

The relationship between the black and the official exchange rates in Vietnam

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This study examines the relationship between the official and the black exchange rates in Vietnam from January 2000 to December 2015. Since the *de facto* rules governing the changes in the official exchange rate are not clearly known in Vietnam, we first present the functioning of both the official and black foreign exchange markets in details and explain why they may mutually influence each other. Applying a cointegration analysis of a vector error-correction model, the results reveal the existence of a long-run equilibrium relationship between both rates. However, disequilibria are corrected only with changes in the official exchange rate, while the black exchange rate seems weakly exogenous. The result supports the argument that a depreciation of the black exchange rate leads the government to adjust the official exchange rate to unify both rates in the long term. The black exchange rate is affected only by short-run shocks from the official exchange rate, but in complex ways.

Keywords: official exchange rate, black exchange rate, cointegration.

JEL codes: E58

1. Introduction

Exchange rate management remains a key challenge in economic development strategies for developing countries' integration in the globalization process (Eichengreen, 2007). Avoiding local currency overvaluation, if not applying undervaluation, remains an imperative, particularly for open economies where competitiveness, growth and inflation are greatly affected by the changes in the exchange rate. Overvaluation would hamper, while undervaluation would accelerate growth (Gala, 2008), with likely non-linear effects (Couharde and Sallenave, 2013). Rodrik (1986, 2008) explains that undervaluation is a positive factor of industrialization by compensating institutional and market failures. Therefore, identifying the appropriate level of exchange rate is still a difficult task for countries pursuing a managed or pegged exchange rate policy.

In countries where the pegged official exchange rate is overvalued and the balance of payments deficit is persistent despite various administrative controls, the international reserves are too low to fulfil the demand for foreign currencies at the official market. Then, a black market for foreign exchange can develop and play an important role, even for the official exchange rate policy (Edward, 1989; Agenor, 1992; Montiel, Agenor and Uj Haque, 1993; Agenor and Taylor, 1993; Kiguel and O'Connell, 1995; Phylaktis, 1997; Panayiotis and Anastassios, 2005).

Since the early 1990s, Vietnam has implemented several changes of its exchange rate arrangement. However, usually the exchange rate has been pegged to the US dollar (USD) in periods of macroeconomic stability, while it has been depreciated with more adjustment in periods of instability (Vo et al, 2000; Phuc and Duc-Tho, 2009; Nguyen et al, 2010)¹.

Foreign exchange transactions in Vietnam coexist in an official market and black markets. The official market can be roughly presented as a two-level market. The first level is a market where foreign exchange transactions are carried out between commercial banks or credit institutions and their final customers, being firms or individuals. The second level is an interbank market in which the foreign currencies are sold and purchased between authorized commercial banks and credit institutions, and where the central bank, the State

¹ According to the categories of the International Monetary Fund's exchange rate regimes, Vietnam followed multiple exchange rates (before 1989); crawling bands (1989-1990); pegged exchange rate within horizontal bands (1991-1993); conventional fixed peg arrangement (1994-1996); crawling bands (1997-1998); conventional fixed peg arrangement (1999-2000); crawling peg (2001-2007); crawling bands (2008-2011); conventional fixed peg arrangement (2012-2015).

Bank of Vietnam (SBV), intervene to determine the level of the official exchange rate (OER).

The *de jure* rules that the authorities use to determine the level of the OER are known. Since 1999, the OER of the day equals the interbank exchange rate (IER) of the previous day (that is calculated as an average of purchasing exchange rates applied by authorized commercial banks and credit institutions); and the IER of the day can evolve around the OER within an authorized margin of fluctuations set by the SBV. The IER and the OER are determined by supply of and demand for foreign exchange in the interbank market, which would be determined by the supply of and demand for foreign currency from the Vietnamese economy. However, supply of and demand for foreign exchange can be strongly controlled by the SBV in the interbank market.

Outside-banks foreign exchange transactions between domestic firms and/or individuals are legally prohibited but are rather tolerated, if not ignored, by authorities, leaving room for the development of black markets. However, Vietnamese authorities have remained silent about the importance and the role of the black markets, while there is evidence showing that black market transactions are not anecdotal.

The question we focus on is whether the black market plays a role in the official exchange rate policy; or whether the black market is only a residual market that is influenced by the events occurring in the official market. The mutual influence that both markets may have each other depend on very specific conditions, such as the relative size of both markets, the porosity between them, and whether actors on one market observe and use information on the supply-demand disequilibria that are reflected in the change in the exchange rate in the other market.

In an attempt to answer this question, we investigate the relationship between the black and official exchange rates in Vietnam over 2000-2015 with monthly data. We apply a cointegration analysis developed by Johansen (1995) and a vector error correction model (VECM) specification that allow to test for exchange rates exogeneity.

The rest of the paper is organized as follows. Section 2 presents the context of Vietnam, with a brief review of foreign exchange markets and policy. Section 3 presents the theoretical elements that underpin the relation between the official and the black exchange

rates. Section 4 is a brief review of empirical works and section 5 introduces the methodology and data. Section 6 presents our empirical results and section 7 concludes.

2. A brief overview of foreign exchange markets and exchange rate policy in Vietnam

2.1. Exchange rate policy

In the move from a central planning to a market-oriented economy, Vietnam unified foreign exchange markets and exchange rates in the early 1990s and since then has experienced various changes in its exchange rate regime. In the period 1989-1991, the exchange rate was considered as floating when a large depreciation associated with hyperinflation occurred. In 1991, after the application of a large but brief and surprising appreciation, the SBV adopted a fixed exchange rate regime to curb inflation and to maintain economic stability. The SBV also replaced two foreign exchange transaction floors² by an interbank foreign exchange market in 1994 where the SBV plays the role of final buyer and seller of foreign currencies. The SBV set the official exchange rate and transactions were permitted at a rate within a band of 0.5-1% around the official rate. Then, the official exchange rate remained stable at 10,000-11,000 Vietnam dong (VND) per US dollar (USD) and only depreciated significantly in periods of macroeconomic disturbances. During the Asian financial crisis in 1997-1999, the official rate depreciated by 10.2% in 1997 and 5.6% in 1998, to around 14,000 VND/USD. At the same time, trading bands were adjusted to 5% then 10% in 1997, and reduced to 7% in 1998. In 1999, the SBV introduced a new method to set the exchange rate where the OER of the day equals the average IER of the previous day. Commercial banks are authorized to trade currencies at a rate within a narrow band of only 0.1% around the OER. While the trading band was enlarged to 0.5%, the OER depreciated only gradually in the period 2001-2007, to around 16,000 VND/USD. In contrast, the period of 2008-2011 witnessed large fluctuations in the exchange rate following the impact of the global financial crisis and macroeconomic instability. The OER depreciated several times in this period, from 16,100 VND/USD at the end of 2007 to 20,800 VND/USD at the end of 2011, losing its value by approximately 29%. Besides, the trading band was first widened several times (from $\pm 0.75\%$ in December 2007; to $\pm 1\%$ in March 2008; to $\pm 2\%$ in April 2008; $\pm 3\%$ in November 2008; $\pm 5\%$ in March 2009) and then narrowed at $\pm 3\%$ in November 2009; and

² In 1991, the SBV opened the two trading floors for foreign exchange in Hanoi and Ho Chi Minh. The OER was determined daily basing on the closing rates of the two floors of the previous day. The commercial banks were permit to set the exchange rate within a trading band of $\pm 0.5\%$ around the OER, IMF (1996).

to $\pm 1\%$ in February 2011). The OER stabilized to attain 21.890 VND/USD at the end of 2015 while the trading band was maintained at $\pm 1\%$. In response to the concern of exchange rate overvaluation, particularly against the Chinese Yuan (IMF, 2009, 2010; Phuc and Duc-Tho, 2009; Nguyen et al, 2010; Bui et al, 2017), the SBV introduced a new method of setting the exchange rate in January 2016. *De jure*, the OER of the day is now determined on the basis of three main elements: (1) the average IER of the previous day; (2) changes in the international markets of the currencies' exchange rates of some partner countries; (3) macroeconomic equilibrium, exchange rate and monetary policy objectives. Although it results in an unclear method of setting the OER, it implies that the anchor of the VND to the USD is replaced by a new anchor based on a basket of currencies. Moreover, the new exchange rate regime is considered as a managed floating exchange rate regime, where the OER fluctuates smoothly.

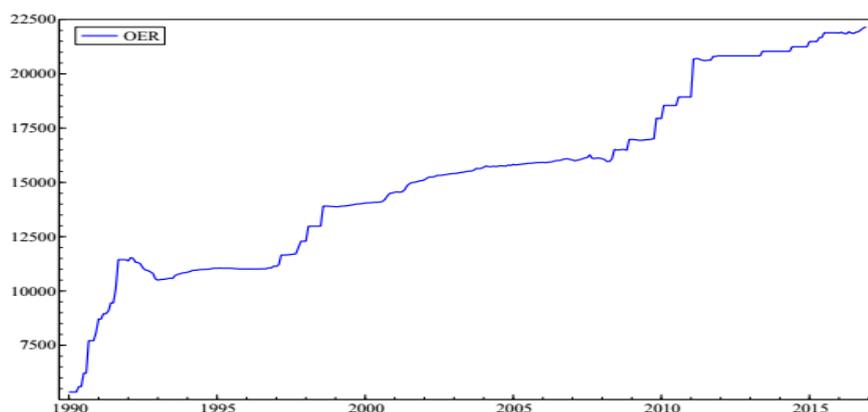


Figure 1: Nominal exchange rate (VND/USD)

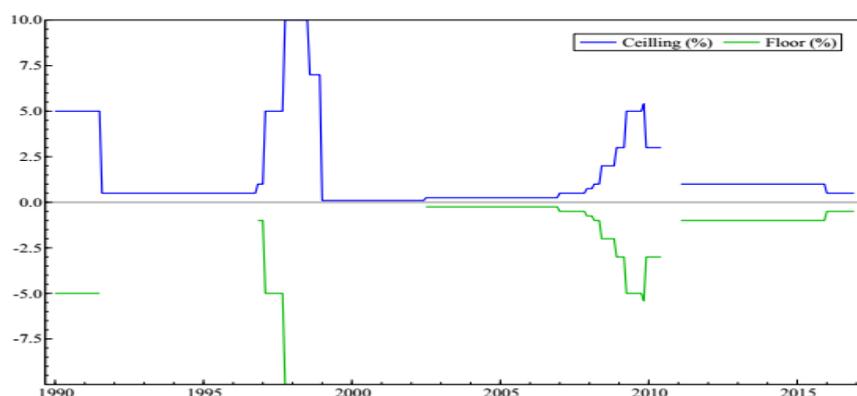


Figure 2. The trading bands

2.2. Foreign exchange controls and segmented foreign exchange markets

The black or parallel foreign exchange market in developing countries is generally viewed as resulting from government restrictions on access to the official market, restrictions that

are set in order to preserve international reserves and to administratively stabilize the official exchange rate. Since the 1990s, the Vietnam's authorities have imposed many restrictions on current account and financial transactions.

In 1998, during the Asian financial crisis, a strict control on foreign exchange surrender requirements was imposed, up to 80% of export revenue. The ratio was gradually reduced to 50% and then 40% in 2001. It was again lowered to 30% in 2002, and completely removed from April 2003 following Vietnam's agreement with the IMF and the World Bank. In 2005, Vietnamese authorities issued a new ordinance on foreign exchange management asserting a liberalization of current account transactions and the abolishment of any requirement of foreign exchange surrender. However, *de facto*, foreign exchange repatriation remains an obligation. According to this regulation, residents that obtain foreign currencies from export or remittances must deposit these earnings into a foreign currency deposit opened in authorized credit institutions in Vietnam. Export revenues can be used for imports and payments in foreign currency and their partial repatriation is prohibited.

Other controls take the form of foreign exchange rationing that is implemented since the 1990s, with the aim of imposing restrictions on imports that can be a cause of shortage of foreign exchange. Priority is then given to imports of capital equipment and materials for domestic production, while imports of consumption and luxury goods are repressed. Priority is also granted to intermediate materials such as petroleum products, fertilizer, iron and steel imported by State owned enterprises (SOEs). Favored access of SOEs to foreign currencies from the commercial banking system has been maintained until recent years (Vo et al, 2000; Nguyen et al, 2010).

In response to these controls on the official exchange rate setting, and on various restrictions on official foreign exchange access, Vietnam has seen the development of a parallel foreign exchange market. Controls artificially reduce foreign currency demand, causing overvaluation of the OER during some episodes over 1990-2008 (IMF, 2009). Phuc and Duc-Tho (2009) find that the real effective exchange rate appreciated by more than 15% in 1992-2007, and Nguyen et al (2010) that it appreciated by 12% in 2000-2009. Another sign of foreign exchange control, excess demand for foreign exchange and overvaluation, is that the exchange rates of commercial banks were usually close to the ceiling bands imposed by the SBV, in particular in 2008-2009.

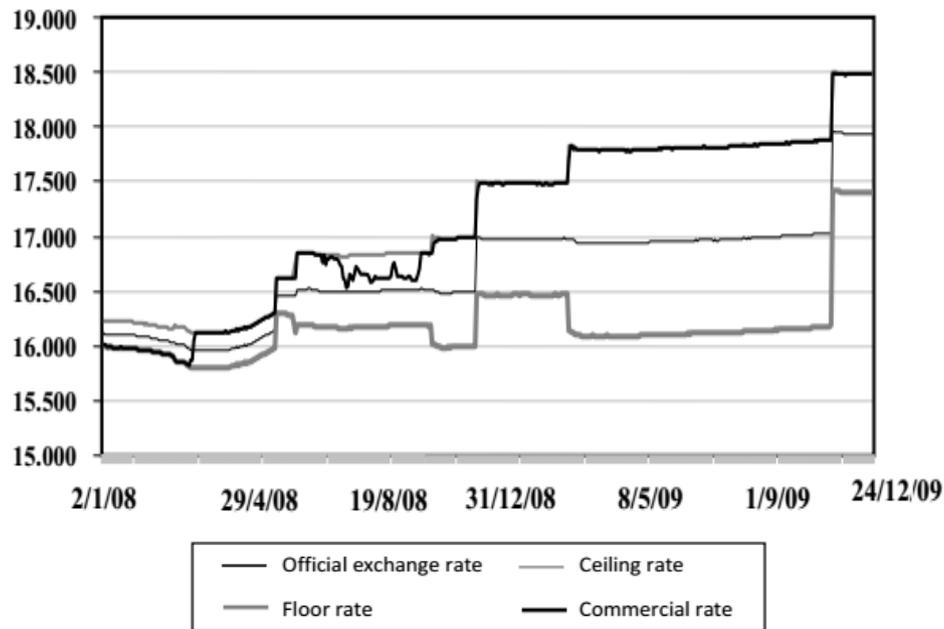


Figure 3: The exchange rate VND/USD and trading bands, 2008-2009. *Note:* the commercial exchange rate is the Vietcombank selling exchange rate (the biggest bank in forex in Vietnam). *Source:* Nguyen et al. 2010.

The unofficial (black) foreign exchange market is illegal but is tolerated by Vietnam’s authorities. Moreover, foreign exchange agents and private exchange offices are recognized by the regulations of the SBV. Therefore, instead of calling this unofficial market as “black”, authorities often refer to the “parallel” or “free” market. Besides direct transactions between economic agents, participants in black market consist of thousands of private foreign exchange offices and jewelry shops, around the country but mostly in the largest cities.

The SBV ignores the importance of the black market and has not published any estimation of the black market size. However, Nguyen (2014) estimated that the black market accounts for 20% of total foreign exchange transaction volume in the 1990s. More recently, Nguyen et al (2010) indicated that the size of black market is quite large in total foreign exchange market and that the black market still grows given the continuing foreign exchange controls imposed by the government.

The historical *de facto* partial dollarization, the use of the dollar for transactions in durable goods and services and in savings, is another characteristic of the Vietnam’s economy that gives room to a black market for foreign exchange.

3. The expected relationship between the OER and the BER

Both official and black markets can be affected by common factors and by specific factors, being economic and policy factors. For instance, exchange arrangement and restrictions may have direct or indirect effects on both markets. Moreover, both markets may mutually influence each other, in the case of porosity between the two markets; i.e. they are not totally segmented. This would justify the presence of a long-run relationship between the OER and the BER, while both rates might diverge in the short-run if common factors do not have the same impact on both, or if they are affected by specific short-run shocks. Moreover, frictions or transactions costs, or different risks, may allow short-run gaps between both rates.

Both markets are connected when the same economic agents can transact in both markets or when participants in one market can transact with participants from the other market. Then, shifts of supply and demand between both markets may ensure that both rates would not diverge considerably and durably. The influence of one market on the other obviously depends on their relative size. The higher the relative size of one market, the more likely is that any excess demand or supply in this market (implying changes in the exchange rate in this market) generate an excess demand or supply in the other market, implying similar changes in the other exchange rate. As explained above, even if significant, black market in Vietnam seems to be smaller than the official market, suggesting that the OER is more likely to influence the BER than inversely.

However, whether the OER and/or the BER adjust to ensure a long term relationship between both rates depends on the specific functioning of the two markets, on *de jure* or *de facto* rules, and on the comportment of agents operating in these markets.

In Vietnam, the OER is determined in the official or interbank foreign exchange market, where only authorized commercial banks, credit institutions and the SBV operate. The IER is the average exchange rate applied in transactions between authorized commercial banks and credit institutions in the interbank market. Roughly, since 1999, the OER is determined following this rule:

OER of the day = IER of the previous day.

IER of the day = OER of the day \pm authorized margin of fluctuations.

The margin of fluctuations is set by the SBV and has been changed over time (figure 2).

The IER is primarily determined by the supply of and the demand for foreign currencies from the commercial banks, for their own operations but they would mostly relay the supply and demand from the real sector of the economy. Except if leakages from the banking system are too important, there then should have a link between the balance of payments disequilibrium and changes in the IER and the OER. However, a particularity of Vietnam is that the needs for foreign exchange transactions are amplified by the *de facto* partial dollarization of the domestic economy, where the USD can be used in transactions in goods and savings between domestic firms and/or individuals. Then, if the official foreign exchange market does not satisfy entirely the needs from the economy, all the more so when foreign exchange restrictions are imposed, the black market may be a last resort, being a residual market influenced by the official market supply-demand conditions. In this case, interventions of the SBV on the official market, and changes in the OER, are susceptible to influence the black market supply-demand conditions and then the BER. The smallness of the black market may then explain that changes in the BER would be amplified, in the short-run, compared to changes in the OER determined in the larger official market.

Because the official market is at an early stage of development in which forward trading and option contracts on foreign exchange remain thin or even absent (Phuc and Duc-Tho, 2009), another relationship between both markets and exchange rates may emerge. Indeed, it is likely that the SBV takes information from the black (or “free”) market and the change in the BER (or the gap between the BER and the OER) as proxies for the equilibrium level of the exchange rate or for the expected change in the exchange rate. The SBV may then takes this information into account to decide its interventions on the interbank market. For instance, in the case of a shock that permanently increases (depreciates) the BER, creating a gap with the OER, the SBV may then decide to increase the OER, by restraining its selling of foreign currencies. However, there could be only a partial adjustment if the SBV does not respond instantaneously and takes other factors into account in its decision to change the OER.

Moreover, it also can be expected that commercial banks take the changes in the BER (or the gap between the BER and the OER) into account in their operations. They can also take the BER as a predictor for the OER, particularly if they consider that the SBV takes the BER into account, voluntarily or under constraints. In the case of speculation and self-fulfilling expectations, if the BER is higher than the OER, the banks may anticipate that the

OER will increase. Then banks may buy the USD (to sell it at a higher price later). If these transactions are large enough, and are not compensated by other factors (or the interventions of the SBV), the OER may then effectively increase.

4. Empirical works on the relationship between black and official exchange rates

The empirical literature on the relationship between the OER and the BER in developing countries gathers works that focus on a group of countries, or on a single country, using time series at different frequencies, testing cointegration and exogeneity. Results are highly country-specific: while a long-run relationship may be found between the OER and the BER, the intensity of the relationship and causality may differ.

Regarding multi-country studies, Agenor et Taylor (1993) study the causality between OER and BER in 19 developing countries using VECM and cointegration analysis on monthly data covering a 13-year period. Their results show that a long-run relationship between the OER and the BER hold in 13 countries, thanks to change in the BER only in 6 countries, change in the OER only in 5 countries, and change in both rates in 2 countries. Bahmani-Oskooee et al (2002) test for a long-run relationship between the BER and the OER for a sample of annual data covering 49 countries over 1973-1990 using panel cointegration techniques. They find a long-run relationship between both rates that is obtained mainly through OER adjustment. Bahmani-Oskooee and Goswami (2004) examine the relationship between OER and BER over 1955-1995 in 31 developing countries employing Johansen's cointegration analysis. They find cointegration between both rates in 15 countries and that the relationship held only through adjustment of the OER in 8 countries. Diamandis and Drakos (2005) investigate long-run dynamics of OER and BER in Argentina, Brazil, Chile, and Mexico using monthly data for the period 1973:10 to 1993:12. They find evidence of a long-run relationship between both rates in these countries, with an adjustment of the BERs. However, adjustment speeds of the BERs vary between countries. Kula et al (2014) use monthly data for a sample of 13 Middle East and Northern African (MENA) countries from 1970 to 1998 and Pool Mean Group estimators. They find evidence of a common long run relationship between the OER and the BER across the sample (the long run coefficient equals one), but short run dynamics are heterogeneous.

Regarding single country studies, for instance, Booth and Mustafa (1991) investigate the relationship between the BER and the OER of Turkey pound to the US dollar and West German mark in the mid-1980s. For both cases, they find that the BER and the OER are

cointegrated. When disequilibria occur, the BERs and the OERs adjust toward the equilibrium levels, however, the speed of adjustments of the BERs are higher than those of the OERs. Baghestani and Noer (1993) find a similar long run relationship between the OER and the BER in India using quarterly data over 1973–1990. The BER is more sensitive than the OER to shocks, and the BER also adjusts more quickly than the OER to allow the long-run relationship to hold. Kouretas and Zarangas (2001) study the relationship in Greece over 1975-1993 using monthly data. They find a long-run relationship between both rates with an adjustment of the BER only. Love and Chandra (2007) examine the relationship between the OER and the BER in India in 1953-1993 period with monthly data. Both rates are cointegrated, and the BER is weakly exogenous, while the OER converges to the equilibrium level defined by the long run relationship. Balamoune-Lutz (2010) investigates the long-run relationship between the OER and the BER and short-run dynamics in Morocco from January 1974 to December 1992. He finds a long-run equilibrium relationship between both rates and that the BER adjusts to the equilibrium level.

To our knowledge, there is no quantitative research focusing on the link between the OER and the BER in Vietnam. However, several qualitative researches mentioned this relationship to show difficulties in implementing the exchange rate policy in Vietnam (Phuc and Duc-Tho, 2009; IMF, 2010; Nguyen et al, 2010; Bui et al, 2017). Phuc and Duc-Tho (2009) stated that changes in the parallel exchange rate may have served as a guide for the OER, the SBV aiming at reducing the gap between both rates in some periods of time. IMF (2010) mentioned the relationship between the OER and the BER, specifically when the VND depreciated in late 2009. Last, Nguyen et al (2010) analysed the cause of the strong depreciation of the OER in 2008-2009. They argued that an increase in the demand of USD combined with a limited supply in the official market lead the firms and individuals to buy the USD in the black market. Consequently, the BER significantly depreciate increasing the gap between both rates, that eventually forced the SBV to depreciate the OER to eliminate this gap.

5. An empirical model and data

We follow the usual framework for analyzing the long-run relationship between the OER and the BER in empirical works, as follows:

$$OER_t = a + b.BER_t + \varepsilon_t \quad (t = 1, \dots, T) \quad (1)$$

Where OER_t is the logarithm of the official exchange rate, BER_t the logarithm of the black market exchange rate, and ε_t is error term. b is the long-run elasticity between both rates, and a is a constant.

Following a conventional cointegration analysis, unit root tests are first performed to examine the characteristics of the series of OER and BER.

Second, we apply the cointegration analysis method developed by Johansen (1995), by estimating a VECM of the form:

$$\Delta Y_t = \alpha \beta' Y_{t-k} + \sum \Gamma_t \Delta Y_{t-i} + D_t + \varepsilon_t \quad (2)$$

where $Y_t = [OER_t, BER_t]$, β' denotes the matrix of parameters of co-integrating vectors, $\beta' Y_{t-k}$ are long-run relationships, α is the matrix of the parameters of equilibrium-correction, Γ_t is the matrix of short-run parameters, D_t denotes deterministic components (constants, centered seasonal dummies, and trends) and ε_t is the vector of error-terms.

Monthly data of the (end-of-period) OER are from the International Financial Statistics (IMF). Getting data on the BER is challenging since the black market is informal and scattered across the country. Ideally, an average of the multiple exchange rates from all black markets would be an adequate measure. However, primary data are obviously unavailable in practice. Here, we use the BER observed in the black market at the capital city of Hanoi, which are the only available historical series to our knowledge. The BER is a selling rate, measured at the end of period, which comes from the SBV and the State-owned Vietcombank that have partially published or give an informal access to these data.

As mentioned in section 2, since January 2016 the SBV set a managed floating regime for the OER against a basket of eight currencies, replacing the managed peg to the USD. Considering that it may influence the nature of the relationship between the OER and the BER, of the VND against the USD, the sample is then chosen to cover the period from January 2000 to December 2015.

As observed in the Figure 4, the BER and the OER gradually, and closely, depreciated in the 2000-2007 period. They sharply rose in 2008-2011 with the global financial crisis and domestic macroeconomic imbalances, but the gap between both rates – the black market premium – sharply increased. The premium has diminished since the mid-2011, but increased again, more gradually, since 2015, as in the Figure 5.

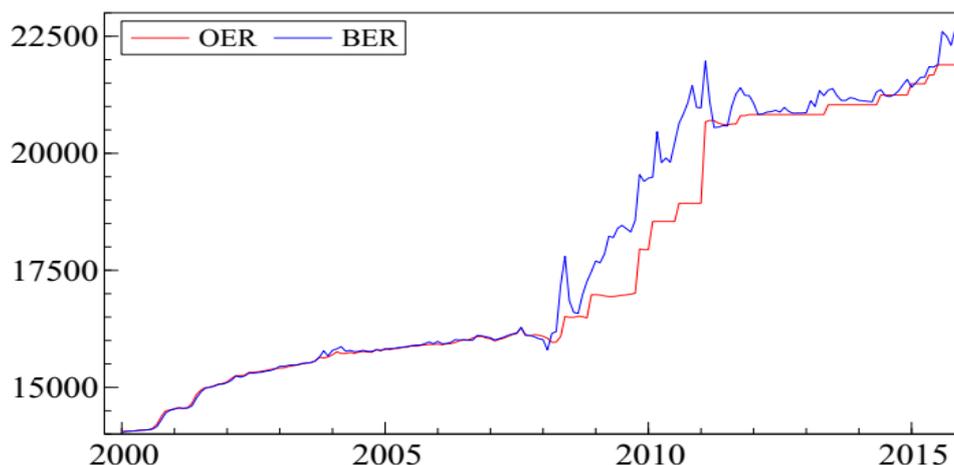


Figure 4. The OER and BER (VND/USD)

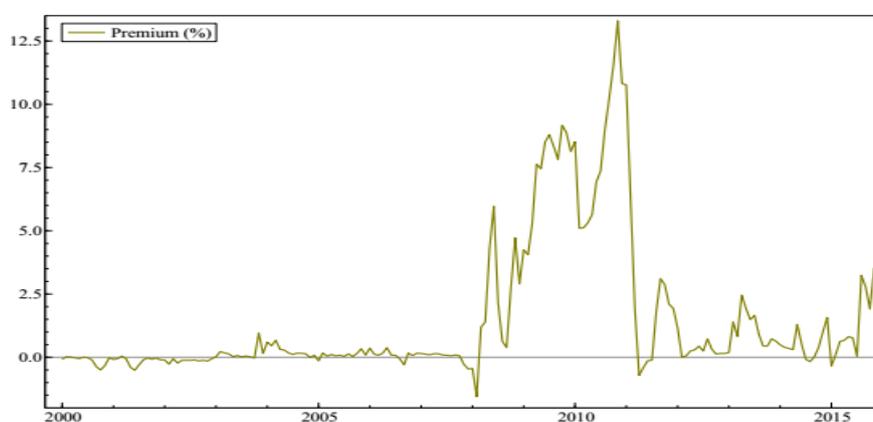


Figure 5. Black market premium (%)

6. Empirical results

Table 1 presents the results of the Augmented Dickey-Fuller (ADF) unit root tests (Dickey and Fuller, 1981), that indicate that the two variables are non-stationary and integrated at the first order $I(1)$, allowing a cointegration relationship to exist between them.

Table 1. Unit root tests of the BER and the OER

Variables	With trend				Without trend			
		X		ΔX		X		ΔX
OER	(1)	-1.393	(0)	-13.85***	(1)	-0.521	(0)	-13.88***
BER	(4)	-1.296	(3)	-8.477***	(4)	-0.625	(3)	-8.49***

Notes:

1. The ADF tests include a constant and seasonal dummies, with or without a deterministic trend.

2. The lags length chosen according to the AIC criterion is given in parentheses.
3. The critical values used are -4.01 and -3.46 with or without trend at 1% critical values, respectively.
4. *** Rejection of null hypothesis of a unit root at a significance level of 1%.

Monthly time series usually impose to include seasonal dummies into the VECM. Particularly, Vietnam' economy is characterized by a high seasonality with boiling activities at the end and beginning of years, with probable consequences on the exchange rates. Using monthly series also invites to use a lags length of 12 months that allow to eliminate residuals autocorrelation. Large exchange rate changes in some periods are the cause of non normality of the residuals. The stability tests show that the VECM is stable in the study period (appendix). However, they display some breaks in the period 2008-2011 that would be associated with the non normality in VECM residuals.

We follow previous studies in choosing the specification with a restricted constant in the cointegrating vector and an unrestricted constant in the VAR. Moreover, including a deterministic trend in the cointegrating space, while not greatly improving the overall specification, gave implausible preliminary results with poor economic sense (results are available on request from the authors). Results are reported in table 2. The trace tests confirm the existence of one cointegrating vector signaling a long-run relationship between the BER and the OER. Unrestricted adjustment coefficients and standardized eigenvectors show that the parameter of the cointegrating vector is close to 1, and that the adjustment coefficient of the OER is higher than the one of the BER.

Table 2. VECM residuals diagnostic statistics of vector $Y=\{OER, BER\}$

	<i>AR(1)</i>	<i>AR(12)</i>	<i>JB</i>	<i>ARCH</i>	<i>H</i>
Y	0.11 [0.98]	1.36 [0.07]	277.9 [0.00]		2.37 [0.00]
OER	0.14 [0.71]	1.37 [0.19]	135.6 [0.00]	0.16 [0.99]	2.84 [0.00]
BER	0.10 [0.76]	1.24 [0.26]	105.7 [0.00]	2.08 [0.05]	1.42 [0.06]

2.2. Reduced rank statistic

<i>Eigenvalues</i>	<i>H0: rank ≤</i>	<i>Trace test</i>
	0	22.57 [0.02]**
0.1185	1	2.56 [0.67]
0.0138	2	

2.3. Adjustment coefficients and standardized eigenvectors (scale on diagonal)

α	$\alpha 1$	$\alpha 2$
OER	-0.19	-0.002
BER	-0.09	-0.019

β	$\beta 1$	$\beta 2$
OER	1	-0.96
BER	-0.97	1
Constant	-0.30	-0.44

2.4. Adjustment coefficients and restricted eigenvectors

2.4.1. Adjustment coefficients and restricted eigenvectors: $\alpha(\text{OER})=0$.

LR test of restrictions: $\chi^2(1) = 14.89 [0.00]^{***}$

α	$\alpha 1$
OER	0
BER	0.05 (0.03)

β	$\beta 1$
OER	1
BER	-0.99 (0.10)
Constant	-0.03 (1.01)

2.4.2. Adjustment coefficients and restricted eigenvectors: $\alpha(\text{BER})=0$.

LR test of restrictions: $\chi^2(1) = 2.087 [0.149]$

α	$\alpha 1$
OER	-0.16 (0.04)
BER	0

β	$\beta 1$
OER	1
BER	-0.97 (0.02)
Constant	-0.28 (0.22)

2.4.3. Adjustment coefficients and restricted eigenvectors: $\alpha(\text{BER})=0$ and $\beta(\text{BER}) = -1$.

LR test of restrictions: $\chi^2(2) = 3.266 [0.195]$

α	$\alpha 1$
OER	-0.14 (0.04)
BER	0

β	$\beta 1$
OER	1
BER	-1
Constant	-0.007 (0.005)

Notes:

1. AR (1) and AR (12) are LM tests for first-order and 1 to 12 order autocorrelation; JB is the Jarque-Bera test for normality; ARCH is LM test for conditional heteroscedasticity; H is the White test for heteroscedasticity.

2. Marginal significance levels of the test statistics are presented in square brackets.

3. Standard errors of coefficients estimated are in parentheses.

The cointegrating vector can be represented in the form of the following long-run relationship: $\text{OER}_t = 0.97 * \text{BER}_t + 0.28$.

The coefficient of BER is close to one. It implies that both rates show similar changes in the long-run.

We apply weak exogeneity tests in the form of restrictions on adjustment parameters. The test results are reported in table 2.4.1 - 2.4.3 and clearly signal that the BER is weakly exogenous while the OER is not: only the changes in the OER, not the change in the BER, are driven by the deviation from the long-run relationship. The error-correction parameter of OER is - 0.16 indicating that the OER changes decrease the gap between both rates by approximately 16% per month. In other word, approximately 4 months are necessary to eliminate 50% of the deviation from the equilibrium levels. This level of adjustment speed of the OER seems reasonable compared to, for example, Love and Chandra (2007)' estimate of 1.7% per month in India or Diamandis and Drakos (2005)'s estimates of 68% to 88% per month. Moreover, this level of adjustment speed of the OER in Vietnam signals that the SBV implemented a controlled adjustment of the OER, following the changes in the BER, but with a certain inertia explained by the aim to avoid large depreciation of the OER. However, the conclusion is that changes in the BER leads the SBV to adjust the OER to eliminate the gap between both rates in the long-run. One can not reject the hypothesis that the SBV use the BER to form its exchange rate expectations or as a proxy for exchange rate equilibrium level.

The fact that the BER is weakly exogenous deserves discussions. The result is consistent with earlier studies by Bahmani-Oskooee et al (2002), Bahmani-Oskooee and Gosmani (2004), and Love and Chandra (2007) in other contexts. It would reveal that the black market is relatively autonomous vis-à-vis the official market and does not present itself as a simple residual market. In the long-run, supply-demand conditions in the official market do not affect supply-demand conditions in the black market. Moreover, agents operating in the black market do not use information from the official market, that would be revealed by current changes in the OER, in a simple way. It would inversely reveal that agents in the black market use external information, that would allow them to form specific expectations on the exchange rate, which, under self-fulfilling expectations, affect the current BER.

The Johansen's cointegration analysis method uses a full VECM specification that includes both the short-run dynamics and the error-correction mechanism for the long-run relation. Following a general-to-specific method (by deleting progressively the variables showing no significant impact), we explore the dynamics of both rates. The results are reported in the

table 3. For both equations, the results reveal inertial processes with a significant impact of lags to up to 11 months. Regarding cross-effects, in the ΔOER equation, changes in the BER cause changes in the OER in the same direction. Inversely, results of the ΔBER equation indicate that changes in the OER cause changes in the BER but with quiet complex dynamics. The one and two-period lagged OER has a negative impact on the BER while the 6-periods lagged OER has a positive impact. In other terms, a depreciation (appreciation) of the OER would cause an appreciation (depreciation) of the BER in the very short-run. Besides complex self-fulfilling expectation process, an interpretation would be that, under a controlled foreign exchange regime, the SBV may allow a depreciation of the OER together with a selling of the USD in the official market. A part of these USD amounts might then fuel the black market and cause a temporary appreciation of the BER.

Table 3. VECM for the ΔOER and the ΔBER equations, 2000:1 – 2015:12

ΔOER		ΔBER	
Variable	Coefficient	Variable	Coefficient
ΔOER_{t-4}	-0.27 (0.06)***	ΔOER_{t-1}	-0.23 (0.09)***
ΔOER_{t-7}	-0.18 (0.06)***	ΔOER_{t-2}	-0.32 (0.08)***
ΔOER_{t-11}	-0.14 (0.07)**	ΔOER_{t-6}	0.23 (0.09)**
ΔBER_{t-2}	-0.18 (0.05)***	ΔBER_{t-8}	0.14 (0.06)**
ΔBER_{t-7}	0.18 (0.05)***	ΔBER_{t-11}	0.26 (0.07)***
ΔBER_{t-11}	0.22 (0.05)***		
EC_{t-1}	-0.11 (0.02)***		
Constant	0.003 (0.001)***	Constant	0.002 (0.001)**
AR (1): 0.98 [0.32]		AR (1): 0.47 [0.49]	
ARCH: 0.08 [0.77]		ARCH: 11.0 [0.00]	
JB: 92.45 [0.00]		JB: 64.02 [0.00]	
H: 5.77 [0.00]		H: 1.69 [0.04]	
R ² : 0.40		R ² : 0.30	
Adj R ² : 0.30		Adj R ² : 0.20	

Notes:

1. AR (1) are LM tests for first-order autocorrelation; JB is the Jaque-Bera test for normality; ARCH is LM test for conditional heteroscedasticity; H is the White test for heterosdasticity.
2. Marginal significance levels of the test statistics are presented in square brackets.
3. Standard errors of coefficients estimated are in parentheses.
4. ***, **, * are significant levels of the test statistic at 1%, 5%, 10%, respectively.
5. The coefficients of seasonal dummies is not listed in the table because they are not study objective.

7. Conclusion

In this study, we examine the long-run relationship and the short-run dynamics of the official and the black exchange rates in Vietnam during the period from January 2000 to December 2015. Applying the Johansen's cointegration method, our results reveal that both rates are cointegrated, implying that both markets are not totally segmented. Moreover, the black market exchange rate is weakly exogenous while only the official exchange rate adjusts to correct gaps with the black exchange rate by approximately 16% per month. Then, the interpretation would be that the SBV intervene to unify both rates progressively in the long-run, and that the BER might be used by SBV as a proxy for equilibrium exchange rate and expectation of exchange rate change. Short-run dynamics also show that changes in both rates mutually influence each other. Finally, the *de facto* exchange rate policy implemented by the SBV over 2000-2015 probably used the black market conditions into account, while *de jure* rules remained silent about that. This would have been at the basis of the change in the exchange rate regime applied in 2016 that aims at allowing more flexibility. Again, the new regime does not give a role to the black market but it seems obvious that this role would remain for a time. This role would reduce progressively with sufficient flexibility of the official exchange rate, and lower exchange restrictions, that would reduce the incentives of economic agents to go to the black market. Development of an official forward market for exchange rates would also aim at reducing the role of the black market.

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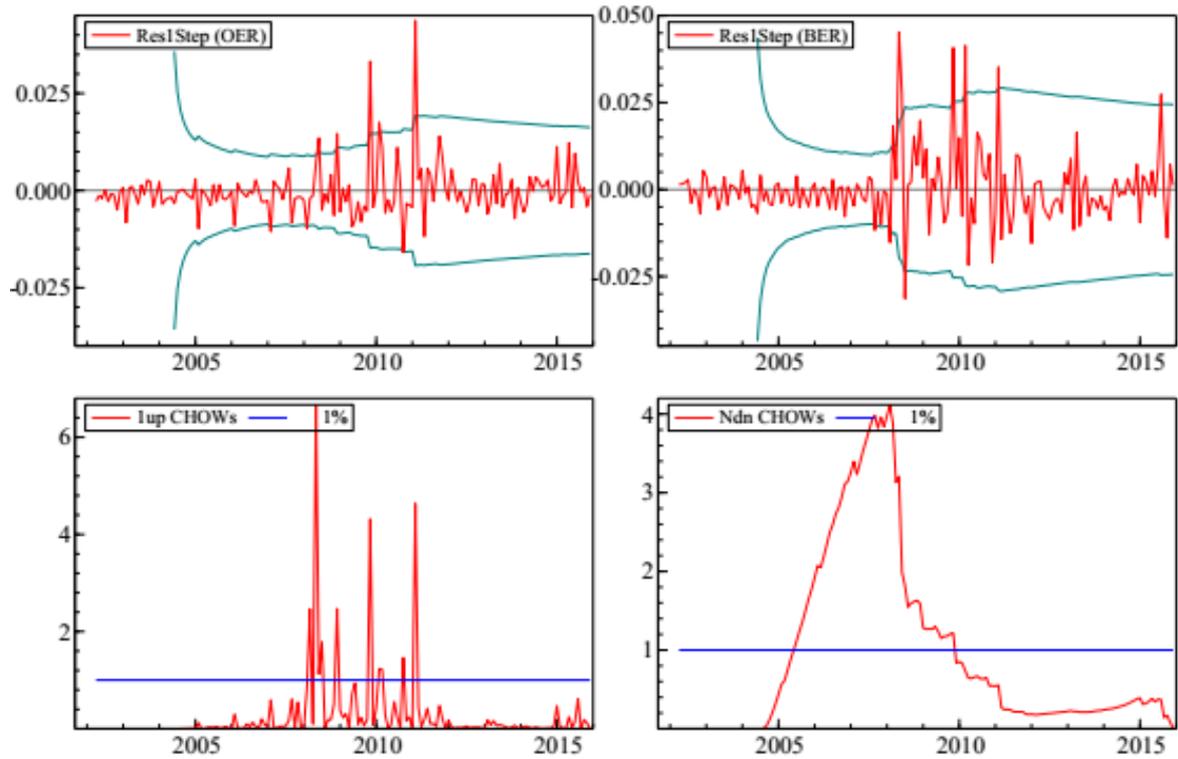
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Appendix. Tests of specification stability.



Note. The graphs depict the one-step residuals, the one-step Chow test (1-up), the break-point Chow test (N-down).