ABSTRACT

MAI, ZIYI. Do Terms-of-Trade Shocks Affect Exchange Rate Regime Choice? (Under the direction of Dr. Asli Leblebicioglu.)

Classical studies on the exchange rate regime choice have investigated factors like common border, colonial connect, trade, etc, but few look at the impact of terms-of-trade on the choice of exchange rate regime. This paper helps to explain the possible connection between shocks on terms-of-trade and exchange rate choice. I use post Bretton-Woods sample (1980-2007) of ninety-one countries to access if shocks on terms-of-trade would have a significant effect on the choice of exchange rate regime using OLS and logistic regression. The results show a statistically negative and significant effect of terms-of-trade shocks on the choice of exchange rate regime, along with some factors that are consistent with the previous studies. These results also suggest an economically relevant role for terms-of-trade in the determination of exchange rate regime choice since significant amount of world trade is conducted between countries with fixed exchange rate regime.

Do Terms-of-Trade Shocks Affect Exchange Rate Regime Choice?

by
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BIOGRAPHY

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1. Introduction

Post Bretton-Wood era has seen a tremendous shift from the pervasive pegged exchange rate to a wide variety of exchange rate regimes, including independent floating, managed floating, crawling pegged etc. Furthermore, during the modern era, many countries have switched from one type of exchange rate regime to another and often have flipped back and forth another time or two. Since most of the countries in the world didn't cast off the chain of gold standard and had spent decades under the Bretton-Wood system, theories and empirical studies about the choice of exchange regimes have not sprung up until early 1980s. Conventional studies concerning what determines a country to adopt fixed or floating exchange rate system have investigated a wide variety of factors in different categories. Most of them have interpreted the reasons from the monetary perspective and the need for more trade. This paper tries to analyze the effect of terms-of-trade shocks on choice of exchange regime across

countries and time by providing empirical results, based on the traditional studies.

In this paper, I specify terms-of-trade as a new factor that previous studies have not paid enough attention to, based on the framework developed by Shambaugh and Kevin (2010). I use a set of data including 91 countries, from 1980 to 2007 to operate both OLS and logistic regression. The results show evidence that there is a negative connection between the positive shocks on terms-of-trade and the likelihood on choosing fixed exchange rate regime and vice versa.

2. Trends in Choice of Exchange Regime in Modern Era

Exchange rate policy is just one facet of the country's overall set of macroeconomic policies, but an appropriate choice of exchange rate regime can help the country meet particular macroeconomic goals. This section briefly describes broad trends in exchange rate regimes based on de jure and de facto categorization that can be divided into pegged, intermediate, and floating regimes.

In past decade there have been important developments in the choice of exchange rate regimes across countries. For advance economies, the most significant development was the adoption of irrevocably fixed exchange rates and a common currency by the euro area countries in 1999 (Figure 1[a]). Since, under European Exchange Rate Mechanism II, these countries' currencies were allowed to fluctuate within wide bands, they were previously classified as having an intermediate exchange rate regime. Although the euro floats against other currencies, countries adopting euro are classified as having a peg, both because the empirical analysis uses country-level (rather than euro area) statistics, and because it would be strange to treat the adoption of a common currency as a move toward greater flexibility.

Among emerging market economies (Figure 1[b]), three trends are discernible. First, consistent with the 1999 review[1] and the bipolar prescription, there is significant hollowing out of the intermediate regime category. Second, since the 1999 review, the proportion of both de jure and de facto floating exchange rate regimes has roughly doubled. However, contrary to the

[1] International Monetary Fund, 1999, "Exchange Rate Regime in an Increasingly Integrated World Economy". This 1999 study argued that advanced economies had either hard pegs or pure floats hence emerging market (and eventually, developing) countries should also go to either of the bipolar spectrum, mainly to avoid crisis.

prescription in the 2003 review[2], the proportion of de facto floating regimes has fallen somewhat since 2003 (Figure 3). Third, there is significant divergence between the de jure and de facto classifications. In a number of cases, the central bank intervenes in the foreign exchange market without taking on the formal commitment to the peg. This is reflected in a larger number of de facto pegs than de jure pegs, and a larger number of de jure floats than de facto floats.

In developing countries, there has been no hollowing out of the (de jure or de facto) intermediate regime category (Figure 1[c]). The proportion of de jure pegs and de jure floats has also remained constant over the past decade (with a slight increase in pegs and decrease in floats). And, as with emerging market economies, there is significant divergence between de jure and de facto regimes.

The divergence between de jure commitments and de facto behavior, evident in both emerging market and developing countries, nearly always reflects cases where the central bank intervenes but does not commit to the parity. The opposite case-taking on a de jure commitment but de facto not defending the parity-is much rarer. Indeed, across the full sample, in more than 90 percent of cases where the exchange rate is de jure pegged it is also de facto

[2] International Monetary Fund, 2003, "Evolution and Performance of Exchange Rate Regimes". The 2003 study focused only on growth and inflation performance, replacing the de jure classification of regimes with the IMF's de facto measure. It found out that the costs of pegged regimes for emerging market economies outweighed the benefit, and therefore advised those economies to move toward greater exchange rate flexibility.

pegged, but only in 50 percent of cases where the exchange rate de jure floats does it also de facto float.

Together, these trends suggest that developing and emerging market countries have only partially followed the advice of previous studies conducted by International Monetary Fund. Thus, consistent with the 1999 review, there has been some hollowing out of the middle; and, following the 2003 study, more emerging market countries are de jure floating their exchange rates. Contrary to the prescription of these two reviews, however, a large proportion of developing and emerging market countries de facto peg their exchange rates-intervening in the foreign exchange markets without taking on the formal commitment to the peg. However as elaborated below, this may be the worst of both worlds: providing neither the policy discipline nor credibility of a formal peg nor the benefits of flexibility that a floating exchange rate affords. While the inflation benefits of pegging accrue mainly to de jure peg (particularly in emerging market countries), the costs in terms of susceptibility to crisis and more abrupt external adjustment apply equally to de facto and de jure pegs.

3. Literature Review

The past three decade has witnessed a great amount of fruitful thoughts and theories concerning the factors that affect the choice of exchange rate regimes. In this section, I lay out four kinds of framework that previous studies have looked at on the matter that this paper is concerned. The first part is optimum currency area, originally developed by Mundell in 1961. In the second part I present some macroeconomic considerations that countries have to take into account before governments decide which one should adopt. The third part shows the indivisible importance between international trade and exchange rate regimes. The last part throw out some conventional views on the relationship between terms-of-trade shocks and exchange rate regime.

3.1 Optimum Currency Area

The nature of the exchange rate regime choice is different in the modern era than in earlier times. The choice of whether to participate in the gold standard was bound up with the choice of whether to be engaged in the broader international monetary system. This had implications for international trade, since participation in the gold standard was viewed as a way to foster trade, an advantage that increased with a widening participation in the gold standard

system (Flandreau 1996; Meissner, 2005). It also had implication for international borrowing, since membership in the gold standard was a way to ensure international investors of creditworthiness (Bordo and Kydland,1996). For these reasons, and also because of limited enfranchisement and a view that governments were not fully responsible for economic conditions, once governments pegged to gold, they had a tendency to consistently maintain this policy, through good times and bad times, up until World War II. After World War II the Bretton Woods system of fixed exchange rates was also relatively stable, with only a few cases of government opting out of the system and allowing their currencies to float. Unlike the earlier gold standard period, exchange rate regime stability in the Bretton Wood era was supported by restrictions on international capital mobility which afforded countries some scope for setting monetary policy despite participation in a fixed exchange rate system.

As we have seen, the hallmark of the modern era has been a wide heterogeneity in exchange rate experiences, even among countries at similar levels of economic development. So the question of exchange rate regime choice has become more interesting than during the gold standard or Bretton

Woods periods, since it is not bound up with the broader question of whether to be engaged in the global economy.

A central framework for accounting the relative gains and losses of a fixed exchange rate system versus a flexible exchange rate is optimum currency area (OCA) theory., originally formulated by Mundell(1961). Strictly speaking, this theory focuses on the choices of a country to participate in a currency union, but its insights can be used to interpret the relative desirability of a fixed exchange rate as opposed to a floating exchange rate since the relevance of its main principles do not differ if one considers a currency union or , instead, a fixed exchange rate. The central idea of OCA theory is that a country should weigh the microeconomic benefits of membership in a currency union (or fixed exchange rate) against its macroeconomic costs. The microeconomic benefit is the reduction in exchange rate uncertainty for trade with other members of the currency union (or alternatively, with the base country and with other countries that peg to the same base). The macroeconomic cost is abandoning autonomy of monetary policy, which could otherwise be used to stabilize business cycles.

Counter to the microeconomic benefits indentified by OCA theory are the macroeconomic costs of pegging a currency. OCA theory focuses on economic features that could mitigate the cost of business cycle fluctuations, such as fiscal

transfers and labor mobility. However, it's likely that these two features are not especially relevant for many countries. Immigration restrictions in many countries have tended to limit countercyclical movements of workers over the past four decades. It may be the case that the single currency in Europe, for example, is importantly supported by the relative ease with which citizens of countries that are members of the European Union to work in other member countries. The point is that in a cross-country analysis it may be difficult to identify variables that are useful proxies for those things identified by Mundell that make membership in a currency union more attractive by mitigating the adverse consequences of abandoning an independent monetary policy.

One implication of OCA theory for the choice of a fixed exchange rate versus a flexible exchange rate is that two countries benefit more from having a fixed exchange rate if they trade more, or if there is a higher potential for trade between them. Thus the level of trade with the base country (or the potential base country) should be positively correlated with the choice with the choice of a fixed exchange rate.

OCA theory also points out that forgoing monetary autonomy is less of a problem when there is a natural coherence in business cycles among members of a currency union. It may be the case that two countries that are physically

more proximate, or that share a common border, have a higher degree of natural coherence in their business cycles.

3.2 Macroeconomic consideration on countries' choice of exchange rate regime

The second theoretical framework that informs our understanding of the choice of an exchange rate regime also focuses on macroeconomic considerations. First, the policy trilemma points out the fact that, in the presence of international capital mobility, a fixed exchange rate ties the hands of monetary authorities. Therefore we might expect to see a greater tendency for a country to have a fixed exchange rate when it has controls on international capital flows, since this would allow some level of monetary autonomy, even when there is a fixed exchange rate.

Second, it also points out that output is relatively more stable with a fixed exchange rate rather than a flexible exchange rate if the shocks hitting an economy are dominated by asset market disruptions rather than disruptions in the goods market.

Third, if output under fixed exchange rate regime, as policy trilemma points out, counties especially developing countries might be in favor of fixed exchange rate regime to sustain the growth rate. Previous studies have shown that output growth (per capita, constant prices in national currency) in advanced

economies is higher under pegged and intermediate exchange rate regimes compared to floating exchange rate regimes in terms of unconditional averages. In emerging market and developing countries, growth rates do not differ markedly between pegged and floating exchange rate regimes, while intermediate regimes exhibit the highest output growth rates. (Ghosh,2009)

Four, exchange rate regime might become a useful weapon to counter financial crises and stable the economy. Financial crises are a more extreme form of volatility, which also leads to shock on terms-of-trade. Avoiding them as possible is an essential goal of the exchange rate regime choice-important to the individual country because of the economic and social costs of the crisis and important to the rest of the system because of the risk of contagion. Empirical Analysis (Bubula, Andrea, Inci Otker,2003) suggests that currency crises are somewhat more common under intermediate regimes compared to pegged or floating exchange rate regimes. In financially open developing or emerging market economies, there is significantly higher likelihood of a financial crisis under a pegged or an intermediate regime than under a floating exchange rate regime.

3.3 International Trade and Exchange Rate Regimes

One of the key attributes of a stable system of exchange rates system is that the exchange rate should facilitate the exchange of goods, services and capital. By reducing exchange rate uncertainty, pegged exchange rate regimes should lower the cost of cross-border transactions-particularly those that involve long horizons, such as foreign direct investment, where the uncertainty cannot be easily hedged (Werner,1970). A first question, therefore, is whether less flexible exchange rate regimes indeed reduce real exchange rate volatility-and over what horizon. From Figure 2, pegged and intermediate exchange rate regimes exhibit lower real exchange rate volatility than floating regimes, with the volatility decreasing in the length of the horizon. Even at a one-year horizon, however, the volatility under floating regimes is close to twice the volatility under pegged or intermediate regimes (Mussa, 1986). However at very long horizons (four to five years), average volatility of the real exchange rate under floating regimes is actually slightly lower than under intermediate regimes-essentially because the floating exchange rate helps offset inflation differentials.

3.4 The conventional debate over terms-of-trades shocks on exchange rate regime

The choice of the exchange rate regime has always been an area of great controversy and debate. The discussion has once again taken center stage in the world. Milton Friedman (1953) argued that one of the most important advantages of flexible regimes over fixed regimes is that they can smooth adjustment to real shocks even in the presence of nominal rigidities. Ever since, this has been one of the least disputed benefits attributed to fully flexible exchange rate regimes. Subsequent to Friedman, many theories of the international transmission of real shocks have confirmed the original intuition that the short-run responses to terms-of-trade shocks should be different across exchange-rate regimes.

Following the works of Robert A. Mundell (1968) and William Poole (1970), many economists still believe that the relative merits of exchange rate regimes depend on the nature of the shocks that buffet the economy. When shocks come from the domestic money market, fixed regimes automatically prevent them from affecting the real economy. In the event of a positive demand shock, money supply increases as monetary authority buys foreign reserves to prevent the appreciation of the local currency, and real output is left

unchanged. On the other hand, flexible regimes require income to fall so that real money demand is reduced back to the unchanged level of real money supply. Therefore, if these shocks predominate in the economy, this is an argument in favor of fixed regimes.

However, when shocks are mostly real, floating exchange rate regimes are in theory the more effective choice. Indeed, one of the most important benefits commonly attributed to fully floating exchange rate regimes is that they allow smooth adjustment to real shocks. When domestic prices are sticky and thus change at best slowly in response to shocks, a negative real shock, as a fall in export demand or an increase in import demand, leads to a depreciation of the nominal exchange rate. This depreciation in the exchange rate, in turn, reduces the relative price of tradable goods at precisely the moment when demand for them has fallen and therefore partially offsets the effect of the negative shock. Furthermore, the nominal depreciation increases the domestic price of the export good exactly when foreign price has fallen, also helping the economy have a smoother adjustment. That is, the exchange rate acts as an automatic stabilizer in flexible regimes.

On the other hand, fixed regimes have to rely on the slow changes of domestic prices to be pulled out from the recession. In other words, pegs simply

have to live with the effects of the negative shock. Moreover, the central bank must prevent the currency depreciation that would otherwise occur by buying domestic money with foreign currency. This is inherently a contractionary action and induces an additional fall in employment. The long and painful deflationary periods necessary to realign relative prices in the United Kingdom and in Argentina during the 1920's and 1990's, respectively, serve as a reminder of the costs associated with a fixed nominal exchange rate.

A second channel through which floating regimes are able to smooth shocks is the freedom they have to pursue an independent monetary policy. In the presence of real negative shocks, governments would like to be able to respond to alleviate the recession. Under flexible rates, the country can respond by means of a monetary expansion. Under fixed rates, any injection of money would imply an outflow of reserves and no effect on output.

In the developing world, flexible exchange rate regimes can insulate the economy better from real disturbances (Broda, 2001). Floats have smoother real output paths after terms-of-trade shocks. There also seems to be no fear of floating in response to terms-of-trade shocks, since floats let their nominal exchange rate depreciate considerably when it is hit by negative shocks.

Furthermore, terms-of-trade shocks are inflationary in floats and deflationary in pegs. (Aghion, Bacchetta and Banerjee, 2000)

4. Empirical Analysis

4.1 Hypothesis and Methodology

In this paper I am specifically interested in how the variations on terms-of-trade affect the likelihood of the choice on exchange rate regimes. First as convention I define terms-of-trade as the ratio of export prices to import prices, presented as index numbers. Terms-of-trade indicate the purchasing power of a country's exports in terms of the imports that they will buy. A rise in the terms-of-trade index indicates an improvement in the terms of trade: one unit of exports will buy more imports. In light of the theory developed by Friedman (1953), a fall in the demand of export goods or an increase in the demand of import goods, which is a real negative shock on terms-of-trade, will lead to depreciation on nominal exchange rate. In order to maintain the peg under fixed exchange rate regime, a central bank has to inject money into domestic market, which increases the money supply and implicitly leads to inflation. This implies that the more often countries face negative terms-of-trade shock, the greater

probability that they will switch from fixed exchange rate regime to a floating one. Thus the sign of coefficient on terms-of-trade is expected to be negative.

The other regressors I use in the model follow the framework formulated by Shambaugh and Kevin (2010). Optimum currency area theory suggests that countries with more potential to trade are more likely to have a pegged exchange rate. For those countries with higher GDP per capita and larger population, they have more potential to trade but tend to be more diversified when they trade, and thus have fewer incentives to peg. For small countries with high GDP per capita but with a small population have more incentive to trade and are prone to peg their currencies to a base country. The effect of trade on large countries that do not tend to peg would be likely to be set off by the effect on small countries that have great incentive to peg. Since small countries in this sample outnumber large countries, I expect the coefficient on GDP per capita would be positively associated with the peg status. Following the assumption that the exchange rate volatility significantly diminishes bilateral trade (Cushman, 1983), those countries which want more trade are prone to peg their currency to a base country to avoid the risk of exchange rate volatility. Thus the coefficient on the percentage of trade over GDP is expected to be positive. I also control for oil rent which is an indicator as a substitution to fuel

exporters that have great incentive to peg their currencies. However, some advanced countries like Norway and U.K. that have relatively higher oil rent but in fact export less crude oil than those Middle East counties might tend to offset the effect of this variable as a substitution. Therefore the coefficient of the oil rent is expected to be ambiguous. The model is specified as following:

$$E(PS_{it})=\beta_1 \ln(TOT)_{it}+\beta_2 \ln(GDP)_{it}+\beta_3 GM2_{it}+\beta_4 \ln(OR)_{it}+\beta_5 \ln(TRADE)_{it}+\beta_6 \ln(POP)_{it}+ \beta_7(GOV)_{it}+\eta_i+\theta_t$$

PS is peg status where 1 indicates a country chooses fixed exchange rate system and 0 indicates a country chooses floating exchange rate system. GDP is GDP per capita. GM2 is the grow rate of qusi-money M2. OR represents the oil rent measured by U.S. dollars. TRADE is the ratio of total trade over a country's GDP. POP is population take the first difference. GOV specifies the ratio of government spending over GDP. η specifies courtiers fixed effect while θ_t capture the year fixed effect. The model is armed with logistic regression as the methodology, along with the regular Ordinary Least Square estimation as comparison. The logistic model is a generalized linear model used for prediction of the probability of occurrence of an event by fitting data to a logit function. The reason to use logistic regression is that the dependent variable in

this empirical analysis is binary variable, in which 1 indicates choice of fixed exchange rate regime and 0 for floating one. Also, the logit mode does lend itself to a fixed effects treatment for the heterogeneity. The purpose of using probability linear model is to provide a wider perspective with how much the result is consistent with the one under logistic regression. The reason that I prefer logistic regression instead of OLS as a more accurate way to measure the impact of terms-of-trade is that logistic model is able to guarantee the coefficients are between 0 and 1. I also add country fixed effect which captures the factors that are time invariable such as languages and laws, and year fixed effect that capture variables affecting all the countries at the same time such as global price shocks.

I use a panel (time-series, cross sectional) data set that includes de facto exchange rate regimes constructed by Shambaugh (2004) over 28 years(1980-2007). Estimation is by a linear probability model(OLS) and logistic model. The latter works seamlessly across panel, time-series, and cross-sectional data, and it also offers a more direct interpretation of the regression coefficients than linear probability model.

4.2 Data

The sample covers annual observations for 91 countries over the period 1980-2007. A list of countries, as well as the definitions and sources for all the variables used in the paper, is presented in Appendix A. All of the data come from the International Monetary Fund and the World Bank databases.

Most of the empirical literature on the evolution and implications of alternative exchange rate regimes groups observations according to a *de jure* classification based on the regime that governments *claim* to have in place, as reported by the IMF in its *International Financial Statistics.* This approach, however, ignores the fact that many alleged floats intervene in the exchange market to reduce exchange rate volatility, while some fixers devalue periodically to accommodate independent monetary policies. To address this problem, we use a *de facto* classification of exchange rate regimes.

The classification that this paper uses is constructed by Jay Shambaugh (2004) created in the spirit of the classification presented by Obstfeld and Rogoff(1995) to consider the empirical relevance of the policy trilemma.[3] The first work using this classification scheme was his article "The Effect of Fixed Exchange Rates on Monetary Policy" published February 2004. The

[3] The policy trilemma states that the monetary authorities of a country can choose no more than two of three policy options: free capital mobility, fixed exchange rates, and domestic monetary autonomy. This then limits the scope for a country's policy options.

Shambaugh classification is bivariate and assigns annul country/ year observations into either a peg or a non-peg category. The assignment is based on whether the official exchange rate stays within a ±2 percent band against the base currency. The base country is the currency to which a country pegs or would peg if it were pegging. This means that a truly multilateral basket peg, one that is not merely a veil for a de facto single currency peg, may not be categorized as a peg if it has no true base. Like Reinhart-Rogoff (1995), this classification relies on the exchange rate to code observations. Unlike Reinhart-Rogoff (1995), it is the official exchange rate, not a parallel rate that is used, because government policies affect the official rate. While it only used the exchange rate volatility to code observations, the classification required two years, of staying within a ±2 percent band to ensure that no observations that randomly lacked volatility were spuriously coded as pegs. Single-year pegs were dropped in the original Shambaugh (2004) classification scheme to ensure that an observation of a stable exchange rate reflects government policy rather than just a quiescent environment.

4. 3 Empirical results of Exchange Rate Regime Choice

In this section I present the results in panel data of both OLS and logistic regression. All the variables in this model are in logs in order to smooth the regression process. I use the first difference of GDP per capita and population to avoid non-stationary. A variable associated with a higher likelihood to float, one suggested by the policy trelemma, is an indicator of the openness of a country's financial account since the monetary constraints of pegging are more binding in this case. A well developed financial sector that is often approximated by the size of a broad monetary aggregate like M2 relative to GDP may also serve to cushion an economy from terms of trade shocks. I use growth rate of M2 here because it is also an indicator of central bank's inflation target.

Table 4.1 presents the first set of results from the OLS estimation with country fixed effect and year fixed effect. The dependent variable in this regression is a dummy variable where 1 indicates a country is pegged and a 0 indicates it is not pegged. The standard errors in this regression are clustered at the country level to control for serial correlation and for heteroskedasticity with countries.

Column 1 which is estimated by linear probability (OLS) with country fixed effect shows the basic panel results. Terms-of-trade is significantly different from zero and its coefficient is negatively associated with fixed exchange rate regime, indicating that countries attempt to switch to floating exchange rate regime when they face negative terms-of-trade shock across time. A negative terms-of-trade means the relative price of exports over imports declines: one unit of exports will buy fewer imports. The purchasing power is shrinking when terms-of-trade decreases. Countries likely to trade more with the base are significantly more likely to peg, and those that are less likely to trade with the base are less likely to peg. As expected, rich countries are less likely to peg and those countries that with high oil rent more likely to peg.

Column 2 shows a set of result with country fixed effect and year fixed effect. The purpose of adding year dummies is to capture global shocks that are common to every country. Variables like GDP per capita, oil rent, government spending and terms-of-trade are still consistent with column 1 and significantly different from zero. Variables like trade has completely flipped sign between country fixed effect and year fixed effect, implying that the specification in the first column suffers from omitted variable bias.

As it is stated earlier, one of the shortcomings of using linear probability here is that it violates the assumption of OLS so that the estimators may be biased. But we will see logistic model as a more accurate way in Table 4.2. Table 4.2 presents the results by using logistic model which takes care of fixed effect and heterogeneity. As similar as Table 4.1, column 1 shows the regular logistic regression with counties fixed effect. Column 2 demonstrates the result with adding year dummies. Now we see more clearly that coefficients on terms-of-trade are negatively associated with fixed exchange rate regime choice and significantly different from zero. Quantitatively, countries that face a negative terms-of-trade shock are roughly 43% more likely to switch from peg to floating regime. The economic rationale behind this is that if terms-of-trade is unfavorable, the relative price of export over import becomes smaller. One unit of exports will buy fewer imports in this case. The domestic purchasing power is shrinking to some extent that countries with fixed exchange rate hit by these shocks have fewer incentives to trade and intend to switch to floating exchange rate to cushion the shock. In other way around, if countries face a positive terms-of-trade shock, which the domestic purchasing power is on a rise and firms have more incentive to trade, thus they are prone to choose fixed

exchange rate. This to a large extent explains the negative relationship between terms-of-trade and the choice of exchange rate regime.

5. Concluding Remarks

The choice over fixed versus flexible debate remains highly contentious. In the search for clearer answers, the theoretical arguments involved ought to be tested and quantified. This paper presents the empirical analysis of how terms-of-trade shocks affect the probability between choosing a fixed exchange rate regime and floating one by using linear probability model and logistic model. It turns out that the impact of terms-of-trade is negatively associated with fixed exchange rate regime across countries and time period, as the literatures indicate above. The impact of other variables on the choice of exchange regime roughly follows the conventional studies of the matter.

In light of Milton Friedman's hypothesis, in a world with sticky prices, the nominal exchange rate could be used to insulate the economy against real shocks. The reason why the nominal exchange rate may matter is the presence of some kind of price stickiness. In countries with fixed exchange rate regime,

after a negative real shock, output falls until wages and prices are (slowly) bid down at a rate permitted by the nominal stickiness. In countries with a flexible regime, by contrast, the monetary authority can respond to the shock by a depreciation of the currency. The depreciation increases the domestic prices of exported goods exactly when the international price of these goods has fallen and thereby partially offsets the negative effect of the shock. Furthermore, the currency depreciation reduces real wages at precisely the time when labor demand has fallen, which also contributes to a smoother adjustment.

In the spirit of Friedman's hypothesis, the more likely a country faces a real terms-of-trade shock, the less likely it pegs its currency because a floating exchange rate is able to smooth the shock in a faster way, without affecting output too much if under a fixed exchange rate regime. Also from the data and the graphs that shown in the section of literature review, we have seen countries, especially developing countries flip the exchange rate regime from fixed to floating, say, during 1997-1998, which witnessed the Asian financial crisis. My results confirm the prediction of Friedman's theory because the time span in the sample has witnessed no more than three recession period around the world.

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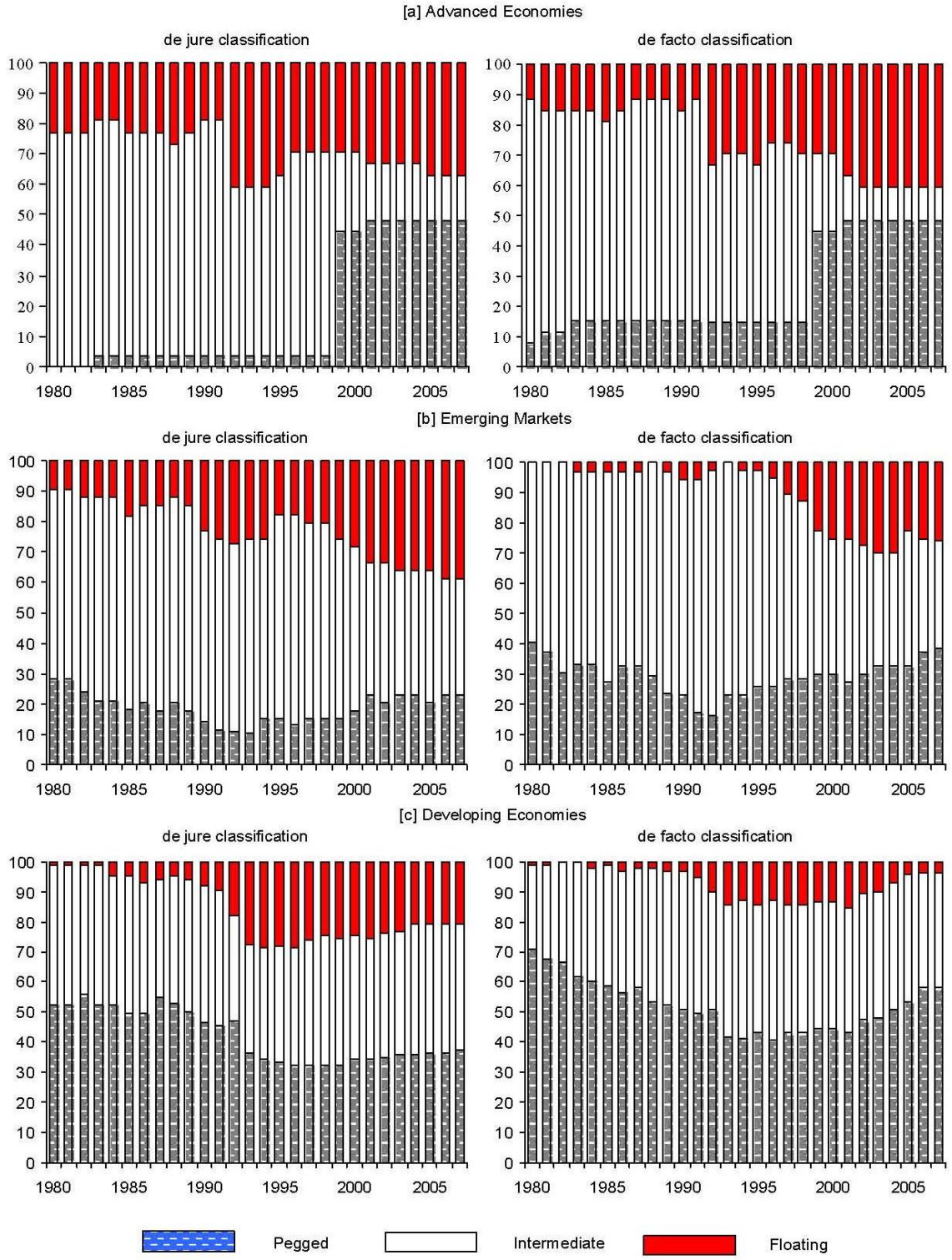

Figure 1. Frequency Distribution of Exchange Rate Regimes (in percent)

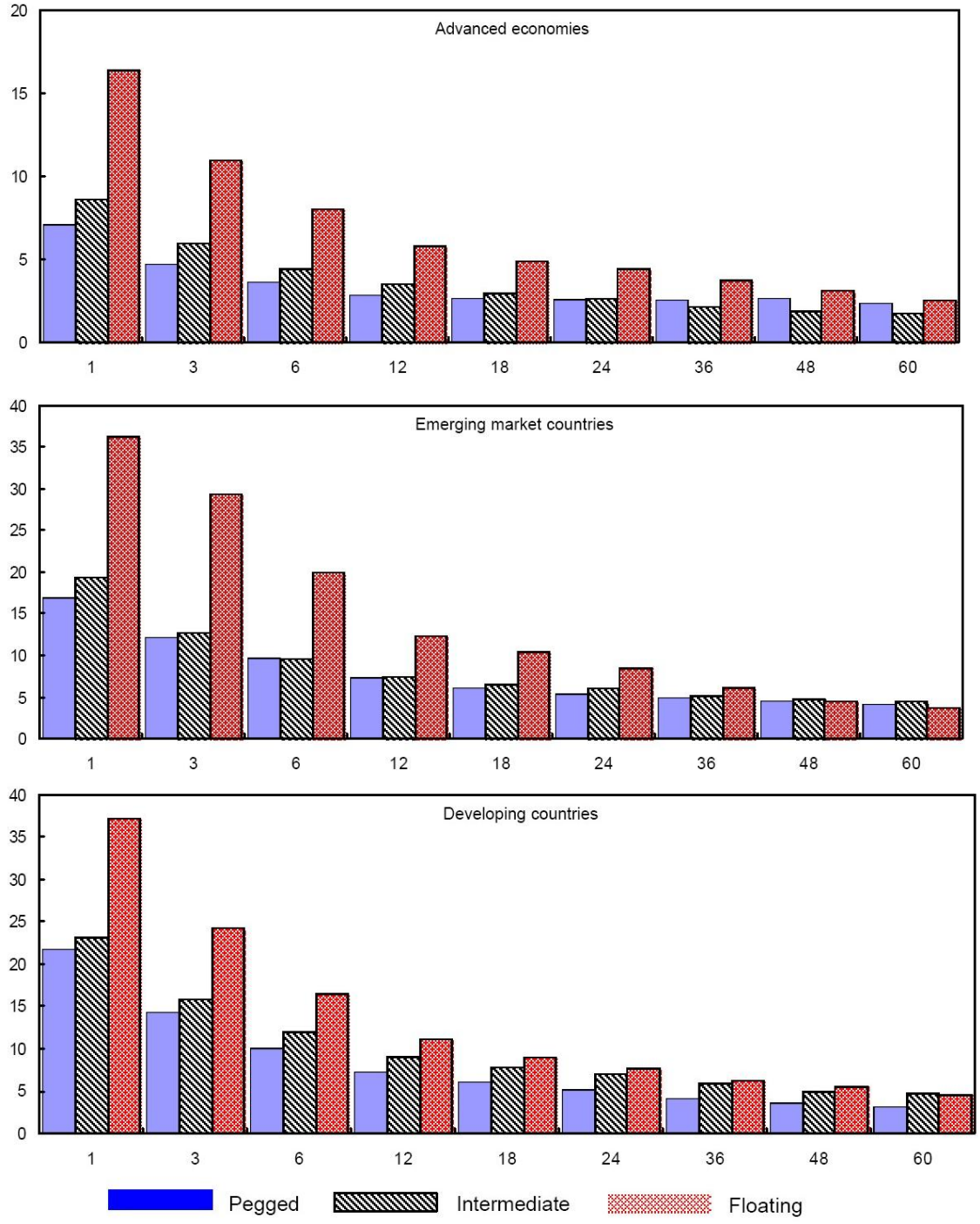

Figure 2. Real Exchange Rate Volatility (in percent per year) at Alternative Horizons (in months)

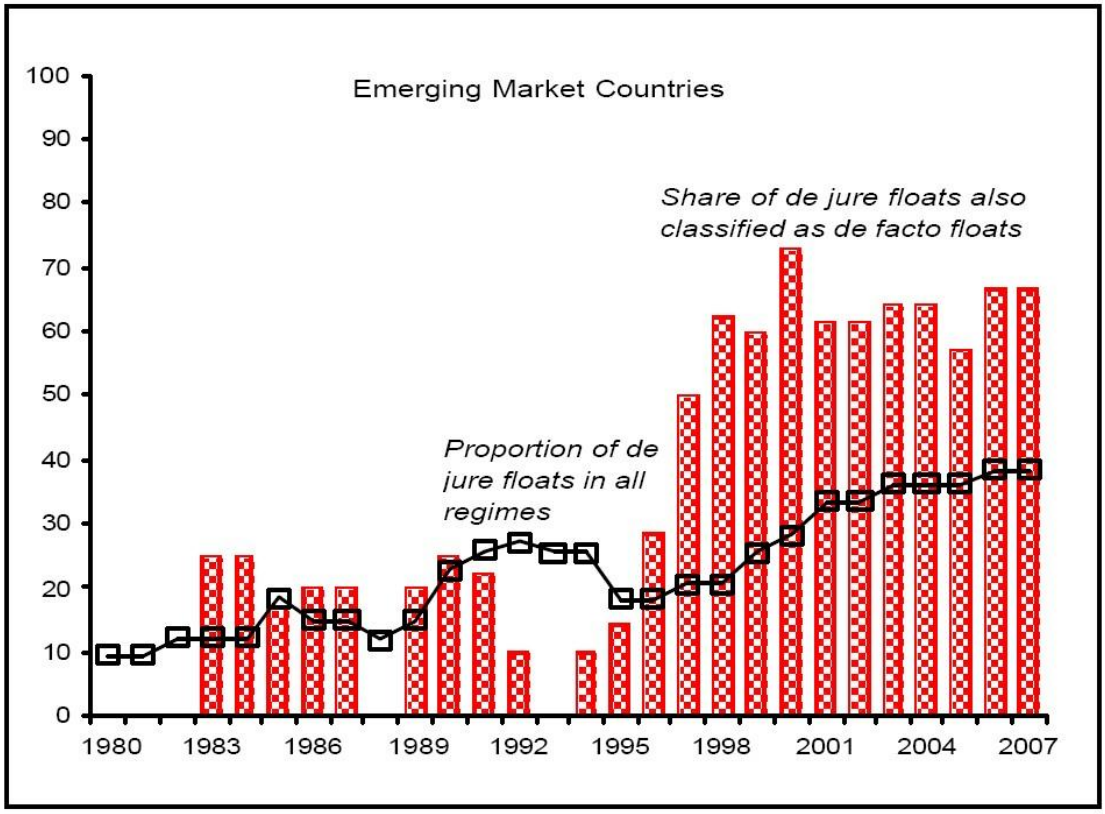

Figure 3. The Trend of Exchange Rate Regime in Emerging Market

Table 4.1. OLS Estimation

Basic Panel Estimation Sample	CFE	YFE
ln(GDP/capita)	0.086*	0.25*
	(0.016)	(0.022)
GM2	-0.0019*	-0.0032
	(0.024)	(0.023)
ln(oil rent)	-0.036*	-0.057*
	(0.0073)	(0.0073)
ln(Govt/GDP)	0.01*	0.01*
	(0.002)	(0.0019)
ln(Trade/GDP)	-0.073*	0.013
	(0.023)	(0.024)
ln(Terms of Trade)	-0.026*	-0.025*
	(0.009)	(0.0089)
ln(population)	-0.13	0.033**
	(0.018)	(0.018)
Observation	2328	2328
R-square	0.045	0.15

OLS estimation

Note: The dependent variable is peg status. Standard errors clustered at the country level below coefficients. *significant at 5%. **significant at 10%. Sample is 91 countries from 1980-2007.

Table 4.2. Logistic Estimation

Basic Panel Estimation Sample	CFE	YFE
ln(GDP/capita)	0.58*	3.19*
	(0.16)	(0.34)
GM2	0.012	0.041
	(0.21)	(0.25)
ln(oil rent)	-0.44*	-0.74*
	(0.093)	(0.14)
ln(Govt/GDP)	0.10*	0.11*
	(0.022)	(0.03)
ln(Trade/GDP)	-0.62*	0.41**
	(0.19)	(0.024)
ln(Terms of Trade)	-0.43*	-0.41*
	(0.15)	(0.20)
ln(population)	0.015	0.32
	(0.13)	(0.32)
Observation	1342	1342
Log likelihood	-595.26	-465.03

Logistic estimation

Note: The dependent variable is peg status; *significant at 5%. **significant at 10%. Sample period: 1980-2007

APPENDIX

Appendix A: A list of countries used in the sample

Argentina
Austrilia
Bangladesh
Beligum
Bolivia
Botsowana
Brazil
Cameroon
Canada
Cape Verde
Central African Rep.
Chile
China
Colombia
Congo,Dem.Rep.
Congo,Rep.
Costa Rica
Cote d'lvoire
Denmark
Dominican Republic
Ecuador
Egypt,Arab Rep.
Equatorial Guinea
Ethiopia
Fiji
Finland
France
Gabon
Ghana
Greece
Guatemala
Honduras
Hong Kong SAR, China
Hungary
Iceland
India
Indonesia
Ireland
Israel
Italy
Japan
Jordan
Kenya
Korea, Rep
Lesotho
Malaysia
Mali
Malta
Mauritius
Mexico
Morocco
Namibia
Netherlands
New Zealand
Nicaragua
Niger
Pakistan
Panama
Paraguay
Peru
Philippines
Poland
Portugal
Senegal
Seychelles
Singapore
Solomon Islands
South Africa
Spain
Sri Lanka
Sudan
Swaziland
Sweden
Swizerland
Tanzania
Thailand
Tunisia
Turkey
Uganda
United Kingdom
United States
Uruguary
Venezuela, RB
Zambia
Zimbawe