moindre coût. Nous travaillons sur un panel de 36 pays émergents, faisant partie du *JP Morgan Emerging Markets Bond Index Global*, sur la période 1993-2014. Nous utilisons diverses méthodes d'évaluation d'impact. Les instruments financiers considérés dans l'analyse comprennent les emprunts internationaux libellés en dollars américains, tels que les obligations Brady, les prêts et les euro-obligations d'une valeur nominale d'au moins 500 millions de dollars américains et d'une durée de 12 ans. L'écart de taux d'intérêt est calculé par rapport aux titres publics américains qui sont considérés comme sans risque. La notation de la dette souveraine est une moyenne annuelle des notations de la dette souveraine à long terme en devises étrangères par les trois principales agences de notation (*Standard and Poor's*, *Moody's* et *Fitch Ratings*) qui sont disponibles sur *Bloomberg* quotidiennement. Ces notes sont converties en un indice numérique échelonné. Une valeur plus élevée de l'indice indique une meilleure notation. Notre variable d'intérêt est une variable muette qui prend la valeur 1 si un pays a adopté une règle budgétaire, et à 0 sinon. L'estimateur économétrique mobilisé permet de traiter le problème d'auto-sélection qui est généralement important dans les études d'évaluations d'impact. Toutes choses étant égales par ailleurs, nous montrons un effet de causalité entre l'adoption des règles budgétaires et un meilleur accès aux marchés financiers. En effet, les pays qui ont adopté des règles budgétaires présentent un écart de taux d'intérêt plus faible et une meilleure notation de la dette souveraine. Nous trouvons également que l'effet de l'adoption des règles budgétaires sur l'accès aux marchés financiers dépend du type de règle. Les règles de budget équilibré et les règles d'endettement améliorent considérablement l'accès aux marchés financiers, tandis que les règles de dépenses n'améliorent pas cet accès. Par conséquent, la simple adoption d'une règle de dépense ne suffit pas à réduire le coût des emprunts souverains. Toutefois, la combinaison des règles de dépenses et des plafonds de dépenses pluriannuels améliore l'accès aux marchés financiers. L'ampleur de cette amélioration est économiquement significative. L'adoption des règles budgétaires réduit les écarts écart de taux d'intérêt de plus de 1.5% tandis qu'elle augmente la notation de la dette souveraine de plus d'un échelon. Par ailleurs, nous constatons que l'interaction des règles budgétaires est très bénéfique en termes de faibles coûts d'emprunt. Les pays qui adoptent à la fois les règles de budget équilibré et les règles d'endettement accèdent plus facilement aux marchés financiers comparativement aux autres. Il existe donc des effets de complémentarité entre les règles. Ces résultats sont robustes à un large ensemble de spécifications alternatives, à des méthodes d'estimation alternatives et à différents échantillons considérés. Les implications de politique

économique sont importantes. Les pays émergents pourraient améliorer leur accès aux marchés financiers en adoptant des règles budgétaires. Plus précisément, ils devraient privilégier les règles de budget équilibré ainsi que les règles d'endettement car celles-ci sont davantage valorisées par les marchés financiers en termes de faible coût de l'emprunt souverain et d'une notation de la dette souveraine élevée. Pour les pays qui ambitionnent adopter des règles de dépenses, des systèmes de gestion des finances publiques solides (y compris des plafonds de dépenses pluriannuels) sont nécessaires pour renforcer leur efficacité et améliorer l'accès aux marchés financiers.

La deuxième partie de cette thèse se focalise sur ce que les pays en développement pourraient faire pour améliorer le financement interne du développement (Chapitre 3 et Chapitre 4).

En effet, nous explorons la relation entre l'adoption des règles budgétaires et la réduction des inégalités de revenus (Chapitre 3). Les tendances de l'inégalité des revenus sont périodiquement examinées par les économistes (voir par exemple Anand et Segal, 2008 ; Piketty, 2014 ; Alvaredo et al., 2017), probablement en raison des conséquences importantes de l'inégalité - voir par exemple Wilkinson et Pickett (2009) *Le niveau spirituel: Pourquoi les sociétés plus égalitaires font presque toujours mieux*, Stiglitz (2012) *Le prix de l'inégalité : comment la société divisée d'aujourd'hui met en danger notre avenir*, ou Atkinson (2015) *L'inégalité : Que peut-on faire ?* Travaillant sur un échantillon de 83 pays en développement sur la période 1990-2015, nous montrons que les pays ayant adopté les règles budgétaires connaissent une baisse importante des inégalités comparativement à ceux qui n'ont pas adopté. Nous utilisons dans ce papier la méthode d'appariement par les scores de propension. Cet effet de l'adoption des règles budgétaires varie en fonction du type de règle : les règles de budget équilibré et les règles d'endettement réduisent plus les inégalités tandis que les règles de dépenses les accroissent. Nous trouvons aussi que l'effet de l'adoption des règles budgétaires sur les inégalités dépend des caractéristiques structurelles des pays. Nos résultats, économiquement significatif, sont robustes à un large ensemble de mesures, de méthodologies et de spécifications alternatives. Notre analyse contribue à la littérature consacrée à l'identification des politiques susceptibles de réduire les inégalités. Même si les règles budgétaires ne sont peut-être pas conçues à l'origine pour lutter contre les inégalités, l'important effet secondaire que nous avons dévoilé suggère qu'il ne devrait pas être considéré comme neutre en termes de lutte contre les inégalités. Ces pays pourront financer leur développement de façon soutenable (à travers la réduction des inégalités) en adoptant des règles budgétaires.

En outre, nous évaluons les effets de la lutte contre les flux financiers illicites sur la mobilisation des recettes fiscales (Chapitre 4). Les flux financiers illicites constituent une source potentielle de perte de recettes intérieures pour les pays en développement en réduisant l'assiette fiscale (Kar & Cartwright-Smith, 2010 ; Kar & LeBlanc, 2013 ; Ndikumana & Boyce, 2012). Sur la période 2004 à 2013, les estimations montrent que dans les pays en développement le montant annuel des flux financiers illicites dépasse le montant annuel cumulé des investissements directs étrangers et de l'aide publique au développement. En outre, le montant annuel des flux financiers illicites dépasse largement le montant annuel des transferts de fonds des migrants dans le monde en développement. Utilisant la méthode d'appariement, ce papier évalue les effets de la lutte contre les flux financiers illicites sur la mobilisation de recettes fiscales. Il exploite des données sur le respect des Recommandations du Groupe d'Action Financière (GAFI) comme variable de traitement et implique 58 pays en développement à travers le monde. En fait, le Groupe d'Action Financière développe et promeut des politiques visant à protéger le système financier mondial contre le blanchiment d'argent, le financement du terrorisme et le financement de la prolifération des armes de destruction massive.

L'objectif de ce papier est d'évaluer les effets de la lutte contre les flux financiers illicites sur la mobilisation des recettes fiscales dans les pays en développement. La lutte contre les flux financiers illicites exige le respect des normes internationales en la matière. L'originalité de ce papier est qu'il évalue les effets de la conformité aux recommandations du Groupe d'Action Financière sur la mobilisation des recettes fiscales. Les recommandations du Groupe d'Action Financière fournissent un cadre réglementaire complet et cohérent pour la lutte contre le blanchiment d'argent et le financement du terrorisme, ainsi que le financement de la prolifération des armes de destruction massive. Depuis 2003, ces Recommandations ont été approuvées et reconnues par plus de 180 pays comme la norme internationale de lutte contre le blanchiment de capitaux et le financement du terrorisme. Nous révélons que les pays qui respectent les Recommandations du Groupe d'Action Financière en matière de lutte contre le blanchiment d'argent et le financement du terrorisme (pays coopératifs) enregistrent des montants de recettes fiscales plus élevés comparativement aux pays qui ne respectent pas ces Recommandations (pays non coopératifs). Autrement dit les pays coopératifs mobilisent plus de recettes fiscales par rapport aux pays non coopératifs. Plus intéressant encore, l'ampleur de cet effet adverse dépend de la structure des taxes : les taxes sur les biens et services sont plus affectées, suivi de la taxe sur la valeur ajoutée (TVA) et des taxes d'accises. Par conséquent, les pays en développement pourront mobiliser plus de recettes fiscales en mettant en œuvre des

politiques visant à empêcher les flux financiers illicites. Par ailleurs, ils doivent mettre en place de bonnes institutions.

En résumé, cette thèse a montré que pour mobiliser davantage de ressources, les pays en développement devraient soutenir l'investissement public et réduire les dépenses courantes. Cela implique qu'ils devraient plutôt augmenter et prioriser les dépenses favorisant la croissance. Ils devraient accorder une attention particulière à la qualité de leur gouvernance, car la réaction des marchés financiers aux dépenses publiques dépend de la qualité des institutions. Compte tenu de leur efficacité en termes d'amélioration de l'accès aux marchés financiers, les pays en développement devraient adopter et mettre en œuvre de manière saine les règles budgétaires. Les pays en développement devraient mettre en œuvre des politiques visant à réduire les flux financiers illicites s'ils souhaitent réellement mobiliser davantage de recettes fiscales intérieures. Ils devraient également mettre en place des institutions solides. Étant donné que les règles budgétaires ne sont pas neutres vis-à-vis des inégalités de revenus, les pays en développement peuvent financer leur développement de manière durable - par la réduction des inégalités - en adoptant des règles budgétaires.

Notre étude montre certaines limites puisque nous n'avons pas pris en compte de manière empirique les réformes budgétaires structurelles (par exemple, les réformes de la gestion des finances publiques), qui affectent également la crédibilité et l'efficacité de la politique budgétaire, et donc les coûts d'emprunt du gouvernement.

La politique budgétaire sera certainement d'une importance majeure surtout dans le contexte actuel de la pandémie de COVID-19 (Baldwin et di Mauro, 2020). Dans le but de créer une marge de manœuvre budgétaire importante pour répondre à la crise, nous considérons plusieurs évolutions de nos travaux. Tout d'abord, étant donné qu'il a été constaté que les investissements publics réduisent les taux d'intérêts, il serait intéressant d'examiner davantage d'autres variables susceptibles de favoriser cet effet favorable, d'autant plus que la qualité des institutions ne s'est pas avérée être un tel moteur. Deuxièmement, on pourrait étudier les effets de débordement que les dépenses publiques réalisées dans un pays peuvent avoir sur ses voisins. Il est bien connu que ceux-ci peuvent être négatifs dans une union monétaire mais ils peuvent également être positifs si les infrastructures (en particulier de transport) financées par les dépenses publiques ont un caractère transfrontalier. Troisièmement, nos conclusions pourraient constituer une motivation supplémentaire pour des recherches futures visant à explorer l'effet de règles budgétaires favorables aux investissements sur l'accès aux marchés financiers dans les pays en développement. Quatrièmement, en élargissant notre analyse pour inclure l'effet des règles budgétaires sur la croissance économique, les recherches futures pourraient explorer la

manière dont différents types de règles budgétaires peuvent traiter le fameux compromis égalité-efficacité suggéré par Okun (1975). Cinquièmement, avec l'élaboration de données fiables sur les flux financiers illicites entre pays, il serait intéressant d'analyser les non-linéarités éventuellement complexes dans la relation entre les flux financiers illicites et les recettes fiscales. Sixièmement, une analyse coût-bénéfice qui comparerait le coût de la lutte contre les flux financiers illicites avec les ressources fiscales supplémentaires qu'elles engendrent serait tout aussi importante. Enfin, outre leur effet sur les impôts, examiner l'effet des flux financiers illicites sur d'autres variables économiques, telles que la croissance ou l'investissement, serait également intéressant. Nous laissons de tels sujets pour les recherches futures.

Mots clés **:** *Politique budgétaire, Mobilisation des ressources, Financement du développement, Spread de taux souverains, Dépenses publiques, Dépenses courantes, Investissements publics, Qualité des institutions, Régression panel à transition lisse, Règles budgétaires, Notations de dette souveraine, Entropy balancing, Groupe d'Action Financière, Flux financiers illicites, Recettes fiscales, Institutions, Appariement par le score de propension, Inégalité de revenus, Marchés émergents, Pays en développement, Analyse d'impact.*

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Contents

ABSTRACT

The central question of this thesis is how fiscal policy could be used for development finance purposes. Indeed, we identify and investigate pathways through which developing states can mobilize resources to improve sustainable development. For this purpose, we conduct policy-oriented researches (using suitable statistical and econometrical tools) and provide advices for developing countries. The first part of the dissertation addresses the issue of external resources mobilization in developing countries (Chapter 1 and Chapter 2). In Chapter 1, we investigate the effects of public expenditures on sovereign bond spreads in emerging market countries. We show that developing countries could have a better access to international financial market by supporting public investment and reducing current spending. Specifically, spending on human capital (education and health) and other public infrastructures significantly reduce bond spreads. They should also improve the quality of governance since financial markets award well-governed countries with better borrowing conditions. We examine, in Chapter 2, the strength of fiscal rules in terms of improving financial markets access for developing countries. We find that the adoption of fiscal rules reduces sovereign bond spreads and consequently improve financial market access. Indeed, this result is explained by the credibility of fiscal policy channel: more credible governments are rewarded in the international financial markets with low sovereign bond spreads and high sovereign debt ratings. Our findings confirm that the adoption and sound implementation of fiscal rules is an instrument for policy makers to improve developing countries' financial market access. The second part of the dissertation focuses on how developing countries could internally finance their development (Chapter 3 and Chapter 4). As a matter of fact, we explore the relationship between fiscal rules and inequality (Chapter 3) and find that fiscal rules adoption contributes to reduce inequality in developing countries. The policy implication is that developing countries could finance their development in a sustainable way (via the reduction of inequalities) by adopting fiscal rules. Moreover, we assess the effects of combating illicit financial flows on domestic tax revenue mobilization in developing countries (Chapter 4). We highlight that countries which cooperate with international standards for anti-money laundering and combating the financing of terrorism (AML/CFT) are more able to mobilize tax revenue than countries which do not cooperate. Consequently, developing countries could mobilize more domestic tax revenue by implementing policies to curtail illicit financial flows. They should establish sound institutions.

Keywords**:** *Fiscal policy, Resource mobilization, Financing for development, Government bond spreads, Government spending, Current spending, Public investment, Quality of institutions, Panel smooth transition regression, Fiscal rules, Sovereign debt ratings, Entropy balancing, Financial Action Task Force, Illicit Financial Flows, Tax revenue, Institutions, Propensity score matching, Income inequality, Emerging market, Developing countries, Impact analysis.*

RESUME

Cette thèse se pose la question de savoir comment la politique budgétaire pourrait être utilisée à des fins de financement du développement. Elle identifie et explore les canaux par lesquels les pays en développement peuvent efficacement mobiliser les ressources (internes et externes) pour le financement du développement. Pour cela, nous conduisons des recherches axées sur les politiques économiques (en utilisant des outils statistiques et économétriques appropriés) et nous formulons des recommandations de politiques économiques aux pays en développement. La première partie de cette thèse s'intéresse à la question de la mobilisation des ressources externes dans les pays en développement (Chapitre 1 et Chapitre 2). Dans le Chapitre 1, nous analysons les effets des dépenses publiques sur les spreads de taux dans les pays émergents. Nous montrons que les pays en développement pourraient avoir un meilleur accès aux marchés financiers internationaux en augmentant leurs investissements publics et en réduisant leurs dépenses courantes. Plus précisément, les dépenses en capital humain (éducation et santé) et autres infrastructures publiques réduisent considérablement les spreads de taux. Ils devraient également améliorer la qualité de la gouvernance puisque les marchés financiers récompensent les pays bien gouvernés à travers de meilleures conditions d'emprunt. Nous examinons, dans le Chapitre 2, la force des règles de politiques budgétaires en termes d'amélioration de l'accès des marchés financiers internationaux par les pays en développement. Nous trouvons que l'adoption de règles budgétaires réduit les taux d'intérêts sur la détention des obligations d'Etat souverains et par conséquent améliore l'accès aux marchés financiers. Nous expliquons ce résultat par le canal de la crédibilité de la politique budgétaire : les gouvernements crédibles sont récompensés sur les marchés financiers internationaux par de faibles taux d'intérêt et des notations élevées des dettes souveraines. Nos résultats prouvent que l'adoption et la bonne mise en œuvre des règles de politiques budgétaires constitue un moyen substantiel pour les décideurs publics d'améliorer l'accès des pays en développement aux marchés financiers internationaux. La deuxième partie de cette thèse se focalise sur ce que les pays en développement pourraient faire pour améliorer le financement interne du développement (Chapitre 3 et Chapitre 4). En effet, nous explorons la relation entre l'adoption des règles budgétaires et la réduction des inégalités de revenus (Chapitre 3) et nous trouvons que l'adoption des règles budgétaires réduit les inégalités de revenus. Ces pays pourront financer leur développement de façon soutenable (à travers la réduction des inégalités) en adoptant des règles budgétaires. En outre, nous évaluons les effets de la lutte contre les flux financiers illicites sur la mobilisation de recettes fiscales (Chapitre 4). Nous révélons que les pays qui respectent les Recommandations du Groupe d'Action Financière (GAFI) en matière de lutte contre le blanchiment d'argent et le financement du terrorisme (pays coopératifs) enregistrent des montants de recettes fiscales plus élevés comparativement aux pays qui ne respectent pas ces Recommandations (pays non coopératifs). Par conséquent, les pays en développement pourront mobiliser plus de recettes fiscales en mettant en œuvre des politiques visant à empêcher les flux financiers illicites. Par ailleurs, ils doivent mettre en place de bonnes institutions.

Mots clés **:** *Politique budgétaire, Mobilisation des ressources, Financement du développement, Spread de taux souverains, Dépenses publiques, Dépenses courantes, Investissements publics, Qualité des institutions, Régression panel à transition lisse, Règles budgétaires, Notations de dette souveraine, Entropy balancing, Groupe d'Action Financière, Flux financiers illicites, Recettes fiscales, Institutions, Appariement par le score de propension, Inégalité de revenus, Marchés émergents, Pays en développement, Analyse d'impact.*