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SPILLOVER EFFECTS OF GLOBAL LIQUIDITY'S EXPANSION ON EMERGING COUNTRIES: EVIDENCES FROM A PANEL VAR APPROACH

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ABSTRACT

The attention for the global liquidity concept has grown over the recent years insofar as its dramatic increase is considered among regulators and economists as one of the possible determinants of the last global financial crisis. Although global liquidity remains without a generally accepted definition in the literature, the destabilizing effects of its expansion are widely studied, especially for the advanced economies. However, empirical studies regarding the consequences in the emerging countries are scarcer and this paper is related to this topic. We rely on a Panel VAR approach to investigate those effects on emerging economies and we find that the consequences are in line with the results of the literature on advanced countries. Nevertheless, contrary to previous empirical studies, we find that the choice of the exchange rate regimes is not important, as the exchange rate regime does not fully isolate the countries from a surge of global liquidity in the issuing countries.

KEYWORDS: *Global liquidity; Emerging countries; International spillovers; Panel VAR model; Vector Autoregressive model.*

JEL C33; E5

1. INTRODUCTION

Usually, *global liquidity* is a concept associated with the overall "ease of financing" considering its dramatic increase prior the global financial crisis (2008-2009) has often be seen as a major driver of credit and assets prices booms in many countries, including the United States. In addition, an extensive literature suggests that monetary authorities further eased monetary conditions by leading policy rates to deviate from Taylor rates (Taylor, 2012, 2014; Hofman and Bogdanova, 2012). This "great deviation" fueled the development of global liquidity conditions, leading to a major financial crisis that drove the global economy into a major recession. Furthermore, policies adopted by monetary authorities to mitigate the crisis have led to an additional increase in the global liquidity conditions. Indeed, major central banks decreased their policy rates to historic low levels and as policy rates attained the zero bound level, central banks adopted unconventional monetary policies, particularly through quantitative easing, which allowed the global liquidity's question to be still relevant. Among economists and policy makers, the debate on the global liquidity focuses particularly on its transmission mechanisms from advanced countries to receiving economies (IMF, 2010; BIS, 2011) and their destabilizing effects on the receiving economies (Baks and Kramer, 1999). A specific strand of the literature, particularly important in the aftermath of the financial crisis, focuses on spillover effects on emerging countries (IMF, 2010; Brana and Prat, 2011). Our paper is related to this topic. We contribute to the literature by using an innovative approach to the spillover effect issue, introducing new macroeconomic variables and advanced econometric methodology to assess the consequences of the global liquidity expansion on the economy of these receiving countries, mainly on emerging economies (EMEs). Particularly, we use a panel Vector Autoregressive approach on a set 26 receiving countries, mainly Asian, South American and African EMEs during the period 2000-2015. Our findings could be summarized into three points: first, we demonstrate that the global liquidity's expansion exerts the same mechanisms in the EMEs compared to advanced economies. Second, our results highlight regional differences, as Asian EMEs are more vulnerable to the global liquidity conditions. Third, we show that the choice of exchange rates does not matter as the global liquidity cycle affects the receiving economies regardless of their exchange rates model.

The rest of this paper is structured as follows. Section 2 investigates the related literature on the global liquidity topic; then section 3 introduces our empirical methodology, the preliminary tests and global liquidity measurements. Section 4 examines the consequences of global liquidity in the emerging countries by applying the Panel VAR methodology (PVAR) through 4 types of models: a benchmark global model, regional models, exchange rate regime model and robustness model. Finally, section 5 concludes on our findings.

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2. LITERATURE REVIEW

Global liquidity is a recent research field pioneered by Baks and Kramer (1999) who introduced prices and quantity liquidity indicators to assess their impacts on economic variables - such as asset prices and equity returns - in receiving economies. Their results confirmed the effects obtained in the past studies working on the effects of liquidity expansion on asset prices at a country level initiated by Friedman (1968). Specifically, Baks and Kramer (1999) - by considering only the public component of the global liquidity - identified strong positive relationships between the expansion of global liquidity and the growth in asset prices and equity returns during the period.

This pioneering study initiated a new topic focusing on the effects of global liquidity in the issuing and receiving countries and the development of theoretical framework explaining its evolution. Early works have investigated the effects of ~~this~~ global liquidity on advanced economies. Ruffer and Stracca's (2006) assess the spillovers on receiving economies by using a Global VAR (GVAR) model. They find significant effects of global liquidity's expansion on financial variables in the euro area and, to a lesser extent, on Japan's financial variables. Excess liquidity is an indicator of inflationary pressures in these economies. Bracke and Fidora (2006) test different hypotheses -namely the global saving-glut, the global liquidity glut and investment strike- that may explain the growing global imbalances, the decline in long-term interest rates and rising asset prices. To this end, they estimate a structural VAR model (SVAR). Their results exhibit positive evidences of the effects of global liquidity glut as possible explanation of the increase of current account imbalances in the developed countries. Sousa and Zaghini (2004) consider the impacts of global liquidity on macroeconomic variables by using the real GDP as indicator of output level on the receiving economies, the exchange rates and domestic prices. They estimate a SVAR model to analyze how the euro area variables react to a foreign monetary expansion proxied with a liquidity indicator of the G5 countries. They show the presence of significant effects of global liquidity expansion Studies on emerging economies are scarcer and represent an interesting field of research. IMF (2010) examines the determinants of capital flows to emerging markets. Using panel regression, IMF highlights the role of global liquidity's expansion in the rises of asset prices and equity returns experienced by those countries. This paper also shows that changes in these financial variables are explained by developments in both global liquidity and changes in the domestic money supply. Finally, IMF (2010) suggests that exchange rate regimes matter in the transmission of the global liquidity. Specifically, exchange rate regimes may trigger the accumulation of foreign exchange reserves as an indirect effect of the liquidity inflows. Tao and Psalida (2011) consider new financial variables such as bank lending and new global liquidity indicators. Their results are in line with the previous literature insofar as they identify positive links between global liquidity's expansion and asset prices; and between the evolution of global liquidity and the accumulation of foreign reserves in emerging countries. Their main findings conclude on the positive correlation between global liquidity expansion and credit growth on one hand, and between global liquidity expansion and equity returns, on the other hand. Chudik and Fratzscher (2011) estimate the impacts of liquidity and risk shocks on a sample of developed and emerging countries using a global VAR (GVAR) model. They stress the heterogeneous effects of these shocks as developed countries are highly vulnerable to liquidity shock while emerging countries are sensitive to shock risk and less vulnerable to a liquidity shock. Brana and Prat (2011) estimate a panel regression analysis by introducing a threshold effect to assess the evolution of asset prices in emerging countries. The investors risk aversion is chosen as threshold variable. Interestingly, they identify the presence of a non-linear effect in the relationship between global liquidity and the evolution of asset. Specifically, when the level of risk aversion is low, the positive relationship between the evolution of global liquidity and asset prices is significant; this effect disappears when the level of risk aversion increases. Such effect has been especially important in the aftermath of the global financial crisis. Djigbenou (2014) investigates the impacts of global liquidity on asset prices of emerging economies using the Panel VAR (PVAR) methodology. Compared with the previous literature, she includes in the estimated model the receiving countries house prices. The author concludes on the mixed effects of global liquidity expansion on asset prices, but she find that these effects are significant for the evolution of consumer prices and GDP growth.

3. METHODOLOGY

3.1 Data

For the purposes of our analysis, we built an unbalanced panel data composed of 30 countries divided into two groups, liquidity issuing economies represented by several advanced economies[1] and receiving economies mainly

[1] *Issuing economies: Euro area, Japan, United Kingdom, United States. These countries are the main reserves currencies issuers.*

composed of emerging countries[2]. Those receiving countries are also decomposed into four country groups from Asia, Latin America, Eastern Europe and lastly Africa and the Middle East. This distinction will be important for modeling the global liquidity spillovers at a regional level. To construct our database, we needed to collect:

- Official liquidity indicators, including broad money M2 and narrow money M1.
- Indicators of performance on financial markets with MSCI index. This indicator has the benefits to be harmonized and available for all the countries including emerging economies.
- Indicators of interest rates modeled by treasury bonds rates for long-term interest rates and interbank rates, discount rates and money market rates for short-term interest rates.
- An indicator modeling the domestic output with the industrial production index.
- Exchange rates between US dollars and local currencies in order to express all variables in the same currency.

These data are collected from January 2000 to May 2014 in monthly frequency from the IMF, Datastream and Macrobond databases.

3.2 Preliminary Conversion

First, some data require preliminary treatment before estimating our models. Indeed, in addition to transformation in the same currency, a frequency transformation is also necessary. It turns out that Industrial production index data are available only in quarterly frequency in some of the countries of our panel. This situation requires the linear interpolation method to transform them into monthly data. This first step allows the creation of our six variables of interest namely GL global liquidity indicator, liquidity indicators in receiving countries $M2$ (or $M1$), IPI represent the short-term GDP, the indicator of assets prices $MSCI$, long term and short term interest rates with ILT and h IST. Then, we perform a logarithm transformation on our variables of interest.

Second, contrary to previous studies, we choose to undertake a panel unit root test procedure. The results[3] of this methodology conclude on the presence of the unit root for all of our variables in level. This unit root is then removed using the first difference on all our variables. So, in order to perform the Panel VAR procedure we choose to use stationary variables.

3.3 Global Liquidity Measurement

Concerning the global liquidity phenomenon, we construct several indicators measuring global liquidity conditions. Numerous empirical indicators can be used as global liquidity indicators, especially those derived from money and credit aggregate, which are the fundamental methods used in previous studies. The indicators are essentially based on narrow monetary aggregates (typically banknotes and coins plus highly liquid bank deposits) or based on broad monetary aggregates that also include less liquid bank deposits and marketable instruments issued by monetary financial institutions). The narrow monetary aggregate has the advantage of homogenous components across economies, rendering the resulting measure is thus easier to interpret. On the other side, broad monetary aggregates provide a less volatile structure of monetary growth in individual economies, as they internalize substitution among the different liquid assets. The main argument over choosing the broad monetary aggregates is its capacity to capture both public and private liquidity through the monetary and market liquidity conditions. So the broader the monetary aggregates are, the greater its capacity to measure the global liquidity conditions.

Two quantity-based indicators are used in this study using broad money and narrow monetary aggregates. Such indicators are in line with previous related literature.

The first indicator developed by Baks and Kramer (1999) is the sum of the broad money of the advanced countries in US dollar expressed as:

$$GL_1 = \sum_{i=1}^{4} \left(\frac{M^i}{S_i} \right)$$

Where M_i represents the monetary aggregates (narrow or broad money) and S_i is the exchange rates between the local currency and the dollar.

The second indicator is a GDP weighted global liquidity indicator that expresses the hypothesis of the existence of global excess liquidity. It is defined as the ratio between narrow or broad money aggregates and

[2] *Receiving economies: Australia, Argentina, Bulgaria, Chile, China, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Lithuania, Malaysia, Mexico, New Zealand, Peru, Philippines, Poland, Russia, Singapore, South Africa, South Korea, Taiwan, Thailand.*

[3] *See annex C.1 for the unit root test for the benchmark model.*

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nominal aggregate GDP of advanced economies. This alternative indicator is developed by Ruffer and Stracca (2006):

$$GL_2 = \sum_{i=1}^{4} \left(\frac{M^i}{GDP^i} \right) . \frac{1}{S_i}$$

3.4 Panel Vector Autoregressive Model

To demonstrate the effects of global liquidity on our panel of emerging countries, we adopt the VAR methodology developed by Sims (1980) applied to panel data according to the empirical methodology developed by Love and Zicchino (2006). We choose this empirical methodology considering Canova's (2013) recommendations on the Panel VAR model. First, we rely on the PVAR methodology to highlights the transmission of idiosyncratic shock across countries and time; in our case, we rely on this methodology to investigate the effects of the global liquidity's expansion in the advanced economies and its impacts on a group of heterogeneous emerging economies. Second, this approach is also suited for investigating what channel of transmission may make responses to internationals shocks across heterogeneous group of countries, particularly we investigate which transmission's channels could explain the evolution of domestic variables in the receiving economies. Third, it is also suited for examining whether the shocks generated outside an area dominate the variability of domestic variables (Canova, 2005; Rebucci, 2010).

The theoretical reduced form of the PVAR model is defined by:

$$Y_{i,t} = \propto_i + \Gamma(L) Y_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where i $(i = 1, \dots, N)$ denotes the country, and t $(t = 1, \dots, T)$ the time. $Y_{i,t}$ represents the vector of endogenous stationary variables, $\Gamma(L)$ the matrix polynomial in the lag operator L, $\propto_i$ denotes the vector of country-fixed effects and $\varepsilon_{i,t}$ is the vector of errors. The indicator of global liquidity and the variables of the receiving economies compose the vector of the endogenous variable: $Y_{i,t}$.

Concerning the empirical methodology, we follow the recommendations made by Love (2006) when implementing the PVAR procedure. This methodology requires imposing the same underlying structure for each cross-sectional unit (country) but this constraint may be violated in practice. The country-fixed effects introduced in the Equation (1) are the solutions to get around this restriction on the parameters so they can capture individual heterogeneity. However, theoretically the fixed-effects estimator in autoregressive panel data models is inconsistent because the fixed effects are correlated with the regressors due to lags of the dependent variable (Nickell, 1981). To overcome this issue, we need to remove the fixed effects before estimating the coefficients by using generalized method of moments (GMM) or ordinary least squares (OLS) estimations. The GMM method needs the Helmert procedure recommended by Love to remove the fixed effects but we use an alternative method to resolve the fixed effects by differencing our variables as the first first-difference method removes the panel fixed effect. However, this choice creates a new issue, in practice, as the PVAR procedure needs the results of the Helmert procedure for the estimation. So, we perform OLS estimation for our PVAR models to overcome the previous technical issue as the OLS estimation use our variables in first difference as both regressors and instruments to estimate the panel VAR coefficients. Specifically, we use Pooled OLS VAR without fixed effects as these effects provide biased estimates of autoregressive coefficients (Juessen and Linneman, 2010).

3.5 Ordering the Endogenous Vector

Regarding the order of our endogenous variables, we use both Cholesky and results[4] from the panel non-causality tests. We specify the Cholesky ordering from the theoretical relationship between our variables and justify the order's choice by using the panel non-causality tests results.

First, we assume that the most exogenous variable of our model is the global liquidity indicator since it is created in the issuing countries. Second, a surge in global liquidity is first transmitted to money supply, which in turn affects the output of the receiving economies. At the same time the asset prices and the long-term interest rates are also affected by the evolution of the money supply, which indicate that the money supply is the most endogenous vector of our model. Furthermore, the evolution of interest rates affects theoretically the evolution of asset price so we conclude that the asset price is less endogenous than the interest rates. Lastly, the long-term interest rates affect the short-term interest rates.

[4] *See annex B.*

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From an empirical perspective, the main results from the panel non-causality tests confirm the important bi-directional causality link between all of our variables. Our results show that most of our variables interact with each other in a positive way. In other words, each variable homogeneously causes the developments of the other variables of the endogenous vector. However, only two non-significant results emerge from the causality test of production to the money supply and the causality test of long-term interest rates to the asset price, which indicates that these variables are more exogenous compared to short-term interest rates, production, and asset prices. Nevertheless, these results are not strong enough to determine the order choice of our variables and since most of our variables face bidirectional causality, we cannot conclude on a stable order for our endogenous vector. So, we rely on the theoretical indications and define the vector of endogenous variables as:

$$Y_{i,t} = \left(\Delta GL_{i,t}; \Delta M1_{i,t}; \Delta OUTPUT_{i,t}; \Delta MSCI_{i,t}; \Delta i_{i,t}^{st}; \Delta i_{i,t}^{lt}\right) \quad (2)$$

4. EMPIRICAL ANALYSIS

To evaluate the effects of global liquidity expansion on emerging countries, we proceed in fourth steps. Firstly, we estimate our benchmark model that includes the whole sample of countries. Secondly, we decompose the sample in regional sub-samples to assess the presence of regional heterogeneity. In a third step, we analyze the influence of the exchange rate regimes. Lastly, we check the robustness of the results. This main approach centers on the impacts of the first indicator of global liquidity we constructed before, which only measure the expansion of the global liquidity created by advanced economies throughout the given period. Additionally, we study the effects of global liquidity under the assumption of global excess liquidity implemented in the second indicator as a robustness analysis that we use this indicator only on the global model.

Since our variables are in first differences, our analysis is centered on the growth rate of those variables. For further analysis, we construct our reasoning on the impulse responses functions (IRFs), which allows examining the responses of a liquidity shock on the endogenous variables of the selected model, and the results of the variance decomposition through variation of each variable explained by the indicator of global liquidity. For every estimation, we use a 5% standard error bands generated with Monte-Carlo 1000 repetitions and we rely on a second order PVAR for our estimations considering the recommendations of empirical studies using monthly data and the Schwarz information criterion.

4.1 Benchmark Model

In the first model (see Fig. 1), we investigate the impacts of global liquidity expansion in the advanced economies on all receiving countries of our panel. We find that a positive shock of global liquidity has a positive significant effect on the evolution of money supply in emerging countries, especially during 3 months after the shock. Moreover, as in Djigbenou (2014), this positive shock leads to an increase in industrial production. These results are consistent with the effects of an expansionary monetary policy highlighted in the new open economy models. However, as we cannot distinguish the individual effects of the liquidity expansion on each country, we cannot conclude on the monetary authority reactions. Their reactions could also explain the positive relation between global liquidity growth and foreign output growth if they increase their available money to reacts to the contraction of their output as explained in the M-F framework. These results are in line with the findings of Sousa and Zaghini (2004).

In addition, the global liquidity shock causes a decrease in interest rates but this effect is short-lived. This temporary effect on interest rates influences the appreciation of asset prices in the receiving countries magnifying the transmission of the global liquidity flows to emerging financial markets. These consequences on interest rates and assets prices are consistent with the "push" channel described by Baks and Kramer (1999) and the findings of Ruffer and Stracca (2006), and Bracke and Fidora (2006).

Variance decomposition analysis (Table 1) confirms the previous IRFs results. Specifically, only a small percentage of the global liquidity shock innovations explain the development of endogenous variables. The strongest effect is observed for the money supply (7.1%).

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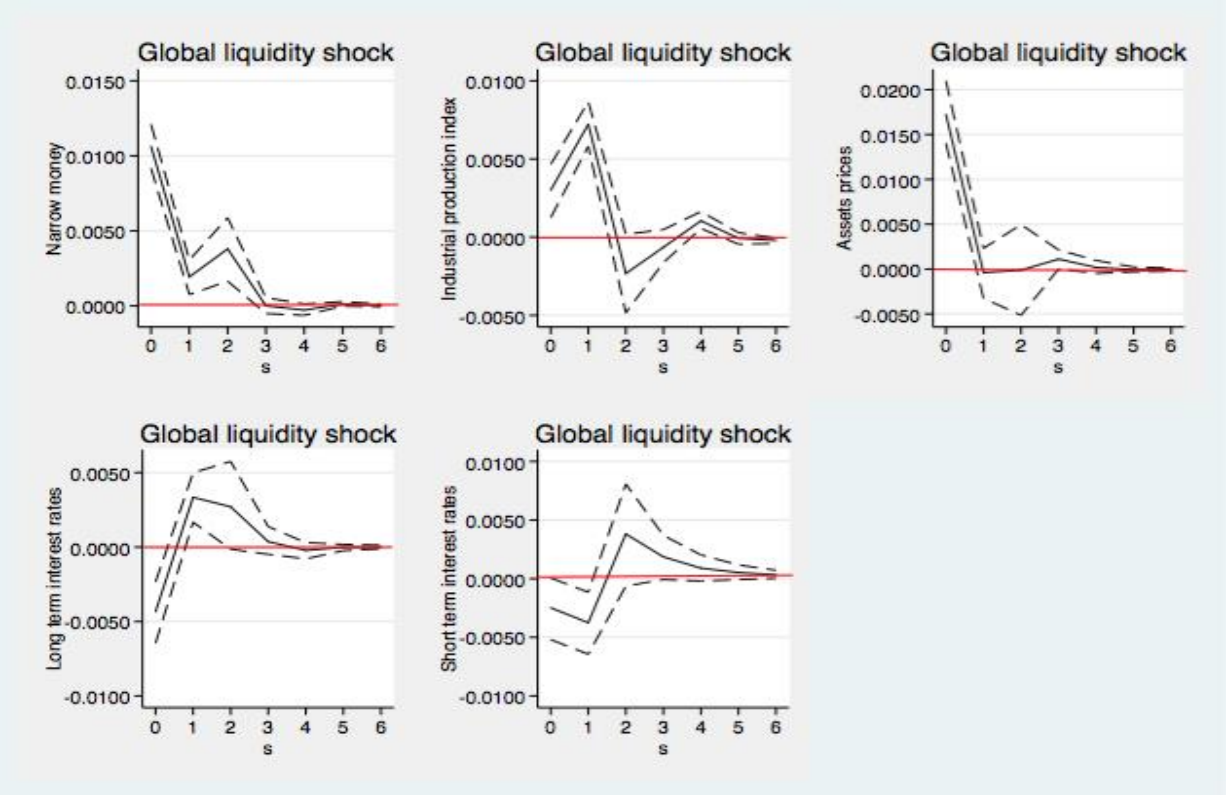

Fig. 1 Benchmark model Impulse responses functions

Table 1 Variance decomposition: percent of variation of the row variable explained by the indicator of global liquidity

	1 month	3 months	6 months
M1	**6.0**	**7.1**	**7.1**
IPI	**0.2**	**0.9**	**1**
MSCI	**2.5**	**2.5**	**2.5**
ILT	**0.2**	**0.6**	**0.6**
ICT	**0.09**	**0.4**	**0.4**

4.2 Regional Models

In this section, we study the effects of global liquidity at a regional level[5] to identify regional disparities.

4.2.1 Asia Pacific Region

The impacts of global liquidity in Asia-Pacific countries[6] (see Fig. 2) are in line with the global model. However, small differences in the magnitude of these effects are noticeable. Indeed, responses of interest rates and output are larger than in the benchmark model suggesting that Asian countries are more responsive to changes in the evolution of global liquidity conditions. A possible explanation lies in the fact that this region tends to receive more international capital flows, particularly direct foreign investment. The response of money supply could also be explained by their exchange rate regimes as most of our countries use intermediate or fixed monetary arrangements. So surge in global liquidity tends to be accompanied by an increase in foreign reserves and, in turn, a rise in domestic money supply.

Interestingly, variance decomposition results (Table 2) show that global liquidity shocks have a better explanatory power in the Asian-Pacific model. For instance, such shocks explains 3.6% of assets prices innovation while this share was roughly around 1% in the benchmark model.

[5] *See annex section A.1 for the IRFs and variance decomposition results for the regional models.*
[6] *Asia-Pacific countries: China, India, Indonesia, South Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, Australia, Thailand.*

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4.2.2 Eastern Europe Region

Eastern European countries[7] exhibit similar responses (see Fig. 3) than the benchmark model. Money supply reacts strongly to a positive shock on global liquidity in line with the "push" channel of global liquidity. Moreover, this strong money growth leads to a modest downward pressure on long term interest rates as confirmed by the variance decomposition (Table 3). Similarly, we observe only weak upward effects on the assets prices. However, the large response of money growth affects strongly the output. Specifically, 10% output forecast error is explained by global liquidity innovations. This result is consistent with the transmission channel of NOE models.

4.2.3 South America Region

Relative to the benchmark model, Latin American countries*8* exhibit important differences concerning the impacts of the global liquidity expansion *(*see *Fig.* 4 below). Despite similar effects on changes in asset prices and output, we see that money supply is very sensitive to the global liquidity inflows. Specifically, variance decomposition (*Table* 4) suggests that liquidity shock explains 10% of innovation in the money supply. In addition, our results show global liquidity shocks exert a strong influence on output as the share of its forecast error explained by the shock amounts to 21%. The significant effects on domestic monetary growth mostly drive rise in output in the South American economies and spillover to asset prices. However, the effects on the interest rates are less significant as their innovations are only explained by less than 2% of the global liquidity shock.

4.2.4 Middle East and Africa Region

As expected given their diversity in the degree of financial openness and in the level of financial development, results for this region[9] are mitigated (see Fig. 5). Indeed, we do not notice any significant effect of global liquidity shocks on the evolution money supply and interest rates, despite significant results concerning the evolution of output and asset prices according to the variance decomposition (
Table **5 Variance Decomposition**), respectively 21% and 2%. These results are not consistent with expected effects of global liquidity expansion. A possible explanation might be that their financial markets are less integrated than other emerging countries and regions.

4.3 Exchange Rate Regime

As stressed by the Mundell-Fleming model, the effects of exogenous liquidity on the receiving economies depend on several macroeconomic factors, including the exchange rate regime of these countries. Surges in global liquidity may induce different responses depending on the nature of the exchange rate regimes in the receiving countries. Indeed, the degree of exchange rate flexibility and the level of capital controls. These effects can be summarized through the corner solutions, namely fixed exchange rates *versus* floating regimes.

To highlight the influence of the exchange rate regimes, countries in our sample are divided into two subsamples according to the adopted exchange rate regimes. To this end, we use the *de facto* monthly coarse classification developed by Reinhart and Rogoff. This classification covers only a part of our period. Yet we apply the average and the median[10] to distinguish the countries exchange rates regime from January 2000 to December 2010. Consequently, when the median during the period is between 1 and 2 or the average is between 1 and 2.5, the country is placed in the fixed exchange rate regime group[11], which consists of 13 countries. Finally, countries with a median between 3 and 6 or an average of between 2.51 and 6 during the period are included in the floating exchange rate regime group[12], which is composed of 13 countries.

The main results[13] of this empirical approach considering the exchange rates regime join the results of the benchmark model but dividing our countries in two groups allows us to interpret the results differently. Our main global result shows that global liquidity shocks on the domestic monetary conditions produce similar effects on both countries groups when we use narrow money as proxy for monetary conditions. However, taking into account the exchange rate regime can complete the previous analysis:

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[7] Eastern Europe countries: Bulgaria, Hungary, Lithuania, Poland, Czech Republic, Russia,
[8] South American countries: Argentina, Chile, Colombia, Mexico, Peru.
[9] Middle East and African countries: Egypt, Israel, Jordan, South Africa.
[10] See annex section D.
[11] Countries with fixed exchange rate: Argentina, Bulgaria, China, Egypt, India, Hungary, Jordan, Lithuania, Malaysia, Peru, Philippines, Russia, Taiwan.
[12] Countries with floating exchange rates: Australia, Chile, Colombia, Czech Republic, Indonesia, Israel, Mexico, New Zealand, Poland, Singapore, South Africa, South Korea, Thailand.
[13] See annex A.2 and A.3 for IRFs and variance decomposition results.

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Firstly, we find that countries with fixed exchange rates regime are particularly sensitive to monetary policies adopted in the issuing countries (see Fig. 6). As we notice significant effects of the global liquidity shock on the monetary conditions in the receiving economies. This result is consistent with theoretical assumptions according to which fixed exchange rate regimes do not isolate the receiving countries from evolutions in monetary policies of issuing countries. Furthermore, contrary to the benchmark model, we also find significant effects on the evolution of monetary conditions with the model using broad money (see Fig. 7). Such result highlights the fact that the global liquidity affects not only the public components of the monetary conditions, but also the behaviors of the private sector, for instance through its stimulating impact on domestic credit[14]

Secondly, in line with Rey (2013) about the trilemma *versus* dilemma debate, we find that floating regimes do not immunize domestic countries against positive global liquidity shocks. Indeed, regarding our model with narrow money as domestic monetary indicator (see Fig. 8), we note that the responses of domestic variables for this subsample are significant to global liquidity shocks. Accordingly, although variables of our second model using broad money (see Fig. 9) are sensitive to changes in global liquidity, the indicator of domestic monetary conditions is not affected by the global liquidity shock. This result moderates our analysis about the behavior of the private sector, as the private liquidity is not stimulated by the developments of the global liquidity conditions. In other words, it means that the global liquidity effects do not affect the behavior of the financial intermediaries and the credit creation in this group of countries.

Thirdly, the interpretation of these results is reinforced by the corroboration of Rey (2013) hypothesis, which states under hypothesis of perfect capital mobility that the choice of exchange rate regime is not important considering the global financial cycles as we notice the global liquidity pass-through consequences on both set of countries.

4.4 Robustness Check

In this section, we investigate the spillovers effects of global liquidity on the emerging economies under the assumption of global excess liquidity in the issuing countries. We rely on the GDP weighted global liquidity indicator[15] developed by Ruffer and Stracca (2006) to assess the results obtained with the first global liquidity indicator. The hypothesis of global excess liquidity in the advanced countries implies that only the excess liquidity affects the receiving economies and developments of global liquidity conditions may only affect the receiving economies at a limited degree.

We adopt the same underlying methodology than in the previous section; the only difference being the nature of the global liquidity indicator implemented in the panel VAR. We focus on the spillover effects of the excess global liquidity on the global model to analyze the differences between the effects of the global liquidity indicators.

The excess global liquidity shock pushes the same mechanisms (see Fig. 10) obtained in the first global model. We notice that the global liquidity shock causes strong money growth, asset prices appreciation and downward pressure on interest rates. The only differences rely on the magnitude of the global liquidity effects as we notice a weak effect on the output and a strong significant effect on the short-term interest rates. The transmission mechanisms are similar to those of the first global model, strong money growth and fall of interest rates, especially long term interest rates, influences the increase of the asset prices through the "push" channel. In turn, the receiving economies output is affected by the money growth, which could be provoked by monetary authorities' reaction to the surge of global liquidity or the effect of global liquidity in the NOE framework.

The analysis is confirmed by variance decomposition (Table 10) results, with a relatively strong effect of the global excess liquidity shock on the innovations of the money growth (6.1%), the asset prices (3.7%) and the short-term interest rate (3.9%). Except, the strong result on short-term interest rates, which normally is influenced by the evolution of the long-term interest rates though these results agreed with the findings of the first global model.

[14] *Strictly speaking, we cannot distinguish properly the effects on the private liquidity of the receiving economies in this model, as we cannot differentiate between the public and private liquidity in the monetary conditions indicator.*

[15] *Ruffer and Stracca (2006) use two indicators to express the hypothesis of global excess liquidity : $log \frac{M3_t}{PIB_t}$ the monetary aggregate M3 weighted by the GDP and $\Delta log \frac{M3_t}{PIB_t}$ the growth rate of the monetary aggregate M3.*

6. CONCLUSION

Since the late 90's, the global liquidity development and its issues on both issuing and receiving countries have captured the attention of economists and the financial macroeconomic literature over the recent years. The debates have been mainly focused on the destabilizing effects of the global liquidity since its components evolutions, official and private liquidity, could had led to the 2008 financial crisis. Moreover, the policies responses to mitigate the crisis effects are also in the center of this topic since the quantitative easing and accommodative monetary policy fueled the evolution of the global liquidity. So, in order to investigate the consequences of global liquidity, one strand of the literature focused exclusively on the spillovers effects to the receiving economies, mostly advanced countries. The studies investigating the effects on emerging countries are scarcer mainly because of data availability reason. In this context, the primary objective of this paper is to examine the theoretical transmission channels and the consequences of the evolution of the global liquidity conditions on the emerging countries. We focus on the effects on specific emerging countries variables such as money supply, asset prices, interest rates and more importantly output. For this purpose, we estimate a panel VAR model on a sample of 30 countries over the period from January 2000 to May 2014.

Our main results are consistent with the hypothesis of destabilizing effects of the global liquidity to the emerging countries. From a financial stability perspective, a surge in global liquidity triggers the emerging economies money growth, drives downwards pressures on the interest rates and upward pressures on asset prices. These findings are in line with Baks and Kramer (1999) and studies focused on emerging countries, especially FMI (2011) and Djigbenou (2014). However, contrary to the papers working on spillover effects of global liquidity, we showed that there are different effects between the emerging countries groups. Some groups are more affected by the global liquidity conditions than others, Asian countries and European countries for instance. Moreover, we find a significant positive correlation between the global liquidity and the output of emerging countries, which is line with the previous results on the topic (Souza and Zaghini, 2004). This result confirms that a surge in global liquidity improves the output development in the receiving economies and we demonstrate the existence of disparity among the countries groups. Finally, distinguishing the emerging countries based on the exchange rate regime revealed that according to Rey (2013) hypothesis, the choice of the exchange rate regime does not matter as the emerging countries are all affected by the global liquidity expansion.

Our contributions to the debate are mainly centered on the financial stability perspective. But in order to measure all the different characteristics of global liquidity, we need to examine the impacts of global liquidity conditions on prices (consumer prices and commodities prices) and inflation under a new approach, the monetary policy perspective.

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APPENDIX

Impulse Response Function and Variance Decomposition

***A*.1 Regional Model**

A.1.1 Asia-pacific Region

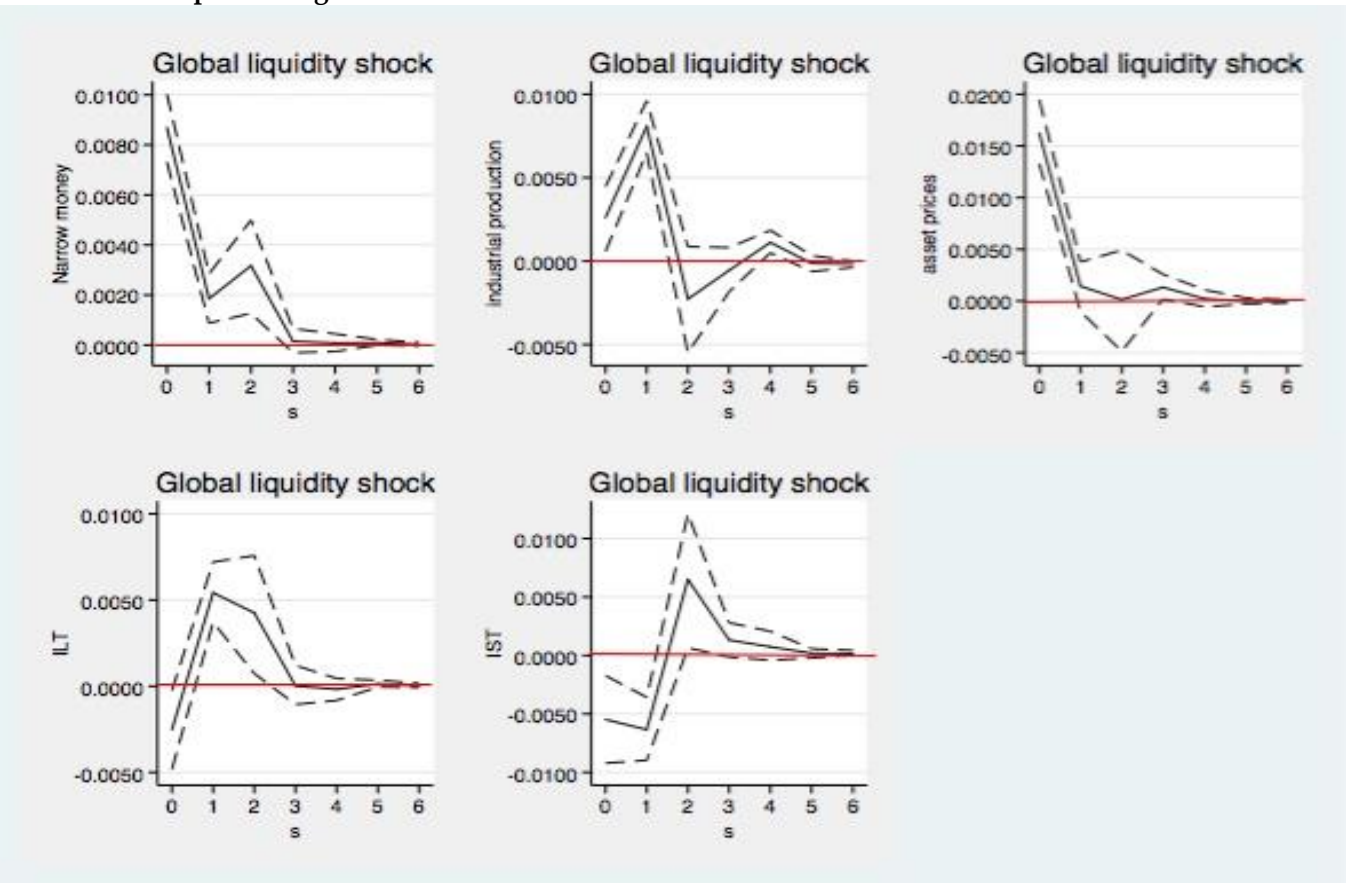

Fig. 2 IRFs Asia pacific

Table 2 Variance Decomposition

	1 months	3 months	6 months
M1	6.1	7.0	7.0
IPI	0.2	2.5	2.6
MSCI	3.7	3.6	3.6
ILT	0.1	1.4	1.4
ICT	0.03	1.1	1.1

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A.1.2 Eastern Europe Region

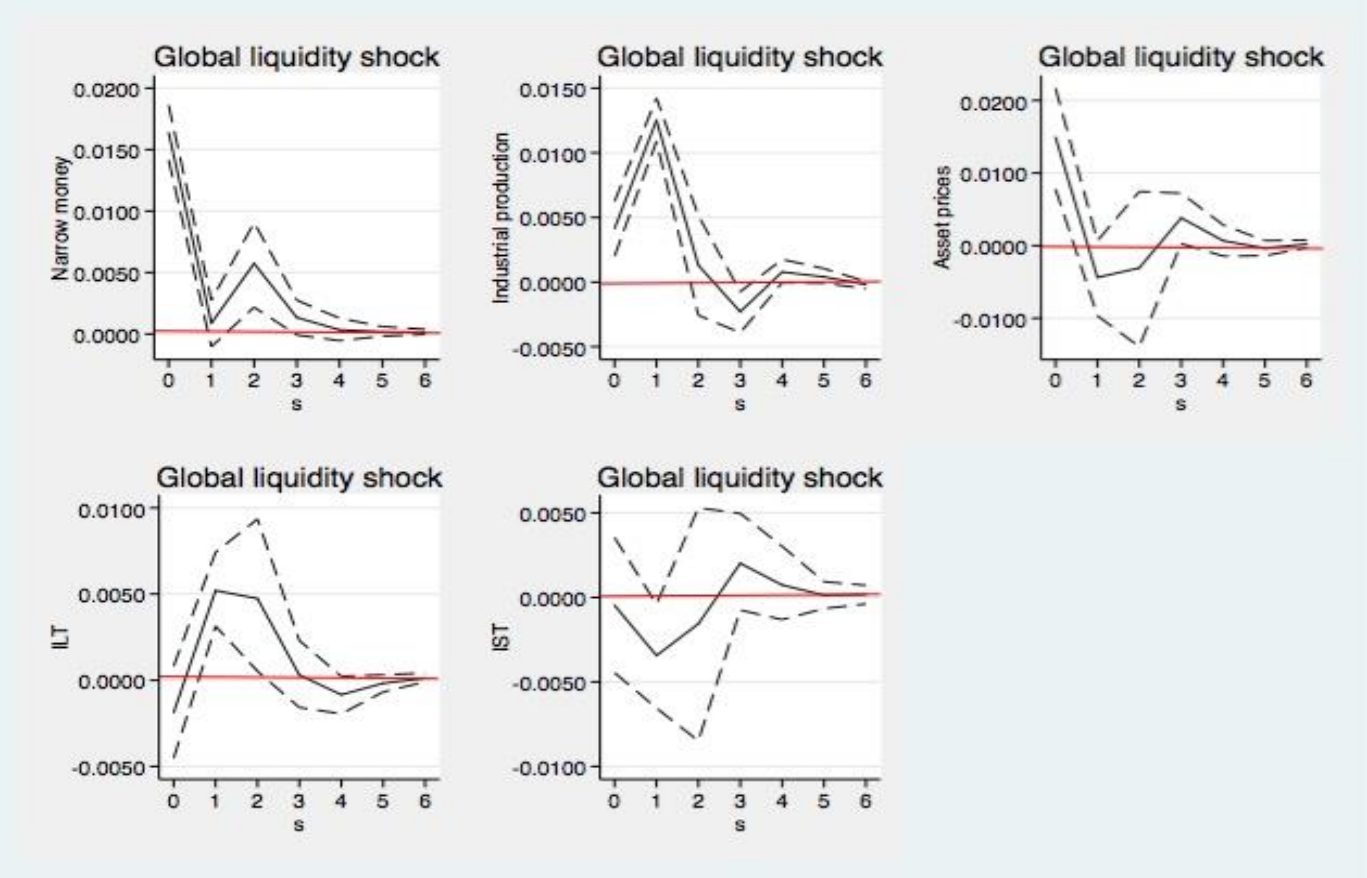

Fig. 3 IRFs Eastern Europe

Table 3 Variance Decomposition

	1 months	3 months	6 months
M1	**15.1**	**15.8**	**15.8**
IPI	**1.1**	**9.7**	**10.0**
MSCI	**1.3**	**1.4**	**1.5**
ILT	**0.1**	**2.0**	**2.0**
ICT	**0.003**	**0.2**	**0.2**

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A.1.3 **South America Region**

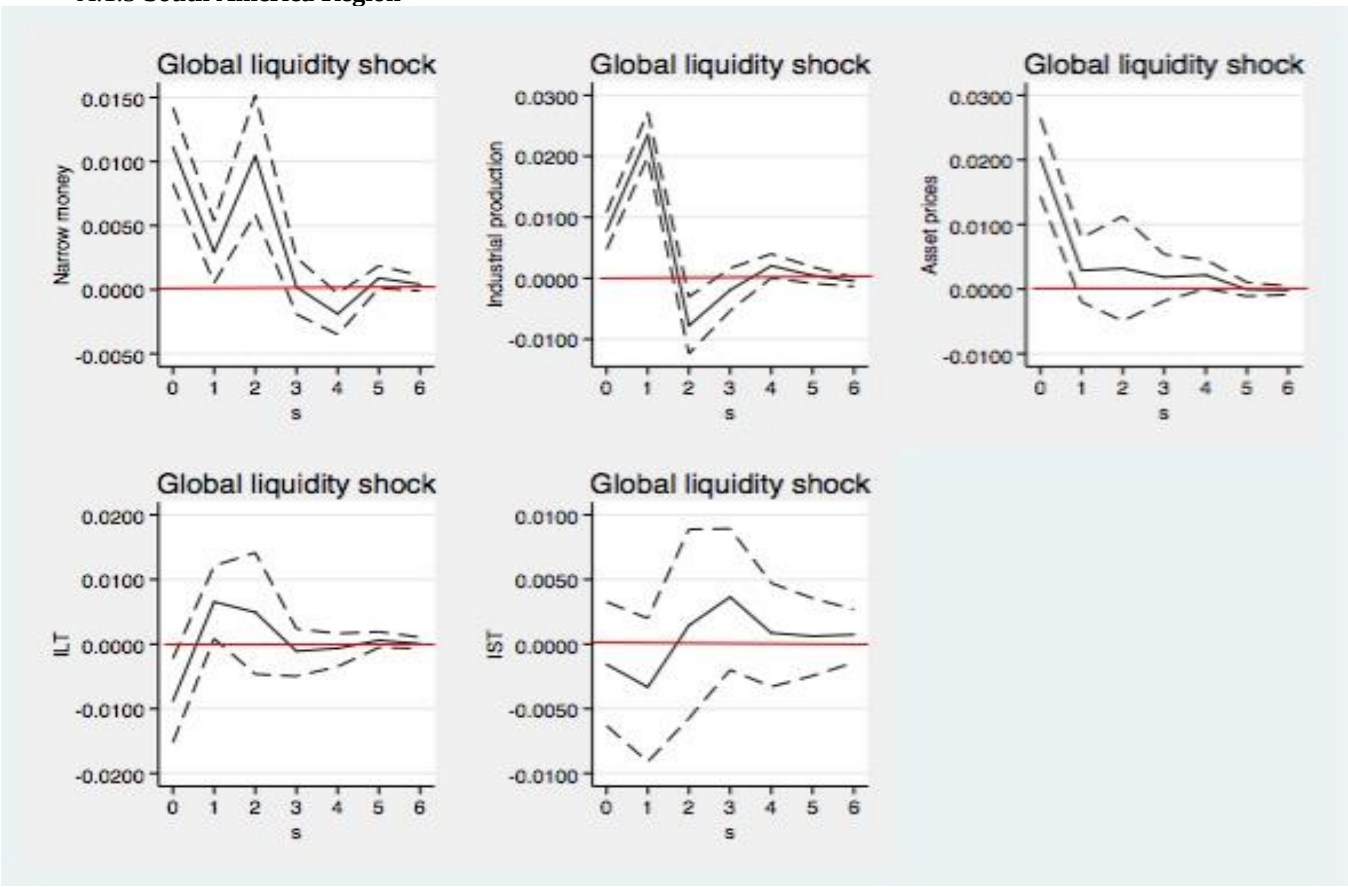

Fig. 4 IRFs South America

Table 4 Variance Decomposition

	1 months	3 months	6 months
M1	5.8	10.1	10.2
IPI	2.9	21.5	21.5
MSCI	4.9	5.0	5.0
ILT	0.9	1.6	1.6
ICT	0.04	0.2	0.3

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4.1.4 Asia-Pacific Region

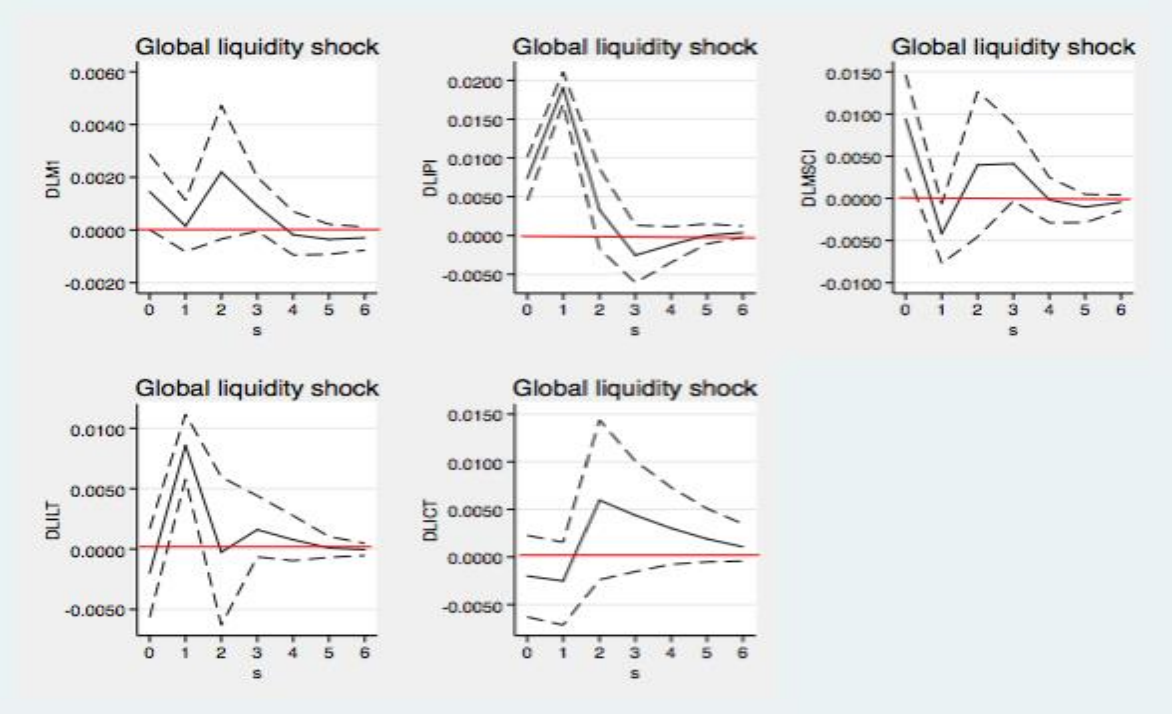

Fig. 5 IRFs Africa and Middle East

Table 5 Variance Decomposition

	1 month	3 months	6 months
M1	0.4	1.3	1.4
IPI	3.2	20.7	20.9
MSCI	1.2	1.6	1.8
ILT	0.1	2.6	2.7
ICT	0.1	0.8	1.2

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A.2 Fixed Echange Rate Model

A.2.1 l Using Narrow Money as Monetary Proxy

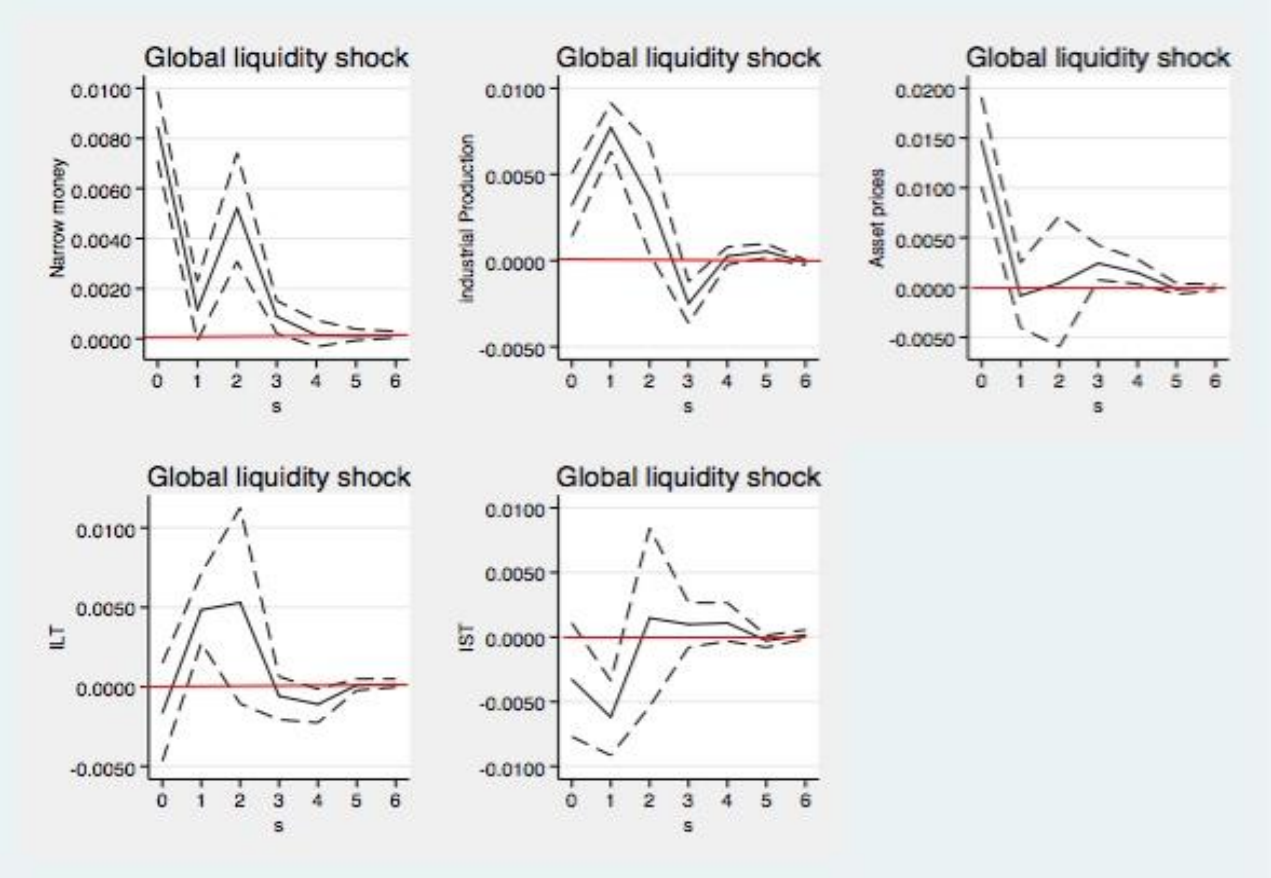

Fig. 6 IRFs Fixed Exchange Rate Model

Table 6 Variance Decomposition

	1 Months	3 Months	6 Months
M2	9.9	10.9	11
IPI	0.4	3.6	3.7
MSCI	1.7	1.7	1.7
ILT	0.05	0.9	0.9
ICT	0.1	0.4	0.5

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A.2.2 Using Broad Money as Monetary Proxy

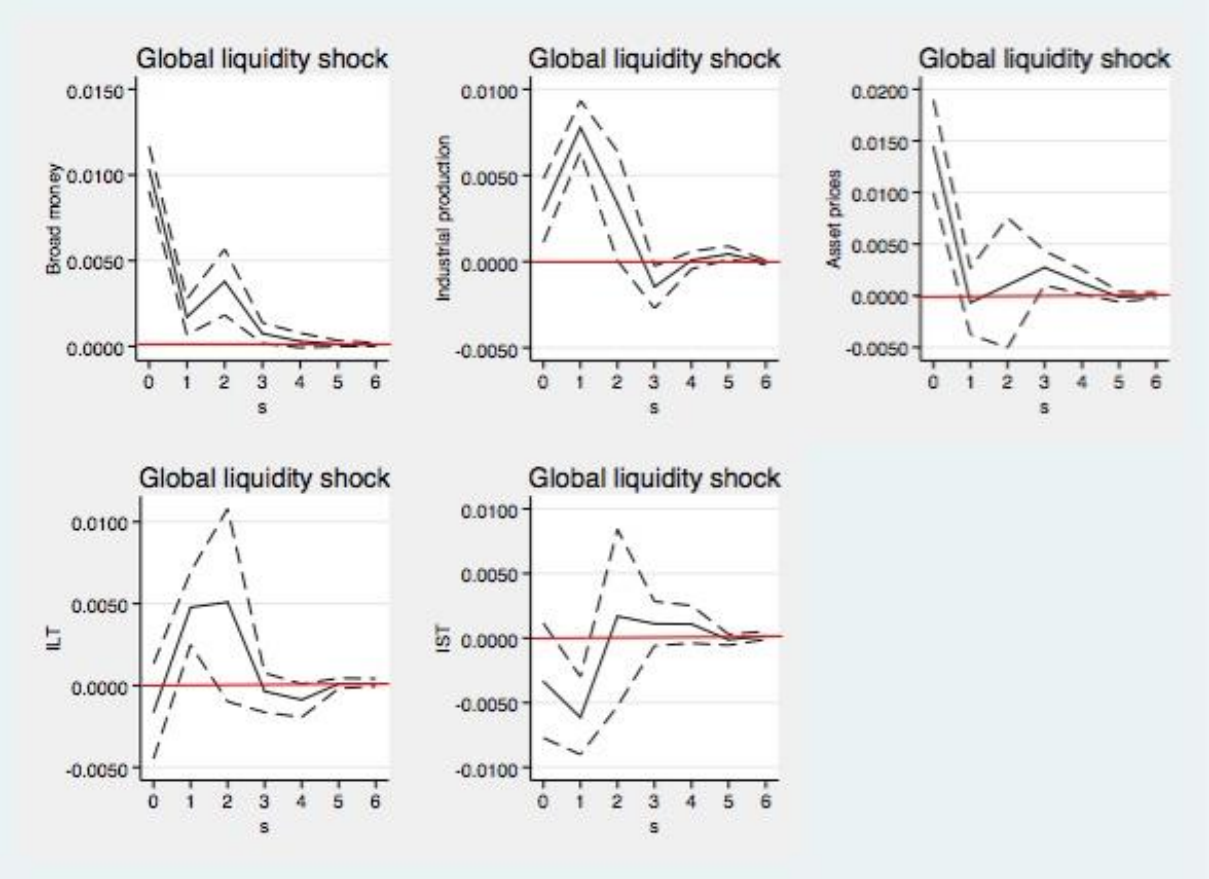

Fig. 7 IRFs Fixed Exchange Rate Model

Table 7 Variance Decomposition

	1 Month	3 Months	6 Months
M1	5.7	7.6	7.7
IPI	0.5	3.7	4.05
MSCI	1.7	1.7	1.7
ILT	0.05	1.0	1.0
ICT	0.1	0.4	0.4

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A.3 Floating Exchange Rate Model

A.3.1 Model Using Narrow Money as Monetary Proxy

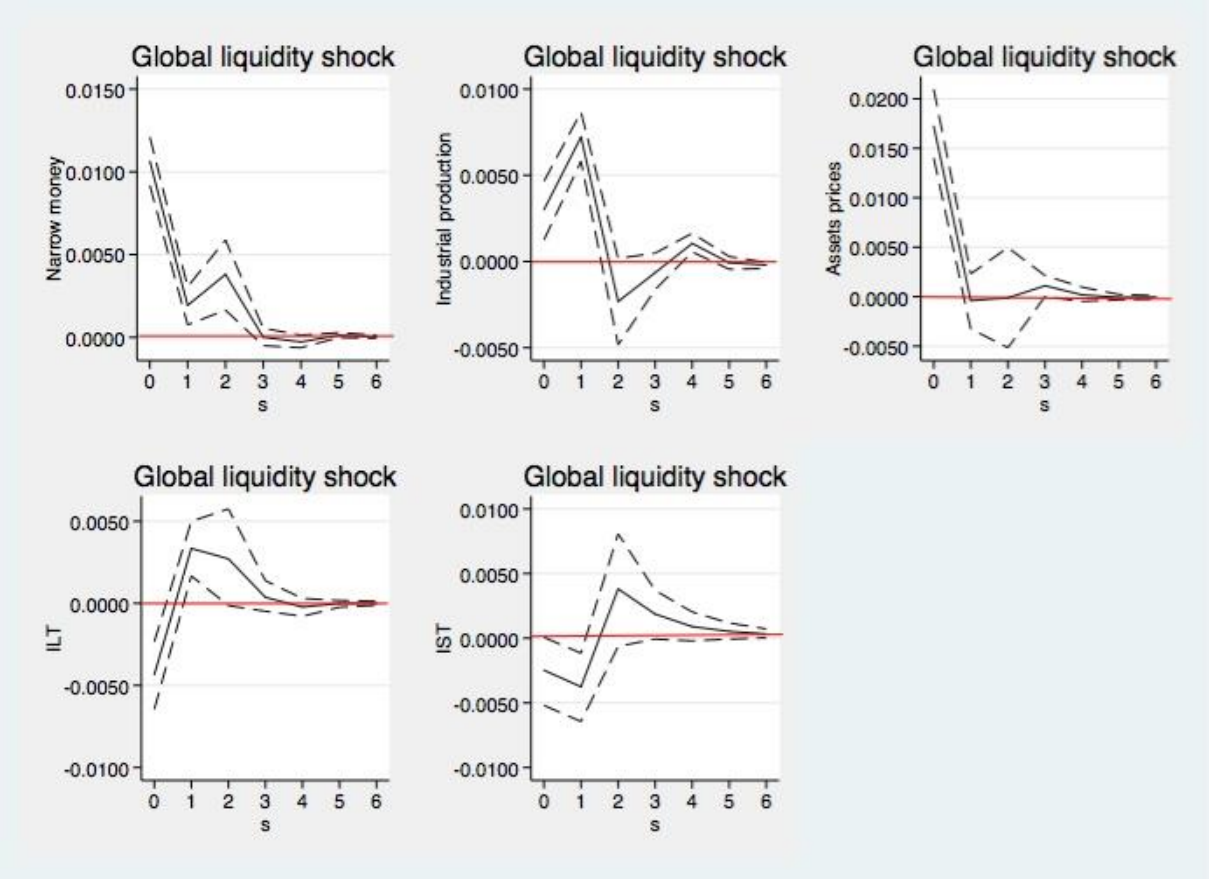

Fig. 8 IRFs Floating Exchange Rate Model

Table 8 Variance Decomposition

	1 Month	3 Months	6 Months
M1	6.7	7.5	7.5
IPI	0.4	2.5	2.5
MSCI	3.4	3.4	3.4
ILT	0.5	1.0	1.0
ICT	0.1	0.5	0.5

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A.3.2 Broad Money as Monetary Proxy

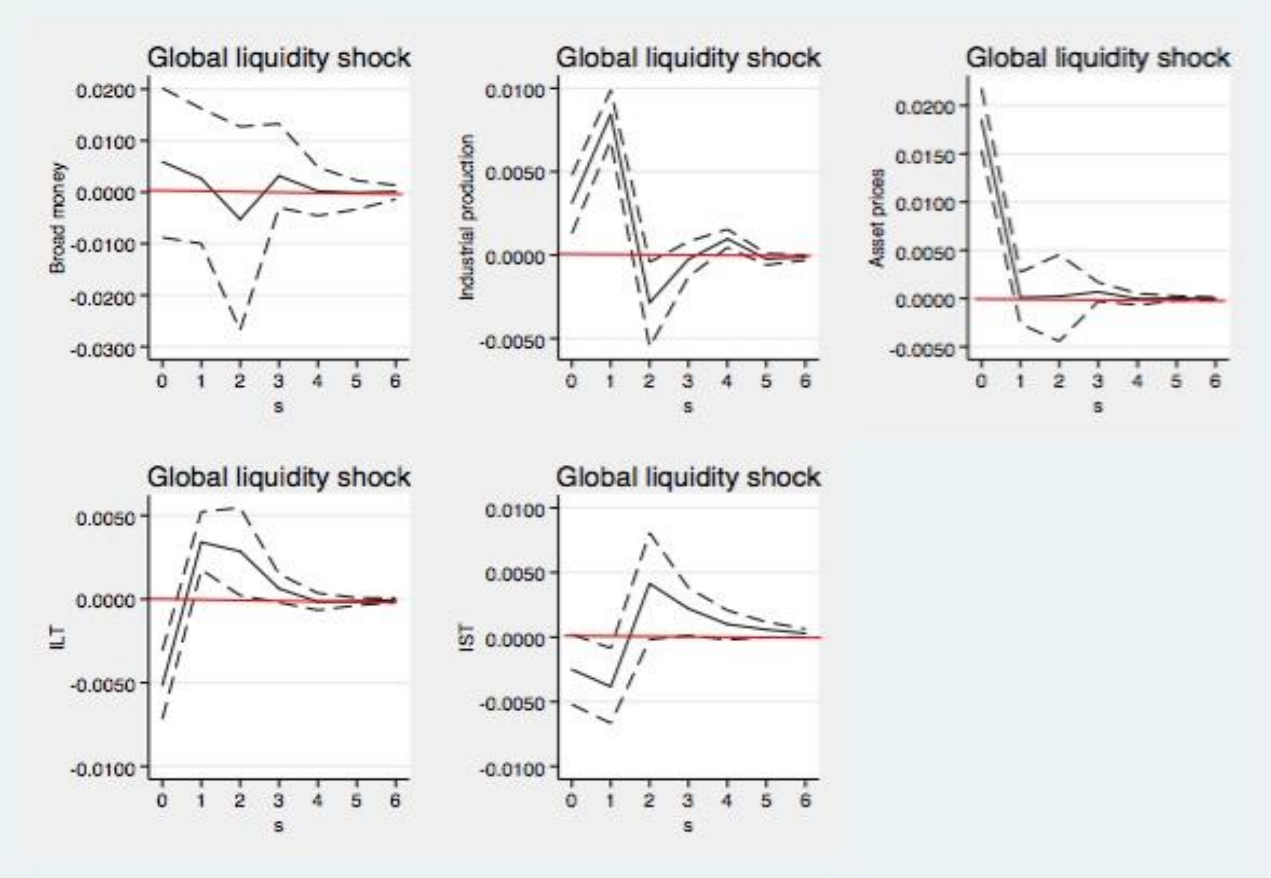

Fig. 9 Floating Exchange Rate

Table 9 Variance Decomposition

	1 month	3 months	6 months
M2	0.02	0.04	0.04
IPI	0.4	3.0	3.3
MSCI	3.9	3.8	3.8
ILT	0.8	1.3	1.3
ICT	0.1	0.5	0.6

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A.4 Robustness check Model

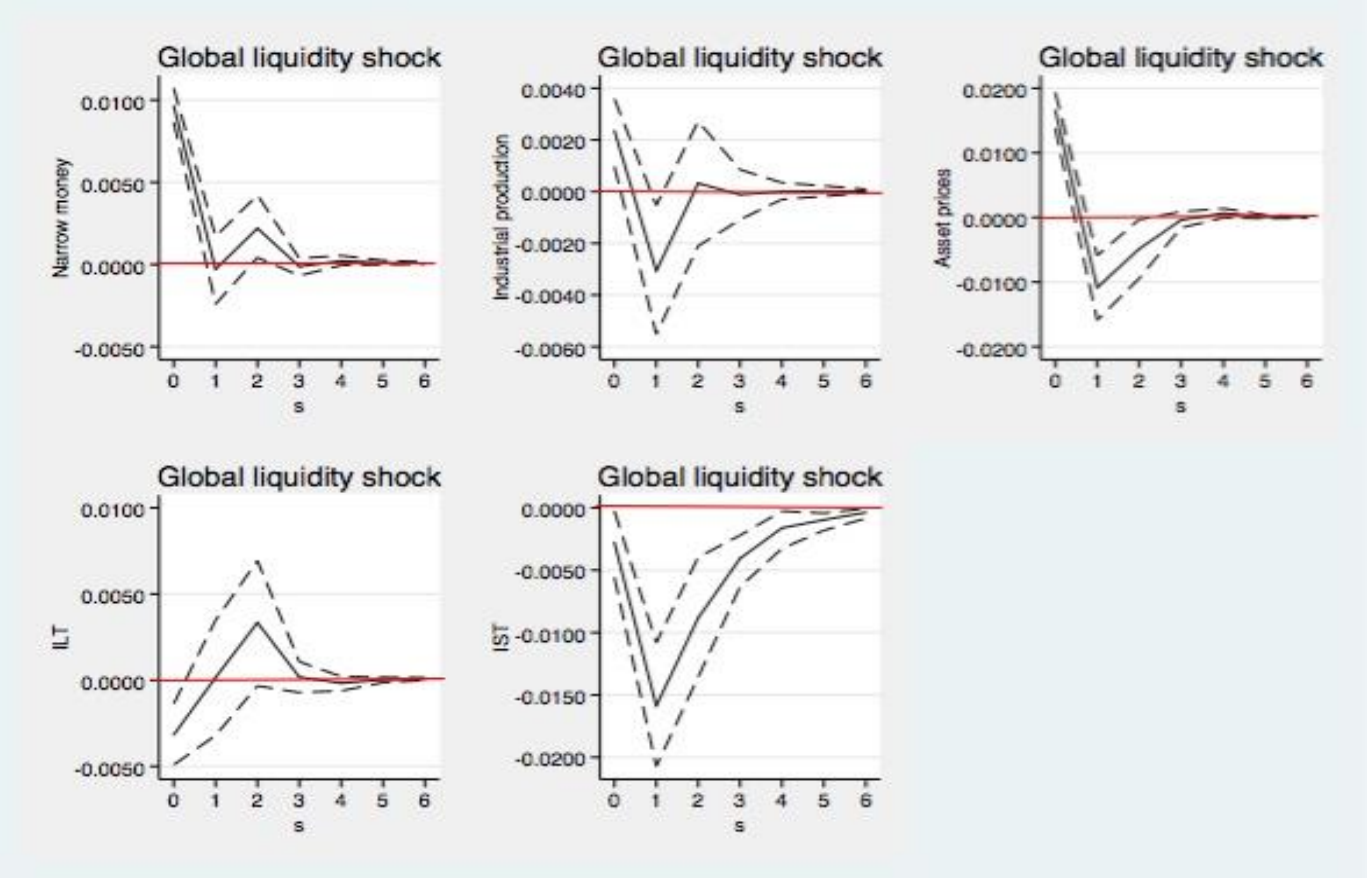

Fig. 10 IRFs Global Model New Liquidity Indicator

Table 10 **Variance Decomposition**

	1 Month	3 Months	6 Months
M1	5.9	6.1	6.1
IPI	0.2	0.59	0.59
MSCI	2.5	3.7	3.7
ILT	0.2	0.4	0.4
ICT	0.09	3.7	3.9

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A. Panel Non-causality Test Result

Lag order	*Statistic tests*									
	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$
	ILT to ICT		**ICT to ILT**		**IPI to ICT**		**ICT to IPI**		**M1 to ICT**	
k = 1	4.28	11.48*	1.62	2.12*	0.10	-3.25*	2.99	7.13*	7.74	24.18*
k = 2	4.10	5.06*	1.11	-2.32*	1.99	-0.09	4.87	7.19*	8.94	17.49*
	ICT to M1		**GL to ICT**		**ICT to GL**		**MSCI to ICT**		**ICT to MSCI**	
k = 1	1.56	1.98*	4.04	10.88*	2.37	4.88*	5.20	15.06*	0.96	-3.29*
k = 2	8.34	15.98*	2.36	0.84	2.05	0.08	5.52	8.84*	0.96	-2.67*
	IPI to ILT		**ILT to IPI**		**M1 to ILT**		**ILT to M1**		**GL to ILT**	
k = 1	0.29	-2.55*	0.47	-1.92	0.36	-2.33*	-2.33	1.21	0.70	-1.13
k = 2	8.36	15.72*	1.16	-2.18*	0.81	-3.04*	4.26	5.54*	0.66	-3.43*

	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$	W_{HNC}	$\bar{Z}_{HNC}$
	ILT to GL		**MSCI to ILT**		**ILT to MSCI**		**M1 to IPI**		**IPI to M1**	
k = 1	1.04	0.09	0.15	-3.06*	0.95	-0.23	0.68	-1.16	0.62	-1.38
k = 2	1.83	-0.57	0.09	-4.83*	2.38	0.84	1.47	-1.39	17.66	39.63*
	GL to IPI		**IPI to GL**		**MSCI to IPI**		**IPI to MSCI**		**GL to M1**	
k = 1	0.08	-3.34*	3.65	9.48*	0.04	-3.48*	0.05	-3.45*	1.06	0.20
k = 2	3.78	4.46*	4.35	5.91*	3.70	4.26*	21.06	48.25*	2.27	0.63
	M1 to GL		**MSCI to M1**		**M1 to MSCI**		**MSCI to GL**		**GL to MSCI**	
k = 1	8.08	28.02*	0.44	-2.03*	0.85	-0.57	1.21	0.71	1.64	2.25*
k = 2	9.13	18.03*	0.41	-4.06*	4.31	5.70*	1.44	-1.48	3.44	3.58*

Note: "X" to "Y" means that we test the null hypothesis of homogenous non-causality (HNC) from X to Y
The sign * means the rejection of null hypothesis at 5% significance level

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B. Panel Unit Root Test Results

C.1 Benchmark Model

Variable	IPS Test			
	Intercept		Intercept and trend	
	t-stat	p-value	t-stat	p-value
i_{ct}	-2.10**	0.017	-1.80**	0.03
Δi_{ct}	-46.85	0.00	-47.5***	0.00
i_{lt}	-3.32***	0.00	-3.41***	0.00
Δi_{lt}	-49.93***	0.00	-50.57	0.00
$OUTPUT$	-0.39	0.34	-1.058	0.14
$\Delta OUTPUT$	-46.4***	0.00	-47.58	0.00
$MSCI$	1.319	0.90	-0.72	0.23
$\Delta MSCI$	-57.67***	0.00	-59.78***	0.00
$M1$	4.99	1	-1.13	0.12
$\Delta M1$	-58.35***	0.00	-60.61	0.00
$M2$	5.73	1	0.663	0.74
$\Delta M2$	-62.14	0.00	-65.06	0.00
GL_index	0.68	0.75	18.73	1
ΔGL_index	-39.39***	0.00	-39.97***	0.00

Note: The signs ***, ** and * means respectively the rejection of null hypothesis at 1%, 5% and 10% significance level

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C. Exchange Rates Regime Classification

	Argentina	Australia	Bulgaria	Chile	China	Czech Rep.	Egypt	Hungary	India	Indonesia	Israel	Jordan	Korea
Median	2	4	1	3	1	3	2	2	2	3	3	1	3
Average	2.51	4	1	3	1.57	2.63	1.71	1.71	2	3	2,51	1	3
Exchange rate regime	**Fixed**	**Floating**	**Fixe**	**Floating**	**Fixed**	**Floating**	**Fixed**	**Fixed**	**Fixed**	**Floating**	**Floating**	**Fixed**	**Floating**

	Lithuania	Malaysia	Mexico	New Zealand	Peru	Philippines	Poland	Russia	Singapore	South Africa	Thailand	Colombia
Median	1	1	3	3	2	3	3	2	3	4	3	3
Average	1.61	1.51	3	3	2	2.29	3	2.11	3	4	3	3
Exchange rate regime	**Fixed**	**Fixed**	**Floating**	**Floating**	**Fixed**	**Fixed**	**Fixed**	**Fixed**	**Floating**	**Floating**	**Floating**	**Floating**

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Code	1	2	3	4
Exchange rate regime	De facto peg	Crawling peg	Managed floating	Freely floating

NB: Coarse classification codes

This exchange rates regime distinction is based on the monthly coarse classification developed by Reinhart and Rogoff. Taiwan is the only country in our dataset not included in their classification. Considering the fact that Taiwan historically use managed crawling peg, we assume that they use fixed exchange rate regime during the period.