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Essais sur les politiques publiques de crises alimentaires et l'amélioration des exportations dans les pays en développement

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"Essays on public policies of food crises and exports upgrading in developing countries"

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Abstract

Abstract

The recent surges in food commodity prices have drawn attention on one of most severe sources of vulnerability for developing countries. In addition to financial constraints that these countries already face, (among these, the lack of insurance system to weather external shocks), their households also spend an outsized portion of their budgets on food consumption. Consequently, they experienced substantial increase in their import bills in the wake of surges in food prices. Our thesis presents several essays that examine on one hand the public policies taken in response to import food shocks. On the other hand, since trade-related policies as well as exports concentration may also heighten countries' vulnerability, relevant aspects of international trade are also discussed.

The first half of our dissertation examines the link between import food price shocks and fiscal policy. Chapter 1 describes the effect of food price shocks on governments' expenditure structure, while Chapters 2 and 3 turn to how governments' use of discretionary fiscal policy and fiscal stimulus during food price shocks affect household consumption and socio-political instability.

The second half of our thesis consists of two chapters addressing agricultural price distortion and exports concentration. Chapter 4 lays out the impact of climatic variability on agricultural price distortions, while Chapter 5 focuses on how exports concentration and exports quality upgrading affect household consumption volatility.

Keywords: food price, vulnerability, government consumption expenditure, discretionary policy, price distortions, exports concentration, exports quality, household consumption, socio-political instability.

Résumé:

Les montées de prix des produits alimentaires au cours de la dernière décennie ont attiré l'attention sur une des sources de vulnérabilité les plus sévères des pays en développement. Au regard des défaillances du système financier (en l'occurrence le manque de produits d'assurance appropriés pour faire face aux chocs extérieurs), ces pays pour la plupart importateurs nets, ont vu leurs factures d'importations exploser à la suite des dernières flambées de prix de produits alimentaires. Cette thèse présente quelques essais analysant, d'une part les politiques publiques en réponse aux crises alimentaires, et d'autre part et la concentration des exportations dans les pays en développement. Constituée de trois chapitres, la première partie de cette thèse se focalise sur les liens entre des variantes de politiques budgétaires et les chocs de prix alimentaires à l'importation. Le premier chapitre présente l'effet des chocs de prix alimentaires sur les dépenses publiques, tandis que les chapitres 2 et 3 s'attellent à analyser les effets des politiques budgétaires discrétionnaires et des relances budgétaires sur la consommation des ménages et l'instabilité socio-politique.

La deuxième partie de la thèse porte sur les distorsions des prix au commerce agricole international, et la concentration des exportations. Dans le quatrième chapitre, nous analysons l'impact des variations climatiques sur les distorsions des prix au commerce international. Le chapitre 5, s'intéresse quant à lui, aux effets de la concentration et de la qualité des exportations sur la volatilité de la consommation des ménages.

Mots clés: prix alimentaires, vulnérabilité, dépenses publiques de consommation, politiques discrétionnaires, distorsions des prix, concentration et qualité des exportations, consommation des ménages, instabilité socio-politique.

Table of contents

Table of contents

Table of contents

Dédicaces

To the beautiful people of my live:
-mon papa Sa majesté Fo'oh Melouong Jiofack Janvier Kuetifouet, de regretté mémoire,
- et ma maman, Mme veuve Fo'oh Melouong, Née Ymele Esther

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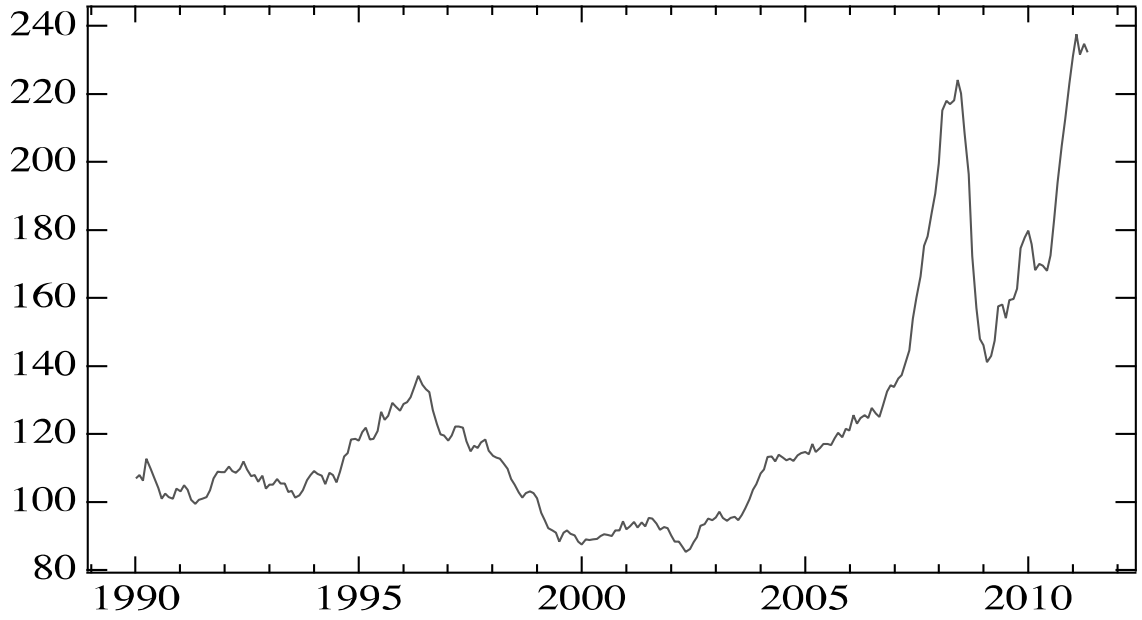
General introduction

The last decade has seen noticeable movements in food commodity prices. In 2006-2008 and 2010-2011, there were important rises in commodities food prices after a long period of relative stability. Compare to its 2004 level, the world food price index (FAO) increased by 20% in 2006 to reach 100 to 120% by 2007-2008. This index then decreased by 50 % by mid 2009 before increasing again by 80 and 130 % in 2010 and 2011.

Figure 0.1: FAO Food Price Index from 1990 to 2011



Source: FAO. The index is equal to 100% in 2002-2004.

These surges arose because of many factors that are widely acknowledged. Some of these factors are the following:

(i) The depreciation of the US dollar (USD): for about 5 years before 2006, the USD lost about 25% of its value (relative to other currencies). Consequently, since prices are measured in USD dollar in the world market, food became more expensive. (Mitchell, 2008) estimates that an increase of about 20% in price level to purchase in developing countries was explained by the dollar depreciation.

(ii) Rising the demand for food, the result of increasing income and urbanization (and fuelled further by the growing energy demand), has led to rising food prices over the previous decades. As suggested in a IFPRI report on global food policy (2017), the increase in urban populations globally has caused a notable change in diet patterns, consisting of more meat,

more often. Thus, these changes in habit led to greater demand of food production for animal feed, (Hawkes, Harris, & and Gillespie, 2017).

(iii) It should be noted that changing climate conditions are also undoubtedly among the prominent causes of recent food crises. Indeed, unanticipated weather variability, which in the extreme cases resulted in droughts or floods, has resulted in poor harvests. Based on large series of rice, maize, soybean and wheat, (Ray, Gerber, MacDonald, & West, 2015) conclude that about 32 to 39 % (in average) of yield variability is caused by some combination of variability in precipitation and temperature.

(iv) Pests and other natural impediments have also been around and contributed to reduce agricultural productivity in many countries, (FAO, et al., 2011).

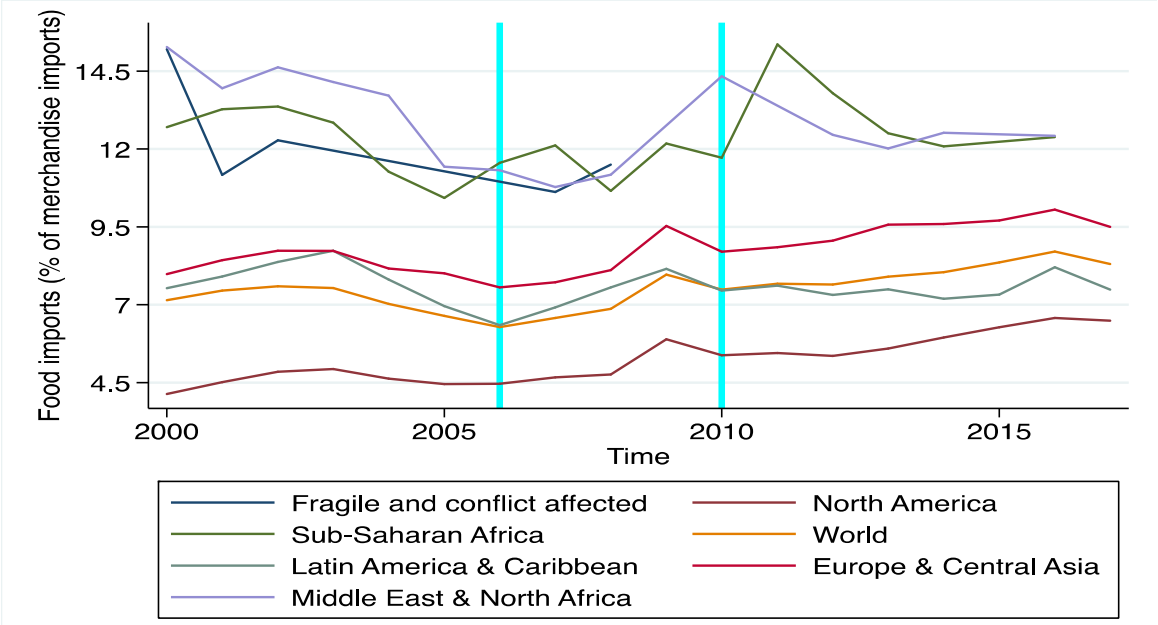
On the other hand, the surge in food prices occurred in the period where the inventories were relatively low or exhausted in some cases, leading to reduced room for food access in low-resources countries.

Although parsing the individual contribution of each of these factors is fraught with difficulty, their multiple interactions have led to the crises, (Mitchell, 2008), (Headey & Fan, 2008).

a) **Surge in food prices and market disequilibrium**

There are many reasons why an increase in food prices might create disequilibrium. They can be grouped by considering both the demand and supply sides. On the demand side, food has low elasticity of substitution with other goods; its consumption sensitivity is weakly affected by price variability. On the supply side, food supply cannot immediately respond to a sudden rise in demand, as decisions to adjust production capacities will take some time (at least couple of months) to be implemented up and to yield outcome for consumption. Hence, for food supply to meet food demand after an external shock, and since supply cannot effectively react in the short run, prices should vary strongly. This variation is found to be more pronounced in situations where inventory levels are weak. Although countries at different stages of income were affected by the surges in food prices, developing countries turned out to be more vulnerable for additional reasons. The prevailing mistrust between the private sector and the government and the high costs of transportation in many developing countries worsened the effect of food price surges. Furthermore, the domestic market structure (with the quasi monopoly in many cases) hardly affected the resiliency of national economies facing food price shocks. Because developing countries are mostly food import dependent, the surges in food price have led to an increase in their import bills (Figure 0.2), widening their external balance deficits and public finance costs.

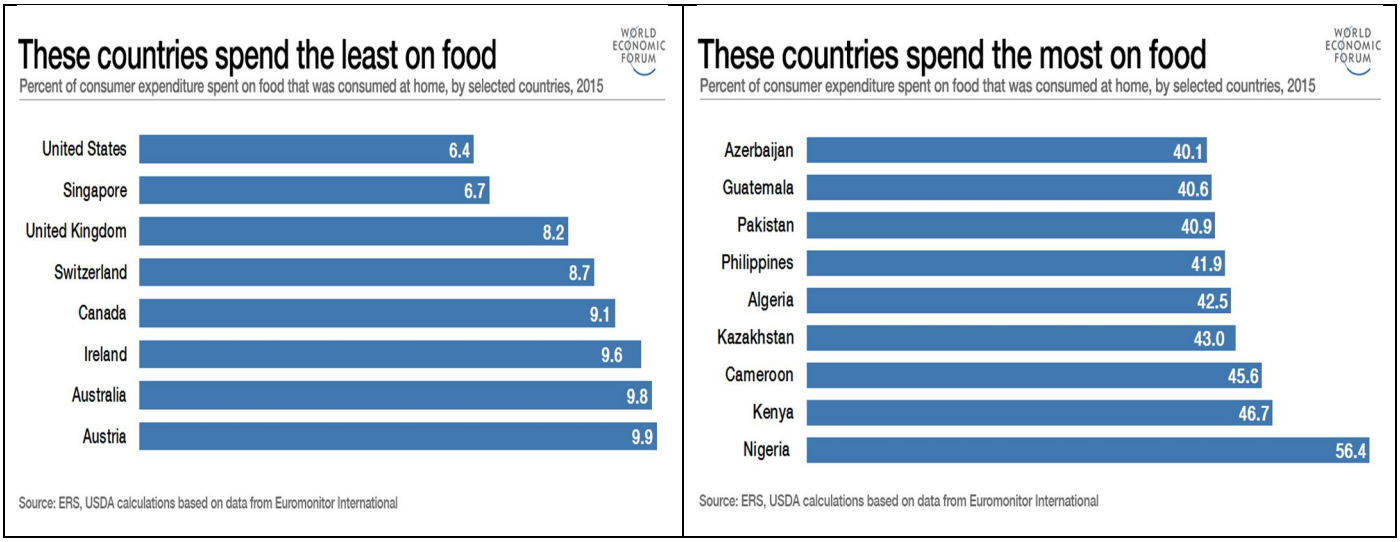
Figure 0.2: Food imports (% of merchandise imports)



Source: WDI (2018)

The effect of food price increase has been more pronounced in developing countries, as their households spend a larger part of their budget on consumption, as compared to households in richer countries (in accordance with the Engle's Law), (Figure 0.3). Even if many of these households are also net sellers, there is no clear evidence that their situations significantly improved after the surge of commodities prices (at least not to the extent expected). Two main reasons can explain why: (i) the prices of fertilizers increased more rapidly than agricultural prices; (ii) trade measures that many governments have taken to insulate their home markets from a volatile international one generally resulted in production uncertainty and losses.

Figure 0.3: Countries by share of food consumption (2015)



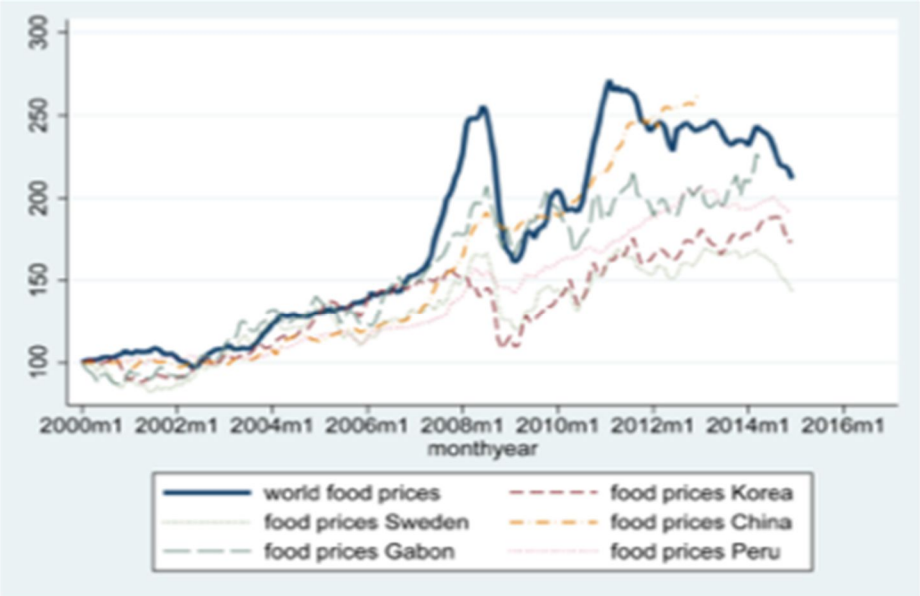
Source: World Economic Forum 2018 (https://www.weforum.org/agenda/2016/12/this-map-shows-how-much-each-country-spends-on-food/)

b) From international market price to national markets prices

The extent to which the international food price shock is transmitted to national or local markets is referred to as the pass-through. It can differ widely between countries (or from one local market to another), depending on how much policy responses and economic structures differ. In fact, according to the Law of one price (LooP), the prevalent price at the local market should be equal to the international price expressed in national currency, plus transport and related transaction costs. Hence, every factor that increase these costs will contribute to widening the difference between local and international prices. Such factors include the prevalent domestic situation, notably the quality of transportation infrastructures; the prevalent trade policies (such as duties and other exports or import related taxation), the unavailability of domestic substitutes, and the market structure. Indeed, because monopoly

remains the most common market structure for food and energy (both in terms of distribution and transport), related practices contribute to maintain local prices relatively high. A recent paper by (Bekkers, Brockmeier, Francois, & Yang, 2017) highlight that trade market integration characterized by low cost to import and to export, low transportation costs and the trade duties, etc.), decrease the pass-through of the international food price to local price, figure (0.4). However, their results yield that the food price pass-thought is about 30 % higher in low-income countries than in higher-income countries. This pass-through could also be affected by the prevalent climate conditions at home, which appear to play a prominent role on food prices at the domestic markets, (Bekkers, Brockmeier, Francois, & Yang, 2017). However, even if we acknowledge the fact that international price is not the prevalent price at the domestic market, the prices data we used in this thesis are collected from the world market (IMF-WEO data 2015). Indeed, since local prices must be correlated with the local market conditions, considering the local price in our analyses is not free of endogeneity concerns.

Figure 0.4: The world food price and local dollar food price indexes



Source: (Bekkers, Brockmeier, Francois, & Yang, 2017)

c) **Socio-political consequences of import food price shocks**

The consequences of food price shocks may depend on the country's situation in international food trade, namely, whether it is a net importer or a net exporter. Similarly, the effect of food price shocks on a given household may depend on its food-producing situation, and whether it is a net seller or a net buyer. For exporter countries, *everything being equal*, they should benefit from rising food prices. The same way, net-food seller households should benefit from the increase in food prices. However, the fact that fertilizer prices increased at

the same time (at the rate more important than that of grain prices) makes it difficult to estimate the producers' net gains. For net-food importer countries and net-food buyer households, the increase in import food price shocks lead to negative socioeconomic consequences, particularly if they do not have cooping tools. This is particularly alarming for households, as the lack of food or poor intake may compromise the future wellbeing of human capital, particularly among youths, (FAO, et al., 2011).

According to (Ivanic & Martin, 2008) and the World Bank (Bank, 2008), the surge in grain price of 2006-2008 has pushed an additional 105 million people below the poverty line. This figure is estimated to be 130 million by the World Food Programme (WFP, 2008b). As a result, is it confirmed that this situation raises socio-political instability in affected countries, since people went to claim on the streets. Accordingly, there is a consistent support that food price outbreaks contributed to riot intensification during the Arab spring[1].

d) **Public policies of food price**

With regard to the consequences mentioned above, and despite the support of both international community and the private sources of assistance, local governments have taken additional policies to mitigate the impacts of the shocks. (Watson, 2015) emphasizes that in the wake of recent crises policy measures taken by governments have mostly included consumption intervention and trade related-policies, instead of measures aimed at strengthening agricultural capacities and production. In terms of consumption interventions, the traditional tools are food assistances and subsidies.

Most governments have sought to cope with shocks (and to protect themselves from international market volatility) by banning food exports and increasing trade tariffs. Indeed, a survey made by the UNU-WIDER at the same period on 14 middle and low income countries showed that more than 50% of countries' responses were directly trade-related, (Babu, 2013), (Watson, 2013). As reported by (Demeke, Pangrazio, & Maetz, 2009), 25 out of 81 developing countries surveyed by the FAO following the 2006-2008 price surge increased taxes on exports or banned them, while 43 had reduced their tariffs on their imports. Such responses have had consequences both at the macro and micro levels. At the micro level, insulating agricultural markets from international trade has created production disincentives by discouraging investment, (FAO, et al., 2011).

[1] A wave a demonstrations and revolution that occurred in the MENA (Middle East and Nord African) region from December 17th 2010 to december 2012. This revolution started in Tunisia in 2010 and spread out throughout all the region. The causes were mostly political and social and the many damages (with more than 500.000.00 deaths) were registered.

Alongside the hunger and poverty that government could be trying to fight by resorting to stabilization policies, there is one macroeconomic reason, namely general inflation. Indeed, since developing countries household spend a sizeable amount of their income on foodstuff, an increase in food price is likely to fuel the general inflation level. Accordingly, the FAO emphasizes that the rising food price of 2007-2008 contributed to an additional 12.4% and 4.4% in Kenya and Senegal respectively (the same figure is estimated at less than 0.8 % in developed countries).

The implications of food price shocks are poorly documented. In fact, governments of countries affected by the shock generally take measures, at least in terms of assistance, that might be efficient or not, in the aim to weather food insecurity concerns. In spite of the fact that these assistances are sometime very limited (Christiaensen & Demery., 2018), they might have an implication on the macroeconomic variables. Thus, an in-depth knowledge of effects of each of these policies would be helpful for countries to prepare for the coming episodes of prices surges. This is particularly relevant, as forecasts are pointing to continued rising food prices in the coming years. It is also of importance in today's context where developing countries need more and more dependable policy instrument to address each social and/or political issue, without wasting resources.

e) **What we do**

This thesis examines the implications of public policies of food crises in developing countries. Our analysis is presented in two parts, both of them are empirical.

The first part is made of 3 chapters. It deals with the implications of food price shocks and the role of fiscal policies taken during the period of shocks. In this part, we limit our study to 6 food commodities, namely maize, rice, soybean, soybean oil, refined sugar and wheat, which according to FAO constitute the most commonly imported items by developing countries. (FAO, 2011). Contrary to the literature that has been focusing on export price to access the implications of commodities price shocks in developing countries, our attention is on import prices. In fact, our main purpose is to highlight the vulnerability to the cost of food import dependence in developing countries. Our food price indicator is the import food price index constructed following (Deaton, Miller, & al., 1995) method. That consists to compute a geometric average of the prices of our 6 items, weighted by their relative value in the total food import baskets. From this food price variable, we compute our food price shocks variable using an econometric approach method that allows us to extract the most exogenous component of the food price.

In the second part of the thesis, we aim to explore some trade-related aspects that have been found to increase countries' vulnerability to external shocks. More precisely, we present two trade-related essays on agricultural price distortions and exports concentration.

Since import food price shocks might lead the government to react using stabilization tools so as to ensure food access to household, the first chapter focuses on the effect of import food price shocks on government expenditure composition in Africa. Indeed, in the short run, *ceteris paribus*, the main priority in these countries after external shocks is to ensure that all households have sufficient access to food and/or means to afford it. For this reason, government subsidies, food assistance, or direct increase in wages, which are all part of government consumption expenditures, might be the main tools to be used. Hence, these measures that will be taking for stabilization purposes should lead to change in government expenditure. However, since countries have been trying to consolidate their public finance, it could be possible that such stabilization policies rather work in terms of composition. In fact, we argue that the concerned government could instead be increasing government consumption as a share of total government expenditures, while the entire government expenditures remain unchanged or even decrease. Using macroeconomic data on 43 African countries over the period 1980-2011, we resort to a system-GMM estimator that allows us to address the endogeneity issues, (Blundell & Bond, 1998). Our results yield that food price shocks do not significantly affect total government expenditures. However, we do find that food price shocks lead to the increase in consumption ratio over total government expenditures. As expected, this effect rises with the level of country's vulnerability (the measure of the extent to which the country relies on food imports while its resources capacity is not sufficiently high to provide households with regularly affordable food). Hence, we advocate for any measure that attempts to reduce African countries vulnerability to external food price shocks and dependency on food imports. Such measures would reduce the need for government intervention by means of increased consumption expenditures and by then, rather allow such expenditures to be used for more productive purposes.

From the previous result, it is then clear that import food price shocks lead to changes in governments' consumption expenditure. It could therefore be worth finding out whether this policy effectively helps the government to meet the stabilization objective. This could be important in determining potential policies recommendations for the concerned governments, when affected by import food price shocks.

Given the previous results, the next two chapters focus on the effect of fiscal policy on some welfare indicators in time of food price shocks. Many studies have tried to evidence the

impact of international assistance and remittances in time of food price shocks. However, to the best of our knowledge, there is no study that has attempted to assess implications of fiscal policies on household consumption and socio-political instability when facing food price shocks.

The second chapter of this thesis assesses role of fiscal policy on household consumption in time of import food price shocks. Based on the findings of chapter 1, the fiscal policy variable considered for this analysis is based on the government consumption expenditure share. Since import food price shocks might be unpredictable, we assume that fiscal policy taken for short-run stabilization purposes would also be unpredictable and only be revealed in retrospect. Specifically, we argue that the government will resort to discretionary measures in order to address the adverse consequences of the shock in the short run. We follow the methodology of (Fatás & Mihov, 2003) to compute the discretionary component of government consumption expenditure. Using a sample of 80 developing countries over the period 1980-2012, our results show that discretionary fiscal policies mitigate the adverse effects of food price shocks on household consumption (per capita). These policies work through government transfers and other subsidies, which directly impact household consumption. Our result is more robust in African countries and in countries with less flexible exchange rate regimes.

We also assess whether fiscal policy helps to smooth the impact of food price shocks on socio-political instability. This is the content of chapter 3. Using a sample of 100 developing countries over the period 1980-2012, we apply the Tobit random effect estimator with its maximum likelihood option and the IV Tobit estimator to assess the effect of fiscal policy on the likelihood of socio-political instability in period of food price shocks, (Miranda, Rabe-Hesketh, & al., 2005), (Finlay, Magnusson, & al., 2009). For this chapter, in addition to the discretionary fiscal policy indicators used in the second chapter, we compute other fiscal policy variables that rather refer to fiscal stimulus. These additional variables were computed by applying the methodology of (Blanchard, 1990) on government consumption expenditures. More interestingly, in addition to the stabilization role of fiscal policy, we also examine whether received remittances could have play a role in lowering the likelihood of socio-political instability in time of food price shocks. As results, we find that a fiscal stimulus (measured as the discretionary fiscal policies that are followed by at least two years of positive economic growth) lessens the chances that food price shocks will generate socio-political instability (civil conflicts, riots and expropriations). This result is robust insofar as it holds robust for several, alternative indicators of instability. In parallel, our findings also

support that received remittances considerably reduce the likelihood of socio-political instability when food price shocks are involved. This result appears strongly robust through our entire sample. This finding is interesting insofar as it establishes that the countercyclical role of remittances that have been proven in the literature regarding income and consumption is also valid for political instability.

Our results support the idea that fiscal stimulus should be used for stabilization purposes. We also recommend measures to increase and support remittances. These include a reduction of the cost of sending/receiving, as well as a decrease in barriers to migration.

From the above, even if public interventions through government expenditures appear to counter the effect of food price shocks on consumption and socio-political instability, we believe that this must be costly. Indeed, for developing countries, which are generally indebted and lack sufficient income to build strong investments capacities, it could be interesting to find other measures that would help them to reduce their vulnerability to external shocks, rather than continue to widen their fiscal deficit at the aim of stabilization. Our analysis also assesses trade policy measures that have been pointed out as factor of vulnerability to food price shocks.

Although it is recognized that international trade in agriculture contributes to every aspect of food security (this is not only by allowing the exchange of food from the surplus zones to the deficit ones, but also by favoring the possibility to varied diets), a. A survey made by the UNU-WIDER shows that more than 50 % of policies taken by governments after the 2006-2008 food crisis were directly trade-related), (Dreze & Sen, 1989), (Diaz-Bonilla, Thomas, Robinson, & Cattaneo, 2000), (Babu, 2013) , (Watson, 2013), (Brooks & Matthews, 2015). These measures consisted of exports banning, exports limitations through tariffs, the decrease in imports tariffs, etc. Indeed, every country were trying to insulate its home market from the international volatile prices, while many exporters countries were trying to keep the available food within their borders for self food security. Unfortunately, is has been found that these insulating measures have rather contributed to fuel the price level and volatility at the international level, leaving the crises' effects even worse than expected, (Boüet & Laborde, 2010), (Martin & Anderson, 2011), (OECD 2017). On the other hand, what is striking is that none of these policies was new: according to the literature, these 'beggar-thy-neighbor' were already common and they just got more pronounced in time of crises, (Jones & Kwiecinski, 2010) (Watson, 2015), etc.

To gain a better understanding about these trade distortion policies, chapter 4 lays out some drivers of agricultural trade distortions in developing countries. We use the World Bank

agricultural trade distortion data computed by Anderson (2008). These data comprise about 70 % of agricultural and non-agricultural price in the world international trade. Our main objective was to evidence how food price shocks and other factors contribute on trade distortions. However, since we do not have data on trade distortions but only on price distortions in international trade, and that the latter are computed using commodities price data, we instead evidence whether price distortions on international trade are affected by climate variability. In fact, we are assuming that climate variability could be a source of agricultural price variability. Furthermore, as developing countries have been pointed out as the ones where anti-agricultural trade measures are particularly common, we focus the analysis only on 40 developing countries over the period 1980-2010. Our sample has been limited by data challenges. Relying on an econometric framework that controls for both countries and year fixed effects, our results show up that:(i) an increase in temperature gives rise to a protection of the agricultural sector of about 5% more than other sectors. (ii) An increase in wetness, as well as an increase in precipitation, give rise to more agricultural protection in countries with low agricultural share of population (less than 52 % of the entire country's population). But the reverse is observed in countries with more than 52% of agricultural population. (iii) We also find that even if large values of climate variability seem to have more sizable effects on price distortions, almost all values of temperature variability have a significant effect. Our results call for more climate mitigating and adaptation tools to be put in place in order to reduce price distortions in international trade.

Following the analysis of trade policy, we now consider another dimension of international trade that might be crucial to limit countries vulnerability in international price shocks. Indeed, trade concentration in developing countries is widely acknowledged as a factor of vulnerability, as staying focus on a narrow number of exports products presents a risk of volatility if the said products' markets come to change. In the fifth chapter, we investigate whether exports concentration affects household consumption volatility (which must be source of wellbeing) in developing countries. We hypothesize that exports concentration leads to exports volatility which, in turn leads to consumption instability due to income volatility. More precisely, our point is that exports diversification could reduce countries vulnerability to import price shocks. Indeed, the lack of appropriate financial tools may not allow poor households to consistently stabilize their income and have food access on the rainy days for example. Thus, the volatility in their income (in response of export volatility) will tend to result in more general consumption volatility.

Export quality might also play a role on export instability, and therefore our fifth chapter considers the effect of exports upgrading (both export concentration and export quality upgrading) on household consumption volatility. Based on data from 100 developing countries over the period 1980-2015, our findings suggest that increases in export concentration lead to increases in household consumption volatility. Conversely, volatility is reduced by exports diversification, both in intensive margins (the increase of quantities within the existing lines of product) and in extensive margins (the increase of the number of lines of product). It is similarly found that exports quality-upgrading results in decreased household consumption volatility. These results are robust and valid in all countries regardless of the geographic area and income level. Thus we suggest any diversification-related policy to be encouraged, including measures to improve quality of the exported products.

PART 1: FOODIMPORT PRICE SHOCKS AND FISCAL CONSEQUENCES

Chapter 1: Food import price shocks and government consumption structure: evidence from African countries

Abstract

The delicacy of socio-political consequences during the recent spikes on food commodity prices has given rise to stabilizing measures that might have had repercussions on public policy alternatives. This effect is worrying for developing countries whose importation bills have been increasing because of their dependent on foreign goods. In this paper, we attempt to evaluate the effect of food price shocks on government expenditures in 43 African countries over the period of 1980 and 2011. Having solved the endogeneity issues, we come to realized that while import food price shocks do not adversely affect the total government expenditures, they however, positively and significantly impact government consumption expenditures (as a share of total government expenditure). This effect undoubtedly increases with countries' vulnerability. Our results suggest that governments rather resort to expenditure composition in time of shocks, favoring consumption expenditure in detriment of capital expenditure.

JEL Classification Codes: H50 N57 Q11

Keywords: government consumption expenditure, price shock, vulnerability, Africa.

1.1 Introduction

About two decades after the commodities price shock at the end of the 70's, major food commodity' prices met two important peaks in 2006-2008, and by the end of 2010. Many factors have contributed to such instability. These include the increase in oilseeds and grains demand (mostly driven by new emerging nations), the depreciation of the dollar, and noticeably adverse weather conditions, etc.

These price surges thus ensued many consequences that were particularly dramatic for developing countries for many reasons. Firstly, they do not have sufficient and safe buffer stocks capacities. Secondly, they are net-importers of both food and fertilizers. And even when they are exporters of certain commodities, their position as price takers does not allow them to significantly offset the level of prices. Indeed, these prices are set in the world-market without always taking into account their socio economic situations. Thirdly, they lack suitable

credit and financial tools to face random shocks. Fourthly they spend about 75 % of their budget on consumption expenditures (whereas developed countries spend 10 to 15 %), WTO (2012). All these factors contribute to make them less resilient when being exposed to random shocks. Indeed, the increasing volatility in food prices is of major concern, given the severe impact they have on households' wellbeing[2]. Moreover, political stability has been undermined in many cases due to social unrests that were fuelled by hunger, (Bellemare, 2015).

Indeed, such price surges have had an important impact on economic policies. Accordingly, (Catao & Chang, 2015)points out that food price shocks have recently driven Central Bank's monetary policies[3]. Notwithstanding that, they also led to considerable changes in both financial and fiscal areas, as governments had to intervene in order to make households meeting their meal.

Many studies have been questioning "food price shocks" by assessing their nexus with poverty, growth and institutional management, vulnerability, exchange rate, etc, (Ivanic & Martin, 2008), (De Janvry & Sadoulet, 2010), (Arezki & Bruckner, 2011), (Bar-Yam, Lagi, & Bar-Yam, 2015).

In fact, governments generally resort to policy measures (principally on import and or export taxes, and subsidies to consumers and/or producers, (Ianchovichina, Loening, & Wood, 2014)) to reinforce household food accessibility and political stability in time of adverse shocks. This could happen in time of positive food price shocks in importer countries, as they might be vulnerable. As supported by (Rodrik & al., 1998), government intervention plays a key role of insurance in random shock situations[4]. In the same vein, (Smith L. D., 1997) points out that governments certainly react to production instability and food insecurity issues, regarding the importance of the latter on political, social and economic ramifications[5]. These authors remind that food security is one of the legitimate concerns of the government in many countries[6]. This implies the integration of food policy measures on the government strategy that favors rapid and distributive growth is inevitable.

[2](WHO & bank, 2012) reported that countries' import bills had considerably increased and billions of people toggled below the poverty threshold since 2006.

[3] These authors mentioned that many countries have adopted inflation target policy because of food price instability

[4] This thesis joins the 'compensation effect' of government expenditure on globalization, as the country' external openness makes it more exposed to shocks and may worsen its vulnerability, (Garrett, 2001).

[5]The government has to respond for farmers', consumers groups' and industrialists' pressures

[6]According to these authors, the government must also avoid the negative consequences of agricultural instability in the whole economy

Although these shocks could thus give rise to considerable change on government policies, the relationship between food price shocks and the main stabilizing tools has not yet retained significant attention in the literature. However, since developing countries, notably African nations are facing serious budget deficit (partly related to their huge debts, (IMF, WEO 2017), it is worth assessing the extent to which public finances could change after the policy taken for a given purpose is met. Moreover, as argued by (Christiaensen & Demery., 2018), contrary to what have been saying before, African countries are more affected by food price shocks than any kind of shock. Thus, as food prices are still projected to remain high in the coming years and will be requiring policy actions, it would be crucial to gather more information about the effect of food price shocks on related policies. This will be helpful to recommend dependable policies that could address the vulnerability issues without tailoring the hands to pro-growth perspectives.

Regarding fiscal policy aiming at stabilizing external shocks, government expenditures might be one of the main tools. Indeed, in order to meet food insecurity after a surge on food prices in the short-run, the used expenditures components are generally consumption expenditures (this include direct or indirect subsidize and transfers, food assistance, wage adjustment, etc.). That is why in this study that is attempting to evidence the effect of import food price shocks on public finances, we only focus on government expenditure.

More precisely, we focus on how government expenditure reacts to import food price shocks. This can be justified by (Andres, Domenech, & Fatas, 2008), according to whom stabilizing effects could be materialized in terms of compositions effect.

Indeed, since countries have been trying to consolidate their public finances for the last decades, the stabilizing effects could possibly lead to the shift on the structure of government expenditures, even if the total government expenditure might be changing in opposite direction.

For this study, we use the SYSTEM-GMM estimator by (Blundell & Bond, 1998)that allows us to address the endogeneity issues. Our food price shocks variables take into account the world price composite index of the most imported food commodities, that are maize, wheat, soybeans, oil soybeans, refined sugar and rice[7]. Based on a sample of 43 African countries over the period of 1980 to 2011, this study finds that food price shocks led to

[7] Indeed, grains, which are the main meal in developing countries were amongst commodities whose price rise the most. Namely, wheat (whose price increased by about 200 % within the period 2002-2008); rice (whose price have accelerated in 2007 to attain the 430% of the 2002s level); soybean and maize. The main difference between the surges of 2006-2008 and that of mid 2010 lied in the level of staple food groups: concerning the last crisis, the rice price have been moderate whereas oilseeds price have continued to rise, see Minot et al. (2009), and the IMF rapport (2009)

significant increase in expenditure on government consumptions (measure as the share of total government expenditure), while their effects on total government expenditure is not significant. Interestingly, we find that the effect of food price shocks on government consumption expenditure increases with the level of vulnerability.

The rest of the paper is organized as follows; the second section sets forth some explanations on food price movements and government intervention; the third presents a brief literature review and the fourth is devoted to empirical analysis. Before concluding, the fifth section presents empirical results and discussions.

1.2 Food price movements and government intervention

According to (FAO, et al., 2011), the effects of the recent food crises were particularly pronounced in African countries because of their food dependence and the weight of food consumption budget in their total budget expenditure. It appears that within 2006 and 2008, African countries have seen their food import bills increased by 74 % whereas about 60 to 80 % of household's budget is spent on consumption (that figure is about 10 and 20 % in developed countries). The striking issue is that at the same time, cash-crop prices have also increased, though at slower pace, while fertilizer's prices were increasing at more rapid pace.
According to the permanent income hypothesis, the consumer's utility consists not only on satisfying his/her consumption, but also to be assured that this consumption will be stable on a regular basis. That is, they want to assure they will be able to access consumption in the future periods. Yet, most households in LDCs do not dispose of savings or insurance tools to overcome hunger in time of crisis. That is why in case of random shocks, the government could resort itself to stabilization policies.

These crises have prompted an evolving literature on food price shocks consequences. Focusing on the most common stabilization tools, some authors stressed on governments' reactions to the surge in food prices. As supported by (Timmer, 1989), escaping from food insecurity is not ensued from the private decision, (Byerlee, Jayne, & Myers, 2006). These studies underline that food price surges lead to government intervention, even if the efficiency of these measures remains in many cases questionable[8].

However, according to (Andres, Domenech, & Fatas, 2008), this stabilizing effect is only present because of compositions effect, that is, the underlined fiscal adjustment will work through a shift in government tools composition.

[8] In fact, concern about picking to appropriate target to benefit food assistance or other vulnerability limiting strategies remain on the table.

In this chapter, we test many hypotheses. (i), we assess whether food price shocks lead to change in total government expenditure: firstly, we expect not to reject this hypothesis, departing from the intuition that government increases its expenditure in order to smooth the negative consequences of external shocks on households. Secondly, this hypothesis can also be rejected: if it happens that the government reacts through other fiscal instruments, as tax alleviation for example in order to reinforce food access for households; or if the government rather decides to maintain the same total expenditure, and then relies on expenditure composition to stabilize price (for instance, temporarily reducing the share of investment expenditures in the total budget in order to supplement the share of current consumptions). (ii) We also test whether food price shocks have caused the shift of government expenditure composition, that is whether the share of government consumption expenditure in total government expenditure has changed. We expect not to reject this hypothesis, our intuition being that government stabilization tools as food subsidies, price administration, wage adjustment, etc, are mostly part of current government consumption. (iii) We finally evidence whether the effect of food price shocks on government expenditures is the same regardless of the country's vulnerability: again, we expect not to reject this hypothesis. In fact, given that vulnerable countries must be mostly negatively affected by supposedly external price shocks, and that government's reaction must include such.

1.3 Literature review

1.3.1 Food price movements and stabilizing measures

It is found in the literature that adverse food price shocks lead to the increase in infant mortality, the decrease of food intake quality and quantity, the increase in political instability[9] and hunger, the decrease of household consumption, (Horton & Diakosavvas, 1998), (De Janvry & Sadoulet, 2010), (Arezki & Bruckner, 2011), (Ortiz & Cummins, 2012), (Anrıquez, Daidone, & Mane, 2013), (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014), (Bellemare, 2015). This literature points out that those effects are greater in most vulnerable countries, and that some credible stabilization tools could be remittances and food security related policies. According to (Abbott & De Battisti, 2011), food security policy options in developing countries include food safety nets, agricultural incentives and government intervention.

In parallel, according to (Ravallion, 1997), (Grada, 2011), (Ianchovichina, Loening, & Wood, 2014), the consequences of price shocks on households depend on the extent to which

[9]Accordingly, (Ortiz & Cummins, 2012) underlines that food price outbreaks have contributed to riot intensification during the Arab spring.

these shocks affect macroeconomic conditions (namely salaries, assets and subsidies). In the same vein, (Albers, Peeters, & al., 2011)show that food price shocks positively affects subsidies on food and fertilizers. Whereas (Abbott & De Battisti, 2011)finds that social assistance spending must increase with the sensibility of households in time of crises. That's why (Demeke, Keil, & Zeller, 2011)mention that social assistance programs help in maintaining food demand in time of crisis

1.3.2 Government expenditure and government expenditure composition

Government expenditure composition is generally evidenced in situations where the change in governments expenditure components may not be on the same extent, even when total expenditure have also changed or not. The concept of government expenditure composition has mostly been covered in the literature of electoral cycles. This is to assess whether incumbents favor some kind of government expenditure in detriment of others before the elections, (Brender & Drazen, 2013). Composition effects[10] have also been evidenced to see whether expenditure composition matters on economic growth performances, (Devarajan, Swaroop, & Zou, 1996), (Mauro, 1998). Lastly, regarding the Structural Adjustment Programs that ran in the earlier 80s, indebted countries got to resort to composition changes, so as to reach IMF's prescriptions[11] in order to have their debts cancelled, (Mahdavi, Shifts in the composition of government spending in response to external debt burden',, 2004), (Hicks & Kubisch, 1984).

Using a sample of 19 developed countries from 1980-2006, (Sacchi & Salotti, 2015)finds out that the most important determinants of sub-government expenditure compositions are demographics and political changes. It was also discovered that corruption, external shock exposition and political stability, have an impact on the composition of government expenditure, (Mauro, 1998) (Gupta, De Mello, & Sharan, 2001), (Mogues & Benin, 2012), (Keefer & Knack, 2007)), (De la Croix & Delavallade, 2009).

[10]According to (Rodrik D. , 1996), external shocks have an impact on the government size, as the latter may serve as stabilization tool in bad periods. Interestingly, according to (Andres, Domenech, & Fatas, 2008), the stabilizing role of the government size in growth is only present because of the composition effect, that is, when the fiscal adjustment will pass through a change in government tools composition. Nevertheless, many studies have been done on government expenditure' determinants.

[11] These prescriptions consisted to reduce the fiscal that can either be reached by reduced government spending or increased revenue, as the latter can appear to distort economic productivity.

1.4 Empirical analysis

1.4.1 Variables

1.4.1.1 Computing the vulnerability index

According to (Briguglio, Cordina, Farrugia, & Vella, 2009), vulnerability is referred to as the extent to which an economy is exposed to exogenous shocks, while resilience measures the capacity of this country to withstand or recover of impact of the shocks. Following (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014), we construct a vulnerability index that takes into account the country's exposition to external shocks and its resiliency capacity. The computation uses many economic variables in a principal component analysis framework.

- The first aspect is a proxy of the extent in which the country is capable of constituting sufficient buffer stocks using exports earnings in time of shocks. This criteria is measured here by the difference between food exportations and food importations[12] The more a country can export more than it can import, the lesser it is vulnerable;
- The second aspect stresses on the country's income capacity: it is used to estimate the extent on which a country is capable of purchasing an additional food quantity in order to reinforce household consumption structures. This criterion is measured by the difference between the per capita GDP at a given year and the GDP of the richest countries in the same year. In other words, the more the country's GDP at a given year is closer to the GDP of the richest country, the lesser it is vulnerable;
- The third aspect stresses on the weight of food import in the country's trade capacity: the idea here is that, the more the country's import scaled in share of its current balance, the more its consumption will depend on international food prices. This criterion is approximated here using the relative weight of imported food on the total imports (because of non-availability of data on current balance). The less the country's food import's proportion is important, the less it is vulnerable;
- The last variable taken into account is the food import in share of households consumption: this is supposed to provide an information about the extent to which household purchasing can change following the international price change. This is approximated by the ratio of food importations on households' expenditures.

[12]food import and export variables that we use in this study include both staple foods and other varieties because we do not dispose of more disaggregated data. That constitutes one of the limits of this work.

All these aspects are considered to draw a composite index using the PCA (Principal Component Analysis). Details about the computation are given in the appendix (tables 1.9 and 1.10).

1.4.1.2 Computing food price and food price shock variables

Following (Deaton, Miller, & al., International commodity prices, macroeconomic performance, and politics in Sub-Saharan Africa, , 1995) and (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014), we compute the food price variable in three steps: first, for each country, we draw the food price index using the relative values of the most imported food commodity within the period. The values are computed using the quantities and the prices of those commodities in the world market during the period of our analysis. These commodities include wheat, sugar, soybeans, soybeans oil, maize and rice[13]. Prices data are from FAO database while import quantities data are from IMF outlook.

Let $w_{ij.}$ be the relative value of commodity j imported by the country *i* each year *t*. w_{ij} is specified as follows:

$$w_{i,j} = \frac{p_{j,.} * q_{i,j,.}}{\sum_{j=1}^{6} p_{j,.} * q_{i,j,.}} \qquad (1.1)$$

Where $q_{i,j,.}$ is the total quantity of commodity j imported by the country i for each year. Secondly, for each country and each year, the price index is given by

$$fp_{i,t} = \prod_{j=1}^{6} p_{j,t}^{w_{i,j,.}} \qquad (1.2)$$

Where $fp_{i,t}$is the price index, and $p_{j,t}$is the price of the commodity j in the world market at time t (same price for all countries). After computing this price index, we then centralize it on the base year 1995 in order to make price yearly comparative. This choice is motivated by the fact that most african countries had devalued their currencies in 1994 and that phenomena could have made huge change in their respective economies.

Thirdly, for each country, we regress the normalized price index on an intercept, its long –term trend and its first and second order lags' variables (this helps us to control for the fact that the government can use the previous price variability to predict the current price level, thus this autocorrelation is removed here)[14]. By doing so, we attempt to obtain food price residuals which are the most unpredictable. The regression is specified as follows:

$$\ln(fp_{i,t}) = \alpha_{i,0} + \alpha_{i,1} time + \alpha_{i,2} * \sum_{i=1}^{3} \theta_{i,p} \ln(fp_{i,t-p}) + \varepsilon_{i,t} \qquad (1.3)$$

[13]see(FAO, et al., 2011)

[14] The number of lag is robust when we introduce only one lag or three lags

As the prices used in this study are measured at the international market and are differently transmitted in each country, the latter regression is running for each country separately.

We construct two shocks variables basing on the latter regression: (1) the first shock variable (SHOCK) is the residual of the regression in equation (1.3), it represents the shocks magnitude; (2) the second shock variable (SHOCK(+)) is the number of positive price residuals in each period (four successive non overlapping years) that is larger than one standard deviation of the period, this variable provided information about the positive shocks frequency.

1.4.1.3 Other variables

Dependent variables: We draw two sets of equations that respectively use the total government expenditure (Gov_exp) and the share of current expenditure (government final consumption) in the total government expenditure[15] (Curr_exp) as dependent variable. Government total expenditure here is the sum of government current consumption and government gross fixed capital formation expenditures in percentage of GDP.

Following the literature, we use the control variables that are listed bellow.

Corruption: it is showed in the literature that the corruption matters on the government expenditure composition, as corrupt governments generally favor some kind of expenditure detrimental of others (health and education for example), (Delavallade, 2006), (Mauro, 1998). We also control our regressions with the democracy level (as one other characteristic of institutions).

Trade openness: (Rodrik D. , 1996) and (Alesina & Wacziarg, 1998) find that government size and external openness are not independent, as the more a country is opened, the more likely the government will spend on new opportunities, and vice versa. Trade openness is measured here as the sum of total exportations and importations of goods and services in share of GDP.

The external debt: the government's decision on its expenditure size could depend on how it is financed. A country could take additional debt at the aim of external shocks stabilization. However, high debt can also constraint a country to increase stabilization expenditures, (Mahdavi, 2004).

The GDP per capita and **GDP growth**: a country with more income will tend to spend more, *ceteris paribus*: that is illustrated by the *Wagner Law*.

[15] The payment of debt interests are not included in government expenditure.

Net Official Development Assistance: this represents the net official aid received from abroad per capita of inhabitant in % of GDP. As the internal aid received can be a potential substitute of government expenditure, it can contribute to food price effect stabilization tools.

We also control our regression with the government revenue, remittances, the financial credit ration to the private population, the share of urban population, the dependence ratio, the agricultural value added, and the probability of natural disasters.

1.4.2 Data, descriptive statistics and some stylized facts

Our study is based on 43 African countries in the period 1980-2011. The choice of this geographic area is motivated by the fact that such countries are most vulnerable to external shocks. That explains their first position in food insecurity across the world (FAO, et al., 2011). Furthermore, according to (Agnello & Sousa, 2009), African countries' public finances are the most volatile: that could be in part explained by stabilization policies that are more common there. The time period is constraint by data availability. In the default of monthly price data that are not available for the entire studied period, we use yearly data. In order to mitigate missing data problem and seasonality issues, we subdivide our period of study into eight sub-periods, seven of 4 years and one of 3 years and. Precisely, for each variable, the period data is given by the mean on the 4 successive non-overlapping years. This might cause the loss of information, but this remains the best way at our level, as econometric methodology (GMM estimator) used in this study lead to more consistent estimates when series are stationary in mean, and estimators are more convergent.

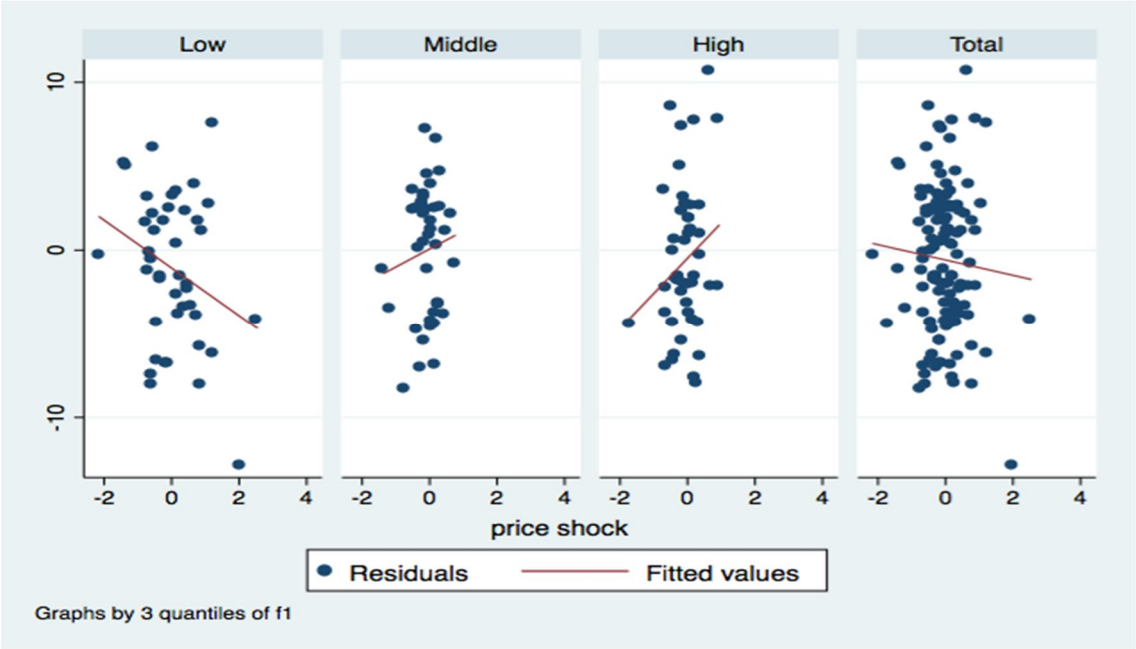
Table **1.5** shows some statistics of the main variables. We can see that our dependent variables present variability both within and between countries, that variability is more pronounced for the current expenditures, which varies for 22 % and 130% of the total expenditure; while total expenditure varies between 2 and 73% of the GP.

Their standard deviations also show a huge dispersion of the current expenditure. The lower variability of expenditure within countries can be explained by their inertia along any given country. Food price shocks vary between 2.23 and 3.07, this variability is mostly explained by the within countries' component (between 5 and 11). The lower variability of food price shocks between countries underlined the international dimension of food price. In fact, this variable is nearly the same for all country, but its impact can differ for each country depending on the conjuncture.

In order to have an idea on the relationship between food price shocks and government expenditure, some stylized facts are drawn in the graph below. Figure 1.1 plots the relation

between food price shocks and current expenditures by vulnerability level. As illustrated in that plot, food price shocks tend to be negatively related with current expenditure when the total sample is considered. But, when we examine the relation per vulnerability percentiles, we see a positive relationship between food price shocks for the high and the middle class of vulnerability, whereas it is negative for low vulnerability.

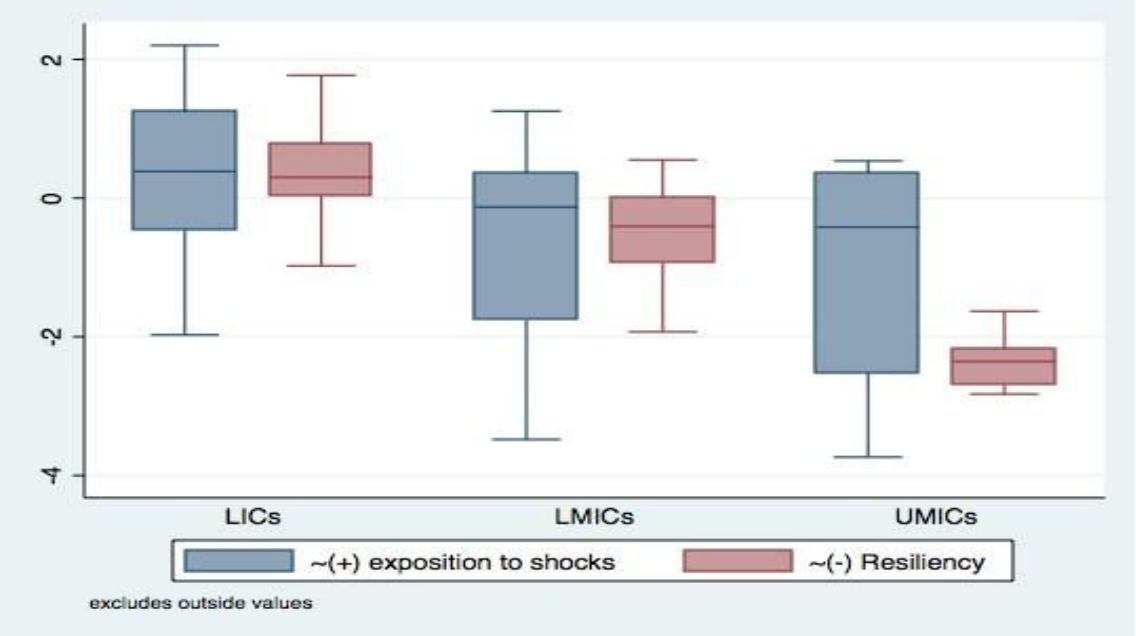
Figure 1.1: Import food price shocks and government consumption expenditure by vulnerability level



source: Author's calculations using FAO, IMF outlook and WDI data

Regarding the vulnerability per se, Figure 1.2 shows that the more the income of the country, the greater it is resilient. Remarkably, we can also see here that LICs are particularly exposed to food price shocks. It appears that their insufficient production capacity causes them to import an important proportion of food, exacerbating their sensitivity to external shock on food price.

Figure 1.2: Vulnerability components by country income level



Source: Author's calculations, using WDI data.Notes: These boxes present income groups of countries per vulnerability degree. We have retained two components from our PCA: the first component was represented by the share of import goods in households expenditure on consumption, that is why we have assimilated this factor as the exposition to shocks; while the second component was more represented by the income gap as compare to the richest country at each period, that component is assimilated as the country's resilience. The line inside the boxes represents the median.

However, the results of this section are drawn from pure correlations. Therefore, we propose in the below section a causality assessment, that can help us to draw more credible conclusions, as we will take into account other factors that may likely affect government expenditures.

1.4.2 Econometric settings

1.4.3.1 The model

Our objective in this section is to highlight the causal impact of food price shocks on government expenditure size and composition. For a given country, there might be inertia on the evolution of government expenditure throughout the time. In order to take that into account, we have to control our regression with the first lag of the dependent variable. However, the introduction of the latter variable in the equation leads to a bias on both the OLS and the fixed effect estimators, because of the endogeneity between the error term and the first lag dependent variable, (Nickell, 1981)[16]. Even though some other econometric approaches might have been more suitable to evidence the effect of shocks series, the

[16]According to (Nickell, 1981), this bias is particularly important in small samples (like ours).

structure of our data does not allow us to come up with robust estimates if we use these methods[17]. To correctly address this endogeneity, the best approach would consist of using valid external instruments. However, since we do not have them, the only way we will take is to resort to internal instruments and more precisely the System-GMM estimator[18]. Several GMM estimators have been proposed and of all, the system-GMM[19] (Blundell & Bond, 1998)is said to be the most consistent. It proceeds by instrumenting variables in first difference with those in level and inversely; those in level are instrumented by the first difference variables. Its estimates are then robust and stable, as the process imposes average stability condition on the dependent variable, (Araujo, Brun, & Combes, 2008). This approach has been criticized for having many instruments, but the over identification test of Hansen is performed here for that concern. The model is validated by the rejection of the over identification hypothesis, the presence of serial independence of order 1 (AR1) and the absence of that of order 2, (Arellano & Bond, 1991). The *windmeijer* correction (Windmeijer, 2005) is also applied in its second step version in order to correct standard errors.

The model is written as follows: $GOVexp_{i,t} = \alpha_1 GOVexp_{i,t-1} + \alpha_2 shock_{i,t} + \alpha_3 vul_{i,t} + \alpha_4 shock_{i,t} * vul_{i,t} + \alpha_5 \boldsymbol{Z}_{i,t} + v_i + w_t + \varepsilon_{i,t}$ (1.4)

Where: GOV is the total government expenditure or the share of government consumption expenditure in the total government spending, for the country i at period t, $GOVexp_{t-1}$ is the first lag of $GOVexp_t$, shock is the food price shocks, vul is the vulnerability index, Z is the vector of controls variable involved in the model (see definition of variable in table 7 in Appendix); $\varepsilon_{i,t}$ is the error term , v_i is the country fixed-effect and w_t is the year fixed-effects. We expect α_2 and $\alpha_4$to be positive.

1.4.3.2 Baseline results

Table 1.1 presents the estimate results of the effect of import food price shocks on

[17] Indeed, estimators like PVAR (Panel VAR) or PMG (Pooled Mean Group) are more suitable to solve dynamic panel series with non-stationary concerns. However, the requirements of these estimates are not fulfilled in our data, as our panel is not balanced, (Love, 2006), (Pesaran, Shin, & Smith, 1999)

[18]A note about GMM advantages and concerns. Advantages: The GMM estimator is consistent asymptotically under a variety of situations, including when the only instruments available are predetermined rather than strictly exogenous (Arellano & Bond, 1991). The GMM estimator is also efficient in certain classes of estimators. GMM estimator is consistent and asymptotically efficient when both N and T tend to infinity under certain conditions (Arellano, Panel data econometrics. , 2003) Concerns: GMM could be biased when the number of moment conditions expands, leading to a bias/efficiency trade-off. also find that the GMM estimator is asymptotically biased when T/N tends to a positive constant (c). Moreover, it is inconsistent as when the autocorrelation in the first differenced errors are neglected. That is why we ran appropriate tests of autocorrelation, and we also subdivides our time period into sub periods

[19] Moreover, the Monte-carlo simulation done by (Blundell, Bond, & Windmeijer, Estimation in dynamic panel data models: improving on the performance of the standard GMM estimator. In Nonstationary panels, panel cointegration, and dynamic panels, 2001) show that system-GMM precision is more important as the studied period decreases.

government expenditure (measured as a share of GDP). We start by introducing control variables that have already been found in the literature to be factors affecting the expenditure of government. In the first column, we add the GDP per capita and the initial GDP per capita (in logarithm), the population (in logarithm), trade openness and corruption. It appears that government expenditure increases with the country's income, but decreases with the initial level of income. This could be implying that already high-income countries tend to spend relatively less than poor income countries, since the latter have more investment needs than the former. This result remains the same in all columns. In the second column, we add the per capita net received ODA, which significantly and positively affect government expenditure. This can be because of two main reasons. Firstly, it is possible that ODA come as a complement to government expenditure, particularly in the situation where there is a real need of investment or other government concerns. Secondly, it is also possible that ODA is involved for a country where there is a need of government expenditure in order to help in capacity building to ensure more efficient ODA. Since the novelty of our work is to see whether food price shocks affect government expenditure, we add this variable on column 3, while all other controls are maintained. Our food price shock variable is not significant, but all our controls maintain their importance. In column 4, we add tax revenue as a control variable and our results do not change considerably. On columns 5 and 6, we rather use the positive food price shocks variable and the results do not change: there is no significance with the effect of positive import food price shocks on government expenditure. This result is not surprising, as even if food price shocks might raise considerable need for government intervention, the share of government expenditure that is used for this concern could be too little to show a significant result. That is why in the following, we focus only on the government consumption spending as a share of total government expenditure. Our intuition is that the effect of food price shocks could be more sensitive on government consumption expenditure, which might reflect the most suitable tools for government interventions in such kind of situations.

Table 1.1: Import Food price shocks, vulnerability and government expenditure

	(1) Gov_exp	(2) Gov_exp	(3) Gov_exp	(4) Gov_exp	(5) Gov_exp	(6) Gov_exp
L.Gov_exp	0.66***	0.60***	0.65***	0.55***	0.70***	0.61***
	(3.64)	(2.94)	(3.33)	(3.54)	(4.04)	(2.98)
Init-GDPp	-15.38***	-10.94**	-11.44***	-10.58**	-10.77***	-11.19***
	(-3.21)	(-2.48)	(-2.84)	(-2.13)	(-3.20)	(-3.16)
GDPp	5.91***	5.82**	6.66***	6.39*	5.22**	6.40**
	(2.78)	(2.10)	(2.91)	(1.78)	(2.09)	(2.32)
Pop	-6.76	0.66	0.54	-4.49	-3.89	-4.43
	(-1.42)	(0.16)	(0.15)	(-1.05)	(-1.33)	(-0.86)
Open	$-1.75x10^{-4}$	-3.05 $X10^{-4}$	-2.86 $X10^{-4}$	1.22 $X10^{-4}$	-4.32 $X10^{-4}$	0.152 $X10^{-4}$
	(-0.59)	(-1.44)	(-1.36)	(0.57)	(-0.23)	(0.06)
Extdebt	$-5.52x10^{-3**}$	$7.69x10^{-3}$	$7.22x10^{-3}$	$-2.27x10^{-2}$	$-2.07x10^{-3}$	$-3.10x10^{-2}$
	(-2.45)	(1.46)	(1.55)	(-0.86)	(-0.31)	(-0.98)
Corrup	-0.48	-1.02	-0.89	0.48	-0.098	0.41
	(-0.40)	(-0.81)	(-0.80)	(0.46)	(-0.11)	(0.28)
ODA		$5.75x10^{-2**}$	$5.64x10^{-2**}$	$3.21x10^{-2}$	$1.98x10^{-2}$	$3.31x10^{-2*}$
		(2.25)	(2.40)	(1.25)	(0.82)	(1.94)
SHOCK			$-4.29x10^{-3}$	$-1.44x10^{-3}$		
			(-0.62)	(-0.15)		
Revenue				0.25		0.14
				(0.67)		(0.44)
SHOCK(+)					-1.11	-0.76
					(-0.94)	(-0.34)
_cons	181.2*	30.77	29.24	100.2	105.6**	105.5
	(1.88)	(0.40)	(0.42)	(1.22)	(1.99)	(1.13)
obs	120	120	120	100	120	100
group	23	23	23	19	23	19
Ar1	0.06	0.08	0.03	0.09	0.02	0.06
Ar2	0.12	0.10	0.47	0.22	0.63	0.19
Hansen	0.76	0.75	0.74	0.7	0.53	0.62

t statistics in parentheses $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$

On table 1.2, we show the estimate results of the effect of food price shocks on government consumption expenditure (measure as the share of total government spending). In the first column, when only the country's income, the Dependence ratio and food price shocks are controlled; we see that the latter positively and significantly affects government consumption expenditure. This effect remains the same when we add Corruption (in column 2), democracy (in column 3) and net per capita received remittances in column 4. The results still hold when we also add many other controls from columns 5 to 7. However, after for controlling all these variables, it appears that government consumption expenditure increases with the democratic level and private credit to the financial sector. Regarding democracy, this result could be saying that the more the country is getting democratic, the more populations are able to claim for their rights and in turn, the government tends to spend more in order to satisfy current social needs.

Table 1.2: Import Food price shocks and government current expenditure

	(1) Curr_exp	(2) Curr_exp	(3) Curr_exp	(4) Curr_exp	(5) Curr_exp	(6) Curr_exp	(7) Curr_exp
L.Curr_exp	0.79***	0.88***	0.84***	0.79***	0.85***	0.88***	0.80***
	(4.85)	(5.14)	(8.06)	(7.40)	(4.48)	(3.96)	(5.95)
SHOCK	0.01*	0.02*	0.02*	0.01*	0.02**	0.03***	0.02**
	(1.66)	(1.85)	(1.80)	(1.65)	(2.48)	(2.60)	(2.00)
GDPp	5.34	-3.36	-2.33	-3.81	1.38	-9.55	-2.59
	(0.56)	(-0.44)	(-0.36)	(-1.21)	(0.30)	(-0.64)	(-0.60)
Depend	0.28	$5.02x10^{-4}$	-0.09	-0.18	0.23	0.23	0.24
	(0.57)	(0.00)	(-0.29)	(-1.05)	(0.66)	(0.34)	(0.83)
Corrup		6.12					
		(0.93)					
Democ			3.80	3.58	5.95*	10.67**	7.13**
			(1.27)	(1.36)	(1.91)	(2.30)	(2.05)
ODA				$3.21x10^{-5}$	-0.04		-0.02
				(0.00)	(-0.66)		(-0.31)
Remit					-0.19		
					(-0.23)		
Urban					0.39	0.77*	0.27
					(1.47)	(1.93)	(1.18)
Extdebt					0.05***	-0.06	
					(4.32)	(-0.92)	
priv						0.18*	0.16**
						(1.74)	(2.19)
Disaster						-0.17	-5.25
						(-0.04)	(-0.70)
Revenue						-0.77	-0.09
						(-0.91)	(-0.20)
Va_agric						-0.25	-0.17
						(-1.09)	(-1.07)
_cons	-45.41	21.45	25.91	57.04	-32.63	35.85	-3.96
	(-0.42)	(0.29)	(0.38)	(1.52)	(-0.45)	(0.23)	(-0.07)
obs	236	160	230	216	152	118	119
group	43	29	43	41	32	25	26
ints	17	21	23	26	26		
Ar1	0.01	0.03	0.02	0.02	0.02	0.08	0.05
Ar2	0.96	0.35	0.82	0.98	0.17	0.61	0.27

Hansen	0.34	0.35	0.63	0.77	0.86	0.95	0.86

t statistics in parentheses $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

However, our intuition is that, since vulnerable countries may have susceptible households, the need of government intervention in these countries could be more important. And so, there could be an heterogeneity on the effect of food price shocks on government consumption expenditure depending on vulnerability. We then add the vulnerability variable as control in our analysis on table 1.2. Results are displayed on table 1.3.

On column 1, we control only for food price shocks and vulnerability. While the former significantly affect government expenditure on consumption, the latter does not. On column 2, we add the interaction term between food price shocks and vulnerability as well as the residual term of GDP growth, the financial private credit, income and the dependence ratio. The results yield that while food price shocks is still significantly affecting the dependent variable, the effect of vulnerability is also positive and significant, as well as that of the interactive term. The latter loses its importance when we add the initial income and democracy. However, this effect became significant when we add more controls in the model, from column 4 to column 7, although vulnerability by itself loses its significance. Interestingly, by introducing the vulnerability and its interactive term, the size of the effect of food price shock is greater than that on table 2; meaning that the effect of food price shock is underestimated when vulnerability is not controlling. This points out the extent to which food price shocks in such countries are not interconnected to vulnerability issues. In a nutshell, our results support that the positive effect of food price shocks on government consumption expenditure is even more important in situation of vulnerability. Although the effects of our controls are barely robust through all the specifications, when they are significant, the results are in line with literature.

Table 1.3: Import Food price shocks, vulnerability and government current expenditure

	(1) Curr_exp	(2) Curr_exp	(3) Curr_exp	(4) Curr_exp	(5) Curr_exp	(6) Curr_exp	(7) Curr_exp
L.Curr_exp	0.62**	0.77***	0.89***	0.87***	0.83***	0.86***	0.84***
	(2.51)	(5.67)	(3.36)	(2.79)	(3.35)	(3.53)	(4.09)
SHOCK	0.01*	0.07**	0.03**	0.02*	0.03**	0.03***	0.03**
	(1.78)	(2.38)	(2.48)	(1.89)	(1.97)	(2.58)	(2.03)
Vul	-1.92	9.59*	5.53*	9.19	6.97	-2.53	1.07

	(-0.73)	(1.92)	(1.79)	(1.21)	(0.98)	(-0.37)	(0.20)
SHOCK*Vul		0.02**	0.02	0.03*	0.04***	0.04***	0.03**
		(2.10)	(1.20)	(1.71)	(2.69)	(2.65)	(1.97)
Res_growth		0.47	-0.19	-1.49	-2.04**	-0.34	-0.61
		(0.64)	(-0.48)	(-1.39)	(-2.49)	(-0.63)	(-0.63)
priv		0.20***	0.13*	0.15	0.09	0.03	0.25*
		(2.60)	(1.72)	(0.91)	(0.88)	(0.24)	(1.81)
GDPp		12.69**	10.98	24.10**	16.68	2.25	3.94
		(2.05)	(1.38)	(1.96)	(1.30)	(0.16)	(0.29)
Depend		0.50*	0.16	0.25	0.20	0.10	0.76
		(1.91)	(0.68)	(0.66)	(0.43)	(0.24)	(1.13)
Init-GDPp			-6.91	-15.57*	-14.82	-5.13	-2.23
			(-0.82)	(-1.86)	(-1.56)	(-0.47)	(-0.15)
Democ			2.26	8.24	11.21***	4.19	7.02
			(0.91)	(1.15)	(2.61)	(0.84)	(1.57)
Extdebt				0.04	$1.54x10^{-3}$	0.11	
				(0.37)	(0.03)	(1.61)	
Remit					-0.38	-1.22	
					(-0.54)	(-1.55)	
ODA						-0.19*	
						(-1.85)	
Revenue							0.33
							(1.43)
_cons	28.39*	-131.0**	-43.77	-87.03	-28.02	25.23	-92.84
	(1.77)	(-2.02)	(-1.17)	(-1.09)	(-0.31)	(0.29)	(-0.99)
obs	172	140	130	128	115	107	104
group	38	35	33	32	30	28	28
Effect at 25th of vul							
Effect at the median of vul							
Effect at the 90th percentile of vul							
Ar1	0.04	0.05	0.05	0.09	0.03	0.08	0.05

Ar2	0.64	0.22	0.81	0.85	0.97	0.37	0.88
Hansen	0.40	0.80	0.61	0.48	0.70	0.92	0.73

t statistics in parentheses

$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

1.4.3.3 Robustness checks

To check whether our results are robust, we maintain the same specification as on table 1.2, but we rather use the number of positive food price shocks instead of food price shocks. As clearly displayed in all the columns of table 1.4, the share of government consumption expenditure increases with the number of positive food price shock increases. Further, as shown on table 1.1, column 5 shows that democracy significantly and positively affects the share of government consumption expenditure.

Table 1.4: Positive Import Food price shocks and government consumption expenditure

	(1) Curr_exp	(2) Curr_exp	(3) Curr_exp	(4) Curr_exp	(5) Curr_exp
L.Curr_exp	0.89***	0.88***	0.90***	0.84***	0.72***
	(3.38)	(6.15)	(4.27)	(4.03)	(2.89)
SHOCK(+)	2.38*	3.40**	4.29**	2.44*	4.00**
	(1.77)	(1.99)	(2.00)	(1.70)	(2.41)
GDPp	0.36	0.23	0.90	1.14	-4.11
	(0.03)	(0.06)	(0.19)	(0.25)	(-0.32)
Depend	0.65	0.06	0.07	0.18	0.27
	(1.45)	(0.22)	(0.28)	(0.52)	(1.00)
Democ		6.64**	4.76	5.39	5.33*
		(2.39)	(0.87)	(1.63)	(1.84)
ODA			-0.03	-0.03	-0.10*
			(-0.45)	(-0.45)	(-1.83)
Remit				-0.25	
				(-0.31)	
Urban				0.30	0.37
				(1.08)	(0.78)
Extdebt				0.06***	
				(4.07)	
priv					0.19***
					(4.99)
Disaster					-8.62*
					(-1.85)
Revenue					0.41
					(0.62)

Va_agric					-0.13
					(-0.47)
_cons	-51.94	-11.48	-4.20	-33.00	4.20
	(-0.68)	(-0.20)	(-0.07)	(-0.48)	(0.05)
obs	236	230	216	152	119
group	43	43	41	32	26
ints	14	21	29	26	
Ar1	0.01	0.03	0.05	0.02	0.09
Ar2	0.96	0.96	0.99	0.22	0.66
Hansen	0.74	0.70	0.60	0.72	0.94

t statistics in parentheses

$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

When we instead use the frequency of positive food price shocks as a food price shock variable, table 1.5 shows that the effect of positive food price shocks became greater than that on table 1.3. And realistically, this effect depends on the level of vulnerability. Other control variables almost maintain the same effects as on table 1.4.

Table 1.5: Positive Import Food price shocks, vulnerability and government current expenditure

	(1)	(2)	(3)
	Curr_exp	Curr_exp	Curr_exp
L.Curr_exp	0.63***	0.69**	0.88***
	(3.05)	(2.48)	(4.74)
SHOCK(+)	4.41**	4.69**	3.78**
	(2.08)	(2.24)	(2.41)
SHOCK(+)*Vul	3.43**	5.26**	6.77***
	(2.38)	(2.01)	(3.61)
Vul	5.82*	11.61**	-1.86
	(1.82)	(2.32)	(-0.48)
Init-GDPp	-9.17	-2.57	1.67
	(-1.01)	(-0.21)	(0.11)
s	-0.03	-0.55	-0.44
	(-0.06)	(-1.60)	(-0.73)
priv	0.18**	0.19*	0.37***
	(2.32)	(1.92)	(3.66)
GDPp	16.20*	13.94	0.01
	(1.70)	(1.08)	(0.00)

Depend	0.41	0.32	1.10**
	(1.18)	(0.94)	(2.29)
Democ		9.61**	7.70*
		(2.41)	(1.72)
Revenue			0.56*
			(1.65)
_cons	-69.86	-111.0*	-136.7
	(-1.48)	(-1.76)	(-1.54)
Nber_obs	133	130	104
Nber_group	33	33	28
Effect at 25th of vul	2.52	1.48	-0.75
Effect at the median of vul	4.84	5.27	4.56
Effect at the 90th percentile of vul	8.08	10.50	11.07
Ar1	0.08	0.09	0.07
Ar2	0.12	0.42	0.15
Hansen	0.71	0.56	0.97

t statistics in parentheses

*p< 0.10, **p< 0.05, ***p< 0.01

1.5 Conclusion

This paper has presented evidence of a positive, significant and robust relationship between food price shocks and government consumption expenditure, while this variable does not significantly affect the total government expenditure. Apparently, this effect of food price shocks on government consumption expenditure is more important for vulnerable countries. These results could be showing that governments resort to consumption expenditure as a tool to reinforce household access to food in time of adverse import price shocks. This could be through all kind of direct or indirect transfers and subsidies, including on wages, on food assistance programs *per se*, or even on social security like medical care that could be brought to families suffering of hunger or other food lack related diseases. On the other hand, it could also include government security spending to maintain stability in cities where food price surges gave rise to unrests and manifestations. Our results suggest that governments rather resort to expenditure composition, rather than on expenditure per se. This can be understandable, as since governments have been trying to consolidate their public finance in order to maintain their fiscal deficit under scrutiny, they could find a room to rather increase the share of a given component expenditure when the total expenditure is maintained or reduced. A potential implication of this result is that food price shocks lead to government intervention that turns out favoring government consumption expenditure, in detrimental of capital formation expenditure, which could have been source of long-term sustainable economic growth. The paper thus calls for any measure that would help to reinforce countries resiliency, when reducing their exposition to potential food price shocks. This includes the strengthening of the home agricultural firms through land regulation and mitigation/adaptation tools to climate shocks. Indeed, these measures will facilitate to reduce household vulnerability to adverse external shocks, by rendering countries less food import dependent and thus requiring lesser need of government expenditure to reinforce food access, which could be beneficial to other components of government expenditures, such as capital investment.

1.6 Appendix

Table 1.6: Descriptive statistics of the main variables

Variable		Mean	Std. Dev.	Min	Max	Observations
Gov_exp	overall	23.94	9.43	6.55	66.02	N = 281
	between		7.59	13.33	48.47	n = 43
	within		5.37	5.86	54.53	T-bar = 6.53
Curr_exp	overall	66.69	12.87	25.48	91.44	N = 281
	between		10.53	31.04	85.93	n = 43
	within		8.53	40.95	92.21	T-bar = 6.53
SHOCK	overall	0.01	0.68	-2.23	3.08	N = 374
	between		0.02	-0.052	0.06	n = 47
	within		0.68	-2.24	3.14	T-bar = 7.96
SHOCK(+)	overall	0.51	0.50	0	1	N = 374
	between		0.14	0.25	0.75	n = 47
	within		0.48	-0.24	1.26	T-bar = 7.96

Table 1.7: Variables, definitions and sources

Variables	Definitions	Sources
Food price shocks	See section (3)	WEO(2015) FAOSTATISTIQUES (2016)
Currenexp	current government expenditure	WDI
Totalexp	total government expenditure = current government expenditure +public gross capital formation (both in % GDP)	Authors using WDI
GDP	Gros Domestic Product per capita	WDI (2015)
Growth	GDP growth	Authors using WDI
Res-growth	GDP growth cycle	WDI
Openess	trade openness, measure as the sum of goods and services import and export over the total GDP	WDI
Remittance	Net remittances received par individual from abroad	WDI
ODA	Net Official assistance received per capita	WDI
External debt	external debt of the central government in % of GDP	WDI
Urbanpop	the share of the population living in urban regions	WDI
Dependence rate	the ratio of people from 0 to 15 and +64 to the total population	WDI
Population	Logarithm of total population	WDI
Private credit	ratio of the credit addressed by the financial and bank sectors to the private sector in % of gdp	WDI
Corruption	corruption level	IRCG
Democracy	democracy level (ranking -10 to +10, from highest autocraties to highest democracies)	IRCG

source: authors

Table 1.8: List of countries by geographic area

Algeria	Chad	Guinea	Mauritania	Sudan
Angola	Comoros	Guinea-Bissau	Mauritius	Tanzania
Benin	Congo	Kenya	Mozambique	Togo
Botswana	Cote d'Ivoire	Lesotho	Namibia	Tunisia
Burkina Faso	Djibouti	Liberia	Niger	Uganda
Burundi	Egypt	Libya	Rwanda	Zambia
Cameroon	Gabon	Madagascar	Senegal	Zimbabwe
Cape Verde	Gambia	Malawi	Sierra Leone	
Central African Republic	Ghana	Mali	South Africa	

source: authors

Table 1.9: PCA for vulnerability computation: variables and contributions

Variables	F1	F2	F3	F4
Income gap(Compare to the richest income)	-0.32	0.68	0.61	0.26
food import/households consumption expenditure	0.65	0.17	-0.15	0.73
export food import food	0.54	-0.31	0.74	-0.26
food Imports /total import	0.43	0.64	-0.25	-0.58

source: authors' calculations using WDI data

Table 1.10: Eighen values and cumulative frequencies in PCA

Component	Eigenvalue	Proportion	Cumulative frequencies	relative
F1	1.82	0.46	0.46	
F2	1.23	0.31	0.76	
F3	0.60	0.15	0.91	

source: authors calculations' using WDI data

Figure 1.3: Government expenditure by income groups

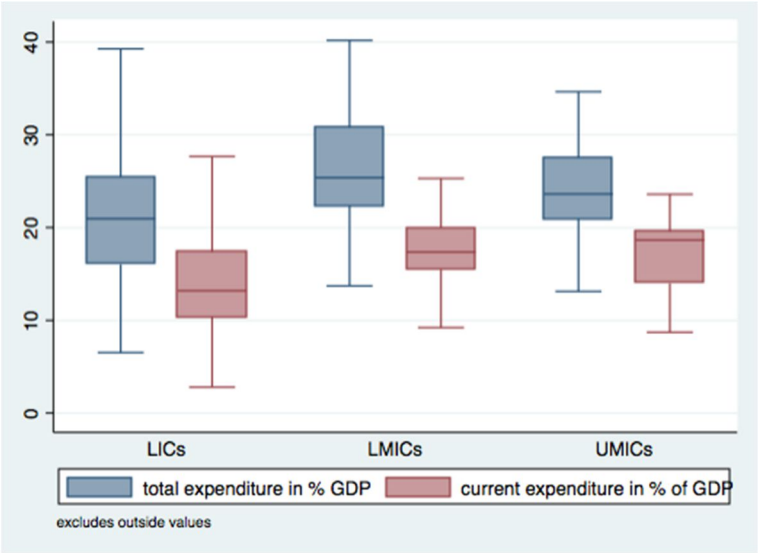
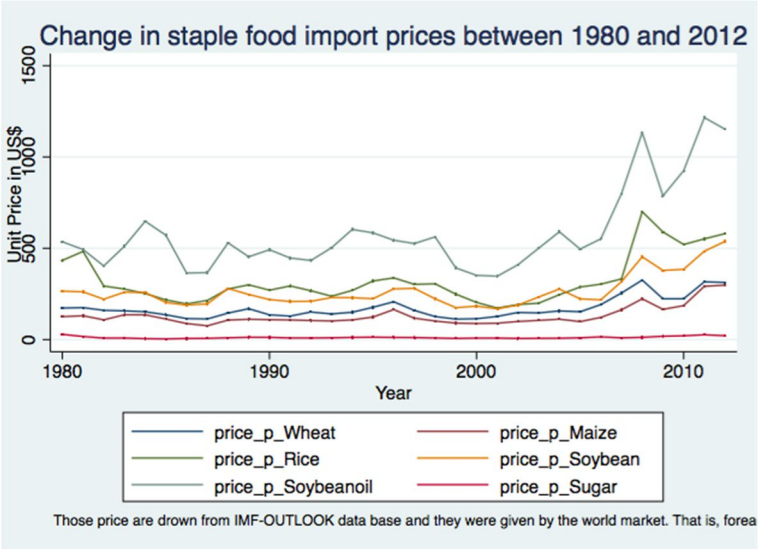
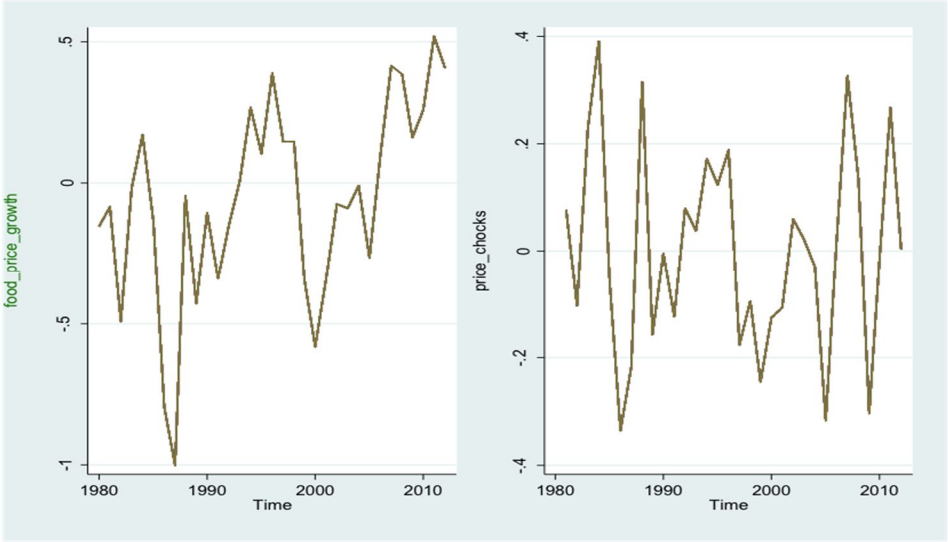


Figure 1.4 World price patterns of selected food staple between 1980 and 2012



Notes: Variation on the price of the six main imported food across the world. Data are drawn from the IMF outlook database

Figure 1.5: Import food price variability (left) and food price shocks in Africa between 1980 and 2011



This graph represents the variation of our food price shocks variable (at the right side) and the variation of the food price growth on the left side (that is the value at time n minus the value at time n 1, divided by the value at time n.). From this plot, we can establish that the two variables almost have the same evolution, but our food shocks variable fluctuates more. That is why we choose to use this variable that may be give the well approximation of food price shocks. Both the two variables are taken at the median values. source: Author's calculations using FAO and WEO data.

Chapter 2: Food import price shocks and household consumption and in developing countries: What role for fiscal policy?[20]

Abstract

We study whether fiscal policy plays a stabilizing role in context of imported food price shock. More precisely, does the fiscal policy dampen the adverse effect of food import price shocks on household consumption? Based on a large panel data of low and middle-income countries, we find that price shocks negatively and significantly affect household consumption. Moreover, it appears that discretionary government consumption can smooth the adverse effect of shocks on household consumption. This effect likely passes through government subsidies and transfers. However, this result is mostly robust in African countries and for countries with less exchange rate flexibility.

Keywords: food import price shocks, household consumption, fiscal policy.
JEL codes: H5; Q02; Q54; R2

[20] Joint work with Jean-Louis COMBES (CERDI, Clermont-Auvergne University)

2.1 Introduction

The early 1980's have been characterized by tremendous concerns of vulnerability in developing countries. This was justified by a considerable increase of external risks due to the climate change, the resurgence of the international financial crisis, the food import prices volatility, etc. Moreover, markets integration facilitates the international diffusion of risks. This context leads to think of all factors that could worsen household vulnerability which is defined as the probability to fall into poverty or to stay poor following an hazardous perturbation, (Chambers, 1989), (Essers, 2013). The rising of import food price in the past decade has been more worrying in countries that rely on agricultural import and where household spend a significant part of their budget on food expenditure. Undoubtedly, food insecurity which has been worsening following these shocks have negative impacts on development' patterns, especially in low-income countries.[21] In these countries indeed, the aggregate demand response to food price shocks is generally larger than those of the other countries (Seale, Regmi, Bernstein, & al., 2003).

A handful of papers deal with the link between food price shocks and household consumption. (Minot & al., 2009) point out that food price instability is problematic for households if it negatively affects their consumption. This point comforts the results found by (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014), and is also uniform to the results found by (Arezki & Bruckner, 2011), who, using a large panel data of 120 countries within the period 1970 – 2007, show that food price shocks negatively affect private consumption and increase income and consumption inequality. This must be a serious issue on food security, and particularly for low-income households who spend a large proportion of their budgets on food needs, (Mitchell, A note on rising food prices , 2008). In the same vein, based a rich survey data from Ethiopia between 2004 and 2008, (Alem & Soderbom, 2012) establishe that large food price shocks lead to a decrease in household consumption. This effect was particularly acute for households that are involved in casual jobs, as well as those with poor or no assets. Further, a meta-analysis conducted by (Green, et al., 2013) show that an increase in food price leads to a decrease in households' consumption. More precisely, these authors find that a one percentage increase in cereals price lower food consumption for about 0.61%. Vehemently, according to the prediction made from their model, poorest households are mostly affected. Their analysis is based on 136 paper involving 162 countries. Such situation led to question

[21]For instance, the harmful effects of food insecurity on human capital may contribute to poor growth prospects (Moser, 1998)

how to smooth households' consumption in time of adverse external shocks. As resilience factors, the literature has focused on external capital flows, namely remittances and public aid (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014). Moreover, according to (Deaton, 1989) consumption smoothing implies government stabilizing mechanisms especially during food crises.[22]. These mechanisms are of an upmost necessity, as food crises have sometimes turned into political turmoil (Watson, 2013).

However, the accelerated role of government spending on households' consumption has received little consideration in the literature. The papers that focus on stabilizing policies in developing countries have mostly been based on income stabilization. They mainly focus on the degree of pro-cyclicality of the fiscal policy (Ilzetzki & Vegh, 2008), (Carmignani, 2010), (Frankel, Vegh, & Vuletin, 2013), (Fatas & Mihov, 2003).

Our purpose in this paper is to assess whether government spending stabilizes household consumption when food import prices surge. For this purpose, we compute a discretionary government consumption variable, which might be mostly involved to stabilize unpredicted shocks in the short run perspectives. We follow the method of (Fatás & Mihov, 2003) to extract this exogenous (or discretionary) component of government consumption expenditure. Using a sample of 80 low and middle-income countries over the period 1980 – 2012, we find that food import price shocks negatively and significantly affect household consumption. Moreover, our results support that discretionary government (consumption) expenditure smooths household consumption. But, this result is robust only in African countries and for countries with less flexible exchange rates, as the negative effect of food price shocks on household consumption is significant for these countries while it is not in others.

The rest of this paper is structured as follows: the second section presents data and the main stylized facts while the third section describes the econometric framework and comments the results. The last section concludes.

[22]the lag between the moment where the crisis happens and when the household benefit from government response leads to poor outcome as the target groups that should be the most vulnerable do not necessarily benefit. Further, the amount of the said subsidies is small and might not necessarily leads to an important effect, (Jha & Ramaswami, 2010).

2.2 Data and some stylized facts

2.2.1 Data and sample

In this section, we successively present the outcome variable, the import food price shocks and the government consumption measure.

The outcome variable is the household consumption expenditure per capita (whose data are available over a large sample of 70 low and middle-income countries within 1980 and 2012). Although food consumption expenditure would have been more suitable for this analysis, we do not have data on it, nor do we have reliable information to disaggregate the total household consumption expenditure. Moreover, the household consumption variable used here is less prone to measurability issues than the traditional food security measures[23].

Price shocks are computed using the econometric approach developed by (Deaton, Miller, & al., 1995) and used by (Collier & Dehn, 2001) and (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014). For each country, we draw the food price index using the values of the most common imported food commodities, see (FAO, et al., 2011). Most of these commodities are cereals as they affordability play a crucial role on food security[24] within the period. In other words, this indicator is the commodity price average, weighted by the average quantities[25]of each commodity during our period of study. Such commodities[26]include wheat, sugar, soybeans, soybeans oil, maize and rice. Based on this food price index, three price shocks indicators are computed (see section Data in chapter 1 for more details):

i) For each country, the logarithm of the import food price index is regressed on its first two lags and the trend. The residual of this regression is taken as the shock variable, (P_Shock).

ii) The second indicator takes into account the sign of the food price import shocks to identify potential nonlinear impact of food price shocks on household consumption. In other words, we split (P_shock) between P_Shock (+) and P_Shock(-) which are respectively the positive and negative shocks.

iii) The third indicator, HP_pshock, results from the running of the Hodrick-Prescott filter[27] on the price index variable (the logarithm of the computed food price index with the base year 1993). We thus separate the trend component to the cyclical component, which is considered as the exogenous price shocks.

[23]It would have been more pertinent to use food consumption expenditure but this variable is barely available in the sample.

[24] Indeed, (Horton, Kerr, & Diakosavvas, 1988) find that higher cereal real prices are significantly associated with higher infant mortality in developing countries.

[25] In fact, since contemporaneous demand quantities might be driven by contemporaneous prices. To overcome the endogeneity issue that could arise from that, we rather weight the contemporaneous prices by the period averages quantities.

[26]

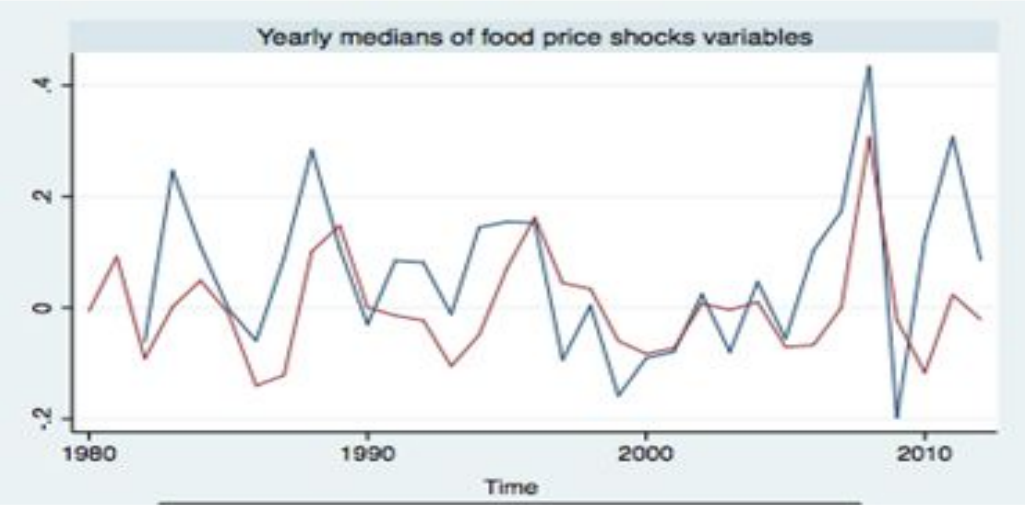
[27]Following (Ravn&Uhlig, 2002) we consider $\lambda = 6.25$ as the smoothing parameter

Following (Fatas & Mihov, 2013) and (Agnello & Sousa, 2009), the discretionary component of government consumption is computed as follows: the change in the government expenditure is regressed on its first lag, the inflation and inflation square, the cyclical component of the GDP per capita (used here as a proxy of the output gap)[28]. The regression is performed for each country; the residual term is considered as the exogenous component of government consumption.

2.2.2 Some stylized facts

Figure 2.1 shows the patterns of the mean of our two price shocks (P_Shock and HP-Shock). It appears that the two variables are significantly correlated.

Figure 2.1: Patterns of import food price shocks variables



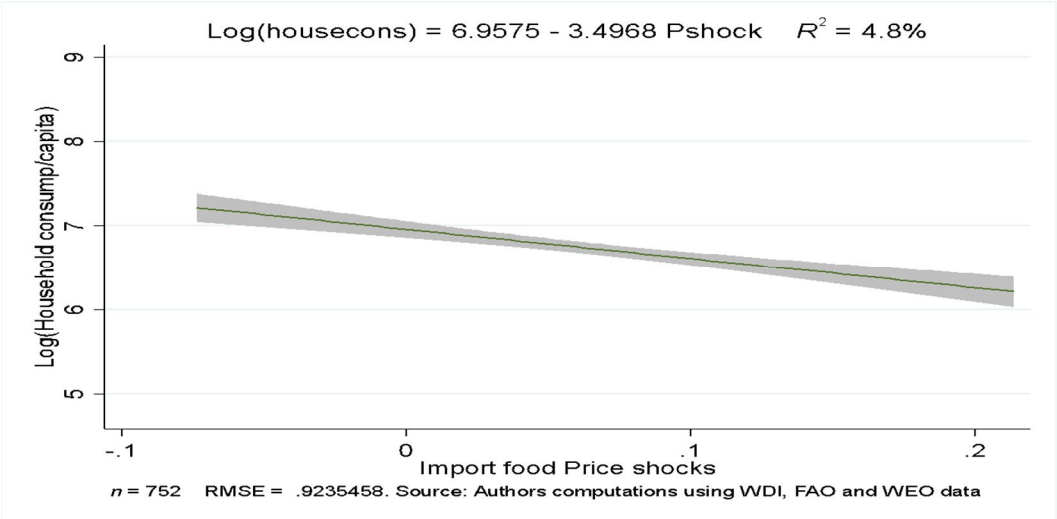
The blue line is P_shock and the red line is HP_Pshock. Source: Authors computation using FAO and IMF data

This figures shows that price shocks have been always present during the period, but an upward trend is seen from 2002 to 2011, with the highest values in 2006-2007 and then in 2011. We observed a decrease in 2009 and then at the end of 2011 and earlier 2012.

Further, as shown in figure 2.2, household expenditure per capita is negatively correlated with the food price shocks. The result can be a weakening of food safety

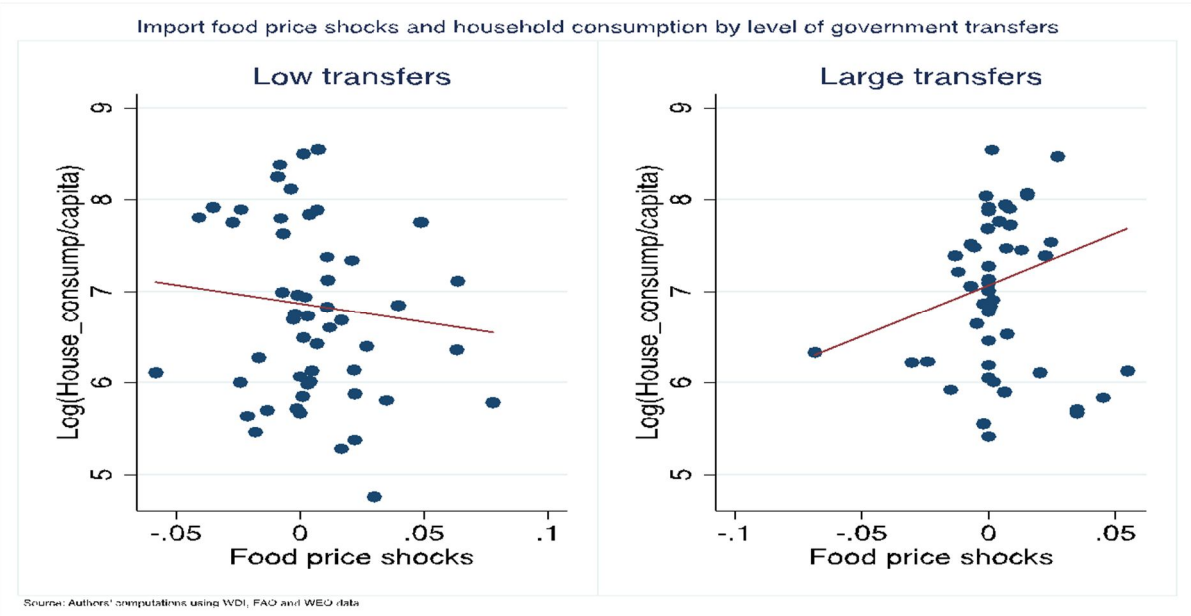
Figure 2.2: Food price shocks and household consumption per capita

[28] The cyclical component is obtained using the Hodrick-Prescott filter on the GDP per capita with a filter parameter λ of 6.25. (Mountford&Uhlig, 2009)



However, when we split this relationship between household consumption and food price shocks by level of government transfers, its appears that there is an heterogeneity. As displayed on the following figure, for low level of government transfers and subsidies, high import food prices are associated with low household consumption (see on the graph at the left), while the reverse is seen in case of high government transfers and subsidies.

Figure 2.3: Food price shocks and household consumption by transfers level



Source: Authors, using WDI, FAO and WEO data

This figure uses data from developing countries (table 2.6 in the Appendix) within the period 1980-2012. The price shocks variable used here is HP_shock. Low level of government transfers refers to the transfers below the median of our entire sample, while large refers to the level of transfers that are greater than the median. This median is set at 28.5% of government expense. Source: Authors' computations using WDI, FAO and WEO data.

Table 2.5 (see Appendix) shows the descriptive statistics of variables used in this paper. The statistics are drawn over household consumption quartiles. As seen in this table, the lowest households consumption are associated with more important food price shocks (both in magnitude and in occurrence), less capital opened, less remittances, and their private sector receives less financial credit, comparing to the highest households consumption. Interestingly, we can also learn that discretionary government expenditure is less important for higher household consumers. Regardless of that, the latter receives relatively more government transfers and subsidies than households at the lowest quartiles of consumption.

However, these patterns are purely descriptive and cannot tell us anything about causality. That is why in the following section, we will use an econometric approach that allows not only to control for other variables in the model, but also to check the causal relationship.

2.3 Econometric settings

2.3.1 The model

The purpose of this paper is to highlight the dampening effect of the fiscal policy on household consumption in time of food price shocks. As mentioned above, we consider the discretionary component of government consumption. In the robustness checks, we use the government transfers in percentage of GDP as the fiscal policy variable. Our model, which takes into account the inertia in the household consumption dynamic, is shown below:

$$HCONS_{i,t} = \alpha_1 HCONS_{i,t-1} + \alpha_2 P\_shock_{i,t} + \alpha_3 Govexp_{i,t} + \alpha_4 P\_shock_{i,t} * Govexp_{i,t} + \alpha_5 \boldsymbol{Z}_{i,t} + v_i + w_t + \varepsilon_{i,t} \quad (2.1)$$

Where: *HCONS* is the household consumption per capita for the country i at period t, $HCONS_{i,t-1}$is the first lag of consumption expenditures, *P_shock* is the food price shocks, *Govexp* is the fiscal policy variable (which in this study is the discretionary component of consumption government expenditure, or the government transfers and other subsidies), *Z* is the vector of controls variable involved in the model (see definition of variable in table 7 in Appendix); $\varepsilon_{i,t}$is the error term , v_i is the country fixed-effect and w is the year fixed-effects. Our main expectations are that α_2 is negative whether $\alpha_4$is positive.

We can compute the level of government expenditure threshold for which the negative effect of positive food price shock on household consumption becomes null:

$$\frac{\partial(\text{HCONS})_{i,t}}{\partial(P\_\text{Shock})_{i,t}} = \alpha_2 + \alpha_4 * Govexp_{i,t} = 0 \rightarrow Govexp^* = -\alpha_2/\alpha_4 \quad (2.2)$$

The control variables are the following: the first one is the *country's total fiscal revenue* that depends on taxation and can negatively affect household consumption. Contra-cyclical *Net remittances per capita* and *net ODA per capita* could smooth households' consumption, (Clark, 1992), (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014) and (Zhu, Wu, Peng, & Sheng, 2014). *Access to credit market* measured as the ratio of private credit over GDP allows controlling for the fact that credit market can be a mitigating tool for the households, (Bacchetta & Gerlach, 1997). The logarithm of the *GDP per capita* (in constant term 2011) is used to control for the income effect. *Trade openness:* measured as the ratio of imports and exports over GDP captures the fact that trade openness could both improve the economic situation but also enhance economic instability with potential consequences on households' consumption, (Nasreen & Anwar, 2014). The effect of fiscal policy might

depends on the degree of flexibility of the exchange rate regime, hence we control for the *Exchange rate regime.* This variable is borrowed from the exchange rate regime classification by (Reinhart & Rogoff, 2004) and is ranked between 1 and 15, that is, from the more fixed exchange regime to the most flexible.

We use a suitable econometric specification that controls for the endogeneity bias. Hence, the OLS estimator is biased, because of the relationship that exists between the error term and the first lag dependent variable when country fixed effects are introduced. This bias, said of (Nickell, 1981) is particularly relevant in small samples as ours. Since we do not have good instrument to address that bias, we will run our model using the GMM approach developed by (Blundell & Bond, 1998) that allow us to instrumenting the endogenous variables with internal instruments. Several GMM estimators have been proposed and of all, the system-GMM is the most consistent. It proceeds by instrumenting variables in first difference with those in level and inversely; those in level are instrumented by the first difference variables. Its estimators are then robust and stable, as the process imposes average stability condition on the dependent variable. Food price shocks and the discretionary components of government consumption are assumed exogenous.

The model is validated by the rejection of the over identification hypothesis, the presence of the first order serial independence and the absence of that second order, (Arellano & Bond, 1991), (Arellano, 2003)[29]. We subdivide our 33 years periods into sub periods of 4 and 5 years in order to obtain more consistent and asymptotically efficient estimators. In fact, working with sub-periods windows allows us to neutralize high frequencies events that could be sources of noises and hinder the convergence of our estimates. Further, as point out by (Roodman, 2009), the issue of too many instruments generated by the GMM system approach have been tackled by limiting the fix number of lags.

2.3.2 Estimation results

Our results are validated by the relevant statistics concerning the system-GMM estimator. The serial correlation of first order (AR1) is not rejected, whereas that of the second order (AR2) is. Further, the Hansen-statistics of over-identification rejects the over identification hypothesis. Our results are thus valid and can be interpreted.

2.3.2.1 Baseline results: Household consumption, food price shocks and Fiscal policy

Table 2.1 shows that import food price shocks significantly affect household expenditure negatively (column 1. This result remains unchanged when personal received remittance and official development assistance (column 2), and fiscal revenue and trade

[29]Moreover, the *windmeijer* correction is also applied in its second step version in order to correct standard errors (2005).

openness are added (column 3). Although the effects of these controls seem not to vehemently affecting household consumption, almost all regressions consistently show that the financial credit to the private sector strongly and positively increases household consumption). Moreover, these results are still consistent when we split the food shocks in import food price variable onto positive and negatives shocks variables (column 4). More specifically, positive shocks lead to a significant decrease in household consumption. This result reconciles with those of ((Arezki & Bruckner, 2011), (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014)) who also find that positive shocks lesser household consumption. Additionally, column 4 shows that negative import food price shocks rather lead to an increase (of household consumption). Government expenditure is not significant. But the interactive term between it and the food price shock variable is positive and significant: discretionary government expenditure involved in time of positive import food price shocks smooths household consumption by dampening the negative effect of such shocks. This result suggests that discretionary fiscal policy can be used as a countercyclical tool.

Table 2.1: Household consumption, food price shocks and Fiscal policy

	(1)	(2)	(3)	(4)
Dependent Variable	Log (HCONS/capita)			
L.Log(HCONS/capita)	0.90***	0.83***	0.84***	0.93***
	(10.57)	(7.98)	(11.25)	(15.18)
P_Shock	-1.85**	-2.69***	-2.01***	
	(-2.27)	(-2.63)	(-2.62)	
Govexp	-0.16	-2.75	-2.44	-1.86
	(-0.19)	(-1.30)	(-1.50)	(-1.58)
P_Shock* Govexp	29.06**	37.86**	22.04*	
	(2.07)	(2.14)	(1.92)	
Log(GDP)	0.01	$-5.21\text{x}10^{-4}$	$3.32\text{x}10^{-3}$	$4.90\text{x}10^{-3}$
	(0.46)	(-0.02)	(0.14)	(0.29)
Priv_cred	$2.05\text{x}10^{-3*}$	$3.36\text{x}10^{-3**}$	$2.33\text{x}10^{-3}$	$1.68\text{x}10^{-3*}$
	(1.91)	(2.23)	(1.36)	(1.73)
Remit		$2.98\text{x}10^{-3}$	$2.76\text{x}10^{-3}$	$-1.81\text{x}10^{-3}$
		(0.38)	(0.65)	(-0.55)
ODA		$2.55\text{x}10^{-3}$	$03.6\text{x}10^{-4}$	-0.01
		(0.43)	(0.00)	(-0.85)
Revenue			$1.73\text{x}10^{-4}$	$4.34\text{x}10^{-3}$
			(0.04)	(0.92)
Openness			$-4.02\text{x}10^{-3}$	$3.72\text{x}10^{-3}$
			(-1.17)	(1.56)
P_Shock (+)				-0.01**
				(-2.16)
P_Shock (-)				0.02*
				(1.87)
P_Shock (+)*Govexp				0.25*
				(1.67)
_cons	0.81	1.33*	1.20*	0.53
	(1.28)	(1.65)	(1.89)	(1.00)
i. FE	Yes	Yes	Yes	Yes
Yrs. FE	Yes	Yes	Yes	Yes
Nber_obs	400	368	294	339
Nber_group	70	68	66	78
Nber_ints	30	30	34	45
Ar1(p-value)	0.08	0.05	0.05	0.02
Ar2(p-value)	0.37	0.11	0.13	0.11
Hansen(p-value)	0.36	0.37	0.27	0.37

The results are given by the two-step system-GMM with (Windmeijer, A finite sample correction for the variance of linear

efficient two-step gmm estimators. , 2005)correction of standard errors. Data are averaged over eight non overlapping 4-years periods during 1980–2011. *t* statistics in parentheses. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$. Price shocks and the government discretion variables are considered exogenous. The lag of the dependent variable is considered as predetermined and all other control variables are considered contemporaneously endogenous

In order to evidence whether this result is the same through all the geographical areas covered in this study, we split our sample into two sub-samples, namely: African and non-African countries. Within Africa, we also run one regression with only sub-Saharan countries (SSA), as they have being saying to be the most vulnerable and the most involved in fiscal policy volatility (Fatas & Mihov, 2013). The results are given in table 2.2.

Import food price shocks remarkably lead to a decrease in household consumption in SSA countries as well as in all African countries (columns 1,2 and 3). This negative effect dampened by government discretionary expenditure involved in time of food price shocks. Conversely, food price shocks do not seem to significantly affect other developing non-African countries. This result holds still when we change the food price shocks variable (column 4 and 5). This could be implying that African countries are in average the most vulnerable to import food price shocks, and thus, are more likely to resort into countercyclical fiscal instruments.

Table 2.2: Food price shocks, household consumption, food price shocks and fiscal policy in Africa versus non-Africa

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	Log (HCONS/capita)				
Sample	SSA	Africa	Other	SSA	Other
L. Log (HCONS/capita)	0.89***	0.91***	0.99***	0.82***	0.85***
	(8.28)	(7.88)	(24.04)	(5.86)	(5.17)
P_Shock	-1.91**	-2.03***	0.07		
	(-2.04)	(-3.10)	(0.18)		
Gov_spend	1.37	-1.50	-0.16	4.38	0.11
	(0.50)	(-1.54)	(-0.52)	(0.60)	(0.05)
P_Shock* Gov_spend	24.42**	24.27**	-2.54		
	(2.53)	(2.45)	(-0.61)		
Priv_cred	-6.02×10^{-4}	1.86×10^{-3}	$7.89\times10^{-3**}$	-1.02×10^{-3}	3.42×10^{-4}
	(-0.13)	(0.45)	(2.21)	(-0.13)	(0.26)
Remit	2.44×10^{-3}	1.37×10^{-4}	-1.55×10^{-3}	5.11×10^{-3}	-4.47×10^{-4}
	(0.80)	(0.06)	(-0.57)	(1.13)	(-0.07)
ODA	-2.04×10^{-3}	-3.15×10^{-3}	-2.17×10^{-3}	2.69×10^{-3}	-0.02
	(-0.50)	(-0.93)	(-0.09)	(0.32)	(-1.06)
Revenue	-0.01	-0.01	-3.36×10^{-3}	-4.56×10^{-3}	0.01
	(-0.75)	(-1.05)	(-0.51)	(-0.36)	(1.06)
Openness	-1.80×10^{-3}	$-1.47\times10^{-3*}$	$3.56\times10^{-3*}$	2.60×10^{-4}	0.01*
	(-1.35)	(-1.84)	(1.80)	(0.11)	(1.82)
HP_Pshock				-6.04**	-2.04
				(-2.13)	(-0.44)
HP_Pshock* Gov_spend				90.39*	26.05
				(1.65)	(0.25)
_cons	0.69	0.71	0.14	0.67	0.81
	(0.84)	(1.13)	(0.45)	(0.87)	(0.82)
i. FE	yes	yes	yes	yes	yes
Yrs. FE	yes	yes	yes	yes	yes
Turning point of fiscal policy	0.078	0.083		0.066	
Countries above the threshold of	6	6		11	

fiscal policy					
% ofobs above the threshold of fiscal policy	15	10		23	
Nber_obs	112	139	155	118	192
Nber_group	26	33	33	27	43
Ar1(p-value)	0.04	0.03	$1.79x10^{-3}$	0.06	0.03
Ar2(p-value)	0.30	0.14	0.11	0.84	0.73
Hansen(p-value)	0.81	0.52	0.41	0.48	0.67

The results are given by the two-step system-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators. , 2005)correction of standard errors. Data are averaged over eight non-overlapping 4-years periods during 1980–2011.*t* statistics in parentheses. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.Price shocks and the government discretion variables are considered exogenous. The lag of the dependent variable is considered as predetermined and all other control variables are considered contemporaneously endogenous.

2.3.2.2 Household consumption, food price shocks and government transfers

Fiscal policy might most directly intervene through subsidies and other transfers to the workers or household. That is why in the following, we use the government transfers as fiscal policy variable.

Table 2.3 presents the effect of food price shocks on household consumption once fiscal government transfers are involved. In column 1, import food price shocks negatively and significantly affects household consumption. Moreover, as found on previous results, the interaction term between government transfers and food price shocks is significant and positive: government transfers dampen the negative effect of food price shocks on household consumption.

Precisely, when we split the food shocks variable onto positive and negative shocks, column 2 shows that positive import price shocks rigorously decrease household consumption. Government transfers undoubtedly play a role in dampening that adverse effect. This result remains unchanged when use another measure of food price shocks (column 3).

Hence, since both government transfers and discretionary government consumption expenditure seem to smooth the adverse effect of positive food price shocks on household consumption, we can conclude that discretionary measures likely pass through government transfers.

Table 2.3: Food price shocks, household consumption and government transfers

	(1)	(2)	(3)
Dependent Variable		Log (HCONS/capita)	
L. Log (HCONS/capita)	0.79***	0.56***	0.57***
	(5.89)	(2.98)	(4.94)
P_Shock	-1.51*		
	(-1.90)		
GovTrans	3.77x10^{-3}	2.60x10^{-3}	0.01
	(0.99)	(0.91)	(1.53)
P_Shock* GovTrans	0.017**		
	(2.05)		
Priv_cred	2.31x10^{-3}	2.00x10^{-3}	7.85x10^{-5}
	(0.65)	(0.75)	(0.03)
Log(GDP)	-0.01	0.08	0.10
	(-0.08)	(0.73)	(0.88)
Remit	-8.57x10^{-2}	-2.46x10^{-3}	1.12x10^{-4}
	(-0.00)	(-0.90)	(0.04)
ODA	-0.01	-0.01	-3.87x10^{-3}
	(-0.56)	(-1.52)	(-0.62)
Revenue	0.01	-4.59x10^{-3}	-0.01
	(0.31)	(-0.67)	(-0.78)
Openness	-9.70x10^{-4}	1.56x10^{-3}	4.57x10^{-4}
	(-0.50)	(0.94)	(0.32)
P_Shock(+)		-0.01*	
		(-1.73)	
P_Shock(-)		4.26x10^{-4}	
		(0.06)	
P_Shock(+)* GovTrans		2.17x10^{-4}**	
		(2.17)	
HP_Pshock			-2.08**
			(-1.98)
HP_Pshock*Gov Trans			0.04**
			(2.08)
_cons	1.45	2.15	1.80
	(0.63)	(1.24)	(1.56)
i. FE	yes	yes	yes
Yrs. FE	yes	yes	yes

Nber_obs	172	202	202
Nber_group	49	60	60
Ar1(p-value)	0.09	0.09	0.10
Ar2(p-value)	0.18	0.11	0.12
Hansen(p-value)	0.26	0.76	0.65

The results are given by the two-step system-GMM with (Windmeijer, 2005) correction of standard errors. Data are averaged over eight non-overlapping 4-years periods during 1980–2011. t statistics in parentheses. * p< 0.10, ** p < 0.05, *** p < 0.01.

Price shocks and the government discretion variables are considered exogenous. The lag of the dependent variable is considered as predetermined and all other control variables are considered contemporaneously endogenous

According to (Ilzetzki, Mendoza, & Végh, 2013)[30], the effect of fiscal policy generally depends on its exchange rate regime. We test this hypothesis in the following. Our exchange regime data are informed from 1984 to 2010. The results are displayed on table 2.4.

When we subdivide the sample according to the flexibility of the exchange rate regime (fixed exchange rate regime in columns 1 and 2 and flexible exchange rate regime in columns 3 and 4), import food price shocks seems to impact household consumption only on countries with less flexible exchange rate regime (with fixed-exchange rate regime), that comforts the traditional wisdom according to which countries with fixed exchange regime have less room when facing external shocks. Moreover, we find that the dampened effects of discretionary government consumption expenditure and government transfers on household consumption in time of import price shocks is only significant in countries with less flexible exchange rate regime. This result is interesting as its comforts the literature according to which government consumption multiplier is larger in countries with fixed exchange regime, while there is no effect or less effect of fiscal policy under the flexible exchange rate regime.

[30]Using quarterly data from 40 countries, they found that government exchange expansion leads to an increase on economic activities under fixed exchange rate regimes, and no effect under flexible exchange rate regime.

Table 2.4: Food price shocks, household consumption and fiscal policy by exchange rate regime

	(1)	(2)	(3)	(4)
Dependent variable	Log (HCONS/capita)			
Sample	Fixed_ER regime		Flexible_ER regime	
L. Log (HCONS/capita)	0.85***		0.60**	0.95***
		0.93***		
	(7.51)	(15.57)	(2.04)	(13.51)
P_shock	-1.16**	-1.18**	-1.76	0.54
	(-2.06)	(-2.12)	(-1.38)	(1.06)
Gov_spend	-0.14		0.17	
	(-0.25)		(0.21)	
P_Shock* Gov_spend	9.76**		4.56	
	(2.05)		(0.59)	
Priv_cred	$3.40x10^{-3}$**	$1.28x10^{-3}$	0.01**	$4.70x10^{-4}$
	(1.98)	(0.61)	(2.26)	(0.72)
Log(GDP)	0.02	0.01	0.09**	0.01
	(0.76)	(0.47)	(2.56)	(0.70)
Remit	$8.30x10^{-4}$	$-4.98x10^{-3}$	0.03	$5.67x10^{-3}$
	(0.44)	(-1.33)	(1.25)	(0.66)
ODA	-0.01	$1.16x10^{-3}$	$-3.99x10^{-3}$	$-3.21x10^{-3}$
	(-1.26)	(0.13)	(-0.33)	(-0.37)
Revenue	$-3.31x10^{-3}$	0.01**	0.01	$-1.49x10^{-3}$
	(-0.54)	(2.06)	(0.44)	(-0.30)
Openness	$-1.11x10^{-4}$	$1.82x10^{-3}$	$-1.75x10^{-4}$	$4.67x10^{-3}$***
	(-0.08)	(1.19)	(-0.09)	(2.71)
GovTrans		$2.52x10^{-3}$		$1.49x10^{-3}$
		(0.69)		(0.74)
P_Shock* GovTrans		0.03*		0.01
		(1.68)		(0.99)
_cons	0.86	0.27	1.33	0.16
	(1.34)	(0.84)	(0.58)	(0.27)
i. FE	yes	yes	yes	yes
Yrs. FE	yes	yes	yes	yes
Nber_obs	153	89	133	82
Nber_group	48	31	42	30
Ar1(p-value)	0.07	0.03	0.09	0.05

Ar2(p-value)	0.38	0.80	0.12	0.90
Hansen(p-value)	0.67	0.77	0.61	0.67

The results are given by the two-step system-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators. , 2005)correction of standard errors. Data are averaged over eight non-overlapping 4-years periods during 1980–2011. t statistics in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Price shocks and the government discretion variables are considered exogenous. The lag of the dependent variable is considered as predetermined and all other control variables are considered contemporaneously endogenous.

2.4 Conclusion and discussions

Using a panel of 80 developing countries within the period 1980-2012, we assess the impact of discretionary fiscal policy decision, which is more likely to be implemented by the government in response to import food price shocks at the aim of stabilizing household consumption. In the height of import food price shocks which negatively and significantly impact household consumption, discretionary government consumption plays a resilient role. In parallel, we find that government transfers and subsidies play a dampened role on household consumption during positive import food price shocks. These results are robust only on African countries and in countries with less flexible exchange rate regimes, where import food price shocks lead to a remarkable decrease of household consumption. Our results are strongly robust regardless the variables that are controlled in the model. Thus, our conclusion points out the fact that policy makers should not neglect this government expenditure component, as it is helpful in reinforcing household consumption on the rainy days.

Regarding the dampened effect of fiscal policy, our results are to be particularly emphasized, due to the fact that countries have been consolidating their public finances since the last decade. Thus, the said consolidation should be mostly taken in terms of composition, as one component like government transfers is hugely important for short run matters. However, this policy should be extremely careful, as beneficiaries are in general not necessarily the most vulnerable or the poorest, (del Granado, Coady, & Gillingham, 2012). Hence, the right target should be of key importance, asking for proficient target strategies to be taken before implementing the policy, are essential measures for success (Besley & Kanbur, 1988). Further, our results clearly establish the need of the financial development in these countries, as private credit positively affects household consumption in many cases. Indeed, any other measure aiming at reducing household consumption vulnerability to import food price shocks would be welcome, as they could act as substitutions of fiscal policy which might be increasing the already large fiscal deficit.

2.5 Appendix

2.5.1 computing food price shocks variables (see section Data in chapter 1)

From the latter equation, we extract the residual term that is our first price shock variable. The second shock variable is obtained by counting the number of positive food price shocks over each period, as positive food price shocks particularly matter to vulnerable households situations.

2.5.2 computing discretionary variables

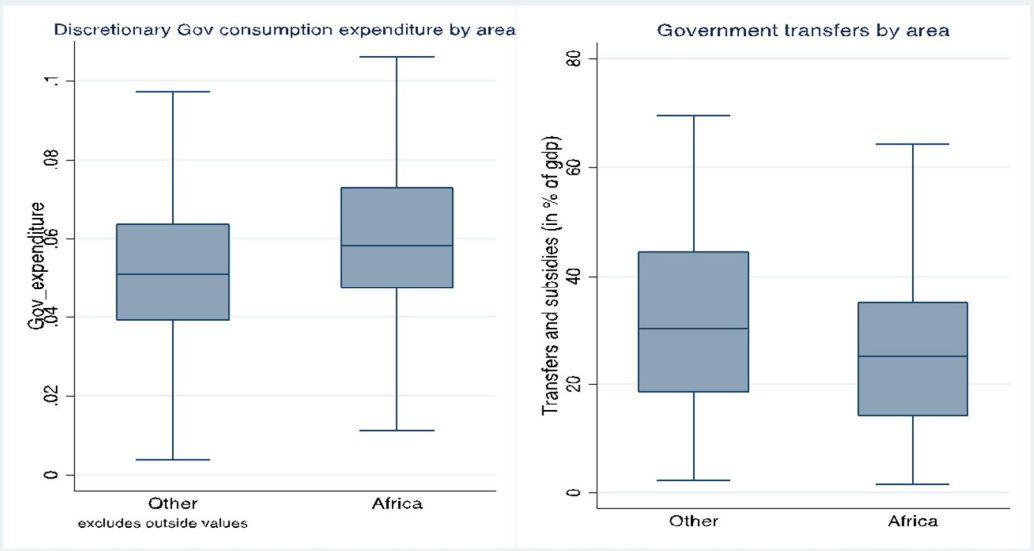
Since we suppose that fiscal policy is implemented in each country dependent on its own matter, we run the following regression for each country separately:

$$\Delta GOV_t = \beta_0 + \beta_1 * time + \beta_2 * \Delta GOV_{t-1} + \beta_3 * Z_t + \beta_4 * OUTGAP_t + \varepsilon_t \qquad (2.3)$$

Where: time represents the trend; ΔGOV is the differential term of the government expenditure in share of GDP in time t minus its value in time $(t-1)$; Z is a vector of variables that are susceptible to affect government expenditure. In this work, we follow (Fatas & Mihov, 2003)and introduce *INFLATION* and *INFLATION SQUARE* in order to purge any effect that inflation episodes could have on fiscal government policies and production. Since the residual term extracted from this regression has outliers, we use the formula below to standardize the series.

$$Gov\_exp_{i,t} = \frac{DISCR_{i,t} - \overline{DISCR_i}}{\sigma(DISCR_{i,t})} \qquad (2.4)$$

Figure 2.4: Fiscal policy by geographic area



This figure is based on developping countries from 1980 to 2012. Source: Authors using WDI (2015) data

Table 2.5: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
First quartile of Household consumption					
Pshock	0.08	0.10	-0.15	0.32	171
Pshock(+)	1.84	1.43	0	4	196
Revenue	17.99	6.82	1.19	44.16	159
Gov_spend	1080.7	17661.31	-50484.20	197709.359	134
Subtrans	23.71	15.8	1.47	65.04	61
GDP/ capita	642450.51	2211633.86	11.02	15617996	196
ODA	12.36	11.62	0.15	90.16	190
Remit	3.28	5.34	0.01	43.94	161
Priv_cred	15.99	14.15	1.77	100.81	182
Second quartile of Household consumption					
Pshock	0.07	0.09	-0.13	0.32	164
Pshock(+)	1.64	1.34	0	4	196
Revenue	25.42	9.36	10.82	59.77	140
Gov_spend	-2288291913.76	20473373068.55	-219553103872	433.94	148
Subtrans	29.52	16.57	2.27	66.75	100
GDP/capita	1890376.66	5527964.88	177.00	28940510	189
ODA	5.60	6.23	0.01	43.87	184
Remit	7.26	13.71	0.01	95.09	176
Priv_cred	30.10	24.29	2.43	148.49	189
Third quartile of Household consumption					
Pshock	0.05	0.09	-0.18	0.27	180
Pshock(+)	1.62	1.28	0	4	196
Revenue	24.79	8.48	5.49	59.92	137
Gov_spend	-5.06	3.41	-3.32	110.07	147
Subtrans	33.99	15.17	6.26	69.50	105
GDP/capita	1020044.39	3096960.40	810.76	27431980	184
ODA	1.80	2.95	-0.07	26.01	182
Remit	4.08	5.80	$0.40x10^{-2}$	29.23	171
Priv_cred	42.20	30.34	3.68	151.92	182

Table 2.6: Countries by Geographical region

Africa		Americas	Asia	Europe	MENA
Algeria	Mauritania	Belize	Bangladesh	Albania	Egypt
Benin*	Mauritius	Brazil	Bhutan	Bulgaria	Iran
Botswana*	Morocco	Colombia	Cambodia		Jordan
Burkina Faso*	Mozambique*	Costa Rica	China		Lebanon
Burundi*	Namibia*	Cuba	India		Turkey
Cameroon*	Nigeria*	Dominican Republic	Indonesia		
CentralAfrican Republic*	Rwanda*	Ecuador	Laos		
Chad*	Senegal*	El Salvador	Malaysia		
Comoros*	Sierra Leone*	Guatemala	Nepal		
Congo	South Africa*	Honduras	Pakistan		
Gabon	Swaziland*	Mexico	Philippines		
Kenya*	Tanzania*	Nicaragua	Thailand		
Lesotho*	The Gambia *	Panama	Vietnam		
Liberia*	Togo*	Paraguay			
Madagascar*	Tunisia	Peru			
Malawi*	Uganda*				
Mali*					

*Sub Saharan African countries

Table 2.7: Variables, definitions and sources

Variables Price index	Definitions seen section (3)	Sources WEO(2015)[25] FAOSTATISTIQUES (2016)
HCONS	Total household consumption expenditure in % of GDP	WDI (2015)
Govtrans	Government total subsidies and other transfers in % of GDP	WDI (2015)
GOV	current government expenditure in % of GDP	WDI[26] (2015)
GOV disc	Current government expenditure (see section...)	WDI (2015) and author's calculations
ER-regime	Categorical variable ranking from 1(lowest flexibility) to 10 (highest flexibility)	Ethan Ilzetzki, Carmen M. Reinhart and Kenneth S. Rogoff (2016).
loggdp	logarithm of GDP per capita in constant term 2011	WDI (2015)
Openness	trade openness, measure as the sum of goods and services import and export over the total GDP	WDI (2015)
Priv_cred	ratio of the credit addressed by the financial and bank sectors to the private sector in % of GDP	WDI (2015)
Remit	Net remittances received par individual from abroad in % of GDP	WDI (2015)
ODA	Net Official assistance received per capita	WDI (2015)
Inflation	rate of inflation deflator	WDI (2015)

Source :Authors' computations

Chapter 2: Food import price shocks and household consumption and in developing countries: What role for fiscal policy?

Chapter 3: Food import price shocks and political instability: do fiscal policy and remittances make any difference?

Abstract

This study presents the causal impact of food price shocks on political instability once fiscal policy and remittances are involved. We focus on import food price shocks with a particular emphasis on positive ones, as they are more suitable in underlining how much importers countries/households are charged. Using a large panel of low and countries within the period 1980-2012, we show that positive food price shocks strongly increase the likelihood of political instability. However, remittances and fiscal stimulus dampen the effects of such shocks on political instability. Our results call for countercyclical fiscal policies with appropriate targets, when encouraging remittances by lowering the transfers' costs.

Keywords: import food price shocks; political instability; remittances; fiscal policy.

JEL codes: H56; Q02; Q54

3.1 Introduction

Political stability is among the prime aims any government should preserve in order to enhance a sustained growth and wellbeing. As pointed out by (Sen Gupta, 2007), within unstable political regimes, governments are not able to construct and properly define property rights. The surge of food price last decade, allied with bad climatic conditions, led to social unrests and instability. The effects were more acute in countries where households have been hardly affected by shocks. In fact, the increase of hunger has compelled citizens to take to the streets, claiming and demonstrating. The literature that develops these features has established that food price vulnerability is key for political and social stability. More precisely, the surge in food price had been among the factors fuelling unrests during the Arab spring, ((Barnett, 2003), (Bruckner & Ciccone, 2010), (Arezki & Bruckner, 2011), (Ortiz & Cummins, 2012), (Bellemare, 2015), (Raleigh, Choi, & Kniveton, 2015)).

Hence, it is important to note how the effect of food price shocks could be damaging in order to reduce or prevent political or social instability. This paper ranges in the literature regarding some dampening mechanisms, namely countercyclical fiscal policies and remittances.

To start with, the government's involvement is for needs following struggles. This action may be particularly determinant in developing countries that are most exposed to adverse shocks without sufficient safety nets and insurance tools for mitigation and resiliency ends. The idea of government intervention is pointed by (Smith L. D., 1997), according to whom the legitimacy of the government depends on its capacity to provide food security ends to its citizens.

Governments might respond in that situation by providing peace and enhancing households live conditions. In general, short terms measures are taken for present situations, as hunger is an urgent need. Such measures include food aid, subsidies, prices administration, and any other mechanisms designed to help households increasing their purchasing power or food access. In the long run, most robust responses consist of significantly reinforcing the agricultural system when taking into account of weather conditions, ((Smit & Skinner, 2002), on Climate Change (2014)).

Second, as source of income, received remittance is acknowledged to play a mitigating role on economic instability. (Craigwell, Jackman, & Moore, 2010), (Combes & Ebeke, 2011), (Chami, Hakura, & Montiel, 2012), (Ebeke & Combes, 2013), (Combes J.-L. , Ebeke,

Etoundi, & Yogo, 2014)). Hence, our point is that remittances could also play an inefficient role on political or social instability, as households that received remittances in bad time would be less prone to join. To our knowledge, this point has not yet been studied in the literature. In trying to bridge that gap in the essay, after the effect of import food price shocks on political and social instability, we indicate this effect differs when countercyclical fiscal policies and remittances are involved.

Regarding fiscal policy, to our knowledge, one paper, (Aguirre, 2016) has quantitatively assessed the impact of countercyclical fiscal policies on conflict likelihood in time of economic shocks. This study relied on agricultural and mineral export price shocks in 44 countries, spinning the period of 1960-2013. They found that conflict occurrences are devastated by the contra-cyclical measures of the government.

However, we think that import food price shocks could also matter on political instability in developing countries. Indeed, since many of them are net importer countries (with many net food-buyers households), import food price shocks, and more precisely positive ones could be source of serious hungers episodes leading to political or social unrests. Another novelty of our paper is that instead of considering only government consumption expenditure growth as (Aguirre, 2016) did, we also consider the cyclically adjusted government consumption expenditure that could be more suitable to underlined discretionary policy taken in times of unpredictable shocks.

Using a large panel data of developing countries over the period of 1980-2012 and using simple and instrumental Tobit estimators that are more suitable to the structure of our dependent variables, we find that food price shocks strongly increase the likelihood of political instability. Fortunately, remittances and fiscal stimulus play mitigating role on the effect of import food price shocks on political instability. Theses effects are valid in our case study. When encouraging more agricultural fortification in developing countries, our study calls for more countercyclical fiscal policy targeting vulnerable populations and, when encouraging remittances through transfer cost reduction.

The rest of the paper is structured as follows: the second section will present a brief literature review. In the third section, data and some facts are presented. The fourth section will present the empirical settings and findings. Afterwards, we will conclude.

3.2 Literature review

(Arezki & Bruckner, 2011) find that food price shocks in low income countries leads to decrease in democratic institutions and increase in anti government demonstrations, riots and conflicts. As the main mechanisms, their results show that food price shocks leads to a significant decrease in private consumption and the increase of income and consumption inequalities. Their study also that food price shocks are associated with social instability in rich countries. This result is the same to those found by (Raleigh, Choi, & Kniveton, 2015) and (Smith T. G., 2014). (Hendrix & Brinkman, 2013) find that the rise in food basket price plays a significant role on conflicts. In the same vein, (Bellemare, 2015), using a monthly data on food price and social unrest for the period January 1990 - January 2011, finds out that the increase of food price has led to an increase of political unrest.

The literature on commodities price effects on political stability has mostly been based according to which export commodities price increase allows politicians to finance protest demonstrations (rebellion), or, when certain social groups fill aggrieved in gains sharing, (Berdal & Malone, 2000), (Collier & Hoeffler, 2004), (Sobek & Boehmer, 2007), and (Pinstrup-Andersen & Shimokawa, 2008)). However, parallel to this large literature, (Besley & Persson, 2008)points out that any rise in import food price that contribute to the lost of purchasing power could contribute to increasing the probability of conflict.

Regarding the relationship between fiscal policy and socio-political instability, it has been found that high government expenditure tends to be associated with less political upheaval, as government used preventative measures involving spending, ((Barro & Sala-i Martin, 1995), (Devereux & Wen, 1998), (Annett, 2001), (Aisen & Veiga, 2013), etc. More recently, (Agnello, Castro, Jalles, & Sousa, 2017) that successful fiscal stimulus, by the increase in the cyclical adjusted balance[31]that is followed by an economic growth prospects in the two following years, dampens the negative effect of income inequality on the likelihood of government crisis.

However, little studies have quantitatively appreciated the impact the government stabilizing role in times of shocks. This could be the matter of data unavailability on subsidies and other tools used for that ends.

(Aguirre, 2016) records the impact of government policies on conflict in time of economic shocks. He uses a sample of 44 countries within 1960 and 2013. The main shock variables are respectively computed on agricultural and minerals commodities prices. His results yield that

[31]computed using the methodology by (Blanchard, 1990)

the probability of conflict decreases with the countercyclical measures of the government. This is the only paper in our knowledge, that have tried to assess the role of stabilization policies on conflict likelihood. More explicitly, his study did not found any significant relation between government consumption expenditure growth (use as their fiscal policy variable) and the conflict likelihood without an interaction with commodities price shocks.

As for remittances, it is acknowledged that they play a counter cyclical role, (Craigwell, Jackman, & Moore, 2010), (Chami, Hakura, & Montiel, 2012). More interestingly, remittances have been found to dampening the effect of adverse shocks on household consumption, (Combes & Ebeke, 2011), (Ebeke & Combes, 2013), (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014). However, from our examination, no study has focused on the potential relationship between remittances and.

More precisely, our main hypotheses are presented as follows: (i) import food price shocks, and more precisely positive import food price shocks increase the likelihood of socio-political instability; (ii) this effect is dampened by remittances and counter cyclical fiscal policy. We use many countercyclical fiscal policy variables based on the government consumption expenditure which in our intuition, is the component of government expenditure that might be most used in time of unpredictable shocks. Like (Aguirre, 2016), we consider the yearly growth of government consumption expenditure. However, we also consider other fiscal policy variables based on cyclical adjusted expenditure on government consumption (Agnello, Castro, Jalles, & Sousa, 2017). Using this set of variable will seems suitable in our paper, as fiscal policies that are taken to tackle unpredictable shocks might be cyclically adjusted.

3.3 Data and some stylized facts

This study focuses on almost 110 middle and countries. Data challenges contained us to limit our period between 1980-2012. Thus, the number of country differs depending on data availability. Food price shocks are derived from price data constructed using IMF data on prices and FAO data on quantities. Given that developing countries are in general price takers, we use the international price data. We that price rate at the national level differ from one country to another, but taking price data at the international market level also allows us to limit the endogeneity problem, due to the fact that prices in each country may depend on quantities demanded and other country-related factors. Since our aim is to focus on the household/countries vulnerability issues to imports, we only use import food price, as this appears as a charge for a country/household. Our socio-political stability variables are from

Upsala/PRIO and Bank (2010) databases. Regarding the fiscal policy indicator, since consistent data on the main tools (food subsidies, wage adjustment, food aid, etc.) that governments generally use for stabilization purposes are not available for our sample, we resort to government consumption expenditure[32]. . Details about all variables computations are given below.

3.3.1 Main variables

- Food price shocks (see more details on section Data in chapter 1)

Food price shocks are computed using the econometric approach developed by (Deaton, Miller, & al., 1995) and used by (Collier & Dehn, 2001) and (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014). In order to obtain our price shock variable, we draw, for each country, the food price index using the relative values of the most common imported food commodities within the period. The said price index is the commodity price average, weighted by the average quantities[33]of each commodity during our studied period. Such commodities[34]include wheat, sugar, soybeans, soybeans oil, maize and rice.

We formulate different measures of price shocks:

- (i)The first price shocks variable is computed by regressing, for each individual country[35], the price index variable on its two first lags, the trend and some error term (see Appendix). The residual of this regression is taken as the shock variable.
- (ii) The second price shocks variable (Po_P_shock) is the number of positive values of *P_shock* whiting a period of four non-overlapping years. This is a proxy of the frequency of positive food price shocks, (Combes J.-L. , Ebeke, Etoundi, & Yogo, 2014).

- Fiscal policy: We use many fiscal policy variables:

- Govcons: his is the annual growth rate of government consumption expenditure in share of GDP
- ;*f*iscal adjus: is the residual of the country-by-country regression of the government consumption expenditure on the cyclical component of the output gap. Details about the computation are given in the appendix;

[32]We do not exclude the possibility that even capital expenditures could be use at the end of shocks mitigation or adaptation, but our intuition is that, as price surge give rise to immediately lost of purchasing power and that poor households do not have sufficient savings or insurance of somewhat kind to face. Thus, hunger and food insecurity quickly increase at the meantime and need to be solve at in the short term.

[33]we attempt to the price effect on quantities, as the latter generally respond to price variations.

[34]see (FAO, et al., 2011)

[35] In fact, the world market price may not necessarily have the same pass-through across countries. Depending on each country's characteristics, including the information structure in place, the given price in the world market may differ on the same price at the domestic level.

- Po_Fiscal_adjus: is a categorical variable that takes the value 1 if Fiscal-*adjus* is positive and 0 otherwise;
- Success_Fiscal_adjus: This is a categorical variable that takes the value 1 at the year *t* if Fiscal_adjus is positive at the year *t* and is followed by positive GDP growth at the following two years (year*t* + 1 and year *t* + 2).

Dependent variables:

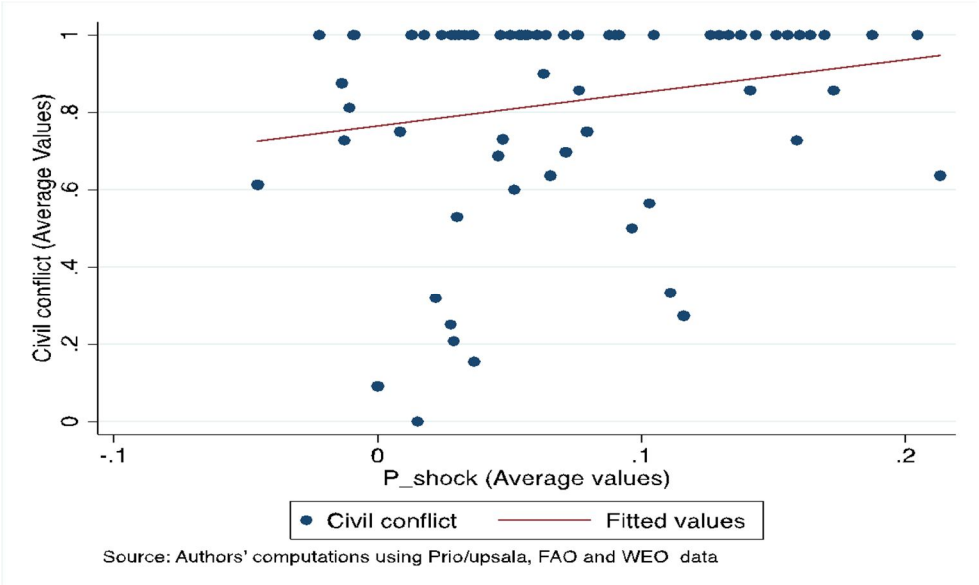
- Civil conflict: this is a dummy variable that takes the value 1 if a country experiences an intrastate conflict with more than 25 battle deaths and 0 otherwise. This data are from Prio/upsala 2017.
- Expropriations: this is a dummy variable that takes the value 1 if a country experiences unrest with a risk of expropriation and 0 if there is no risk of expropriation
- Riots: This is a dummy variable that takes the value 1 if the country experiences at least one riot episode and 0 otherwise.

- Control variables: Our main control variable is the GDP per capita growth that is used to account for the economic context. We expect this variable to negatively affecting the probability of socio-economic instability.

3.3.2 Some stylized facts

In this section, we present some stylized facts regarding political instability, import food price shocks, fiscal policy and remittances in our sample.

Figure 3.1: Food price shocks and civil conflict



Source: Authors' computations using Prio/upsala, FAO and WEO data

According to figure 3.1, high levels of food price shocks are associated with high probabilities of civil conflict. This relationship is the same between food price shocks and the of and expropriations (stylized facts available upon request). Hence, it could be important to evidence whether there could be a mean to dampen such adverse effect of import price shocks. Our main ways here are countercyclical fiscal policy and remittances inflows.

Figure 2 displays the average values of civil conflicts, expropriations by level of cyclically adjusted government consumption expenditure. As we can see, both political instability-related variables tend to be higher in the situation with less cyclically adjusted government consumption expenditure. The same situation seen in figure 3.3, where we present political instability variables by level of personal remittances received by inhabitants.

Figure 3.2: Socio-political instability over government discretionary consumption expenditure quartile

From the last two figures, we can establish that both fiscal policy and remittances could offset the relationship between political instability and food price shocks seen on figure 1,whichwill help us taking into account other variables and analyzing their relationship in terms of causality.

3.4 Empirical settings

3.4.1 The model

The model: First our assess estimates the effect of import food price shocks on political instability.

$$polinstab_{i,t} = \alpha_1 + \alpha_2 P\_shock_{i,t} + \alpha_3 Fiscalpol_{i,t} + \alpha_4 Remit_{i,t} + \alpha_5 P\_shock_{i,t} * Fiscalpol_{i,t} + \alpha_6 P\_shock_{i,t} * Remit_{i,t} + \alpha_5 \boldsymbol{GDP}_{i,t-1} + v_i + w_t + \varepsilon_{i,t} \quad (3.1)$$

In this model: *Polinstab*is the socio-political instability variable; *P_shock*is the food price shock measure; *Remit* is the personal received remittance in share of GDP; *Fiscalpol*if the fiscal policy variable considered;$\varepsilon_{i,t}$is the error term, v_i is the country specific random-effect[36] and w is the year fixed-effects.We expect $\alpha_2\beta$tobe positive, meaning that that we expect socio-political instability to increase with food price shocks. We also expect that fiscal policy and remittances dampen the positive effect of food price shocks on socio-political instability: in other words, we expect α_5 and α_6 to be negative.

Since our dependent variables are categorical variables, the traditional OLS estimator might be biased because of the issues due to random errors, selection bias, measurement error and even confounding, (Maddala & Lahiri, 1992). Hence, we resort to probability estimators that are more suited for this structure of dependent variable. Further, since our dependent variables present a high number of 0, the probit andlogit estimates could be biased. To overcome that, we resort to the simple Tobit estimator with it maximum likelihood option, (Miranda, Rabe-Hesketh, & al., 2005). For robustness as well as the potential endogeneity issues, we use the IV Tobit model, (Finlay, Magnusson, & al., 2009)

3.4.2 Econometric Results

Baseline results: positive food import food price shocks and conflicts

Table 3.1 reports the result of the effect of positive food price shocks on the probability of civil conflict occurrence. We control for net personal remittance received in all the regressions, and with different variables of fiscal policy in each specification. The first regression *fiscal adjust* (our first fiscal policy variable), whereas the second *success_Fiscal_adjust*on focuses on positive Fiscal adjust, while the annual government consumption expenditure growth. We also control for years and our results indicate that positive food price shocks significantly affect civil conflict. However, neither fiscal policy variables, nor remittances are significant in regressions. This could be because of the missing variables in the model.

We subsequently continue our investigations by adding other variables in the specifications.

Table 3.1: Baseline results 1: Positive food price shocks and civil conflict

DepVar	Civil conflict			
	(1)	(2)	(3)	(4)
Po_P_shock	0.08***	0.08***	0.07***	0.09***

[36]Since the fixed-effect tobit model is not yet set on our econometric software, we resort to the tobit random fixed-effect.

	(3.20)	(3.29)	(3.07)	(3.59)
Fisc_adjust	$-6.02x10^{-3}$			
	(-0.95)			
Remit	-0.01	-0.01	-0.01	$-2.71x10^{-3}$
	(-0.75)	(-1.06)	(-1.04)	(-0.33)
Fisc_adjust_success		0.03		
		(0.55)		
PoFisc_adjust2			-0.02	
			(-0.28)	
Govcons				$-5.87x10^{-4}$
				(-0.54)
_cons	0.58^{***}	0.58^{***}	0.61^{***}	0.53^{***}
	(5.78)	(6.69)	(7.16)	(5.68)
Nber_obs	409	442	452	395
Nber_group	56	64	66	52
chi_squared	12.65	12.48	10.90	14.07

t statistics in parentheses

$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

In the following table, we add the interaction terms between remittances and positive food price shocks. We also add the interaction terms between fiscal policy and food price shocks. In all our regressions, the effect of positive food price shocks on civil conflicts is more important than in the last table without interactions. The fiscal policy measured as *Fisc_adjus* (column 1), seems to decrease the likelihood of civil conflict. However, its interaction with food price shocks positively affects the probability of conflict. This result is contra intuitive as we were expecting the opposite, However, this effect is very low and could be due to fiscal adjustment that failed to reach the suitable target, thus, contributing to widening inequality, which turn out lead to the increase of civil conflicts. Interestingly, even if remittances taken individually do not appear to significantly affecting the likelihood of conflict, its interaction term with positive food price shocks does. This result is particularly interesting, as it could be implying that even though remittances might not necessarily smooth civil conflicts, they play a countercyclical role on political instability in time of food price shocks. This result is in line with (Craigwell, Jackman, & Moore, 2010) and (Combes & Ebeke, 2011), according to which remittances counter the adverse effect of external shocks on (household consumption volatility). This result is strongly significant through all the regressions.

Table 3.2: Baseline results 2: Positive import food price shock, fiscal policy, remittance and civil conflicts

DepVar	Civil conflict			
	(1)	(2)	(3)	(4)
Po_P_shock	0.07**	0.12***	0.10***	0.12***
	(2.14)	(3.96)	(2.98)	(3.86)
Fisc_adjust	-0.02**			
	(-2.10)			
Po_P_shock* Fisc_adjust	0.01*			
	(1.95)			
Remit	0.01	0.01	0.01	0.01
	(1.04)	(0.72)	(0.69)	(1.13)
Po_P_shock* Remit	-0.01**	-0.01**	-0.01**	-0.01**
	(-2.30)	(-2.26)	(-2.26)	(-2.32)
Fisc_adjust_sucess		0.14		
		(1.26)		
Po_P_shock* Fisc_adjust_sucess		-0.04		
		(-1.10)		
PoFisc_adjust2			-0.03	
			(-0.24)	
Po_P_shock* PoFisc_adjust2			$4.42x10^{-3}$	
			(0.11)	
Govcons				$-2.90x10^{-3}$
				(-1.47)
Po_P_shock* Govcons				$1.60x10^{-3}$
				(1.45)
_cons	0.62***	0.49***	0.58***	0.51***
	(5.64)	(4.92)	(5.82)	(5.50)
Nber_obs	409	442	452	395
Nber_group	56	64	66	52
chi_squared	21.12	19.05	16.11	21.82

t statistics in parentheses. $p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

Robustness checks:

This section is presented into two subsections:

1. First, we use other dependent variables or another import price shocks measure. We also add region dummies in some specifications. Finally, according to the income level of the.

Table 3.4 (appendix) presents the results that we obtained by running the same specification as those with civil conflicts which results are presented on table 3.1. These results support that food price shocks significantly and positively increase the feasibility. Interestingly, successful fiscal policy seems to significantly and negatively affect the likelihood of socio-political instability.

Even if no fiscal policy variables seem to significantly affect the probability of conflict, table 3.5 (appendix) supports that the dampen effect of remittances in time of food price shocks remains strongly significant when we add the regional dummies on our regressions (where remittances that are taken individually affect the probability of conflict negatively), and consider the food price shock variable (not only the positive food price shocks). This is also strong when other variables are considered (columns 5 to 8).

Furthermore, column (6) also shows that successful fiscal policy and its interaction term with food price shocks negatively affect the possibility of expropriation.

Then, we also subdivide our sample according to the countries level of income. We hypothesize that countries with more income will be less prone to experience socio-political instability. Our rich countries are those whose income per capita is greater than the median in our sample; and our poor countries are those that are below the median.

As shown on table 3.6, food price shocks significantly increase the likelihood of socio-political instability in the two subsamples. Even if the interaction term between successful fiscal policy and food price shocks tends to be not significant, column (2) of table 3.6 shows that successful fiscal policy taken exclusively decreases the likelihood of socio-political instability.

2. Second, we use an instrumental variable Tobit estimator to address the potential endogeneity issue**.**

We think that political stability may not only depend on the price cycles or movements. People can also be encouraged in joining manifestations if they are dissatisfied as a result of poor GDP growth, in case of inadequate economic cycle, for example. However, since breed a reverse causality between GDP growth (indeed, any kind of political instability

can lead to poor economic growth because of capital destructions and other adverse effects), we resort to the IV Tobit estimator

Table 3.3 reports the results using the instrumental estimator. While positive food price shocks still strongly increase the probability of civil conflict, our results strongly remain significant regarding the dampen effect of remittances on civil conflict in time of positive import food price shocks. However, our results fail to find the dampen effect of fiscal policy measured as the stimulus of government consumption expenditure.

Table 3.3: Robustness checks 1: Positive import price shocks, remittances, fiscal policy and civil conflicts (IV Tobit)

DepVar	Civil conflict							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Po_P_shock	0.07**	0.06***	0.06***	0.09***	0.06*	0.14***	0.10***	0.13***
	(2.51)	(2.65)	(2.62)	(3.40)	(1.68)	(4.03)	(2.88)	(4.17)
Fisc_adjust	-3.30x10^{-3}				-0.02			
	(-0.56)				(-1.51)			
Remit	-0.01	-0.01	-0.01	-0.01	0.01	3.63x10^{-3}	3.95x10^{-3}	0.01
	(-0.97)	(-1.22)	(-1.26)	(-1.45)	(0.68)	(0.41)	(0.45)	(0.87)
Fisc_adjust_ sucess		4.96x10^{-3}				0.28**		
		(0.08)				(2.12)		
Po Fisc_adjust2			0.06				0.13	
			(1.10)				(0.98)	
Govcons				-9.46x10^{-4}				-2.30x10^{-3}
				(-0.71)				(-1.00)
Po_P_shock *Fisc_adjust					0.01			
					(1.46)			
Po_P_shock *Remit					-0.01**	-0.01**	-0.01**	-0.02***
					(-2.05)	(-2.08)	(-2.14)	(-3.23)
Po_P_shock *						-0.11**		

Fisc_adjust_ sucess						(-2.28)		
Po_P_shock *Po_ Fisc_adjust2							-0.03 (-0.54)	
Po_P_shock *Govcons								$901x10^{-4}$ (0.64)
Gdpgrowth	0.01 (0.42)	$4.29x10^{-3}$ (0.38)	$4.66x10^{-3}$ (0.42)	0.02 (1.32)	$2.74x10^{-3}$ (0.22)	0.01 (0.49)	$4.64x10^{-3}$ (0.41)	0.02 (1.38)
_cons	0.48^{***} (4.48)	0.50^{***} (5.72)	0.47^{***} (5.36)	0.39^{***} (4.26)	0.53^{***} (4.22)	0.33^{***} (3.25)	0.41^{***} (3.79)	0.34^{***} (3.58)
Nber_obs	406	437	438	383	406	437	438	383
$\chi 2$	0.14	0.03	0.06	0.55	0.07	0.11	0.07	0.75
$\chi 2$(Pval)	0.71	0.85	0.81	0.46	0.80	0.74	0.79	0.38

IV estimation of Tobit model. Wald test of exogeneity is reported at the bottom of the table. *t* statistics in parentheses. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

3.5 Conclusion

This paper aims at evidencing the effect of remittances and fiscal government expenditure stimulus in political stability in time of import food price shocks. We use a large sample of developing countries during the period 1980-2012. After exploring some stylized facts, we resort to an econometric analysis based on the Tobit estimator that is more suitable given the structure of our dependent variables. We found that positive food price shocks significantly increase the probability of political instability. Fortunately, remittances dampen this adverse of positive food price shocks on political stability. We also find that this dampened effect is more important in relatively poor countries. Our results remain profoundly significant and robust, when we add the years fixed effects and the region dummies. It can also be interpreted in terms of causality, as they remain very intense when we switch to the instrument variable by adding other controls in the model.

As implications, our findings thus underlined the adverse effect of positive import food price shocks on political instability, which complete the literature in accordance to which export food price shocks increase the likelihood of political instability in developing countries. This finding fortifies the conviction that there is a need in strengthening agricultural productivity via investments in agriculture, trainings, climate mitigation and adaptation, so as to empower developing countries to be less dependent on action of food. Thus, rendering them less vulnerable to the effects of import food price shocks. Unsurprisingly, our result supports that remittances play a vital role in dampening the inauspicious impact of import food price shocks on political stability.

Finally, fiscal policy should also be more countercyclical and purely targets vulnerabilities in time of import food price shocks.

Figure 3.3: Socio-political instability and over remittances quartiles

Table 3.4: Robustness checks 2: food price shocks and political instability

DepVar	Expropriations				Riots			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P_shock	2.92***	2.24***	2.57***	2.68***	0.76***	0.53**	0.70***	0.76***
	(3.33)	(2.78)	(3.16)	(2.90)	(2.89)	(2.11)	(2.77)	(2.83)
Fisc_adjust	-0.04				3.81x10^{-3}			
	(-1.47)				(0.33)			
Remit	0.03*	0.02	0.02	0.02	-3.80x10^{-3}	-5.73x10^{-4}	-5.16x10^{-3}	-4.54x10^{-3}
	(1.81)	(1.63)	(1.07)	(1.52)	(-0.42)	(-0.06)	(-0.58)	(-0.49)
Fisc_adjust_sucess		-1.13***				-0.45***		
		(-3.37)				(-5.12)		
PoFisc_adjust2			0.46*				-0.03	
			(1.65)				(-0.31)	
d.Govcons				2.96x10^{-3}				1.31x10^{-3}
				(0.50)				(0.79)
_cons	-4.97***	-4.72***	-5.45***	-5.04***	-1.47***	-1.38***	-1.58***	-1.27***
	(-6.95)	(-7.28)	(-7.40)	(-6.57)	(-9.65)	(-10.08)	(-11.16)	(-9.74)
Nber_obs	2301	2698	2773	1837	2301	2698	2773	1837
Nber_group	101	115	117	84	101	115	117	84
chi_squared	13.71	18.84	12.57	9.63	8.60	32.81	8.07	8.70

t statistics in parentheses *p< 0.10, **p< 0.05, ***p< 0.01

Table 3.5: Robustness checks 3: Import food price shock, fiscal policy, remittance and political instability

DepVar	Civil conflict				Expropriation			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P_shock	0.35	0.73***	0.68**	0.40*	3.12***	3.89***	2.11*	3.20***
	(1.35)	(2.72)	(2.51)	(1.66)	(2.65)	(3.61)	(1.71)	(2.75)
Fisc_adjust	$-4.47x10^{-3}$				-0.06			
	(-0.57)				(-1.64)			
Remit	-0.02*	-0.02**	-0.02**	-0.02*	0.03*	0	0.02	0.0163
	(-1.91)	(0.009)	(-2.13)	(-1.72)	(1.89)	(.)	(1.10)	(1.12)
P_shock *Fisc_adjust	0.0261				0.236			
	(0.66)				(1.51)			
P_shock*Remit	-0.102*	-0.0865*	-0.0951*	-0.101*	-0.247**	-0.175*	-0.189*	-0.22**
	(-1.90)	(-1.66)	(-1.84)	(-1.72)	(-2.30)	(-1.77)	(-1.87)	(-2.04)
Fisc_adjust_success		0.09				-0.87**		
		(1.61)				(-2.48)		
P_shock *Fisc_adjust_success		-0.55				-3.07*		
		(-1.58)				(-1.68)		
PoFisc_adjust								
P_shock								

*PoFisc_adjust								
PoFisc_adjust2			0.04				0.14	
			(0.64)				(0.44)	
P_shock			-0.47				2.49	
*poFisc_adjust2								
			(-1.43)				(1.62)	
Govcons				$2.93x10^{-5}$				-0.01
				(0.02)				(-0.46)
P_shock				0.01				0.10
*Govcons								
				(1.58)				(1.56)
_cons	0.97**	0.88**	0.93**	0.94**	-5.26***	-5.47***	-6.04***	-13.28
	(2.31)	(2.17)	(2.33)	(2.48)	(-4.74)	(-5.51)	(-5.65)	(-0.03)
africa	-0.09	-0.07	-0.10	-0.11	0.19	0.57	0.69	8.12
	(-0.23)	(-0.16)	(-0.24)	(-0.28)	(0.23)	(0.81)	(0.92)	(0.02)
Americas	-0.15	-0.09	-0.12	-0.25	0.33	0.60	0.64	8.57
	(-0.35)	(-0.21)	(-0.28)	(-0.61)	(0.39)	(0.83)	(0.84)	(0.02)
Asia	-0.27	-0.25	-0.27	-0.20	0.85	1.23*	1.32*	8.62
	(-0.62)	(-0.59)	(-0.66)	(-0.49)	(0.98)	(1.68)	(1.70)	(0.02)
Europe	0	0	0	0	0	0	0	0
	(.)	(.)	(.)	(.)	(.)	(.)	(.)	(.)
Nber_obs	393	409	411	361	2301	2698	2773	1837
					101	115	117	84
Nber_group	51	56	57	45	18.68	25.71	20.10	15.55
chi_squared	11.28	15.54	14.05	11.33				

t statistics in parentheses $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$

Chapter 3: Food import price shocks and political instability: do fiscal policy and remittances make any difference?

Table 3.6: Robustness checks 3: Import food price shock, fiscal policy, remittance and political instability

DepVar	Expropriations							
Sample	Low income				High income			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P_shock	4.29**	4.55**	2.88	3.47*	3.69**	4.08***	2.38	4.01**
	(2.04)	(2.43)	(1.33)	(1.81)	(2.32)	(2.87)	(1.53)	(2.54)
Fisc_adjust	-0.15**				-0.01			
	(-2.16)				(-0.27)			
P_shock *Fisc_adjust	0.10				0.16			
	(0.33)				(0.85)			
Remit	0.01	$2.71x10^{-3}$	$-1.40x10^{-3}$	$-4.94x10^{-3}$	0.13***	0.10**	0.10**	0.16***
	(0.52)	(0.12)	(-0.06)	(-0.22)	(2.96)	(2.46)	(2.54)	(3.17)
P_shock*Remit	-0.40**	-0.29*	-0.29*	-0.28*	-0.34*	-0.25	-0.25	-0.47**
	(-1.97)	(-1.75)	(-1.79)	(-1.66)	(-1.82)	(-1.44)	(-1.39)	(-2.33)
Fisc_adjust_sucess		-1.17*				-0.62		
		(-1.95)				(-1.42)		
P_shock *Fisc_adjust_sucess		-3.55				-2.73		
		(-1.08)				(-1.25)		
PoFisc_adjust								
P_shock								

*PoFisc_adjus t								
PoFisc_adjust 2			0.55				-0.17	
			(1.04)				(-0.40)	
P_shock *PoFisc_adjus t2			2.24				2.51	
			(0.85)				(1.34)	
Govcons				-0.03				-0.01
				(-0.87)				(-0.70)
P_shock * Govcons				0.05				0.17**
				(0.45)				(2.00)
_cons	-4.60***	-4.98***	-5.81***	-4.74***	-5.16***	-4.85***	-5.07***	-5.31***
	(-4.14)	(-4.39)	(-4.45)	(-4.22)	(-5.51)	(-5.73)	(-5.78)	(-5.00)
Nber_obs	1033	1298	1301	774	1236	1400	1403	1050
Nber_group	46	56	.	.	59	66	.	.
chi_squared	9.09	10.49	12.53	7.24	13.31	14.62	16.60	25.35

3.6 Appendix

3.6.1 Computing food price shocks variables (see section data in chapter 1)

3.6.2 Computing fiscal policy variable (see section appendix in chapter 2)

Table 3.7: Variables, definitions and sources

Variables	Definitions	Sources
Price shocks	seen section (3)	WEO(2015)[37]FAOSTATISTIQUES (2016)
Civil conflict	dummy variable that takes the value 1 if a country experiences an intrastate conflict with more than 25 battle deaths and 0 otherwise	Uppsala Conflict Data Program (UCDP) (2017)
Riots	Is the dummy variable, noted 1 if there is any manifestation of Riot and 0 if not	Bank (2010)
Expropriation	Is the dummy variable, noted 1 if there is any manifestation with a risk of expropriation and 0 otherwise	Bank (2010)
GOV	current government expenditure in % of GDP. this variable is used to compute fiscal policy variables (see section...)	WDI[c](2015)
gdpgrowth	The annual rate of gdp growth	WDI (2015)
Remit	Net remittances received par individual from abroad in % of GDP	WDI (2015)

Source : Authors

Table 3.8: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Expropriation	4432	.02	0.15	0	1
Riots	4432	.13	0.34	0	1
Civ conf	677	.68	0.46	0	1
P_shock	3779	.06	0.15	0-.33	0.84
Remit	3145	4.67	8.56	$2.28.10^{-4}$	106.47
Growth Gonv-cons	2429	5.14	28.35	-82.326	1004.60
Gov cons	3284	15.41	7.36	0	84.50
Gdp/pc	4099	3.87	6.90	-62.07	147.67

[37]World Economic Outlook (2015) [b]For this variable, missed data were code "-66" or "-77" or "-88". We have changed them into "." [c]World Bank Indicator

Table 3.9: list of countries

Afghanistan	Dominican Republic*	Kenya	Pakistan	Turkmenistan*
Algeria	Ecuador*	Kiribati*	Panama	Uganda
Angola	Egypt*	Kyrgyzstan*	Papua New Guinea	Ukraine*
Armenia*	El Salvador*	Laos	Paraguay	Upper Volta*
Azerbaijan	Equatorial Guinea*	Lebanon	Peru*	Uzbekistan
Bangladesh	Eritrea	Lesotho	Philippines	Vanuatu*
Belarus*	Fiji*	Liberia	Rwanda	Vietnam*
Belize*	Gabon*	Libya	Saint Lucia*	Yemen*
Benin*	Gambia	Madagascar*	Vincent and the Grenadines*	Zimbabwe*
Bhutan*	Georgia	Malawi*	Senegal	congo
Botswana*	Ghana	Malaysia	Sierra Leone	China**
Brazil*	Grenada	Maldives*	Somalia	Argentina**
Burkina Faso	Guatemala	Mali	South Africa	Cote d'Ivoire**
Burundi	Guinea	Mauritania	Sri Lanka	Ecuador**
Cambodia	Guinea-Bissau	Mauritius*	Sudan	Egypt**
Cameroon	Guyana*	Mexico	Suriname	El Salvador**

Central African Republic	Haiti	Moldova	Swaziland*	Ethiopia**
Chad	Honduras*	Mongolia*	Syria*	Kampuchea**
Colombia	India	Morocco	Tajikistan	Myanmar (Burma)**
Comoros	Indonesia	Mozambique	Tanzania*	Russian Federation**
Congo	Iran	Namibia*	Thailand	Trinidad and Tobago**
Costa Rica*	Iraq	Nepal	Togo	Venezuela**
Cuba*	Jamaica*	Nicaragua	Tonga*	
Djibouti	Jordan*	Niger	Tunisia*	
Dominica	Kazakhstan*	Nigeria	Turkey	

Source: authors

PART 2: PRICE DISTORTIONS AND EXPORTS CONCENTRATION.

Chapter 4: Agricultural price distortions and climate shocks in developing countries[38]

Abstract

Based on a sample of 40 developing countries, we provide evidence on the effect of climate variability on agricultural price distortions within the period 1980-2010.Using diverse climatic measures, our results highlight that increase of precipitation as well as wetness gave rise to pro-agricultural bias in countries with low agricultural share of population (less than 52 % of the entire country's population), while it is in the reverse (anti agricultural bias) in countries with large agricultural distribution of population. This result thus calls for government consciousness regarding agricultural trade distortions. In the meantime, mitigation and adaptive tools should be put in place for an agricultural trade free of price distortions.

Keywords: Agricultural trade distortions, Relative Rate of Assistance, Developing countries, climate variability.
JEL codes: O1, Q17, Q54

[38] Joint work with Cedric PENE (Agriculture and commodities division, WTO, Geneva)

4.1 Introduction

Besides the structural change driven by the growing demand of food, the instability of the dollar, and climate change, it is acknowledged that agricultural trade-related policies have been part of the driving force of the recent surges of food prices, (OECD 2017)[39]. In the same token, a survey conducted by UNU-WIDER on policy measures taken in 14 countries within 2006-08, food crisis shows that more than 50% of countries' responses were directly trade-related, (Babu, 2013), (Watson, 2013). Indeed, aiming to enhance its domestic food security in time of price surge, each country generally tends to insulate its own home market. These so-called 'beggar-thy-neighbor' measures have given rise to an artificial increase in the international food price, as demand has been increasing without meeting sufficient supply, (Boüet & Laborde, 2010), (Martin & Anderson, 2011). For instance, (Anderson & Nelgen, 2010) underline that the food price surge of 2010 happened following the announcement of Russia to ban its exports for the adverse drought it was facing. This is alarming since many net exporters had been trying to rely on self-food sufficiency[40]during the recent food crises. These policies turn out harmful, as a study (OECD 2017) shows that removing the rice market supports in Indonesia and Philippines would lead to decrease the undernourishment rate by respectively 10% and 54% in these countries.

The literature has mostly been worrying about the consequences of agricultural trade policies. Studies have particularly focused on (i) the impact of governments trade responses in fueling food prices at the international market, (Boüet & Laborde, 2010), (Martin & Anderson, 2011); (ii) the adverse effect of these responses on production incentives, (iii) the contribution of these measures to increase poverty, inequality and wellbeing (Croser & Anderson, 2011), (iv) and their roles in lowering economic growth, consumption, investment, and fiscal outcomes.

In parallel, other researches underline that agricultural trade distortions seem to isolate poor importing countries from the international market, that is, disable them to enjoy best price and more quantities. Indeed, (Bekkers, Brockmeier, Francois, & Yang, 2017) recently found that adverse trade responses to international price shocks strongly affect the pass through of the international price to local markets. According to (Bekkers, Brockmeier, Francois, & Yang,

[39]This acknowledgement has given rise to the implementation of comprehensive tools in order to help countries conducting more comprehensive policies. After the food price crisis of 2008, the UN agencies, the WTO, the IMF and the World Bank made in place a system called UN High-Level Task Force aiming to coordinating policies for global food security. In 2011, AMIS (Agricultural Management Information System) was also been created in the same token, that is a forum hold by FAO, OECD ,WTO and others, for sharing information on food price and their forecasting. This system particularly provides information about food security, departing from the follow up based on four main food commodities (rice, wheat, maize and soybean).

[40]notably India, Egypt, Pakistan, Vietnam, china and Cambodia amongst others, (Anderson & Nelgen, 2010)

2017)food security in low income countries will remain threatening for this exposure to international price surges.

Interestingly, it appears from the literature that policy makers do not resort to new measures in time of food crises. Rather, they widening the intensity of existing policies, (Jones & Kwiecinski, 2010), (Watson, 2015). However, some authors have being trying to evidence the drivers of such disturbing measures, (Bates & Block, 2009), (Anderson, Kurzweil, Martin, Sandri, & Valenzuela, 2008). In short, they found that the income level of the country as well as its political economy play an important role on price distortions. In trying to evidence the drivers of price distortions, it could be worth to focus on the factors that could directly affect prices. Amongst these factors, climate shocks could possibly be determinant, as they could lead to supply variability and hence policies responses. In specific terms, our instinct is that in the aim of increasing food supply, climate shocks might lead to an upsurge in prices and hence trade barriers. For instance, tax on export or quantitative restriction on exportation could likely be imposed. Indeed, Article 6 of the WTO Agricultural Agreement classifies these measures in the « amber box » due to their adverse effects on international trade. Governments could also try to respond by lowering trade barriers on importations in order to reinforce the needs of urban populations. Possibly in such situations of climate shocks, the government could respond by rendering assistance to the agricultural sector, which would depend on the agricultural share of the population.

In the light of this, (Klomp & Hoogezand, 2018) recently conducted an interesting study on the role of natural disaster on agricultural price distortions. They found that extreme weather conditions like floods, droughts and storms significantly impact the degree of agricultural assistance, as the policy makers will be trying to protect the farmers. However, they focused on the nominal assistance to the agricultural sector. In this paper, our intuition is that price distortions may not only depend on the agricultural sector, as the farmers' incentives will also depend on the protection or taxes assigned to other sectors. Our paper thus completes the study of (Klomp & Hoogezand, 2018) in several points: i) we consider the relative assistance of the agricultural sector, that is the assistance or taxes received by the agricultural sector relative to those received by other sectors; ii) price distortions are not only sensitive to natural disasters, that is why we consider all climate shocks and not just extreme shocks.

The objective of this paper is to assess the impact of climate variability on agricultural price distortions. We focus on developing countries since they are the most vulnerable to climatic conditions. Indeed, their geographical characteristics expose them more often to climate

variability while the suitable coping tools are insufficient. The constraints to data availability limit analysis between 1980-2010. Using a fixed effect estimator, we found that: (i) an increase of temperature gives rise to a protection of the agricultural sector of about 5% more than other sectors. (ii) An increase of wetness, as well as an increase in precipitation, give rise to more agricultural protection in countries with low agricultural share of population (less than 52 % of the entire country's population). But the reverse is observed in countries with more than 52% of agricultural population.(iii) We also find that even if large values of climate variability seem to have more important effect on price distribution, almost all values of temperature variability have a significant effect. The results we have obtained call for more climatic mitigation and adaptation tools to be put in place in order to make international trade free from all price distortions. Indeed, this is one of the key ways to enhance food security and accessibility.

The rest of the paper is structured as follows: in the second section, we present some nexus between climate shocks and international trade. The third section presents a brief literature review, which is followed by data and some stylized facts in the fourth section. The fifth section presents the econometric setting in the fourth section and the sixth section is the conclusion.

4.2 Agricultural trade and climate shocks

International trade contributes in many dimensions of food security. Indeed, when encouraging food production and import, trade policies allow the exchange of food from surplus to deficit areas, (Dreze & Sen, 1989). Researches in agricultural market efficiency have clearly found that barriers to agricultural trade are not the solution to end up with more food access and food security. Instead, efficient measures consist of strengthening the markets transactions and enhancing the measures that can be helpful in reducing transaction costs, (Zulauf & Irwin, 1998), (Kherallah, Delgado, Gabre-Madhin, Minot, & J, 2000), (Fafchamps, Gabre-Madhin, & Minten, 2005). International trade also helps to diversify diet (Brooks & Matthews, 2015). As pointed out by (Diaz-Bonilla, Thomas, Robinson, & Cattaneo, 2000), economic growth generated by trade may results to redistribution, enhance food access and reinforce the government finance (through revenue collected from trade). As international trade might give rise to better production standards, it thus allows local citizens to access healthy food. It is also important to recognize that agricultural trade might also be helpful to stabilize prices when there is lack of important correlation between the production levels of different trade partners, (Bahiigwa, 2014). This situation generally occurs in time of climate shocks. Indeed, thanks to weather spatial variability, some countries or regions might be facing idiosyncratic climate shocks. In this case, integrated markets through international trade allow managing food security, (Baldos & Hertel, 2015).

Further, as supported by the previous authors, in a longer run perspective, international trade[41]may also be helpful in shaping valuable comparative advantage throughout geographic areas. Although the increasing specialization could worsen countries vulnerability to idiosyncratic shocks, the role of global trade in facilitating international transfers of norms and technologies is of greater importance in enhancing mitigation and adaptation tools, (Tamiotti, 2009).

4.3 Literature review

A vast literature has been developed on the negative effects of domestic supports and trade barriers, (Diao, Somwaru, & Roe, 2001)[42], (Anderson, Martin, & Valenzuela, 2006)find that domestic subsidies account for only 6% of the welfare cost whereas trade barriers account for about 86%. This finding is supported by (Anderson & Martin, 2005), (Hertel & Keeney, 2006), (Croser & Anderson, 2011), (Anderson & Nelgen, 2012). Their explanations related to the relative importance of trade barriers compare to export subsidies, the large variability of barriers across countries and time (that generate more cost), and the fact that barriers might directly distort both consumption and production, while domestic support only hampers consumption. This can be understandable as barriers are not only in form of tariffs, but also in form of quotas or non-tariff barriers. In fact, all forms of trade distortions might be detrimental, as (Anderson & Brückner, 2012), found that the increase of the relative agricultural assistance leads to a significant decrease in the economic growth[43]. More so, using a large sample covering the period 1960-2007, (Rakotoarisoa, Iafrate, & Paschali, 2011)raises policies distortions as one of the reasons why African countries have become net food importers in spite of its huge agricultural potential[44]. Accordingly, (Gouel & Jean, 2015) conduct a theoretical analysis of the trade and storage measures taken by developing countries in time of adverse external shocks. For these countries, price stabilization measures may be acceptable, as markets are incomplete (the lack of financial and insurance tools to face the adverse periods). This analysis shows that the optimal trade policy should be to subsidizing imports when taxing exports. However, this should be accompanied with an accordance storage combination enabling both consumers and producers to benefit from the price stabilization ends.

[41] Indeed, thanks to international trade, investments in mitigation and adaptation measures for a climate-smart food system (Wheeler & Von Braun, 2013) could be established at cheaper cost.

[42]It was found that international agricultural commodities price would increase to up to 11% if trade distortions where to be remove

[43] An increase of relative agricultural assistance of 10 % leads to a decrease in the GDP per capita growth of about 1/2 percentage point. This study uses a panel data of SSA countries from 1960 to 2005

[44] Following the price spike of 1973-74, (Johnson, 1975)conducted an analysis showing that the actual market price prevailing during and after the crisis would had been less if grain trade measures of insulation did not occurred. This position is reinforced by many findings, (Tyers, Anderson, K., & al., 1992). This literature recognizes the objective, which is well justified, of each government to stabilize both the quantity of food available in the local market and their prices. In the meantime, it recognizes the merit of international trade.

Because of the costs generated by trade distortions, it is crucial to understand what the explanatory factors are.

Based on a sample of ten emerging economies, (Jones & Kwiecinski, 2010) examines the short-term policies that have been taken during the 2006-08 food crisis in order to evidence their fiscal impacts. They found that only one-fifth of the sample has taken measures to increase the domestic supply. Indeed, six out of the 10 countries have reduced (partially or completely) import tariffs. Exports taxes[45](and lower price of export) have been observed in six cases. Fortunately, this study shows that short-term policies were almost the continuity of structural policies that have in general been taken in the given countries. According to the authors, the main drivers of these measures were the long-term policies aiming to enhance food security and farmers' earning stabilization. In addendum, they underline that the difference between countries in terms of policies taken have been driven by the difference in economic, social and political status, namely: the national wealth and its distribution within the country, the agricultural value added in terms of GDP, the agricultural sector employment, the relative proportion of food expenditure, inequality, the fiscal capacity, electoral calendars, historical experiences and values. (Babu, 2013) supports this results and highlights that the policy response may also depend on the existing policy process, which itself may be driven by the degree of decentralization as well as the country's size. Many authors also studied the drivers of such trade and price distortions in international agricultural trade, (Bates & Block, 2009)[46], (Anderson & Nelgen, 2012)[47] and others. In general, their results support the previous literature according to which price distortions are driven by the country's income level and political economic factors like the electoral calendar. However, less has been said about the relationship between climatic conditions and price distortions. Some papers have rather evidenced the relationship between climate change and international trade. To narrow it down, this literature has been underlining (i) the essential role international trade has in mitigating the adverse effects of climate change, including food security, (Reilly & Hohmann, 1993) (Rosenzweig, Parry, & al. , 1994), (Chen & Woodland, 2013), (Baldos & Hertel, 2015), (Tamiotti,

[45] In the same vein, (Shama, 2011) approximately the third of 105 countries on which he conducted a survey rescrubbed to the restriction of exports during the period 2007/2011.

[46] (Bates & Block, 2009) assess the political economy of agricultural trade distortions in African countries. More precisely, they assess whether regional inequality (measured as the origin of the president), the lack of income and the farmers' share of the voters could affect price distortions. Their results yield that an increase of agricultural share of the population lead to an increase of agricultural taxation when there is no electoral competition, but the reverse is true when there is. However, there is no evidence for the need of income in the countries where agriculture is taxed (since anti agricultural measures are not significantly linked to the countries' total revenue), nor does the president particularly favored agriculture when food crops are produced in his region. Their paper is very interesting as they distinguish the type of agricultural products (crash-crops and food-crops).

[47] Based on 75 developed and developing countries, (Anderson & Nelgen, 2012) draw a difference between policy responses of the 2006-08 and 1974-1975 price crises. They found that NRAs (Nominal Rate of Assistance) of agricultural product depend on the country's income level (negative sign for poor revenue and positive for high levels, as the latter tend to subsidize their agricultural sector, while the former tend to tax theirs), negative with the area of the arable land per capita in the country, the extent to which the national price of the product deviates from its trend, and the trade status of the country (whether the country is an exporter or not), the latter variable negatively affects the NRA.

2009), (ii) and how climate change has been threatening international trade: namely, (Jones & Olken, 2010) assesses the impact of climate variability on economic growth, that they measured as the growth on exports (While they do not found any significant effect on developed countries, their results yield that an additional one degree Celsius led to a reduction of developing countries' growth rates of about 2 to 6 percentage points. Interestingly, their analysis by export categories established that this impact is mostly stem from agricultural and light manufactured items.).

To our knowledge, only one study has focused on this specific topic. (Klomp & Hoogezand, 2018) recently conducted an interesting study on the role of natural disaster on agricultural price distortions. They found that extreme weather conditions significantly raise the degree of agricultural assistance, as the policy makers will be trying to protect the farmers. Our main idea is that climate shocks lead to trade distortions, as exporting countries will be trying to insulate their markets in order to enhance food security at home. Part of this effect in fact, might be translated through the surge in food prices.

4 .4 Data and stylized facts

4.4.1 Variables

4.4.1.1 Dependent variable

The dependent variable is the Relative Rate of Assistance (RRA) computed by the World Bank, (Anderson et al., 2008). The RRA provides information on the extent to which agricultural tradable items are supported by government policies comparing to non-agricultural tradable. Thus, the calculation of the RRA[48]involves the use of NRAs (Nominal Rates of Assistance) on each sector. The Nominal Rate of Assistance is a change (in percentage) in producers' return due to government intervention. It can be positive (if producers receive more than what they should have received without any intervention) or negative (if they receive less than what they should received in case of no government intervention). The database proceeds by computing the NRA of the agricultural sector and comparing the border price to the domestic price for each covered product. In the process of computation, agricultural items account for about 70% of the farm production value (75 most imported products) in each country (75 countries, developing and developed).For each item, the NRA (NRA as used here is different from the PSE (Producer Support Estimate) of the OECD as the former is expressed as the percentage of undistorted price) is negative if the producer receive less than the international (border) price .The average NRA of the agricultural sector is obtained by computing the average NRA of each agricultural item, weighed by its gross

[48] The RRA construction follows (Lerner, 1936) who used the so-called asymmetry theory to explain that in an economy with two sectors, the impacts of export taxation are same to that of import taxation. Indeed, because of the interactions in the economy, farmers are not only affected by agricultural prices, they are also impacted by the signals offsetting prices in other sectors. In other words, farmers are affected by the relative price and hence the relative rate of assistance, (Anderson, Rausser, & Swinnen, 2013). This indicator is mostly price-based and do not include other type of potential discriminations like norms and standards.

values of production at undistorted prices. More details on the computation of the RRA and NRAs are given in appendix A of the book, (Anderson, Kurzweil, Martin, Sandri, & Valenzuela, 2008)In order to obtain the NRA of the whole sector, NRAs of the products had been weighted by their GDP shares

The Relative Rate of Assistance is given as follows:

$$RRA_{i,t} = \frac{100+NRAag_{i,T}^{Tr}}{100+NRAnonag_{i,T}^{Tr}} - 1 \qquad (4.1)$$

Where $NRAag_{i,t}^{Tr}$ and $NRAnonag_{i,t}^{Tr}$ are respectively the percentages of NRAs of the agricultural tradable and the non agricultural tradable products, in the country *I* at the year *t* . For the non-agricultural tradable, the NRA is the weighted average of trade taxes from mining, manufacturing and forestry, the contribution of each sector in the GDP being taken as a weight.

Thus, the increase of RRA means that the agricultural sector is receiving relatively more supports (such as subsidies) than other sectors, while the decrease of RRA means the reverse (the agricultural sector is being more taxed).

4.4.1.2 Independent variables

- Climate variables: following the recent literature, (Vicente-Serrano, Beguería, & López-Moreno, 2010) (Salehyan & Hendrix, 2014), (Raleigh, Choi, & Kniveton, 2015), we use tree different variables. The first one is the SPEI (Standard Precipitation and Evapotranspiration index) computed and used by (Vicente-Serrano, Beguería, & López-Moreno, 2010). This is an indication of the soil moisture and it increases with the soil wetness. It negative values indicate dryness conditions and its positive values indicate wetness situations. Our second variable is the precipitation measured in mm. We use it in logarithm form for scale purpose. The third climate variable is the temperature in Celsius degree. All these data are from Global SPEI database v2.5. This primary database provides high frequency climate data measured at the meteorological centers of each country. However, since our dependent variable and other controls are observed annually for each country, we borrow a secondary climate data from CERDI, that computes the year average (of climate data provided by all the meteorological centers of the given country) values for each country. GDP per capita: agricultural policies depend on development level. We

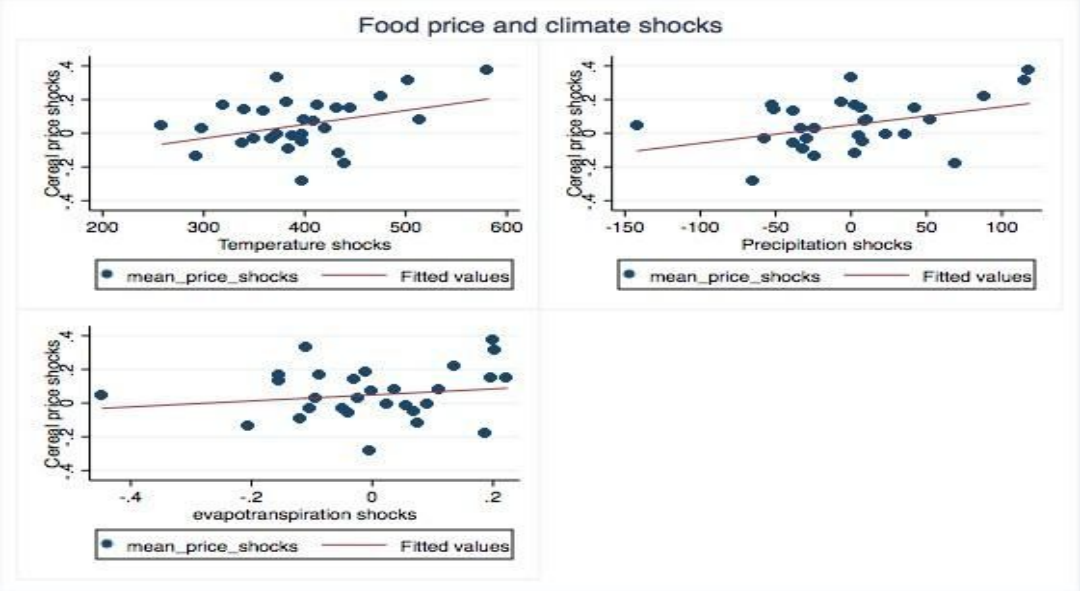
also control for the GDP/capita square to address non-linearity of the effect of the GDP (Anderson & Nelgen, 2012). [49] on the RRA (Relative Rate of Assistance) of the agricultural tradable products

- Agricultural population: measured as the proportion of agricultural-dependent persons in the total population. In countries where many persons directly depend on agricultural employment, governments are more likely to protect the agricultural tradable sector.
- Electoral competition: this is used here to control for the existence of the competitive electoral party. Our intuition is that the politician could favor the agricultural sector because of the electoral weight of farmers, (Bates & Block, 2009).

4.4.2 Stylized facts

The following figure shows that precipitation and temperature shocks (measured as the deviation between the actual level and the 4 years trend. For this stylized fact, since our intuition is that price shocks are more concern than price levels, we present the relation with food price shocks. Thus, we also compute climate shocks. This makes sense if we want to see how price shocks evolve with the evolution of climate conditions. Note that the shocks variables are only used in this section and are different to the climate variables used in the econometric setting that have been associated with the increase of cereal import prices. Adverse climate variability caused poor harvest, (Lobell & Field, 2007) which led to low supply (in a context of an increasing demand, IFPRI 2017[50]) and therefore, inflating price up.

Figure 4.1 : Food price and climate shocks

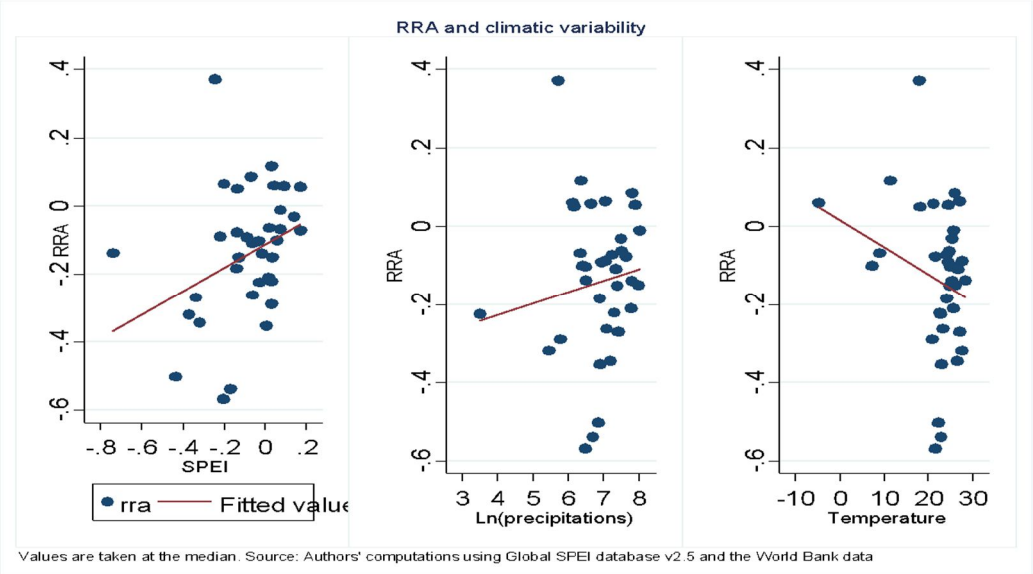


[49] (Dell, Jones, & Olken, 2008) find that climate variability are strongly correlate to economic growth rate in low income countries. In order to avoid the multi-colinearity that could happen if we introduce climate variables and the income per capita in the same regressions, we start by only controlling for climate shocks.

[50] *http: //www.ifpri.org/publication/*2017 − *global* −*food* −*policy* −*report*

Source: Authors, using CERDI, the World Bank, FAO and WEO data.

Figure 4.2: agricultural price distortions and climatic conditions



This graph shows that high values of SPEI (high values of wetness or low level of dryness) and precipitations are associated with high levels of RRA, that is the relatively more protection of the agricultural sector. Regarding temperature, high levels are associated with relatively less protection (more taxation) of the agricultural sector. Of course, these results should be interpreted as correlations, they bear no information about the potential causal mechanism which could be only highlighted by an econometric analysis.

4.5 Econometric settings

This section presents the econometric settings and the methodology.

4.5.1 The model

$$RRA_{i,t} = \alpha_1 + \alpha_2 climate_{i,t} + \alpha_3 Z_{i,t} + v_i + w_t + \varepsilon_{i,t} \quad (4.2)$$

Where:

Climate is the climatic variability considered (SPEI, precipitation or temperature) and *Z* is the matrix of control variables (as the GDP per capita and its square, the agricultural share of the population and the electoral competition).*i* and *t* are respectively the country and the time

dimensions (we use a sample of developing countries aver the period 1980-2012)$\varepsilon_{i,t}$is the error term , v_i is the country fixed-effect and w is the year fixed-effect. Our main expectations are that α_2 being positive.

4.5.2 Methodology

We use a fixed-effects estimator that allows us to control for unobservable countries' specificities that remain fixed throughout the time. We also control for years fixed effects, which control for the common phenomena that happen at the same time in all countries[51]. Further, standard errors are bootstrapped in order to correct the potential measurement errorson dependent and independent variables.

4.5.3 Econometric results

Table 4.1 shows the first results of the effect of climate shocks on the RRA variable. When other controls and years fixed-effects are not introduced in our regressions (columns 1 to 3), it appears that all climate variables significantly affect price distortions. However when years fixed-effects are added (columns 4 to 6), only temperature variability maintains its significance, although the size of this effect diminished. Finally, when both years fixed-effects and other controls are added (columns 7 to 9), only temperature variability significantly affect the RRA positively. This effect remains strong even if the agricultural share of population and the electoral completion are added. These variables have significantly strong and positive effect on price distortions. As established on column 6, an additional one Celsius degree leads to additional 4% of the protection in the agricultural sector than other sectors. This can also be interpreted as the reduction of taxation from the agricultural sector as opposed to other sectors. As high temperature can give rise to production losses, then the government could tend to protect the farmers. However, our hypothesis is that there could exist some heterogeneity of the effect of climate shocks on RRA depending on the weight of agricultural population in the country. That is why in the following, the sample is divided according to the share of agricultural population (the sample median which is set at 52% of the total population).

[51] Unit root tests have been administered in our variables and in general, they is not a stationary issue (results are available upon request).

Table 1: Climate variability and price distortions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dep Variable	RRA								
spei	0.02*			-0.01			-3.15x10^{-3}		
	(1.85)			(-0.85)			(-0.24)		
lnpre		0.08*			-0.01			2.01x10^{-3}	
		(1.84)			(-0.37)			(0.04)	
tmp			0.14***			0.05***			0.05**
			(8.68)			(2.68)			(2.20)
propoagric							1.46***	1.46***	1.48***
							(5.59)	(6.23)	(4.25)
logpercap							0.21	0.21	0.18
							(0.81)	(0.84)	(0.77)
logpercapsq							-0.01	-0.01	-0.01
							(-0.52)	(-0.54)	(-0.49)
eiec							0.01**	0.01***	0.01***
							(2.45)	(2.63)	(2.71)
_cons	-0.16***	-0.70**	-3.40***	-0.05	0.01	-1.24***	-1.79**	-1.81**	-2.87***
	(-17.78)	(-2.38)	(-9.11)	(-1.43)	(0.07)	(-2.74)	(-2.01)	(-2.00)	(-3.30)
R	2.43x10^{-3}	2.75x10^{-3}	0.08	0.21	0.21	0.21	0.21	0.21	0.22
Nber_obs	1023	1023	1023	1023	1023	1023	948	948	948
Nber_group	36	36	36	36	36	36	34	34	34

t statistics in parentheses $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$

The results on table 4.2 show that the effect of climate variability on RRA in low populated distribution of agricultural countries is the opposite of that in countries with large share of agricultural population.

When the agricultural share of population is low, an increase of one additional point in wetness (or a decrease of one point of dryness) leads to an increase of 2% of the RRA indicator (column 1). This result is supported by the result on column 2, where an increase of 1 point of percentage in precipitation leads to 10% of agricultural protection as compare to other sectors. The opposite effects are seen in case of large share of agricultural population, where an increase of wetness (column 4) and an increase of precipitation (column 5) lead to a decrease in the relative agricultural protection. As the increase in wetness and precipitation might be associated with good agricultural harvests, this result can be implying that in such situations with good harvest, governments in low share of agricultural populated countries continue to protect the agricultural sector more than other sectors. On the contrary, in the event of a drop in harvests, government may reduce agricultural protection to enhance food security of urban dwellers that are more important in these countries. This result is interesting, as it suggests that when the urban share of population is low (large agricultural share of population), a drop in harvest (following a decrease of wetness) leads to an increase of farmers' protection by the government. On the other hand, when the urban share of population is larger, a drop of harvest could make the government reduce agricultural protection, in the sole aim of making availability of food at affordable prices.

Table 4.2: Climate variability and price distortions by share of agricultural population

	(1)	(2)	(3)	(4)	(5)	(6)
	rra	rra	rra	rra	Rra	rra
	Low agricultural share of population			Large agricultural share of population		
spei	0.02*			-0.03*		
	(1.85)			(-1.87)		
lnpre		0.11*			-0.09*	
		(1.97)			(-1.81)	
tmp			$-2.21x10^{-4}$			0.06
			(-0.01)			(1.14)
R	0.14	0.14	0.13	0.42	0.41	0.42
Nber_obs	510	510	510	510	510	510
Nber_group	24	24	24	23	23	23

t statistics in parentheses. These regressions control for income per capita, income per capita square and electoral competition, which are not significant.$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

In the following, we test a non-linear impact of climate variability. More precisely, we evidence whether the size of climatic variability matters. In the first two columns, we present the results by splitting the sample according to the position of the standard deviation of the SPEI across our entire sample. The results show that SPEI is significant only if the value is greater than 1 standard error. Regarding the precipitation, column 4 shows that the values more than the standard errors do not matter, but the top 15% of precipitation distributed matters. Regarding temperature, the results are significant for almost all temperature values, regardless if the effect is more important to the top 15 % distribution of the temperature.

Table 4.3: Climate variability and price distortions: does the size matter?

	(1) rra Spei<1 sd	(2) rra Spei>1 sd	(3) rra prec>1. sd	(4) rra Top 15% of prec	(5) rra Tmp>1.5 sd	(6) rra Top 15% of tmp
spei	-0.02	-0.15*				
	(-1.29)	(-1.81)				
lnpre			-0.01	0.33**		
			(-0.21)	(2.57)		
tmp					0.05***	0.17***
					(4.82)	(4.07)
R	0.21	0.57	0.21	0.42	0.20	0.16
Nber_obs	896	127	1023	170	982	170
Nber_group	36	28	36	8	35	7

t statistics in parentheses. $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$

4.6 Conclusions and remarks

The objective of this paper is to study the effect of climate variability on price distortions in international agricultural trade. We limit our reasoning on developing countries that are generally more vulnerable to hard climatic conditions that contribute to widening food insecurity. As for the agricultural price distortion variable, we use the relative rate of protection of the agricultural sector that gives information on the extent to which agricultural products are supported relatively to other products. The period 1980-2010 marked the variable data availability constraint that limit our time horizon. Using the fixed effect estimator, we found several results with notable heterogeneities. (i)An increase in temperature gave rise to a protection of the agricultural sector of about 5% more than other sectors. (ii) An increase in wetness as well as an increase in precipitation gave rise to more agricultural protection in countries with low share of agricultural population (less than 52 % of the entire country's population). But the reverse is seen in countries with more than 52% of that population, where the increase in wetness and precipitation rather led to relatively major decrease of the agricultural sector as in other areas. However, the effect of wetness on price distortion differs by geographical areas: while the rising increase of wetness is negatively associated with agricultural protection in African countries, it is to the contrary to other developing countries. We also found that even if large values of climate variability seem to have more important effect to price distortions, almost all values of temperature variability have a significant effect. This result suggests that not only extreme climate conditions matter.

Our results may suggest that bad climatic conditions characterized by an increase of temperature gave rise to pro-agricultural trade policy in order to encourage farmers while favoring food availability to urban dwellers. In parallel, an increase of wetness or precipitation that might be good for agricultural harvest implies an increase of pro-agricultural trade measures in countries with large share of urban dwellers. However, such good harvest climate conditions rather give rise to the increase of anti-agricultural bias in countries with large share of those populations, as the government might be trying to collect more fiscal revenue through taxation gearing from agriculture. These results thus call for mitigation and adaptation tools in these

countries, in order not to leave agricultural trade being subject to the adverse effects of such climatic change that are continuing to widening food insecurity.

Further investigations will attempt to prove the agricultural distortions using more disaggregated data of agricultural products, in order to see whether commitments taken at the WTO by countries contribute to lesser the agricultural biases. We will also set an empirical framework to evaluate the main implication of different agricultural trade measures on public finances.

4.7 Appendix

Table 4.4: List of countries

East Asia & Pacific	Europe & Central Asia	Latin America &the Caribbean	Middle East & North Africa	South Asia	Sub-Sah aran Africa
Indonesia	Turkey	Brazil	Egypt	Banglades h	Cameroon	S. Africa
Malaysia	Ukraine	Colombia	Morocco	India	Cote d'Ivoire	Senegal
Philippine s		Ecuador		Pakistan	Ethiopia	Sudan
Thailand		Mexico		Sri Lanka	Ghana	Tanzania
Vietnam		Nicaragua			Kenya	Uganda
					Madagasca r	Zambia
					Mozambiq ue	Zimbab we
					Nigeria	

Table 4.5: Summary statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
RRA	-0.16	0.27	-0.95	1.30	1020
Spei	-0.08	0.57	-1.76	1.85	1020
Precipitation	1282.36	810.30	19.29	3800.45	1020
Temperature	22.80	5.33	-5.26	29.17	1020
Elec comp	5.62	1.98	1	7	958
Log(GDP/cap)	7.29	1.01	4.87	9.32	1010
Agri Pop	0.51	0.22	0.10	0.89	1020

Source: Authors

Table 4.6: Variables, definitions and sources

Variable	Definition	Sources
RRA	Relative Rate of Assistance. See section data	the World Bank (2011), (Anderson et al., 2008)
SPEI	Year average Standardized Precipitation Evapotranspiration Index. (computed on 12 month windows). It is measured as the difference between precipitation and the potential evapotranspiration .(Vicente-Serrano et al., 2010),	CERDI/ from Global SPEI database v2.5
precipitation	Year average precipitation in (mm)	CERDI/ from Global SPEI database v2.5
Temperature	Year average temperature(in Celsius degree)	CERDI/ from Global SPEI database v2.5
Elec_comp(electoral party competition)	Categorical variable with modalities ranked from 1 to 7: No legislature: 1 Unelected legislature: 2 Elected, 1 candidate: 31 party, multiple candidates: 4 multiple parties are legal but only one party won seats: 5 multiple parties DID win seats but the largest party received more than 75% of the seats: 6 largest party got less than 75%: 7	(Database of Political Institutions 2012. Philip Keefer, World Bank)
Food price	international import cereal price, (details available upon request)	Source: Authors, using the World Bank, FAO and WEO data
Agric_pop	agricultural-dependent population/total population	the world Bank (Anderson et al., 2008)
Log gdpp	Logarithm of GDP per capita(in constant term 2011)	the world Bank (WDI)

Source: Authors

Chapter 5: Export upgrading and consumption volatility in developing countries.

Abstract:

This paper explores the effect of exports quality and exports concentration on household consumption volatility. Using a sample of one hundred developing countries over the period1980 to 2015, we find that: (i) upgrading exports quality significantly decreases consumption volatility; (ii) the increase in exports concentration (both in terms of the volume and in terms of the number of product) essentially increases consumption volatility. The main channel goes through exports and GDP volatility: indeed, both poor exports upgrading quality and high exports concentration lead to exports volatility, which in turn increases income (level and growth) volatility.

Keywords: export concentration, export quality, consumption volatility
JEL codes: F1, E21, O11

5.1 Introduction

Economic volatility is traditionally acknowledged to render countries continuously vulnerable to external shocks, (Massell, 1970). One of the factors of such vulnerability is high export concentration. Indeed, developing countries generally rely on few numbers of commodities as main sources of income. Thus, since these products' prices are subject to various fluctuations on the international market, their economies remain highly vulnerable. Even if the prescription of the traditional international trade is to specialize on the product where the comparative advantage is optimized in situation of trade integration, this can also be detrimental if the international market prices and quantities are subject to various changes.

Amongst the macroeconomic variables, consumption is one of the most informative when discussing a household's welfare. Thus, its volatility may be just as detrimental for social wellbeing, in accordance with the permanent income theory. For this reason, the drivers of consumption volatility have received ample attention in the literature. Amongst others, (Wolf, 2004) points out that the main drivers of private consumption volatility include shocks that hit the economy, the factors affecting the extent to which household income will be affected by these shocks and the effect that income would have on consumption. More precisely, he finds that the volatility in inputs components, output volatility, and the level of economic development drive consumption volatility. Further, financial volatility, term-of-trade variability, remittances, have also been found to affect consumption volatility ((Craigwell, Jackman, & Moore, 2010), (Combes & Ebeke, 2011)[52], (Sapci, 2017), (Mendoza, 1997)).

But considerably less research has focused on the structure of international trade and the extent to which macroeconomic volatility could evolve.

In fact, exports concentration could be source of substantial export volatility, reinforcing income and consumption volatility in dependent countries is highly recommended. Furthermore, countries with poor export quality could be more vulnerable to phenomena that weaken demand on the international market. The purpose of our paper is to further investigate the effects of exports concentration[53] and exports quality upgrading on household consumption volatility[54] in developing countries. We hypothesize that through the effects of exports diversification and exports quality upgrading on the volatility on exports (which in turn affect household income volatility), they do impact household consumption volatility. This idea is reinforced by the fact that in developing countries, since households have huge constraints to financial tools, their consumption could be highly volatile following a fall on their income. This paper contributes to the literature by linking consumption vulnerability to international trade patterns. It closes with a recommendation of which internal trade structure would be helpful to smoothing consumption volatility.

[52] These authors find that external shocks, namely agricultural shocks, fiscal policy shocks, financial shocks and natural disasters increase consumption vulnerability. Further, their research underlines the role of remittances as a resilient factor on consumption volatility.

[53] In this paper, we only focus on product concentration, while geographic concentration will be the object of other papers.

[54] Even though volatility can be accompanied by uncertainty because of households' expectations, in this paper, we are not dealing with uncertainties as computing them is not straightforward (we do have a risk's model in this study).

We use a new dataset on concentration index, whose construction is based on the Theil index and that indicates the extent to which countries exports are limited to few lines of products. This index yields a fuller picture by using the sub-components of extensive margin (the increase of the number of product lines) and intensive margin (the increase within the existing lines of products). Data on export quality[55] are from the same dataset and were computed base on the product value construction. As quality is not directly observable, the authors estimate export quality from the exports products' unit values (average value of each export product) data, after controlling for the production and shipment costs, and the firms' pricing policy, that could also affect the unit value of a product. Their computations are based on about 20 million of product-exporter importer-year observations. These data are from the IMF (2014 & 2017)[56]and have been computed based on the harmonized bilateral trade flows data at 4-digit and using (Cadot, Carrère, & Strauss-Kahn, 2011) methodology.

Focusing on developing countries over the period 1980- 2015, we use the system-GMM estimator (Blundell & Bond, 1998)to correct for the endogeneity issues. Our results yield that (i) exports upgrading results to less volatility on household consumption expenditure; while, (ii) exports concentration, both in intensive margin (in term of new products) and in extensive margin (in terms of volume). (iii) This result is valid across all regions, including in Africa. The results are also valid in both fuel exporters and non-fuel exporters nations. The main transmission mechanism goes via volatility on exports and income, export upgrading and export diversification (the reverse of country's concentration) give rise to less volatility in exports (in level and in growth), and that lead to lesser volatility in income and income growth.

The remainder of this paper is as follows: the next section provides a brief literature review. In the third section, we present data and some stylized facts. The fourth section provides econometric settings and results, while the last section concludes.

[55] An alternative data of exports quality could have been the Economic Complexity Index (that measures the country's knowledge on its exports, (Hidalgo & Hausmann, 2009). However, this database does not cover most of our countries for most of the years.

[56] https://www.imf.org/external/np/res/dfidimf/diversification.htm

5.2 Literature review

In this paper, export upgrading means the improvement of export quality, as well as export diversification. This diversification can be in terms of volume, the number of product lines, or both.

The literature is mixed in choosing between trade diversification and trade concentration. According to some authors, trade specialization (concentration) maybe good to effectively take opportunities of comparative advantages. According to these authors, a country should choose the suitable product to be specialized on, (Rodrik D. , 2006) (Hausmann, Hwang, & Rodrik, 2007). For others, trade concentration may be the way forward when a country is poor; however, as it gets richer, it should diversify and then re-concentrate as its wealth grows Accordingly, (Imbs & Wacziarg, 2003)finds out a u-shape relationship between income and exports concentration. According to their study, at the earlier stages of development, countries concentrate their exports, but this concentration diminishes when the countries are getting developed, before concentrating again once they are very rich. This result is confirmed by (Schott P. , 2003), (Schott P. , 2004), (Xiang, 2007) and (Cadot, Carrère, & Strauss-Kahn, 2011). The same relationship is found between economic growth and export upgrading by (Henn, Papageorgiou, Romero, & Spatafora, 2017): their study shows that export upgrading improves faster at the earlier stages of the development process. However, highlighting Asian countries as an example, (Subramanian, 2007)supports that export diversification is relevant for economic growth in low-income countries.

Indeed, there is evidence that export concentration increases the likelihood of exports volatility. (Massell, 1970) finds that commodity specialization and geographic concentration in low-income countries increase export volatility. This result received some additional empirical supports from (Love, 1979), (Malhotra, 2015), etc. According to these authors, exports concentration makes countries dependent on a narrow number of products, which could harm for exports-earning stability if the prices of such products do change.

In parallel, a wide number of studies concur that exports volatility is detrimental for economic growth (Gyimah-Brempong, 1991), (Dawe, 1996). Amongst these studies the one by (Cadot, Carrère, & Strauss-Kahn, 2011) upholds “exports instability” curse, emphasizing that

export volatility affects economic growth through the adverse consequences on terms-of-trade volatility.

There is a literature arguing that export diversification affects economic growth and export earnings (Herzer & Nowak-Lehnmann D, 2006)[57]. One channel of this effect could be passed through export stability.

Additionally, based on a sample of 34 small[58] countries over the period 1990-2015, (McIntyre, Li, Wang, & Yun, 2018)finds that exports diversification leads to higher economic growth and lower income volatility. Since consumption might be one of the most important macroeconomic factors to consider, we become interested in weighing the evidence of whether export concentration affects it. Because households may mostly be concerned about the regularity on their consumption (departing from the permanent income theory), it is well worth knowing how consumption volatility reacts to exports diversification (or concentration). Further, this study could lead to better-informed measures to be taken on trade, rather than simply focus on income or income growth (or even income volatility) by itself. This could be enriched by more attention to how export quality affects consumption volatility. Even if geographic concentration might also affect exports volatility, the focus of this paper is on product concentration.

There is a strong literature supporting the idea that consumption volatility evolves over time (Kandel & Stambaugh, 1990), (Kim & Nelson, 1999). However, its harmful effects are also materialized. Namely, (Ramey & Ramey, 1995) find that consumption volatility hampers economic growth and social welfare.

Describing the financial implications, (Boguth & Kuehn, 2013) finds that consumption volatility leads to substantial increase of risk premium, leading to remarkable changes in expected returns. Such harmful effects explain why many studies have explored the drivers of consumption volatility, even if the direction of the relationship is not always obvious.

According to (Sapci, 2017), financial volatility fuels excess consumption volatility. (Mendoza, 1997) and (Crucini, 1997) find that income volatility is a source of consumption volatility. In the same vein, (Wolf, 2004)resorts to a classification tree setting to illustrate how the inputs components volatility, output volatility, and the level of economic development are the main

[57]the direction of causality is not straightforward, (Cadot, Carrère, & Strauss-Kahn, 2011)

[58] In their paper, “small countries” comprises sovereign states with a population of 1.5 million people or fewer

drivers of consumption growth volatility. Indeed, under perfect market situation, households can constitute precautionary savings for the rainy days. However, precautionary savings remain costly for low-income households, who would not have other choices but to pass on the adverse effects on their consumption. Consequently, for such financial market imperfections, the effect of income volatility on consumption can be pretty pronounced in developing countries. In fact,

In our opinion, the link between export diversification (or concentration) and consumption volatility has not yet received the attention it deserves. Based on a large panel dataset, (Craigwell, Jackman, & Moore, 2010) find that greater exports concentration decreases consumption instability in Africa and Middle East countries, but has the opposite effect in other countries. However, their results[59]draw from an econometric setting with fixed-effects estimator, which could be biased: in fact there could be some dynamics on consumption volatility, rending the fixed-effect estimator inconsistent due to the endogeneity between the error term and the lag of the dependent variable, (Nickel, 1981).

Regarding exports quality, investigations have been undertaken thus far mostly firm-level investigations. Many of these studies attempt to sort through the determinants of export quality upgrading. Amongst them, financial leverage, GDP, input tariffs, import competition, human capital, institutions, FDI inflows, appear to significantly affecting exports quality, (Imbs & Wacziarg, 2003), (Bernini, Guillou, & Bellone, 2015), (Bas & Strauss-Kahn, 2015), (Curzi, Raimondi, & Olper, 2014). Exports quality and exports concentration have many implications. Regarding the quality, (Verhoogen, 2008) focuses on Mexico (after the devaluation of the peso) and finds exports quality upgrading lead to the increase of within-industry wage inequality.

[59] Further, the concentration index is used as a control variable and is thus subject to less interest in their settings.

5.3 Data and some stylized facts

This study uses data on 101 low and middle-income countries from the period 1980 to 2015. The data are organized into six periods of 5 non-overlapping successive years (1980-1984; 1985-1989; 1990-1994; 1995-1999; 2000-2004 and 2005-2009) and two periods of 3 non-overlapping successive years (2010-2012; 2013-2015). Data on exports quality are available until 2010. Thus, for each variable, observations are the sub period average values of the yearly observations on the corresponding variable. By subdividing like this, we address the potential bias that could arise from the presence of missing yearly-data on our dataset. Importantly, Relying on sub-period observations rather than yearly ones provided this paper with a more robust econometric methodology.

5.3.1 Variables

1) Dependent variable:

   The main dependent variable is household consumption expenditure volatility. This is the sub-period standard deviation of household consumption expenditure (scaled on GDP).

2) Independent variables

   -Interest variables:

   Exports quality: this index is computed only on commodities[60] and is extracted from the IMF databases, constructed with the methodology by (Cadot, Carrère, & Strauss-Kahn, 2011).

   Exports concentration: this indicates the extent to which exports (of goods) are concentrated on a handful product' lines. The dataset used in this study offers us many other concentration indexes[61], but we choose to use the Theil concentration index that allows us to come up with both the concentration that is due to the within and between variation in concentration. This overall concentration index is computed as follows:

$$Exports\ concentration = \frac{1}{N}\sum_{1}^{N}\frac{Exports\ values_i}{Average\ exports\ values} * Ln\left(\frac{Exports\ values_i}{Average\ exports\ values}\right) \quad (5.1)$$

[60] (Khandelwal, 2010) points out that different product might be of different quality. But since our consumption variable is an aggregate measure, we did not distinguish the product in terms of quality. We consider the overall commodities quality.

[61] There are also, (Hummels & Klenow, 2005), (Brenton & Newfarmer, 2007).

Where i is the product i.

The greater this value of $Exports\ concentration$, the fewer the number of products a country concentrates on. This total exports concentration is the summation of two-sub concentration indices, namely the intensive margin and extensive margin.

Exports concentration on extensive margin: this indicates the extent to which already existed lines of products are increasing. The concentration index is computed by distinguishing products into separate groups: traditional products (this includes products that have been traded since the beginning of the period), new products (includes new lines products) and non-traded as follows: $\left[extensive_{marg}\right] = \sum_k (\frac{N_k}{N})(\frac{\mu_k}{\mu}) Ln((\frac{\mu_k}{\mu})$ (5.2)

In this equation, k is the product group, N_k is the number of export products in the group k and $(\frac{\mu_k}{\mu})$is the relative mean of the group k.

Exports concentration in intensive margin: this is an indication of the extent to which other new line products are introduced. The formula is given as follows:

$$\left[intensive_{marg}\right] = \sum_k (\frac{N_k}{N}) \left(\frac{\mu_k}{\mu}\right) \{\left(\frac{1}{N_k}\right) \sum_{i=1}^{i=k} (\frac{x_i}{\mu_k}) Ln \left(\frac{x_i}{\mu_k}\right)\} \quad (5.3)$$

Where x is the export value

-Control variables:

➔*Exports volatility*: this is the sub-period average of 5 years standard deviation of the exports of goods and services in percentage of GDP. Another exports volatility variable is sub-period 5 years standard deviation of the exports (of goods and services in share of GDP) growth.

➔GDP per capita volatility: this is the sub-period average of 5 years standard deviations standard deviation of GDP per capita. We also use the GDP per capita growth volatility.

➔Government consumption expenditure and discretionary government consumption: this is the sub-period average of 5 years standard deviation of government consumption expenditure and discretionary government consumption. (Herrera & Vincent, 2008) find that consumption volatility is positively associated with fiscal policy volatility[62]. Further, as capital investment could also offset the resiliency of the economy (and thus of income volatility), we control for investment growth (measured as the growth of the gross formation of fixed capital) and

[62] Indeed, even if fiscal policies are barely stabilizing in developing countries, they could be countercyclical.

investment instability (measured as the instability of the gross formation of fixed capital) in the regression of income volatility, (Afonso & Furceri, 2010).

➔Received *remittances*: According to (Combes & Ebeke, 2011), consumption volatility significantly decreases with remittances. In other words, remittances received by households allow them to smooth their consumption (decrease consumption volatility).

➔As the role of institution in economic growth is historically demonstrated, (Acemoglu, Johnson, Robinson, & Thaicharoen, 2003), we controlled for *democracy accountability* and investment profile in the income growth volatility regression.

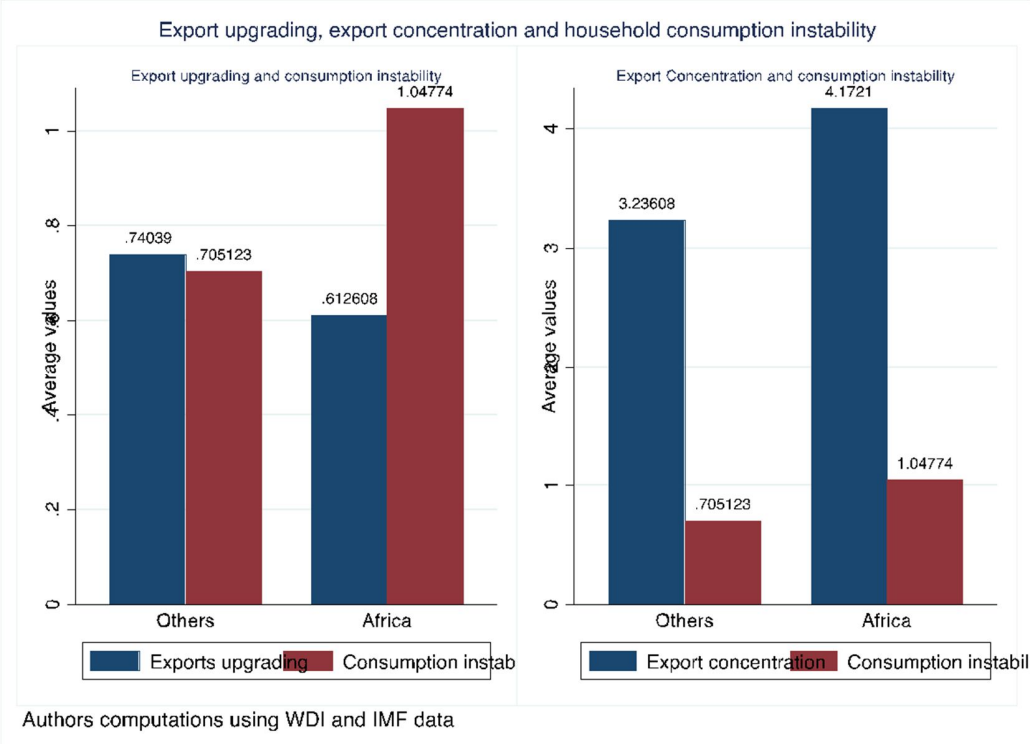
➔We also control for *natural disaster*, measured as the occurrence of natural disasters (namely droughts, storms and floods) in the country. Indeed, export stability could be hampered by natural external factors such as natural disasters (Guillaumont, Guillaumont Jeanneney, & Brun, 1999) (Noy, 2009), (Gassebner, Keck, & Teh, 2010).

➔External openness variables, namely *trade openness, capital openness, capital openness square* (as external openness could increase or decrease macroeconomic instability depending on the extent to which a country's 'market is connected to other countries' markets'), (Barrot Araya, Calderón, & Servén, 2016).

➔*Private credit* (measure as the share of financial credit that received the private sector) and money (measure as the money and quasi-money in share of GDP): we include them interchangeably to account for the effect of financial development (financial access) on consumption volatility.

5.3.2 Some stylized facts

Figure 5.1: displays the distribution of household consumption volatility and exports upgrading in developing regions between 1980 and 2015



On average, household consumption is more unstable in African developing countries (standard deviation equal 1.04) than in other developing countries of different geographical areas (America, Asia, Europe, Middle East and Oceania), (standard deviation equal 0.7). Furthermore, as clearly established on the right, exports upgrading is also greater in other countries than in African countries. Meanwhile, exports are more concentrated in African countries than in others. Put together, these graphs show that household consumption is more unstable in countries with lesser upgrading exports and higher export concentration. Specifically, the latter relationship is reflected by figure 5.2 (Appendix), which suggests that household consumption is more instable in countries with greater exports concentration (both on intensive and extensive margins).

As these results are drawn from simple correlations, we cannot say with certainty that export upgrading and export concentrations causally affect household consumption volatility. Moreover, since household consumption could be influenced by other factors (such as remittances, government consumption expenditure, etc.), extrapolating much from mere correlations would be misleading. That is why in the following, we will resort to an econometric approach to investigate whether exports upgrading and exports concentration cause household consumption volatility. This exercise will take other economic, natural and socio-political factors into account.

5.4 Econometric settings

In this section, we present the model and econometric results.

5.4.1 The model

We run two regressions based on three main equations.

The first equation uses consumption volatility as the dependent variable. In this equation, the interest variable is a variable of export upgrading. Equation is as follows:

$$HCONSVOL_{i,t} = \alpha_1 HCONSVOL_{i,t-1} + \alpha_2 X\_UP_{i,t} + \alpha_3 \boldsymbol{Z}_{i,t} + v_i + w_t + \varepsilon_{i,t} \quad (5.4)$$

Where: $HCONSVOL_{i,t}$is the household consumption volatility for the country i at period t, X_UP is a variable of export upgrading (that is export quality, or overall export concentration, or export concentration at the intensive margin, or export concentration at the extensive margin). Z is the vector of controls variable involved in the model (see definition of variable in table 14 of the Appendix); ε is the error term , v is the country fixed-effect and w is the year fixed-effects. Our main expectations are that: α_2 is negative when X_UP is a variable of export quality (meaning that consumption volatility decreases when export quality is improved): $\alpha_2$is positive when X_UP is a variable of export concentration (meaning the more exports are concentrated, the more consumption is volatile. In other words, the more exports are diversified, the less consumption is volatile.

The second equation is written like the first, but our dependent variable is instead exports volatility, so as to ascertain whether exports upgrading affect exports volatility. This would highlight our transmission mechanism. We introduce the first lag of the dependent variable, as the dependent variables in all these regressions to account for the inertia that could exist on these series. However, once this variable is included, there is an endogeneity issue due to the

correlation between this variable and the error term, thus OLS estimations will be biased, (Nickell, 1981). To address this bias, as we do not have valid external instruments that could help us to instrument the endogenous variable, we turn to the SYSTEM-GMM estimator by (Blundell & Bond, 1998)that also allow us to tackle other endogeneity issues which could be in link with other controls. It proceeds by instrumenting variables in first difference with those in level, then, inversely; those in level are instrumented by the first difference variables. Its estimations are then robust and stable, as the process imposes average stability condition on the dependent variable.

Our estimates will be valid if: the over identification hypothesis is rejected, the presence of the first order serial independence and the absence of that second order, are not rejected. (Arellano & Bond, 1991), (Arellano, 2003)[63]. Moreover, as pointed out by (Roodman, 2009), the issue of too many instruments generated by the GMM system approach has been tackle by limiting the fix number of lags.

5.4.2 Econometric results

In all our regressions, all controls are supposed endogenous, but periods fixed effects that are considered exogenous. As exports quality and exports concentration could influence each other, we do not control for them in the same regressions.

5.4.2.1 Baseline results

As shown on table 5.1, export quality upgrading significantly and negatively affects consumption volatility. This result remains firmly significant whatever variable is added or removed on the regression. Trade openness amplifies consumption instability (which confirms the results of (Combes & Ebeke, 2011)), columns 4 and 5 also show the private credit ratio and income per capita to smooth consumption volatility, even if these results are not consistent with the introduction of other variables.

[63] Moreover, the *windmeijer* correction is also applied in its second step version in order to correct standard errors , (Windmeijer, 2005).

Table 5.1: Effect of quality upgrading on household consumption volatility

	(1)	(2)	(3)	(4)	(5)
L.depvar	$-2.04x10^{-3}$	0.05	0.02	0.05	0.02
	(-0.02)	(0.60)	(0.21)	(0.57)	(0.20)
QUAL	-4.57^{**}	-2.82^{**}	-3.10^{**}	-3.80^{**}	-3.64^{***}
	(-1.98)	(-2.10)	(-2.18)	(-2.53)	(-2.70)
Remit	$-4.17x10^{-3}$	$-8.42x10^{-3}$	0.01	0.02	$-4.65x10^{-3}$
	(-0.09)	(-0.16)	(0.36)	(0.68)	(-0.17)
Trade_open	0.03^{*}	0.02	0.02^{**}	0.02^{*}	0.02^{*}
	(1.69)	(0.80)	(2.10)	(1.78)	(1.86)
GDPpc	-0.27		-0.24	-0.23	-0.25^{*}
	(-1.29)		(-1.52)	(-1.62)	(-1.96)
M2/GDP	-0.01				
	(-0.98)				
Priv_cred		$-3.56x10^{-3}$	-0.01	-0.01^{*}	-0.01
		(-0.87)	(-1.57)	(-1.71)	(-1.04)
kaopen				-0.03	-0.02
				(-0.34)	(-0.24)
Kaopen_SQ				-0.04	-0.01
				(-0.45)	(-0.12)
Gov_cons	-0.02	0.01	-0.03	-0.03	
	(-0.46)	(0.31)	(-1.04)	(-0.93)	
Gov_Discretion					0.02
					(0.41)
_cons	6.92^{*}	2.70^{**}	6.00^{**}	6.40^{***}	6.02^{***}
	(1.83)	(2.13)	(2.17)	(2.66)	(2.87)
N_obs	359	361	360	359	338
N_group	94	94	94	94	89
N_Instr	25	17	32	39	41
Ar1(Pval)	$3.49x10^{-4}$	$9.30x10^{-5}$	$3.20x10^{-4}$	$3.11x10^{-4}$	$3.44x10^{-4}$
Ar2(Pval)	0.23	0.18	0.25	0.30	0.19
Hansen(Pval)	0.85	0.26	0.63	0.88	0.68

Note: The estimation method is a two-step System-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators', 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$,

$^{***}p< 0.01$.

Regarding export concentration, table 5.2 shows that the more a country's exports are concentrated on few number of product lines, the more household consumption is volatile. This result persists even when we add and remove other controls in the model. More precisely, an increase of one point in Theil index of export concentration leads to the deviation of consumption for about 0.4 point from the normal trend.

Table 5.2: Effect of export concentration on household consumption volatility

	(1)	(2)	(3)	(4)	(5)
Lag depvar	0.04	0.11	0.05	0.07	0.05
	(0.44)	(1.14)	(0.54)	(0.66)	(0.57)
CONCENT	0.35*	0.47***	0.35**	0.40**	0.39***
	(1.77)	(2.72)	(2.49)	(2.50)	(3.76)
Remit	0.05	0.08*	0.06	0.09	0.05
	(1.05)	(1.94)	(1.45)	(1.61)	(1.08)
Trade_open	-0.02	-0.03	-0.02	-0.03*	-0.02
	(-0.86)	(-1.27)	(-0.90)	(-1.75)	(-1.19)
GDPpc	-0.21		-0.20	-0.24	-0.26
	(-1.00)		(-1.01)	(-1.26)	(-1.37)
M2/GDP	$-6.13x10^{-3}$				
	(-0.73)				
Priv_cred		$-1.18x10^{-3}$	-0.01	-0.01	$-4.25x10^{-3}$
		(-0.30)	(-0.95)	(-0.89)	(-1.00)
kaopen				-0.17*	-0.08
				(-1.67)	(-0.79)
kaopen_SQ				-0.04	-0.07
				(-0.50)	(-0.84)
Gov_cons	$-8.11x10^{-4}$	$2.88x10^{-3}$	-0.01	-0.04	
	(-0.02)	(0.14)	(-0.34)	(-1.14)	
Gov_Discretion					-0.07
					(-0.85)
_cons	2.22	-0.87	2.20	2.70	2.49
	(0.66)	(-1.02)	(0.75)	(0.97)	(1.01)
N_obs	367	369	368	367	346
N_group	94	94	94	94	89
N_Instr	23	21	24	25	32

Ar1(Pval)	0.01	$2.62x10^{-3}$	0.01	0.01	$4.43x10^{-3}$
Ar2(Pval)	0.54	0.66	0.64	0.96	0.97
Hansen(Pval)	0.42	0.72	0.56	0.988	0.88

Note: The estimation method is a two-step System-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators', 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

However, of interest to us was investigating which component of export concentration amplifies consumption volatility. We therefore change the overall export concentration variable to its within component (intensive margins) and its between component (extensive margins) respectively. As the intensive margins and the extensive margins series are not totally uncorrelated, we put them on the same regressions. Results of this are given in the following tables.

Table 5.3: Effect of export concentration-intensive margin on household consumption volatility

	(1)	(2)	(3)	(4)	(5)
Lag depvar	0.07	0.11	0.07	0.10	0.03
	(0.73)	(1.39)	(0.90)	(1.19)	(0.34)
INTENS_marg	0.36^{***}	0.34^{***}	0.33^{**}	0.53^{***}	0.23^{***}
	(3.23)	(2.63)	(2.46)	(3.63)	(3.08)
Remit	-0.02	$-1.08x10^{-3}$	0.02	0.07	0.02
	(-0.46)	(-0.04)	(0.56)	(1.50)	(0.54)
Trade_open	$-4.61x10^{-3}$	$-1.00x10^{-3}$	-0.01	-0.02	-0.02
	(-0.33)	(-0.07)	(-0.58)	(-1.14)	(-0.89)
GDPpc	-0.19		-0.18	-0.22	-0.29^{*}
	(-0.98)		(-0.92)	(-1.28)	(-1.71)
M2/GDP	$-4.54x10^{-3}$				
	(-0.67)				
Priv_cred		$-1.18x10^{-3}$	-0.01	$-3.73x10^{-3}$	-0.01
		(-0.30)	(-0.93)	(-0.88)	(-1.43)
kaopen				-0.21^{*}	-0.09
				(-1.80)	(-0.88)

kaopen_SQ				0.03	-0.04
				(0.31)	(-0.40)
Gov_cons	0.02	0.02	-0.01	-0.06	
	(1.25)	(0.95)	(-0.21)	(-1.25)	
Gov_Discretion					$2.81x10^{-3}$
					(0.06)
_cons	1.68	-0.48	2.08	2.45	3.56*
	(0.65)	(-0.85)	(0.73)	(0.98)	(1.72)
N_obs	367	369	368	367	346
N_group	94	94	94	94	89
N_Instr	32	31	25	29	31
Ar1(Pval)	$4.89x10^{-4}$	$4.17x10^{-5}$	$3.91x10^{-4}$	$1.22x10^{-3}$	$2.39x10^{-3}$
Ar2(Pval)	0.44	0.38	0.60	0.86	0.51
Hansen(Pval)	0.37	0.83	0.61	0.67	0.55

Note: The estimation method is a two-step System-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators', 2005)small sample but robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009, and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Table 5.3 and 5.4 respectively support that exports concentration on few lines of product and on little volume of products amplify consumption volatility. These results are robust to the introduction of controls in the model. These results remain significant when *INTENS_marg* and *EXTENS_marg* (intensive margins and extensive margins) are introduced in the same regressions (table 5.9 in Appendix).

Table 5.4: Effect of export concentration- extensive margin on household consumption volatility

	(1)	(2)	(3)	(4)	(5)
Lag depvar	0.05	0.11	0.06	0.08	0.09
	(0.40)	(0.95)	(0.53)	(0.86)	(0.82)
EXTENS_ marg	0.35**	1.25*	0.32**	0.39*	0.35*
	(2.47)	(1.81)	(2.30)	(1.84)	(1.94)
Remit	-0.01	0.04	-0.02	0.05	0.01
	(-0.14)	(0.52)	(-0.34)	(1.59)	(0.31)
Trade_open	-0.03*	-0.03*	-0.02*	-0.03	$1.79x10^{-3}$
	(-1.88)	(-1.71)	(-1.86)	(-1.28)	(0.11)
GDPpc	-0.62**		-0.57*	-0.72***	-0.27**
	(-2.02)		(-1.73)	(-2.72)	(-2.23)
GDPpc_ins tab	0.56*	0.17	0.54	0.54*	
	(1.73)	(0.34)	(1.61)	(1.82)	
M2/GDP	-0.01**				
	(-2.01)				
Priv_cred		$1.72x10^{-4}$	-0.01*	-0.01**	-0.01*
		(0.02)	(-1.70)	(-2.07)	(-1.75)
kaopen				-0.21*	-0.03
				(-1.87)	(-0.36)
kaopen_SQ				0.08	-0.02
				(0.68)	(-0.33)
Gov_cons	0.04	0.10	0.06	-0.04	
	(0.46)	(0.69)	(0.72)	(-1.42)	
Gov_Discr etion					$1.37x10^{-3}$
					(0.02)
_cons	3.24	-2.42	2.30	4.72***	3.57**
	(1.13)	(-0.40)	(0.79)	(2.77)	(2.51)
N_obs	367	368	368	367	346
N_group	94	94	94	94	89
N_Instr	21	19	21	30	42
Ar1(Pval)	$1.39x10^{-3}$	$6.32x10^{-3}$	$2.85x10^{-4}$	$5.42x10^{-4}$	$8.58x10^{-4}$
Ar2(Pval)	0.22	0.19	0.22	0.24	0.37
Hansen(Pv al)	0.36	0.49	0.29	0.50	0.41

Note: The estimation method is a two-step System-GMM with (Windmeijer, A finite sample correction for the variance of linear

efficient two-step gmm estimators', 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

5.4.2.2 Heterogeneity

Since according to (Craigwell, Jackman, & Moore, 2010), the effect of export concentration in African countries differs from other, we control for this heterogeneity by subdividing our sample into Africa and non-Africa sub samples. Indeed, since African economies have meaningful constraints on their financial markets, their private consumption could be subject to more volatility in response to any macroeconomic instability. We hold the last regression of the above tables (the equation where all our controls variables are included). The results are displayed on table 5.5. Columns 1 and 5 show that household consumption volatility decreases with exports upgrading, and that the effect is greater in non-African countries than in African countries (5.5 versus 2.4 standard points of the standard deviation). In terms of export concentration, columns 2 to 4 support that consumption volatility increases with export concentration in Africa. This result also holds true for non-African countries (columns 6 to 8).

Table 5.5: Effects of export upgrading and export concentration on household consumption volatility: Africa versus non-Africa

	Africa				Non Africa			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag depvar	0.06	0.19	0.19*	0.21	-0.06	0.0	0.1	-0.03
	(0.42)	(1.62)	(1.69)	(1.47)	(-0.49)	(0.62)	(1.44)	(-0.17)
QUAL	-2.43**				-5.61*			
	(-2.08)				(-1.70)			
CONCENT		0.24***				0.20*		
		(3.19)				(1.78)		
INTENS_marg			0.33**				0.20*	
			(2.51)				(1.71)	
EXTENS_marg				0.27*				0.49*
				(1.67)				(1.67)
Priv_cred	-0.01*	-0.01	-2.97x10-3	-4.13x10-3	-0.01	2.62x10-3	-1.54x10-3	0.01
	(-1.86)	(-0.94)	(-0.46)	(-0.70)	(-0.75)	(0.65)	(-0.45)	(0.54)
Remit	-0.02	-0.01	-0.02	0.08	-0.08**	-0.00492	-5.03x10-4	-0.01
	(-0.92)	(-0.47)	(-0.48)	(1.43)	(-2.31)	(-0.14)	(-0.01)	(-0.09)
Trade_open	-0.01	-0.01*	-0.01	-0.01	2.76x10-3	-2.73x10-3	-3.45x10-3	0.02
	(-0.38)	(-1.70)	(-0.68)	(-0.87)	(0.40)	(-0.20)	(-0.25)	(1.43)
GDPpc	-0.06	-0.13	-0.04	-0.12	0.75	-0.04	-0.05	0.12
	(-0.44)	(-1.11)	(-0.33)	(-0.94)	(1.20)	(-0.47)	(-0.61)	(0.53)
Gov_cons	-1.08x10-3	0.02	0.02	-0.08**	0.03	0.04	-0.01	0.06
	(-0.03)	(0.52)	(0.76)	(-1.99)	(0.46)	(0.96)	(-0.34)	(0.86)

kaopen	0.01	-0.08	-0.08	$2.48x10^{-3}$	-0.06	-0.09	-0.11	-0.40
	(0.03)	(-0.71)	(-0.49)	(0.01)	(-0.40)	(-0.85)	(-0.72)	(-0.89)
kaopen_SQ	0.05	0.27**	0.32**	0.13	0.04	0.01	0.09	-0.06
	(0.21)	(2.45)	(2.34)	(1.24)	(0.51)	(0.15)	(1.11)	(-0.46)
_cons	3.65	0.87	-0.46	3.19	-2.33	-0.25	0.45	-2.24
	(1.61)	(0.42)	(-0.22)	(1.63)	(-0.43)	(-0.24)	(0.47)	(-0.98)
N_obs	160	168	168	168	199	199	199	199
N_group	42	42	42	42	52	52	52	52
N_Instr	29	32	31	38	32	31	38	19
Ar1(Pval)	0.01	$3.27x10^{-3}$	$4.70x10^{-3}$	$9.78x10^{-3}$	0.01	0.01	$2.43x10^{-3}$	0.02
Ar2(Pval)	0.15	0.69	0.67	0.85	0.41	0.36	0.46	0.32
Hansen(Pval)	0.26	0.64	0.66	0.46	0.50	0.42	0.41	0.66

Note: The estimation method is a two-step System-GMM with (Windmeijer, 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Further, to check whether our results are driven by the dominance of natural resources, we also subdivide our sample according to the level of fuel exports. The Median of fuel exports in our sample being 3.44 % of total exports merchandise, we distinguish the cases where fuel exports are less than the median on those where fuel exports are more than the median. The results are displayed on table 5.10. While both export concentration in intensive and extensive margins seem to significantly increase consumption instability in countries with low fuel exports dependence, only intensive margin export concentration seems to robustly affecting consumption instability in countries with higher fuels exports dependence. This result is interesting, as it is implying that in countries that are highly dependent on fuel exports, decreasing their concentration on such existed lines of exports will allow them to decrease consumption instability.

5.4.2.3 Transmission mechanisms

In this section, we entail to evidence what is behind the effect of export diversification and export quality upgrading on household consumption. We hypothesize that export quality and export concentration would affect consumption volatility through their effects on income volatility. In order to test that hypothesis, we add the export concentration or export quality variables in the equation once income volatility is included (table 5.6).

In column 1, income per capita volatility is included and enters positively and significantly to explain household consumption volatility. However, when export concentration variable is added (column 2), income volatility is no more significant while the export concentration is significant at 5%. Interestingly, other controls maintain their significance comparing to the model on column 1. The same thing is done with the concentration in intensive margins and concentration in extensive margin on columns 3 to 6. In both cases, income volatility enters positively and significantly when the concentration index is not included. But when the latter is taken into account, it enters positively and significantly, while income volatility completely lost its significance. The same thing happens with export quality on columns 7 and 8. Income volatility enters positively and significantly on column 7, but when export quality is added on column 8, it enters negatively and significant, while income volatility is no more significant.

Table 5.6: Household consumption volatility, GDP volatility and export upgrading and export concentration

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lag depvar	0.12	0.06	0.14	0.07	0.07	0.07	0.19*	0.06
	(1.21)	(0.66)	(1.56)	(0.83)	(0.74)	(0.76)	(1.92)	(0.76)
CONCENT		0.40**						
		(2.48)						
INTENS_marg				0.30**				
				(2.31)				
EXTENS_marg						0.36*		
						(1.77)		
QUAL								-3.41**
								(-2.54)
GDPpcinstab	0.24**	0.42	0.51*	0.31	0.47*	0.47	0.43*	0.29
	(2.18)	(1.01)	(1.76)	(1.33)	(1.79)	(1.62)	(1.95)	(1.06)
Remit	0.06	0.07	0.04	0.05	0.03	0.04	0.01	0.02
	(1.64)	(1.14)	(1.05)	(1.20)	(1.05)	(1.25)	(0.59)	(0.80)
GDPpc	-0.35*	-0.61	-0.64**	-0.53**	-0.68***	-0.69***	-0.50**	-0.45*
	(-1.86)	(-1.51)	(-2.21)	(-2.24)	(-2.84)	(-2.88)	(-2.19)	(-1.81)
Trade_open	-0.02*	-0.04*	-0.02	-0.02	-9.57x10-3	-9.78x10-3	2.70x10-3	0.01
	(-1.68)	(-1.77)	(-0.91)	(-1.12)	(-0.52)	(-0.57)	(0.26)	(0.85)
Gov_cons	-0.06	-0.05	-0.06**	-0.04	-0.05*	-0.05	-0.01	-0.03
	(-1.58)	(-1.19)	(-2.20)	(-1.23)	(-1.72)	(-1.59)	(-0.50)	(-1.18)
kaopen	-0.25**	-0.22**	-0.21**	-0.18**	-0.19*	-0.18	-0.22**	-0.08
	(-2.54)	(-2.12)	(-2.13)	(-1.96)	(-1.75)	(-1.50)	(-2.28)	(-0.75)
kaopen_SQ	0.09	0.03	0.10	0.02	0.07	0.04	0.17**	0.03
	(1.35)	(0.25)	(1.12)	(0.21)	(0.70)	(0.37)	(2.15)	(0.32)
_cons	3.48*	3.64	4.69***	3.88*	5.30***	5.11***	2.57*	6.30***
	(1.82)	(1.45)	(2.77)	(1.89)	(2.92)	(3.21)	(1.90)	(3.08)

N_obs	367	367	367	367	367	367	367	359
N_group	94	94	94	94	94	94	94	94
N_Instr	26	23	25	31	32	33	39	39
Ar1(Pval)	$4.64x10^{-4}$	$2.72x10^{-3}$	$3.60x10^{-5}$	$3.72x10^{-4}$	$6.16x10^{-5}$	$5.47x10^{-5}$	$4.69x10^{-5}$	$3.94x10^{-5}$
Ar2(Pval)	0.26	0.55	0.31	0.40	0.18	0.21	0.23	0.18
Hansen(Pval)	0.70	0.95	0.71	0.97	0.49	0.48	0.45	0.89

Note: The estimation method is a two-step System-GMM with (Windmeijer, 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the household consumption (scaled on GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

In the following, we dig more deeply to observe the transition mechanism in more detail. Our intuition is that lower export quality and export concentration increase export volatility, which turns out with increasing income volatility. In order to evidence that intuition, we assess the impact of export concentration and export quality regarding the volatility on exports. The results are given on table 5.7.

Export quality upgrading (columns 1 to 3) significantly smooth export growth. This result remains robust whatever controls are included in the model. Moreover, from columns 4 to 6, there is clear evidence that export concentration leads to an increase of export volatility. The significant and positive effect of export concentration remains the same when we instead use exports volatility as dependent variable (Table 5.8).

Table 5.7: Impacts of export upgrading and export concentration on export growth volatility

	(1)	(2)	(3)	(4)	(5)	(6)
Lag depvar	0.30***	0.16*	0.20***	0.25**	0.20**	0.14
	(2.66)	(1.94)	(2.71)	(2.57)	(2.31)	(1.32)
XQUAL	-6.19*	-10.27*	-11.33**			
	(-1.69)	(-1.69)	(-2.10)			
CONCENT				3.81*	3.58*	4.41**
				(1.85)	(1.84)	(2.44)
Priv_cred	-0.04*	-0.07***	-0.06***	$-3.19x10^{-3}$	0.02	0.03
	(-1.79)	(-3.06)	(-2.67)	(-0.06)	(0.28)	(0.57)
Remit	0.01	-0.09	0.15	0.11	0.07	0.05
	(0.06)	(-0.46)	(0.80)	(0.64)	(0.28)	(0.18)
gfcf_growth	-0.10			-0.09		
	(-0.96)			(-1.18)		
gfcf_instab		1.27	1.04		0.55	0.67
		(0.81)	(0.93)		(0.75)	(0.64)
nat-desaster	-0.28	-0.08	-0.12	0.39	0.71	1.04**
	(-1.36)	(-0.27)	(-0.38)	(1.08)	(1.64)	(2.04)
kaopen	-0.37	1.54	0.14	-0.80	0.18	1.07
	(-0.62)	(1.01)	(0.10)	(-0.80)	(0.19)	(1.08)
Democ	0.74	1.11	0.58	1.64	-0.55	-3.17
	(0.76)	(1.12)	(0.46)	(1.40)	(-0.22)	(-1.50)
Invst_profile			2.10***			0.78
			(3.03)			(0.62)
_cons	10.15***	12.74**	-4.458	-10.61	-5.10	-3.48
	(3.25)	(1.98)	(-0.61)	(-1.04)	(-0.52)	(-0.38)
N_obs	438	443	443	310	315	315
N_group	100	100	100	66	66	66
N_Instr	32	23	29	32	29	32
Ar1(Pval)	0.03	$2.62x10^{-3}$	$6.13x10^{-4}$	0.04	$1.95x10^{-4}$	$1.47x10^{-3}$

Ar2(Pval)	0.50	0.33	0.24	0.56	0.23	0.12
Hansen(Pval)	0.18	0.23	0.71	0.31	0.23	0.31

Note: The estimation method is a two-step System-GMM with (Windmeijer, 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is the export growth (of goods and services) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Table 5.8: Effect of export concentration on export volatility

	(1)	(2)	(3)
Lag depvar	0.14*	0.18**	0.19*
	(1.67)	(2.12)	(1.91)
Concent	0.70**	0.70**	0.69**
	(1.99)	(2.39)	(2.15)
Priv_cred	0.03	0.02	0.02
	(1.52)	(1.37)	(1.29)
Remit	0.02	0.12	0.13
	(0.11)	(0.79)	(0.89)
gfcf_growth	0.03		
	(1.08)		
gfcf_instab		0.28	0.18
		(1.02)	(0.63)
Democ	0.20	0.03	-0.17
	(0.45)	(0.08)	(-0.39)
nat-desaster	-0.12	-0.03	-0.03
	(-1.01)	(-0.18)	(-0.23)
kaopen	0.40	0.34	0.43*
	(0.86)	(1.37)	(1.77)
Invst_profile			0.101
			(0.43)
_cons	-1.44	-1.66	-1.49
	(-0.51)	(-0.69)	(-0.56)
N_obs	326	375	375
N_group	68	74	74
N_Instr	26	32	36
Ar1(Pval)	0.01	$2.96x10^{-3}$	$2.64x10^{-3}$
Ar2(Pval)	0.37	0.43	0.44
Hansen(Pval)	0.25	0.24	0.20

Note: The estimation method is a two-step System-GMM with (Windmeijer, A finite sample correction for the variance of linear efficient two-step gmm estimators', 2005)small sample robust correction. Time effects are included in all the regressions. T-statistics are below the coefficients. Instability is the 5-year standard deviation of the corresponding variable. Data are averaged over six non-overlapping 5-year periods between 1980 and 2009 and two non-overlapping 3-year periods between 2010 and 2015. The dependent variable is goods and services exports (in scale of GDP) instability.*t* statistics in parentheses, $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

5.5 Conclusion

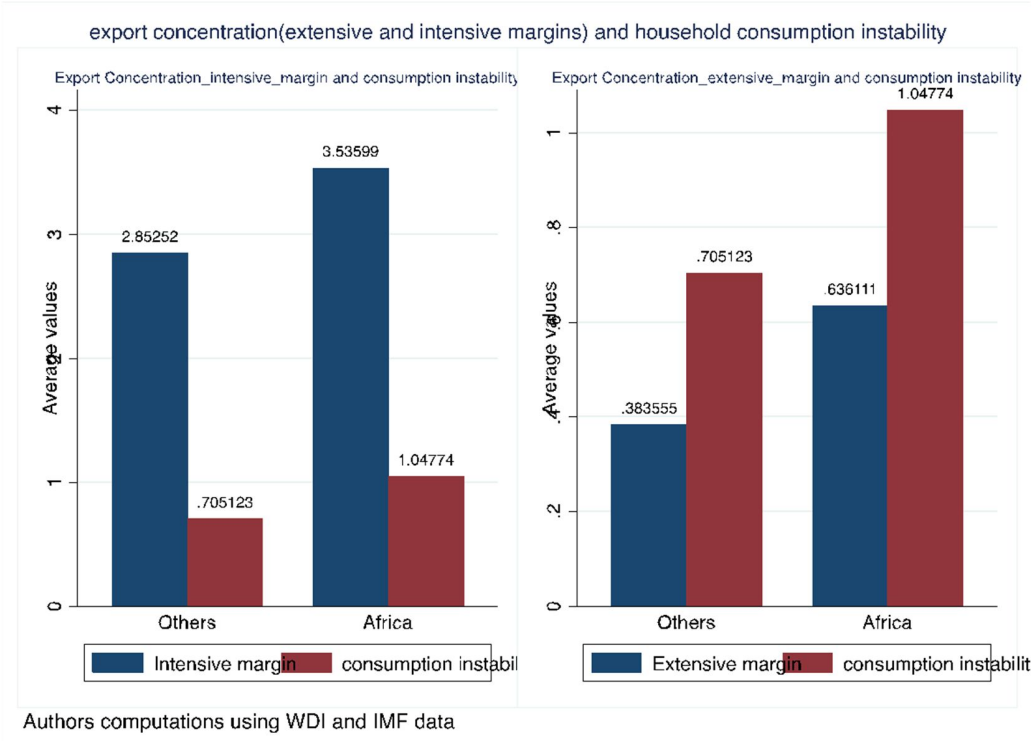
In this paper, we analyzed a sample of 101 low and middle-income countries over the period 1980-2015, to investigate how export concentration and export quality affect household consumption volatility. Using an econometric setting based on the SYSTEM-GMM approach, which allow us to address the endogeneity issues such as the reverse causality concern. We find that export concentration increases consumption volatility. This result is valid for both exports concentration in intensive margins (in terms of the change within the existing lines of products) and in extensive margins (in terms of the change in number of the lines of products). Additionally, we find that exports quality upgrading decreases consumption volatility. These results are valid in African and non-African countries.

These results are also significant regardless the dependence of the country to commodities (proxied here as the share of fuel exports on total merchandise exports). Interestingly, we found that if highly fuel export dependent countries decrease their concentration on the existed lines of commodities, they will see their household consumption volatility decreases.

Our results support the idea that the increase in export quality upgrading and the decrease of export concentration lead to less exports volatility, which in turn lead to less income volatility. Thus, this paper recommends any trade policies that attempt to favor exports diversification, both in terms of volume and in terms of the number of product to be supported. It also suggests that developing countries raise their exports quality in order to have less export instability, and therefore less income and consumption volatility. This is of the utmost importance, as other government stabilizing tools are widening the fiscal deficit, jeopardizing future growth perspectives. Further research will be conducted using most disaggregated consumption and export quality data.

5.6 Appendix

Figure 5.2: Exports concentration and household volatility



Authors computations using WDI and IMF data

Table 5.9: Effect of export concentration on consumption volatility

	(1) log_housegdp _ vol	(2) log_housegdp _ vol	(3) log_housegdp _ vol	(4) log_housegdp _vol	(5) log_housegdp _vol
L.depvar	0.06	0.14	0.07	0.11	0.05
	(0.65)	(1.48)	(0.80)	(1.09)	(0.50)
INT_marg	0.36**	0.29**	0.37***	0.38**	0.20***
	(2.46)	(2.39)	(2.59)	(2.09)	(3.57)
EXT_marg	0.32*	0.60**	0.48*	0.58**	0.27*
	(1.74)	(2.27)	(1.70)	(1.98)	(1.87)
M2/GDP	-4.82x10^{-3}				
	(-0.76)				
Remit	0.05	0.03	0.05	0.07	0.03
	(1.31)	(0.93)	(1.21)	(1.35)	(0.80)
Trade_open	-0.02	-0.01	-0.02	-0.02	-3.70x10^{-3}
	(-1.07)	(-1.00)	(-1.17)	(-1.00)	(-0.16)
GDPpc	-0.18		-0.08	-0.04	-0.18*
	(-1.06)		(-0.51)	(-0.25)	(-1.71)
Gov_cons	0.02	0.03	0.01	0.02	
	(0.56)	(1.24)	(0.43)	(0.36)	
Priv_cred		-4.03x10^{-4}	-2.74x10^{-3}	-7.97x10^{-4}	-4.24x10^{-3}
		(-0.13)	(-0.52)	(-0.17)	(-1.31)
kaopen				-0.08	-0.07
				(-0.73)	(-0.79)
Kaopen_sq				0.01	-0.03
				(0.10)	(-0.36)
Gov_Discretion					0.04
					(0.96)
_cons	1.47	-0.76	0.25	-0.62	2.12*
	(0.61)	(-1.33)	(0.11)	(-0.28)	(1.68)
Nber_obs	367	369	368	367	346
Nber_group	94	94	94	94	89
Nber_ints	33	37	30	34	38
Ar1	1.76x10^{-3}	1.91x10^{-4}	9.67x10^{-4}	9.90x10^{-4}	1.29x10^{-3}
Ar2	0.41	0.39	0.52	0.48	0.31

Hansen	0.25	0.56	0.48	0.47	0.43

t statistics in parentheses

$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

Table 5.10: Effect of exports concentration on consumption volatility by level of fuel exportations

	(1)	(2)	(3)	(4)	(5)
Sample	Fuel exports > 3.44% exports merchandises		Fuel exports < 3.44% exports merchandises		
DepVar					
L.depvar	0.20*	0.03	0.01	-0.02	-0.09
	(1.75)	(0.33)	(0.08)	(-0.17)	(-0.71)
INT_marg	0.30	0.23**	0.45***	0.22***	
	(1.14)	(2.02)	(3.90)	(2.78)	
EXT_marg	0.30**	0.14	0.53***	0.36*	
	(2.07)	(0.78)	(3.41)	(1.74)	
M2/GDP	0.02		$-2.46x10^{-3}$		
	(1.51)		(-0.50)		
Remit	0.08**	0.07	0.02	0.02	0.01
	(2.02)	(1.49)	(0.50)	(0.44)	(0.37)
Trade_open	$2.30x10^{-3}$	0.01	-0.02	-0.01	-0.01
	(0.18)	(0.62)	(-1.47)	(-1.00)	(-1.15)
GDPpc	-0.04	-0.18*	-0.08	-0.05	-0.01
	(-0.22)	(-1.72)	(-0.88)	(-0.40)	(-0.13)
Gov_cons	0.07**		0.03		
	(2.17)		(1.14)		
Priv_cred		$-7.35x10^{-3}$		$-3.11x10^{-3}$	$6.11x10^{-4}$
		(-0.12)		(-0.54)	(0.18)
kaopen		0.01		-0.24**	-0.25***
		(0.05)		(-2.34)	(-2.90)
Gov_Discretion		0.03		0.04	0.09
		(0.72)		(0.67)	(0.71)
Kaopen_sq		-0.12		0.20**	0.24***
		(-1.31)		(2.38)	(3.14)
CONCENT					0.38**
					(2.41)
_cons	-1.80	2.13*	-0.09	0.04	-0.6
	(-0.87)	(1.73)	(-0.09)	(0.03)	(-0.56)
Nber_obs	210	195	157	151	151
Nber_group	75	70	54	51	51
Nber_ints	33	37	33	38	32
Ar1	0.01	0.01	0.01	0.02	$3.92x10^{-3}$

Ar2	0.35	0.36	0.73	0.90	0.97
Hansen	0.47	0.66	0.68	0.20	0.51

t statistics in parentheses

$^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$

Table 5.11: Countries

Albania	Dominican Republic	Liberia	Romania
Algeria	Ecuador	Libya	Rwanda
Angola	Egypt	Macedonia	Saint Lucia
Armenia	El Salvador	Madagascar	Senegal
Bangladesh	Eritrea	Malawi	Sierra Leone
Belarus	Gabon	Malaysia	Solomon Islands
Belize	Gambia	Mali	South Africa
Benin	Georgia	Mauritania	Sri Lanka
Bolivia	Ghana	Mauritius	Sudan
Bosnia and Herzegovina	Guatemala	Mexico	Suriname
Botswana	Guinea	Moldova	Swaziland
Brazil	Guinea-Bissau	Mongolia	Syria
Bulgaria	Guyana	Morocco	Tajikistan
Burkina Faso	Haiti	Mozambique	Tanzania
Burundi	Honduras	Namibia	Thailand
Cambodia	India	Nicaragua	Togo
Cameroon	Indonesia	Niger	Tonga
Chad	Jamaica	Nigeria	Tunisia
Colombia	Jordan	Pakistan	Turkey
Comoros	Kazakhstan	Panama	Uganda
Congo	Kenya	Papua New Guinea	Ukraine
Costa Rica	Kyrgyz Republic	Paraguay	Vietnam
Cote d'Ivoire	Lebanon	Peru	
Djibouti	Lesotho	Philippines	

Table 5.12: Some descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Consump_instab	367	0.87	0.78	-1.60	3.53
QUAL	359	0.68	0.17	0.25	1.04
CONCENT	367	3.58	1.14	0	6.27
INT_marg	367	3.09	1.00	0	5.81
EXT_marg	367	0.48	0.51	-0.036	2.36
M2/GDP	367	39.85	28.50	7.07	236.95
Priv_cred	367	27.55	25.04	1.61	148.31
Remit	367	4.17	5.80	0.00	37.21
GDPpc	367	10.86	2.42	2.70	17.05
GDPpc_inst	367	7.68	2.52	0.29	14.42
Trade_open	367	13.27	13.14	-21.75	73.48
Kaopen	366	-0.34	1.27	-1.90	2.37
GOVCONS	367	14.32	5.73	4.08	46.89
Gov_Discretion	345	-0.99	2.09	-4.74	12.10
GFCF_instab	364	2.51	2.07	0.02	14.69
GFCF_growth	311	7.53	28.9	-80.06	486.68
Fuel_exports	317	15.41	25.31	0	97.81
Exports_instab	318	11.18	7.89	0.87	49.37
Democ	303	3.40	1.28	0.61	6
Invest_profile	303	6.75	1.75	1.72	11.32

Table 5.13: Variables: definitions and sources

Variable	definition	source
Consump_vol	Household consumption volatility. Foe each country, this is the standard deviation of household consumption (in share of gdp) of each non-overleaping successive 5 years	WDI 2018

QUAL	Exports quality of commodities: see section on variable	IMF[64]
CONCENT	Exports (of good) concentration: see section on variable	IMF
INT_marg	Exports (of good) concentration in intensive margins: see section on variable	IMF (2018)
EXT_marg	Exports (of good) concentration in extensive margins: see section on variable	IMF (2018)
M2/GDP	Ratio of money and quasi money in share of GDP	WDI 2018
Priv_cred	Financial credit given to the private sector, in scale of GDP	WDI 2018
Remit	Personal remittances received (in share of GDP)	WDI 2018
GDPpc	GDP per capita (in logarithm)	WDI 2018
GDPpc_inst	GDP per capita (in logarithm) instability: this is the standard deviation of GDP per capita measured on the successive 5 on overlapping years	Authors
Trade_open	Trade openness: sum of total exports and imports of good and services, in share of GDP	WDI 2018
Kaopen	International Capital openness: (normalized from 0 to 1)	(Chinn, 2006)
GOVCONS	Government consumption expenditure (in share of GDP)	WDI 2018
Gov_Discretion	Discretionary government consumption expenditure: this is the residual of the regression of government consumption expenditure on its first two lags and the trend	Authors
GFCF_instab	Instability of Gross fixed capital Formation: this is the standard deviation of Gross fixed capital Formation, measured on each 5 successive non-overlapping years	Authors
GFCF_growth	Growth of Gross fixed capital Formation	WDI 2018
Fuel_exports	Total exports of fuels ((% of merchandise exports)	WDI

64 https://www.imf.org/external/datamapper/Technical%20Appendix%20for%20Export%20Diversification%20database.pdf

		2018
Exports_instab	Instability of exports of good and services: measured as the 5 years standard deviation of exports of good and services	Authors
Democ	Democracy accountability: ranking -10 to +10, from highest autocracies to highest democracies	IRCG 2014
Invest_profile	Investment profile	IRCG 2014
Nat_disasters	Natural disasters: this is the logarithm of the number of affected persons following episodes of storms, floods and droughts	EMDATA (2017)

Chapter 5: Export upgrading and consumption volatility in developing countries.

General conclusion

This thesis examines some public policies of food crises and exports upgrading in developing countries at the macroeconomic level. First, it assesses how food price shocks generally affect government expenditure composition, as well as the effects of fiscal policies and remittances on social wellbeing during times of food price shocks. Second, in the context of trade-related measures that governments have generally taken in time of food crises, we assess the role of climatic variability in driving price distortions on agricultural trade. Finally, turning to potential trade-related structures and household vulnerability, we discuss the importance of exports diversification and implications of exports concentration on household consumption volatility. Our research relies mostly on data from the period 1980-2012, and we leverage different econometric frameworks to order to address potential issues of endogeneity.

This thesis focuses on food import crises in developing countries through the lens of import food prices, since such countries are generally net-food importers and therefore more prone to seeing their imports food bills increase after surges in food prices. While domestic factors (such as weather conditions, roads, and energy infrastructures) may also expose local prices to international ones, our food price data are measured at the world market, which allow us to avoid any endogeneity issues that could arise from the fact that local prices in each country are influenced by the country's characteristics.

We find in Chapter 1 that food price shocks do not significantly affect total government expenditures. However, such shocks lead to a significant increase of the share of government consumption expenditures on total government expenditure. Interestingly, the effect of food price shocks on government consumption expenditure increase with country's vulnerability. These findings suggest that the composition effect is present when a government acts to stabilize prices. Capital expenditures, recognized to play a most determinant role for future growth perspectives, are thus hindered in time of food crises because of the advantage of government consumption expenditure to meet short-terms needs. This calls for more attention to the issue of food crises, as vulnerable countries will thus be seeing their future prospects for growth perspectives (which mostly rely on capital expenditures) under threat.

In Chapter 2, we find that discretionary fiscal policies (as measures of the unanticipated change in government consumption expenditures) play a resilient role in mitigating the effects of food price shocks on household consumption. This result is mostly observed in African economies and in countries with less flexible exchange rate. According to our findings, such discretionary fiscal policies may pass through government subsidies and other transfers. In the same vein, we argue in Chapter 3 that fiscal stimulus on government consumption expenditure significantly reduces the impact of food price shocks on socio-political stability. Remittances similarly appear to play an important and related role in reducing the likelihood of socio-political instability in time of food price shocks.

This finding supports the positive impact of such fiscal policies on social wellbeing in time of food crisis. And just as remittances play the countercyclical role of income and consumption (in the previous literature), this result also suggests that remittances decrease the likelihood of socio-political instability during food crises. This is to be expected, since remittances may bolster the purchasing power of recipients and therefore their consumption, and discourage socio-political revolts.

Our thesis also supports the idea, discussed in Chapter 4, that price distortions in international trade are also connected to domestic weather conditions. More precisely, we find that increased precipitation promotes pro-agricultural bias in countries with a low share of population working in agriculture, while the inverse is true for countries with large percentages of people in agriculture. While of course large variability in climatic conditions give rise to large trade distortions, our results also show that even minor climate variability makes a difference. Finally, our thesis looks beyond external shocks to the role played by trade structure on household vulnerability. Specifically, Chapter 5 assesses the effects of exports concentration and upgrading on household consumption vulnerability. We find that the increase in exports concentration leads to a significant decrease in consumption volatility. This result is observed both in terms of the number of products and in terms of the quantity of the products. We show that exports quality upgrading plays a similarly significant role in reducing household consumption vulnerability. In fact, we find that both a decrease in exports concentration and an increase in exports quality lead to less volatile exports, which then decrease income volatility and therefore also consumption volatility.

However, this thesis has its limitations. Data challenges constrained our focus to considering fiscal policies at the macro and not the micro level, however accounting for household characteristics at the very micro level could yield more detailed information. The limited scope of this paper could be fleshed out with some case studies at the micro level. These studies would consider domestic related factors, such as weather conditions and other natural disasters episodes, the state of transportation infrastructures and trade distortionary measures, which should affect the pass through of international prices to domestic prices. Regarding the effect of fiscal policy on household consumption and socio-political instability, great care should be taken to ensure that these measures directly benefit the most vulnerable.

Notwithstanding these limitations, they could hence reveal some recommendations. Regarding the extent to which food price shocks affect government expenditures, it could be good that every measure gearing at limiting countries vulnerability to international food price shocks be encouraging. This will be helpful since the government may not need all the time to react which such policies that are not favoring the future growth perspectives (indeed, government consumption expenditure has proven unproductive for growth, contrary to capital expenditures whose effects may be more pro-growth in the near future). These measures would be every means that could help to increase agricultural production. This includes mitigation and adaptation tolls to climate change, the improvement of roads and energy infrastructures. While fiscal policies at the aim of stabilization in bad times are to be encouraged, the authorities need to be cautious about the target population. Drawing from results, remittances may also be encouraged for their helpful role in reducing the likelihood of socio-political instability. This action could consist of lowering the cost of sending money in developing countries, (IMF 2017), and decreasing barriers for migrations, (Clemens & McKenzie, 2018).

This study also suggests that governments should pay attention to the different groups of population when intervening on international trade. Indeed, even if they have favored urban population by banning exports, these measures are not advantageous for the producers that may not be encouraged to produce more. They could rather allow free trade see how to compensate the losers. This idea is reinforced, as trade distortions have been recognized to fuel the food prices at the international level.

Another implication of this thesis regards exports concentration, suggesting their harmful effects on household consumption volatility. Thus, developing countries are encouraged to

produce more good for trade. They are also encouraged to recourse to technology; for instance, to increase both the quantities exported and the quality, while extending the number of line of products. Indeed, all these measures would undoubtedly sustain an increasing economic complexity, which is important for future economic growth and development, (Hidalgo & Hausmann, 2009). Moreover, improving the quality of products would also help reduce consumption volatility, as it will be contributing to reduce exports volatility. These suggestions are valid both for commodities natural resources countries and non-natural resource rich countries.

General conclusion

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