

IMF Working Paper

Emerging Economy Responses to the Global Financial Crisis of 2007–09: An Empirical Analysis of the Liquidity Easing Measures

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IMF Working Paper**Monetary and Capital Markets Department****Emerging Economy Responses to the Global Financial Crisis of 2007–09: An Empirical Analysis of the Liquidity Easing Measures****Prepared by Etienne B. Yehoue[‡]**

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Abstract

This paper draws on a unique data set on the nontraditional systemic liquidity easing measures recently undertaken by many emerging market economies. It offers an empirical analysis of the key determinants affecting the decision to undertake these measures over the period September 2008–March 2009. The paper finds that economy size, access to international credit markets, CDS spreads, currency depreciation, and current account balances are among the key factors influencing the adoption of these measures. It provides a rationale for the differences in central bank policy responses, which reflect differences in economic structures rather than conflicting views on fundamental principles. The paper also provides a preliminary assessment of the effectiveness of these measures and points out that despite their positive impacts, they have not fully shielded the real economy from the recent financial meltdown.

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Contents	Page
I. Introduction	4
II. Description of Systemic Liquidity Easing Measures	5
III. On the Determinants of the Systemic Liquidity Easing Measures	7
IV. Preliminary Assessment of the Effectiveness of the Measures	13
V. Policy Issues.....	16
VI. Concluding Remarks	17
Glossary	3
 Tables	
1. Binomial Choice: Probit Regressions for FX Liquidity Measures	20
2. Binomial Choice: Probit Regressions for Cross-Country Swap Facilities	21
3. Binomial Choice: Probit Regressions for Domestic Liquidity Measures	22
4. Multinomial Choice: Ordered Probit Regressions for FX Liquidity Measures	23
5. Multinomial Choice: Ordered Probit Regressions for Domestic Liquidity Measures.....	24
 Figures	
1. Emerging Market Countries, Liquidity Supporting Measures.....	25
2. Composition of SLE Measures Implemented	26
3. Emerging Market Asset Classes	27
4. Emerging Market External Bond Spreads	28
5. Brazil, Hungary, Korea, and Russia, Interest Rates.....	29
6. Russia's Foreign Exchange Reserves and Rubles per Basket	30
7. Russia, Sovereign Bond and CDS Spreads over U.S. Treasuries.....	30
8. Brazil's Foreign Exchange Reserves, Reais per USD, and Reais Implied Volatility.....	31
9. Brazil: Corporate and Sovereign Bond Spreads over U.S. Treasuries	32
10. Korea: FX Reserves, Exchange Rate, Currency Volatility, and CDS Spreads.....	33
11. Hungary: FX Reserves, Exchange Rate, Currency Volatility and CDS Spreads	34
References.....	18

Glossary

CAB	Current account balances
CDS	Credit default swap
ECB	European Central Bank
FCL	Flexible Credit Line
Fed	US Federal Reserve Bank
FX	Foreign Exchange
GDP	Gross domestic product
IMF	International Monetary Fund
LDV	Limited dependent variable
LIBOR	London interbank overnight rate
MCM	Monetary and Capital Markets Department
OIS	Overnight index swap
SLE	Systemic liquidity easing
SNB	Swiss National Bank
WEO	World Economic Outlook

I. INTRODUCTION

In the summer of 2007, the world witnessed the beginning of a severe financial crisis that originated in the world's most advanced financial system. In the face of financial distress, central banks have sought to ensure that financial institutions have the necessary funds to conduct their daily business, and more generally have monitored and tried to protect the stability of the financial system.

By the fall of 2007, it became clear that traditional monetary policy tools were not sufficient. Nontraditional instruments were needed once policy rates became very low, or to steer liquidity to particular sectors or markets. The Federal Reserve Bank (Fed) in the United States led the way in taking these nontraditional liquidity measures and was followed by other major central banks. As the crisis expanded and became global, emerging markets, too, began to experience liquidity strains and a number have since taken nontraditional liquidity measures.

There is a growing literature documenting and analyzing the liquidity easing measures taken by major central banks (Cecchetti, 2008a; Chailloux et al., 2009; Kuttner, 2009; Deutsche Bank, 2009; IMF, 2009). However, only recently Ishi, Stone, and Yehoue (2009a, 2009b) brought to the forefront the liquidity measures in emerging markets.

This paper documents and formally analyzes the systemic liquidity easing measures (SLE measures hereafter) taken by emerging markets during September 2008–March 2009.¹ It uses a database on emerging market SLE measures compiled and regularly updated by the Monetary and Capital Markets Department (MCM) of the International Monetary Fund (IMF).

The paper has three broad objectives. The first is to analyze SLE measures recently taken in emerging markets. The second is to examine in-depth the key determinants affecting the decision to take these measures. The paper explores why some emerging economies have taken such measures, while others have not and, more specifically, which factors affect the likelihood that an economy adopts more than one measure. The third is to provide a preliminary assessment of the effectiveness of the measures, along with a discussion of the associated policy issues.

Despite the global nature of the crisis, the policy responses have differed markedly from one economy to another. Some emerging economies have implemented only foreign exchange (FX) liquidity measures, others both FX and domestic liquidity measures, and yet others no measures at all. This heterogeneity suggests that there might be some key factors affecting

¹ Aizenman and Pasricha (2009) study from the U.S. policy perspective the criteria for the selection of the four emerging markets benefiting from the Fed swap lines but do not offer a comprehensive study of the determinants of the overall SLE measures. Ishi, Stone, and Yehoue (2009a, 2009b) document the measures and examine whether they are playing the same role in advanced and emerging economies.

the decision to take a specific type of measure. Identifying these factors for each type of measure will help to better understand the specific objectives of each. It will also shed some light on the specific indicators that can be used to assess the effectiveness of each specific measure.

The findings suggest that economy size, access to international credit markets, CDS spreads, currency depreciation, and current account balances are among the key factors influencing the adoption of SLE measures. The analysis also indicates that the full effectiveness of these measures has yet to materialize.

Thus, differences in central bank policy responses reflect differences in economic structures and not necessarily conflicting views on the principles and objectives of policy. Moreover, many of the factors are somewhat related to an economy's interactions with the rest of the world: beyond the usual factors such as excessive leverage, credit boom, and securitization that were apparent in the immediate pre-crisis periods, international macroeconomic imbalances may be a key driving force of the crisis. This is consistent with the view in some policy circles that macroeconomic imbalances contributed to the augmentation of global liquidity, further fueling credit growth and debt accumulation. The oil and commodity price boom that preceded the crisis further aggravated global imbalances.

The paper is organized as follows. Section II provides a description of SLE measures. Section III provides an econometric analysis of the factors affecting the decision to adopt SLE measures. Section IV offers a preliminary assessment of the effectiveness of SLE measures. Section V raises some policy issues. Section VI offers some concluding remarks.

II. DESCRIPTION OF SYSTEMIC LIQUIDITY EASING MEASURES

This section draws on a recent IMF working paper on systemic liquidity easing measures taken by emerging market economy central banks in the current crisis (Ishi, Stone, and Yehoue, 2009b). It first discusses the build up of the crisis and the liquidity conditions that followed, and then provides a brief description of different measures implemented by emerging economies.

While the collapse in the market for sub-prime mortgages in the U.S. was the spark that ignited the crisis, the fundamental cause is deeper. The factors at the root of the current crisis include a large expansion of credit fueled by financial innovation that allowed the securitization of payment streams generated by wide variety of assets. The emergence of new financial instruments to hedge against risk in the years before the crisis facilitated the underestimation of risk and led to excessive leverage. Big global financial institutions, along with U.S. home buyers, appear to have bet that U.S. home prices would not fall on a nationwide basis, and that macroeconomic volatility would remain low even as macroeconomic imbalances built. The credit expansion was also reflected in major global current account imbalances.

Another factor was the failure of regulation and supervision to keep pace with financial market developments. As in past crises, risk was perceived to fall during the boom phase, and

there was little or no recognition of the need to tighten financial regulation to constrain the excessive rise in leverage.

Underlying problems in the U.S. sub-prime mortgage market started to surface in July 2007, and in early August led to money market disruptions in the major economies. Liquidity problems worsened sharply in September 2008 following the collapse of Lehman Brothers. Doubts about bank asset quality, combined with the severe tightening of bank dollar funding, contributed to an increase in perceived counterparty risk, and interbank rates rose and became more volatile. Banks' reluctance to lend to each other also increased demand for central bank funds (liquidity). As illustrated in Chart 1, the three-month LIBOR-OIS spread, an indicator of global dollar liquidity tightness, significantly widened from mid-September to mid-October. Global bank dollar funding markets dried up, reflecting the inability to roll over debt and forcing companies to deleverage via asset sales.

Against this backdrop, about three-quarters of the 39 emerging market economies covered in this paper took at times unprecedented measures to increase the flow of foreign exchange and ease credit tightening (Chart 2).² The measures include: foreign exchange liquidity support, cross-country foreign exchange swap arrangements, domestic liquidity support facilities, and relaxation of reserve requirements.

Foreign exchange liquidity support measures include provisions of dollar liquidity to local markets, easing of foreign exchange liquidity requirements, relaxation of terms on existing foreign exchange facilities, and the introduction of new foreign exchange facilities. Several emerging economies eased conditions on or introduced new foreign exchange credit instruments as well as domestic liquidity support instruments. For example, the Korean authorities eliminated regulatory restrictions on dollar financing from the offshore forward market, introduced a competitive auction swap facility, and took steps to ease foreign exchange financing to exporters. The central bank of Russia set aside \$50 billion in foreign exchange reserves for use by banks and corporations to meet foreign liability obligations.³ The central bank of Brazil stepped up foreign exchange swaps, eased collateral requirements, and extended direct financing to private companies for debt repayment and capital investments.⁴

Cross-country foreign exchange liquidity arrangements involve at least two central banks whereby the liquidity providing central bank offers its currency to the domestic central bank via a foreign exchange swap, and the domestic central bank distributes the foreign exchange to local counterparties in need. Nine of the economies covered have been involved in such

² The economies covered are: Argentina, Brazil, Bulgaria, Chile, China, P.R., Hong Kong SAR, Colombia, Costa Rica, Croatia, Czech Republic, Egypt, Estonia, Hungary, Iceland, India, Indonesia, Israel, Kazakhstan, Korea, Latvia, Lithuania, Malaysia, Mexico, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Serbia, Republic of, Singapore, South Africa, Thailand, Turkey, Ukraine, Uruguay, Vietnam.

³ It appeared that only \$12.8 billion was disbursed.

⁴ See Ishi, Stone, and Yehoue (2009a, 2009b) for further details.

arrangements. The Fed, European Central Bank (ECB), the Swiss National Bank (SNB), as well as the Nordic central banks are the main liquidity providers. For example, the Fed established arrangements with Brazil, Korea, Mexico, and Singapore. The ECB, the SNB, and the Nordic central banks set up liquidity arrangements for emerging market economies in Europe. It is worth mentioning that while the IMF's Flexible Credit Line (FCL), which was launched in March 2009, could be seen as a foreign exchange liquidity measure, it is not a central bank arrangement and is thus not covered in this paper.

Domestic liquidity support facilities are aimed at alleviating domestic liquidity shortages by targeting key credit markets (commercial paper, corporate bonds, and equity markets). In the sample, about seventeen emerging market economies took such measures to increase domestic liquidity (Chart 2). For example, the central bank of Russia expanded eligible collateral and gave banks immediate access to their own funds at the central bank, thus alleviating its stance of reserve requirements and reducing banks's reliance on the interbank market. The central bank also introduced uncollateralized lending to banks due to acute difficulties in the interbank market. The Bank of Korea stepped up repo operations by broadening eligible collateral, expanding the number of counterparties, and it also contributed to a bond stabilization fund.

Steps to loosen reserve requirements are aimed at freeing up bank liquidity. In the sample, the central banks of about half of the emerging market economies relaxed their reserve requirements (Chart 2). These emerging economies were represented in all regions.

While most of the emerging economies have been hit by the global financial meltdown with external financing needs generally preceding domestic liquidity shortages, the responses to the crisis have differed from one economy to another. Some emerging economies have implemented only FX liquidity measures, others both FX and domestic liquidity measures, with another group of emerging economies implementing no measures at all. The next section investigates the key factors related to the decision to undertake a specific type of measure.

III. ON THE DETERMINANTS OF THE SYSTEMIC LIQUIDITY EASING MEASURES

This section presents an econometric analysis of the key determinants affecting the adoption of SLE measures by emerging economies, and addresses two fundamental questions. First, which emerging economies have undertaken nontraditional liquidity easing measures and why? Second, why do some emerging economies undertake more than one measure while others do not?

A. Data Description and Empirical Methodology

The paper uses monthly panel data covering the 39 emerging market economies in the sample. The dependent variables are dummies based on the number of SLE measures taken by emerging market economies from September 2008 to March 2009. Three types of measures are examined: foreign exchange liquidity support measures, cross-country central bank foreign exchange swap facilities, and domestic liquidity and market support measures.

For each type of measure, a dummy variable takes the value 1 if the measure is adopted and the value 0 otherwise.

To answer the second question (for the foreign exchange liquidity measures and the domestic liquidity measures) a multinomial group variable is used: it takes value 1 if one measure has been taken and value 2 if more than one measure has been taken. Each of these two types of measures is split into only two groups because for the first group, out of 273 observations, 29 take the value 1, 8 take the value 2, 4 the value 3, 1 the value 4, and 2 the value 7, the remaining observations taking the value 0. Thus, group one has 29 observations, and in order to have a high frequency of observations in any other group, the remaining nonzero values are clustered into another group. This later group captures emerging economies having taken more than one measure in the time period and has 15 observations. Applying a similar methodology to domestic liquidity measure leads to two groups: group 1 (one measure) with 14 observations and group 2 (more than one measure) with 10 observations. For cross-country swap measures, most emerging economies have taken only one measure with only three taking two measures, so no multinomial group variable analysis is warranted.

The independent variables include GDP, foreign debt, current account balances, international reserves, domestic credit, broad money, exchange rate, dummy for exchange rate regime, monetary policy rate, and CDS spreads. GDP is at constant price and expressed in 2003 U.S. dollar. To generate monthly GDP data, a polynomial interpolation is used based on a combination of quarterly and annual GDP. Monthly current account data are generated using polynomial interpolation based on quarterly and annual data from IFS and the World Economic Outlook (WEO). Monthly debt data are generated from annual WEO data, and information from IMF country desks. Reserves, credit, and money data are from the *International Financial Statistics* (IFS). Monthly (average) exchange rate and policy rate data are from Bloomberg and central bank websites. CDS spreads are from Bloomberg and DataStream depending on availability. A dummy variable for fixed exchange rate is also created using the *IMF Annual Report on Exchange Arrangements and Exchange Restrictions*.

The discrete and limited nature of the dependent variables requires an intrinsically nonlinear model commonly known as limited dependent variable (LDV) models. The following basic specification is used.

$$P(\text{Measures}_{it} = 1 | \text{MKTINDICATOR}_{it}, \text{CONTROL}_{it}, \mu_i) = \Phi(\beta \text{MKTINDICATOR}_{it} + \lambda \text{CONTROL}_{it} + \mu_i), \\ t = 1, \dots, T; \quad i = 1, \dots, N$$

Where Measures_{it} captures in the first set of regressions dummies for each type of measures and a multinomial group variable defined earlier in the second set of regressions. MKTINDICATOR is a vector that captures the different market indicators that are explored to see whether they affect the decision of adopting systemic liquidity measures. They include the dynamics of exchange rate, CDS spreads, international reserves, current account balances, foreign debt and domestic credit. CONTROL is a vector that captures control variables. They include GDP used as proxy for the size of the economy, broad money, used as a proxy for the dept of the financial market, policy rate, and a dummy for exchange rate

regime. The individual effect given by μ_i captures unobservable individual effects, while Φ is the cumulative probability distribution.

To make the LDV models linear, a transformation is done on the dependent variable. In logit regressions, the transformation is the logit function, which is the natural log of the odds. In probit models, the function used is the inverse of the standard normal cumulative distribution also known as a z-score. In this analysis a probit model is used. The LDV models are estimated using maximum likelihood, which unlike the method of least squares, is not based on minimizing error variance. This means there is no measure of the model “fit” directly comparable to the R-squared in OLS, and as a result, model assessment is largely restricted to testing the joint significance of all model variables (as is done in OLS using an F-test of overall model significance). In a probit model, this is carried out via a chi-squared-test, which will be used throughout this analysis to assess the overall significance or model ‘fit’.

It is common that studies using LDV models lack large samples. However, while Long (1997, pp 53-54) points out that 500 or more observations are desirable, he also suggests that sample sizes of at least 100 observations is acceptable as long as there are at least ten observations per parameter to be estimated. In this paper, the sample of 273 observations with maximum estimated parameters of 10, suggests that the criteria for validity of the estimations are met. To avoid simultaneity bias, lagged variables as well as first differences in variables are used. The results with the first difference turn out to be the strongest. These two types of variables, allowing different forms of lag structure, also help to deal with any potential endogeneity issues that might emerge. Model significance is indicated by the significance ($p < 0.05$) of the likelihood ratio chi-square statistic, which tests the model considered against an intercept only model.

B. Results and Analyses

1. Why Do Some Emerging Economies Undertake SLE Measures while Others Do Not ?

In order to answer this question, a series of probit regressions using dummies for each type of liquidity measure as dependent variable, is run. Tables 1, 2, and 3 respectively present the results for FX liquidity, cross-country FX swaps, and domestic liquidity support measures.

All the independent variables are introduced first contemporaneously, second with a time lag, and third in the form of first difference (Models 1, 2, and 3; Tables 1, 2, and 3).⁵ The results show that regardless the type of SLE measures the model with first differences (Model 3) performs better than the others. It has an overall higher chi-squared, a higher number of

⁵ The control variables always enter contemporaneously.

variable significances, and a higher pseudo R-squared. This model is then used as a benchmark and the variables that are not significant in the model are dropped progressively in order to pin down the key determinants of SLE measures.

FX liquidity support measures: For FX liquidity measures, in Table 1 Model 4 changes in domestic credit and exchange rate regime dummy are dropped. In Model 5, CDS spreads is dropped and in Model 6 exchange rate depreciation is also dropped. The likelihood ratio chi-squared of 49.56 with a p-value of 0.000 shows that Model 6 as a whole is statistically significant at 1 percent level.

In this Model 6, the coefficient of all the remaining variables are significant. In a probit regression, the coefficients of the regressors are not enough to make any structural inferences. One needs to look at the marginal effects, which capture the impacts of one unit change of the independent variable on the likelihood or the probability that SLE measures will be undertaken.⁶

The marginal effects of Model 6 (Table 1) are significant, suggesting that changes in international reserves, in current account balances, and in international debt are key determinants of adopting FX liquidity support measures. The sign of international reserves is negative, suggesting that an increase in reserves reduces the likelihood of adopting FX liquidity measures. Intuitively, an increase in reserves might be seen by financial markets as a signal of strong macroeconomic fundamentals, thereby reducing the need of adopting SLE measures. The marginal effect of foreign debt, which also has a negative sign, indicates that an increase in contemporaneous foreign debt means greater access to the international financial markets, and hence less need for exceptional interventions to provide FX liquidity.

For current account balances (CAB), the positive sign might be hard to interpret at first glance. However, the interpretation becomes obvious once one notices that an increase in the change in CAB implies an increase in the contemporaneous current account balances, CAB(t) and/or a decrease in the current account balances for the earlier period, CAB(t-1). An increase in CAB(t) is a sign of improvement, thereby reducing the likelihood of exceptional interventions as confirmed by its negative and significant sign in Model 7 (Table 1). A decrease in CAB(t-1) means a deterioration and would likely require intervention in the following period as it is confirmed by its negative and significant sign in Model 8. Combining these three elements suggests that in the sample of this study the impact of CAB(t-1) outweighs that of CAB(t) and is the main driving force behind the positive relationship between the change in CAB and the likelihood of adopting FX measures. In

⁶ The parameter estimates for LDV models must be transformed to yield estimates of the marginal effects (i.e., the change in predicted probability associated with changes in the explanatory variables). This is because the marginal effects are nonlinear functions of the parameter estimates and the levels of the explanatory variables, so they cannot generally be inferred directly from the parameter estimates. The marginal effect of a continuous variable X_i

on the conditional probability is given by $\frac{\partial P(Y_j = 1 | X_i, \mu)}{\partial X_{ij}} = \beta_j \phi(X_i \beta + \mu)$, where $\phi(X) = \frac{d\Phi(X)}{dX}$ is

the density function corresponding to Φ .

other words, an increase in CAB is mainly brought about by a lower CAB in the earlier period, which increases the likelihood of exceptional FX measures.

The marginal effects of the control variables GDP, broad money, and policy rate are all significant. The marginal effect for GDP is positive, suggesting that bigger economies are more likely to take SLE measures. For broad money, the marginal effect is negative, indicating that emerging economies with deeper financial markets are more able to absorb external shocks and less likely to adopt FX liquidity measures. The positive sign of the policy rate marginal effect suggests that exceptional FX liquidity measures could be accompanied by policy tightening. This helps to halt a precipitous currency depreciation as was the case in Russia in February 2009.

Replacing international reserves by exchange rate depreciation makes the latter significant (Model 9). The positive sign of depreciation's marginal effect suggests that a rise in the depreciation rate increases the likelihood of adopting FX liquidity measures.

Investigating further why CDS spreads were not significant, depreciation is dropped and replaced by CDS spreads, which now becomes significant (Model 10). The positive sign of the marginal effect of CDS spreads indicates that higher spreads increase the likelihood of FX liquidity measures.

To sum up, the analysis reveals that larger economies facing exchange rate depreciation and a deteriorating current account are the ones most likely to undertake FX liquidity measures. The analysis also seems to suggest that the higher the CDS spreads, the more likely the undertaking of FX measures.

Cross-country FX swap facilities: Starting from the first difference or benchmark model (Model 3, Table 2), international reserves, domestic credit, and exchange rate dummy are dropped (Model 4). The variable current account balances is dropped first in Model 5 and then the policy rate is dropped in Model 6. Broad money loses its significance after dropping the policy rate, suggesting that market depth matters for FX swap facilities only after controlling for policy rate. In Model 7, broad money is dropped without altering the significance of the other variables. The marginal effects in Model 6 and Model 7 all confirm that countries with bigger economies and depreciating currencies are more likely to seek cross-country FX swap facilities.⁷

Domestic liquidity support measures: From the benchmark model (Model 3, Table 3), international reserves and the exchange rate dummy are dropped (Model 4), followed by currency depreciation (Model 5), and then by domestic credit (Model 6). The insignificance of domestic credit throughout Table 4 and the strong significance of broad money might signal that what matters for domestic liquidity measures is broad money, which indirectly determines domestic credits. In Model 7, the current account and policy rate are dropped,

⁷ Aizenman and Pasricha (2009) find that from the U.S. policy prospective, exposure of US banks to Emerging Markets is the most important selection criterion of the swap-line beneficiaries.

leaving the remaining variables strongly significant. The marginal effects for Models 6 and 7 all confirm that countries with bigger economies and higher CDS spreads are the ones most likely to take domestic liquidity measures. Emerging economies with better access to international credit markets characterized by an increase in contemporaneous foreign debt are less likely to take exceptional domestic liquidity measures. After all, such emerging economies would have experienced fewer credit crunch impacts, thereby reducing the need to take exceptional liquidity measures. Also emerging economies with deeper financial markets proxied by broad money are less likely to take exceptional domestic liquidity measures as they might be better able to absorb shocks.

2. Why Do Some Emerging Economies Take More than One SLE Measure while Others Do Not?

The focus of this subsection is about FX liquidity measures and domestic liquidity support measures. Cross-country FX swap facilities are left out since only three emerging economies in the sample have arranged more than one (precisely two) FX swap facilities. The multinomial group variables constructed above are the dependent variables, leading to the use of the ordered probit, contrary to the simple probit used earlier. The same procedure of introducing all the independent variables first contemporaneously, second with a time lag, and third in the form of first difference are used (Models 1, 2, and 3, Tables 4 and 5).⁸ The results again show that for the two types of measures considered in this subsection, the model with first difference (Model 3) performs better than the others. This model is used as a benchmark and the variables that are not significant are dropped progressively in the same manner as above.

FX liquidity support measures: Starting from the benchmark model, CDS spreads and domestic credit are dropped (Model 4, Table 4), followed by exchange rate regime dummy (Model 5). Since the objective of this subsection is to explore the determinants of adopting more than one measure, the analysis focuses on the marginal effects score (2) in line with the second group of the multinomial group variable. While the coefficients of the remaining variables (Model 5) are significant, the marginal effects (score (2)) of two of them, depreciation and policy rate, are not. This is common for ordered probit models. Thus, these variables are dropped (Model 6). The score (2) marginal effect of current account balances is not significant in Model 6, forcing the subsequent drop of this variable (Model 7). The score (2) marginal effects for Models 6 and 7 all suggest that emerging economies with higher international reserves and with better access to international credit markets characterized by an increase in contemporaneous foreign debt are less likely to undertake more than one FX liquidity measure. They also suggest that economy size and depth of financial markets matter in the same way as highlighted above.

⁸ Again the control variables always enter contemporaneously.

Multiple measures are not always taken simultaneously. Thus the analysis also looks at possible persistence effects. Persistence is tested for by looking at possible state dependence, that is, the effect of a lagged SLE measure. For FX liquidity measures, the result of introducing the lagged variable is reported under Model 8 (Table 4). The result indicates that the lagged variable is not significant, suggesting that liquidity strains have been so severe that taking an additional SLE measure is related to current liquidity conditions and not directly to any earlier measures. If there is any effect of earlier measures, it is through their impact on current liquidity conditions.

Domestic liquidity measures: From Model 3, international reserves and the exchange rate regime dummy are dropped (Model 4, Table 5), followed by depreciation and domestic credit (Model 5), and later by current account balances and policy rate (Model 6). Although the coefficient of foreign debt is significant in Model 6, its score (2) marginal effect is not. Thus, in Model 7 foreign debt is dropped. The score (2) marginal effects for Model 6 as well as in Model 7 all indicate that emerging economies with bigger economies and rising CDS spreads are the ones most likely to take more than one exceptional domestic liquidity measures. The high risk perception captured by higher CDS spreads seems to contribute to the drying up of the domestic liquidity market, thereby leading to the adoption of more liquidity measures. Similarly to the earlier findings, the depth of financial markets proxied by broad money matters.

The effect of lagged domestic liquidity measures is also tested. The results (Model 8, Table 5) indicate no direct impact. If there is any effect, it is through the impact of earlier measures on current determinants of domestic liquidity.

IV. PRELIMINARY ASSESSMENT OF THE EFFECTIVENESS OF THE MEASURES

It might be premature to fully assess the effectiveness of the crisis. This paper provides only a preliminary assessment of the effectiveness of the measures, through the first quarter of 2009. This is done by first looking at pressures on emerging market assets. Second, developments of key market indicators such as money market rate, exchange rate volatility, and CDS spreads of some selected emerging economies are also analyzed. While there is evidence that the measures might be having a measurable positive impact, they have not kept financial system distress from affecting the real economy.

A. Emerging Market Assets

The broad liquidity measures taken by emerging markets appear to have had a measurable effect. After emerging markets stepped up their actions in October-November 2008, broad pressures on emerging market assets appear to have abated starting in December 2008. Asset prices have largely stabilized, rebounding from the extreme levels registered in the last quarter of 2008, but remain at depressed levels (Chart 3). Emerging market investor sentiment showed signs of improvement, although modest, with surveys indicating investors

are less underweight EM assets, and with retail outflows from EM funds abating.⁹ As a result, emerging market bond spreads declined (Chart 4).

B. Developments of Key Market Indicators for Selected Emerging Economies¹⁰

In this subsection, the effectiveness of SLE measures is gauged by examining developments in the money and foreign exchange markets for Russia, Brazil, Korea and Hungary. The objective is to see whether signs pointing to market easing emerge after the introduction of these measures.

In Russia, after the implementation of about 18 measures, money market rates have started coming down from the extreme levels registered in the last quarter of 2008 and early 2009 (Chart 5). The exchange rate seems to have slightly stabilized since February 2009, from the precipitous depreciation registered in the last quarter of 2008 (Chart 6). In addition the perception of risk has relatively abated as illustrated by the evolution of the sovereign bond spreads and the five-year CDS spreads (Chart 7).¹¹ It is worth mentioning that this did not happen easily. In September 2008, Russia has undertaken about seven liquidity injection measures. Despite this, the country sovereign bond spreads and the CDS spreads have continued widening all the way into October, suggesting that the liquidity injections may have backfired. This seems to underscore the importance of the country's external vulnerability.

By the end of September the government has taken a significant FX measure, announcing that it is pledging \$50 billion in foreign exchange reserves (10 percent of the total) to support liquidity in the banking system and limit contagion. This amount would be lent to banks and corporates to repay liabilities contracted before September 26 to foreigners. In addition, a key central bank undertaking was the provision of substantial uncollateralized ruble liquidity combined with a relatively rigid exchange rate policy, whereby the ruble liquidity was used by banks to buy FX reserves and the central bank intervened to sell FX reserves to avoid severe depreciation. These two elements facilitated the effective transfer of a substantial portion of the central bank reserves to banks at a good price, allowing them to markedly reduce their FX exposure. These measures along with others undertaken in October finally brought down the spreads on Russian debts. The first most significant drop in both—sovereign bond spreads and five-year CDS spreads—occurred in November 2008 (Chart 7).

⁹ JPMorgan's EM Global Local Markets Investor Survey and JPMorgan's Sovereign External Debt Investor Survey, February and March 2009.

¹⁰ These indicators are assessed only through April 2009.

¹¹ Notice as mentioned earlier that the study period here is September 2008-March 2009 and that despite strong signs of improvements the March figures in the charts still show some stress. Currently, these indicators are no longer elevated. The central bank of Russia has cut the reference rate seven times since March--a cumulative drop of 300 bps, the reference rate is now 10 percent, down from 13, and the interbank rate is around 8-9 percent. The exchange rate has appreciated by around 9 percent since March, and sovereign spreads have dropped by almost two-thirds to around 250 bps.

Brazil implemented about two dozen measures, among which about half are relative to foreign exchange liquidity, eight relative to reserve requirement framework, and four about domestic liquidity support, and some results seem to be emerging. The currency volatility has started coming down since November albeit some fluctuations (Chart 8 Panel C) and the severe depreciation of the currency observed since October has moderated as illustrated by Panel B of Chart 8. The first sharp drop in the reais volatility occurred in November (Chart 8 Panel C) after the Fed set up its FX swap credit line with Brazil on top of about five measures related to the FX market that the economy has already undertaken before the Fed's announcement.¹² Stone, Walker, and Yasui (2009) find that the announcement of the FX swap with the Fed had the biggest effect in easing the stress on the Brazilian FX market. They find that the FX liquidity easing measures reduced the onshore cost of dollar financing and smoothed exchange rate volatility.

Money market rates have been declining since the beginning of the year (Chart 5). Corporate and sovereign bond spreads have largely stabilized, easing from the extreme levels registered in the last quarter of 2008, but remain at depressed levels as of April 2009 (Chart 9). The sharpest drop in these spreads also occurred in November after the announcement of the Brazil's FX swap with the Fed (Chart 9). This chart also reveals a lower risk perception for sovereign debt compared to corporate one. This might be justified by the recent reduction of the country's public external debt level, which stands at 12.9 percent of GDP in 2008.

In Korea, after the implementation of more than 15 SLE measures, the stress in various markets has slightly eased. The pressure on the money market has been easing as illustrated by the downward trend of the rates since December 2008 (Chart 5). The exchange rate that was experiencing a rapid and sustained depreciation since April 2008, has shown some signs of stabilization though the depreciating pressure remains perceptible (Chart 10, Panels A and B). The level of FX reserves which was falling at a rapid pace, has started showing signs of stabilization (Chart 10, Panel A). The won volatility that spiked in the last quarter of 2008 has come down, but remains at depressed levels as of April 2009 (Chart 10, Panel C). In fact, the first significant drop in the implied volatility occurred in mid-December following the undertaking of eight successive measures related to FX liquidity easing between early September and early December 2008. The last of this series was the Bank of Korea decision to tap US \$4 billions in the Fed FX swap credit line for additional dollar injection into local banks. The CDS spreads also eased from the extreme levels observed in the last quarter of 2008, though they remain at levels that show signs of stress as of April 2009 (Chart 10, Panel D). For the CDS spreads, the drop also started in mid-December 2008 similarly to the won volatility and sharpened in January 2009.

Over the study period, Hungary implemented about a dozen of SLE measures and some results seem perceptible. The exchange rate that started a precipitous depreciation since July 2008, has shown signs of stabilization since February 2009, though stress remains perceptible (Chart 11, Panels A and B). The forint volatility has also somewhat eased (Chart 11, Panel

¹² The Fed announced the credit line establishment on October 29th, 2008.

C). The CDS spreads also show signs of improvement but still remain at depressed levels (Chart 11, Panel D).

The evidences presented above seem to suggest that after the number of SLE measures reached their peak (end October), the broad pressure in emerging economies has started easing. After the adoption of the measures, market indicators have shown some signs of improvements, though stress remains.

Despite these positive impacts, the full effectiveness of the measures has yet to materialize. In addition the measures have not shielded the financial meltdowns from having significant impacts on the real economy. In 2008, the Russian economy grew at its slowest pace in six years, and is currently in the worst recession since 1998, with a GDP contraction of 10.9 percent in the first quarter of 2009 compared to the same period last year. Brazilian exports declined, shifting the country's current account from a surplus to a deficit of about 2 percent of GDP in 2008. The Korean economy contracted by about 5 percent in the last quarter of 2008 compared to the previous quarter and exports declined sharply with plummeting global demand, and this fed through to weaker consumption and investment as well. In Hungary, industrial output fell by 23 percent in January 2009 (y-o-y), due mainly to large declines in the car and consumer electronics industries. The unemployment rate increased to 8.4 percent in the three months to January and a recent IMF mission projects the country's real GDP growth at -3.3 percent for 2009.

V. POLICY ISSUES

Many emerging economies did not change their policy rate while implementing SLE measures. While countries close to the zero interest rate bound would need to resort to unconventional or SLE measures, most emerging market economies had room to lower the policy rate. Their reluctance to do so might have reflected fear of capital outflows and the associated currency depreciation, and some even appear to have raised rates for these reasons.

For example, by late fall 2008, Russia shifted the policy focus from easing liquidity pressures to adjusting the stance of monetary and exchange rate policies. The shift to a tighter policy aimed at countering an increasing and persistent trend of capital outflows and the related ruble depreciation. Indeed, capital outflows in 2008 reached a record of \$130 billion, and the ruble had depreciated by about 40 percent vis-à-vis the dollar compared to its level just before the mid-September 2008 Lehman collapse. The central bank used foreign exchange interventions and raised its reference rate by some 2 percent between mid-November 2008 and early December, bringing it to 13 percent in December 2008, to help halt capital outflows. The 13 percent rate was maintained until April 2009.¹³ Heavy interventions resulted in a decline in international reserves by 22 percent between September and December 2008.

¹³ Notice that the interest rates associated with the central bank of Russia uncollateralized loans increased from around 10.5 percent in October 2008 and peaked at around 18 percent in March. They have since then fallen to around 11.5 percent.

The concerns about capital outflows in emerging markets during the global financial crisis also led some countries to tighten capital controls. Iceland, Nigeria, and Ukraine, for example, took steps to limit capital outflows. These measures were taken on a temporary basis, consistent with the Fund's standing views that capital controls may help to buy time during a crisis, but cannot substitute for more fundamental policy actions.

VI. CONCLUDING REMARKS

The 2007-2009 financial crisis has prompted central banks around the world to take unprecedented actions aiming at counteracting the effects of a global credit crunch. This paper studies the nontraditional systemic liquidity easing measures taken by 31 emerging market economies. The paper asks why some emerging economies took such measures while others did not. It also asks why some emerging economies took more than one measure while others did not. The empirical analysis found that economy size, CDS spreads, currency depreciation, current account balances, and access to international credit markets are among the key factors influencing the adoption of SLE measures.

The paper also offers a preliminary qualitative assessment of the effectiveness of SLE measures. It suggests that the measures have helped to ease the global credit crisis, but highlights that in most cases, it may still be too early to draw firm conclusions. Moreover, despite the positive impact of the measures on financial markets, they have not prevented the financial crisis from affecting the real economy.

Central banks' role in maintaining confidence to the markets has been essential, in the sense that banks are no longer concerned about access to liquidity. Going forward, the use of SLE measures needs to be balanced against policies consistent with price stability in the medium and longer terms (Trichet, 2009). While the real economy is still weak, monetary policy support, including through unconventional measures, will continue to be needed. However, it is not too early to begin thinking about a strategy to unwind SLE policies, to be implemented as economic conditions permit.

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Table 1. Binomial Choice: Probit Regressions for FX Liquidity Measures

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>	<u>Model 6</u>		<u>Model 7</u>	<u>Model 8</u>	<u>Model 9</u>		<u>Model 10</u>	
						Coefficient	Marginal Effect			Coefficient	Marginal Effect	Coefficient	Marginal Effect
Exchange Rate	0.00003 (0.87)												
CDS Spreads	0.0002 (1.26)												
Reserves	-0.0029 (-0.88)												
Current Account	0.0004 (0.08)							-0.0085 (-2.01)*					
External Debt	-0.0001 (-0.04)												
Credit	0.0022 (1.72)												
Broad Money	-0.0021 (-2.14)*	-0.0015 (-1.75)	-0.0014 (-4.3)**	-0.0015 (-3.76)**	-0.0015 (-3.82)**	-0.0016 (-2.17)*	-0.0002 (-2.62)**	-0.0007 (-1.27)	-0.0007 (-1.29)	-0.0014 (-4.85)**	-0.0002 (-4.32)	-0.0016 (-4.07)**	-0.0003 (-4.03)**
GDP	0.2317 (3.48)**	0.2120 (2.95)**	0.2517 (5.15)**	0.2686 (5.6)**	0.2641 (5.62)**	0.2753 (4.8)**	0.0425 (5.05)**	0.2111 (4.23)**	0.2105 (4.28)	0.2552 (5.59)**	0.0430 (4.99)	0.2752 (5.77)**	0.0450 (5.18)**
Policy Rate	0.0420 (1.84)	0.0495 (2.06)*	0.0441 (1.91)	0.0498 (2.24)*	0.0494 (2.24)*	0.0539 (2.49)*	0.0083 (2.19)*	0.0386 (1.82)	0.0387 (1.82)	0.0482 (2.14)*	0.0081 (2.09)	0.0540 (2.35)*	0.0088 (2.25)*
Exchange Rate Dummy	-0.3497 (-1.05)	-0.2296 (-0.64)	-0.3745 (-1.15)										
Constant	-1.9050 (-6.95)**	-1.8738 (-6.41)**	-1.9041 (-6.72)**	-2.0293 (-7.86)**	-1.9919 (-7.91)	-1.9598 (-7.78)**		-1.8980 (-7.42)	-1.9002 (-7.4)**	-1.9265 (-7.67)**		-2.0276 (-7.79)**	
Exchange Rate (-1)		0.00003 (0.86)											
CDS Spreads (-1)		0.0001 (0.41)											
Reserves (-1)		-0.0052 (-1.67)											
Current Account (-1)		-0.0010 (-0.2)							-0.0088 (-2.06)*				
External Debt (-1)		0.0003 (0.26)											
Credit (-1)		0.0024 (1.79)											
XR Depreciation			0.0160 (0.73)	0.0201 (1.19)	0.0270 (1.75)					0.0395 (2.61)**	0.0067 (2.52)**		
ΔCDS Spreads			0.0018 (0.73)	0.0021 (0.87)								0.0054 (2.55)**	0.0009 (2.42)*
ΔReserves			-0.0469 (-2.22)*	-0.0405 (-2.04)*	-0.0468 (-2.44)*	-0.0570 (-2.99)**	-0.0088 (-2.89)**	-0.0701 (-3.19)**	-0.0707 (-3.21)**				
ΔCurrent Account			0.0141 (2.32)*	0.0139 (2.31)*	0.0144 (2.38)*	0.0141 (2.2)*	0.0022 (2.19)*			0.0146 (2.4)*	0.0025 (2.49)	0.0133 (2.12)*	0.0022 (2.23)*
ΔExternal Debt			-0.1509 (-4.13)**	-0.1514 (-4.14)**	-0.1557 (-4.35)**	-0.1581 (-4.09)**	-0.0244 (-3.61)**	-0.1071 (-2.48)*	-0.1055 (-2.48)*	-0.1441 (-4.06)**	-0.0243 (-4.02)	-0.1400 (-3.56)**	-0.0229 (-3.67)**
ΔChange in Credit			-0.0110 (-0.32)										
Wald chi2	60.90	53.51	60.76	57.65	58.80	49.56		51.65	52.42	55.05		48.84	
Number of countries	39	39	39	39	39	39		39	39	39		39	
Pseudo R2	0.20	0.20	0.28	0.28	0.27	0.26		0.27	0.27	0.24		0.25	

Significance level (*) at 5 percent and (**) at 1 percent. z-statistic in parenthesis.; Source: Staff Calculations

Table 2. Binomial Choice: Probit Regressions for Cross-Country Swap Facilities

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>	<u>Model 6</u>		<u>Model 7</u>	
						Coefficient	Marginal Effect	Coefficient	Marginal Effect
Exchange Rate	-0.0001 (-1.74)								
CDS Spreads	-0.0001 (-0.93)								
Reserves	-0.0019 (-0.68)								
Current Account	0.0002 (0.06)								
External Debt	0.0016 (1.41)								
Credit	0.0003 (0.24)								
Broad Money	-0.0002 (-0.24)	-0.0011 (-1.48)	-0.0006 (-1.89)	-0.0006 (-2.00)*	-0.0006 (-2.01)*	-0.0005 (-1.83)	-0.00003 (-1.83)		
GDP	0.1202 (1.64)	0.0936 (1.2)	0.1678 (2.77)**	0.1692 (2.92)**	0.1708 (2.93)**	0.1586 (2.8)**	0.0107 (2.62)**	0.0606 (3.66)**	0.0047 (2.87)**
Policy Rate	-0.0127 (-0.39)	0.0318 (0.8)	-0.0647 (-0.06)	-0.0645 (-1.65)	-0.0678 (-1.74)				
Exchange Rate Dummy	-0.2084 (-0.28)	0.1928 (0.28)	-0.0305 (-0.06)						
Constant	-2.0560 (-6.95)**	-1.6537 (-4.72)**	-1.9799 (-4.3)**	-1.9914 (-4.88)**	-1.9896 (-4.88)**	-2.3270 (-7.96)**		-2.1276 (-9.25)**	
Exchange Rate (-1)		-0.0003 (-0.84)							
CDS Spreads (-1)		-0.0021 (-1.61)							
Reserves (-1)		-0.0007 (-0.28)							
Current Account (-1)		-0.0019 (-0.56)							
External Debt (-1)		0.0011 (1.1)							
Credit (-1)		0.0016 (1.06)							
XR Depreciation			0.0544 (1.82)	0.0535 (2.31)*	0.0534 (2.28)*	0.0561 (2.63)**	0.0038 (2.55)*	0.0955 (2.95)**	0.0046 (3.08)**
ΔCDS Spreads			0.0034 (1.24)	0.0036 (1.55)	0.0037 (1.65)				
ΔReserves			-0.0027 (-0.18)						
ΔCurrent Account			0.0071 (1.21)	0.0070 (1.18)					
ΔExternal Debt			-0.0705 (-2.35)*	-0.0692 (-2.31)*	-0.0554 (-2.76)**	-0.0549 (-2.57)**	-0.0037 (-1.9)	-0.0487 (-2.61)	-0.0038 (-1.94)
ΔChange in Credit			0.0026 (0.06)						
Wald chi2	32.81	25.60	49.680	35.09	29.49	23.09		24.77	
Number of countries	39	39	39	39	39	39		39	
Pseudo R2	0.17	0.24	0.28	0.28	0.27	0.24		0.20	

Significance level (*) at 5 percent and (**) at 1 percent. z-statistic in parenthesis; Source: Staff Calculations.

Table 3. Binomial Choice: Probit Regressions for Domestic Liquidity Measures

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>	<u>Model 6</u>		<u>Model 7</u>	
						<u>Coefficient</u>	<u>Marginal Effect</u>	<u>Coefficient</u>	<u>Marginal Effect</u>
Exchange Rate	0.00001 (0.23)								
CDS Spreads	-0.0002 (-1.41)								
Reserves	0.0036 (1.6)								
Current Account	0.0010 (0.38)								
External Debt	-0.0014 (-1.39)								
Credit	0.0017 (1.44)								
Broad Money	-0.0025 (-3.11)**	-0.0033 (-3.52)**	-0.0005 (-1.98)*	-0.0005 (-2.00)*	-0.0005 (-2.08)*	-0.0006 (-2.28)*	-0.0001 (-2.25)*	-0.0006 (-2.26)*	-0.0001 (-2.27)*
GDP	0.1109 (1.68)	0.0807 (1.11)	0.1441 (2.71)**	0.1429 (2.73)**	0.1452 (2.8)**	0.1534 (3.00)**	0.0154 (2.93)**	0.1517 (3.03)**	0.0178 (3.03)**
Policy Rate	0.0055 (0.22)	0.0413 (1.38)	-0.0410 (-1.37)	-0.0415 (-1.49)	-0.0387 (-1.43)	-0.0371 (-1.39)	-0.0037 (-1.39)		
Exchange Rate Dummy	0.0995 (0.27)	0.5933 (1.29)	0.0530 (0.14)						
Constant	-1.5784 (-4.88)**	-0.9849 (-2.55)*	-1.7028 (-5.29)	-1.6902 (-6.22)**	-1.6892 (-6.22)*	-1.7074 (-6.23)**		-1.9857 (-9.09)**	
Exchange Rate (-1)		0.00001 (0.21)							
CDS Spreads (-1)		-0.0030 (-3.18)**							
Reserves (-1)		0.0059 (2.27)*							
Current Account (-1)		-0.003 (-0.83)							
External Debt (-1)		-0.0021 (-2.39)*							
Credit (-1)		0.0027 (1.76)							
XR Depreciation			0.0161 (0.82)	0.0166 (0.82)					
ΔCDS Spreads			0.0068 (2.7)**	0.0072 (3.03)**	0.0077 (3.24)**	0.0086 (3.81)**	0.0009 (3.48)**	0.0082 (3.87)**	0.0010 (3.62)**
ΔReserves			-0.0077 (-0.34)						
ΔCurrent Account			0.0085 (1.49)	0.0083 (1.47)	0.0081 (1.45)	0.0077 (1.42)	0.0008 (1.39)		
ΔExternal Debt			-0.1175 (-2.82)**	-0.1143 (-2.84)**	-0.1138 (-2.83)**	-0.1117 (-2.91)**	-0.0112 (-2.65)**	-0.0648 (-2.51)*	-0.0076 (-2.28)**
ΔChange in Credit			-0.0092 (-0.27)	-0.0099 (-0.29)	-0.0239 (-0.89)				
Wald chi2	20.47	24.91	33.69	30.60	30.21	30.77		28.60	
Number of countries	39	39	39	39	39	39		39	
Pseudo R2	0.12	0.22	0.23	0.23	0.22	0.22		0.21	

Significance level (*) at 5 percent and (**) at 1 percent. z-statistic in parenthesis; Source: Staff Calculations.

Table 4. Multinomial Choice: Ordered Probit Regressions for FX Liquidity Measures

	Model 1	Model 2	Model 3	Model 4	Model 5		Model 6		Model 7		Model 8	
					Coefficient	Marginal Effect (score 1)	Marginal Effect (score 2)	Coefficient	Marginal Effect (score 2)	Coefficient		Marginal Effect (score 2)
Exchange Rate	0.00003 (0.91)											
CDS Spreads	0.0001 (1.09)											
Reserves	-0.0020 (-0.67)											
Current Account	-0.0006 (-0.13)											
External Debt	-0.0004 (-0.34)											
Credit	0.0023 (1.95)											
Broad Money	-0.0023 (-2.57)**	-0.0019 (-2.14)*	-0.0014 (-5.35)**	-0.0013 (-5.41)	-0.0014 (-5.08)**	-0.0002 (-3.79)**	-0.0001 (-2.61)**	-0.0016 (-2.15)*	-0.0001 (-2.32)	-0.0016 (-2.4)**	-0.0001 (-2.51)*	-0.0015 (-2.01)*
GDP	0.2269 (3.45)**	0.2087 (2.91)**	0.2448 (5.36)**	0.2432 (5.49)**	0.2617 (6.18)**	0.0321 (4.35)**	0.0093 (2.68)**	0.2728 (4.92)**	0.0110 (2.77)**	0.2681 (5.36)**	0.0135 (2.98)**	0.2438 (4.40)**
Policy Rate	0.0391 (1.71)	0.0480 (2.01)*	0.0357 (1.69)	0.0356 (1.68)	0.0419 (2.08)*	0.0051 (1.9)	0.0015 (1.77)					
Exchange Rate Dummy	-0.3692 (-1.19)	-0.2433 (-0.74)	-0.5243 (-1.61)	-0.5331 (-1.56)								
Exchange Rate (-1)		0.00003 (0.86)										
CDS Spreads (-1)		0.00001 (0.07)										
Reserves (-1)		-0.0032 (-1.01)										
Current Account (-1)		-0.0021 (-0.38)										
External Debt (-1)		-0.0003 (-0.27)										
Credit (-1)		0.0023 (1.96)*										
FX Liquidity Measures (-1)												0.2298 (1.34)
XR Depreciation			0.0244 (1.09)	0.0371 (2.47)*	0.0374 (2.54)*	0.0046 (2.44)*	0.0013 (1.67)					
ΔCDS Spreads			0.0016 (0.64)									
ΔReserves			-0.0483 (-2.29)*	-0.0539 (-2.7)**	-0.045 (-2.61)**	-0.0055 (-2.51)*	-0.0016 (-2.32)*	-0.0601 (-3.54)**	-0.0024 (-2.17)**	-0.0597 (-3.51)**	-0.0030 (-2.4)**	-0.0614 (-3.49)**
ΔCurrent Account			0.0143 (2.36)*	0.0148 (2.46)*	0.0145 (2.42)*	0.0018 (2.34)*	0.0005 (1.98)*	0.0130 (1.94)	0.0005 (1.71)			
ΔExternal Debt			-0.1518 (-4.23)**	-0.1565 (-4.51)**	-0.1561 (-4.46)**	-0.0191 (-3.76)**	-0.0055 (-2.53)*	-0.1593 (-3.93)**	-0.0065 (-2.3)*	-0.1036 (-2.53)*	-0.0052 (-2.08)*	-0.1015 (-2.55)*
ΔChange in Credit			-0.0157 (-0.46)									
Wald chi2	62.250	53.910	76.340	76.480	73.140			51.330		49.960		55.21
Number of countries	39	39	39	39	39			39		39		39
Pseudo R2	0.17	0.17	0.26	0.25	0.25			0.21		0.20		0.20

Significance level (*) at 5 percent and (**) at 1 percent. z-statistic in parenthesis; Source: Staff Calculations.

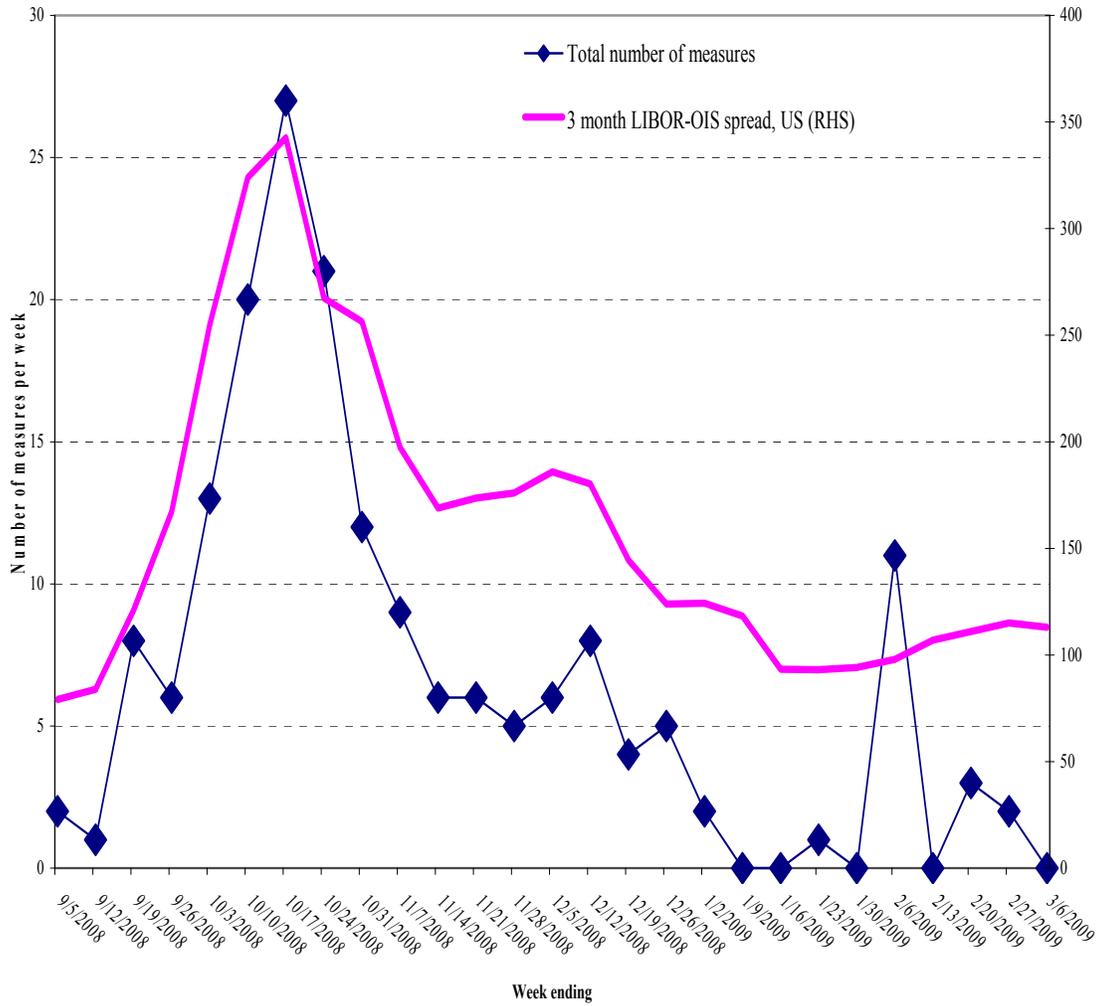
Table 5. Multinomial Choice: Ordered Probit Regressions for Domestic Liquidity Measures

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6			Model 7		Model 8
						Coefficient	Marginal Effect (score 1)	Marginal Effect (score 2)	Coefficient	Marginal Effect	
Exchange Rate	0.0000 (0.14)										
CDS Spreads	-0.0003 (-1.52)										
Reserves	0.0040 (1.66)										
Current Account	0.0005 (0.21)										
External Debt	-0.0014 (-1.28)										
Credit	0.0015 (1.31)										
Broad Money	-0.0025 (-3.00)**	-0.0032 (-3.69)**	-0.0006 (-2.41)*	-0.0006 (-2.49)*	-0.0007 (-2.85)**	-0.0007 (-2.84)**	-0.0005 (-2.56)**	0.0000 (-2.01)*	-0.0006 (-2.77)**	0.0000 (-2.01)*	-0.0006 (-2.45)**
GDP	0.1234 (1.83)	0.0987 (1.41)	0.1571 (2.94)**	0.1597 (3.05)**	0.1717 (3.33)**	0.1694 (3.38)**	0.0130 (2.86)**	0.0067 (2.26)*	0.1638 (3.33)**	0.0073 (2.28)*	0.1490 (2.95)**
Policy Rate	0.0051 (0.2)	0.0413 (1.37)	-0.0424 (-1.52)	-0.0422 (-1.57)	-0.0372 (-1.42)						
Exchange Rate Dummy	0.0775 (0.23)	0.5787 (1.31)	-0.0185 (-0.05)								
Exchange Rate (-1)		0.0000 (0.18)									
CDS Spreads (-1)		-0.0032 (-3.16)**									
Reserves (-1)		0.0061 (2.45)*									
Current Account (-1)		-0.0033 (-1.05)									
External Debt (-1)		-0.0020 (-2.16)*									
Credit (-1)		0.0023 (1.68)									
Domestic Liquidity (-1)											0.2194 (1.22)
XR Depreciation			0.0168 (0.82)	0.0177 (0.84)							
ΔCDS Spreads			0.0066 (2.89)**	0.0069 (3.16)**	0.0085 (4.08)**	0.0082 (4.07)**	0.0006 (3.00)**	0.0003 (2.51)*	0.0084 (4.25)**	0.0004 (2.63)**	0.0086 (4.25)**
ΔReserves			-0.0063 (-0.27)								
ΔCurrent Account			0.0084 (1.48)	0.0082 (1.45)	0.0076 (1.39)						
ΔExternal Debt			-0.1156 (-2.88)**	-0.1132 (-2.92)**	-0.1106 (-2.99)**	-0.0661 (-2.52)*	-0.0051 (-2.16)**	-0.0026 (-1.79)			
ΔChange in Credit			-0.0138 (-0.47)	-0.0133 (-0.44)							
Wald chi2	21.93	24.98		31.70	32.09	28.54			24.79		24.93
Number of countries	39	39		39	39	39			39		39
Pseudo R2	0.11	0.19		0.20	0.20	0.18			0.17		0.17

Significance level (*) at 5 percent and (**) at 1 percent. z-statistic in parenthesis; Source: Staff Calculations.

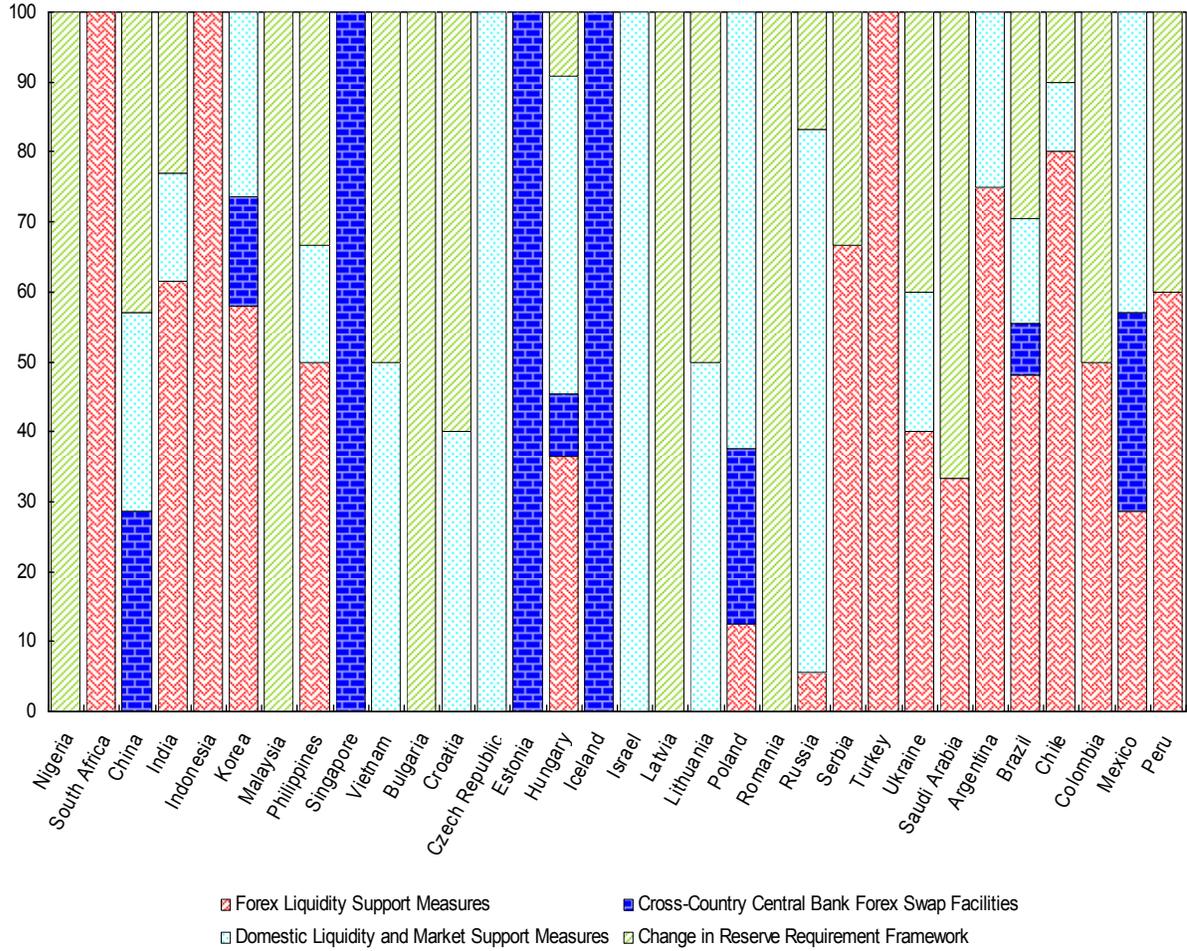
Chart 1. Emerging Market Economies, Liquidity Supporting Measures and LIBOR-OIS Spreads

**Emerging Market Countries, Liquidity Supporting Measures & LIBOR-OIS Spread
September 2008-March 2009**



Source: Ishi, Stone, and Yehoue (2009a).

Chart 2. Composition of SLE Measures Implemented (in percent)–September 2008 to March 2009.¹⁴



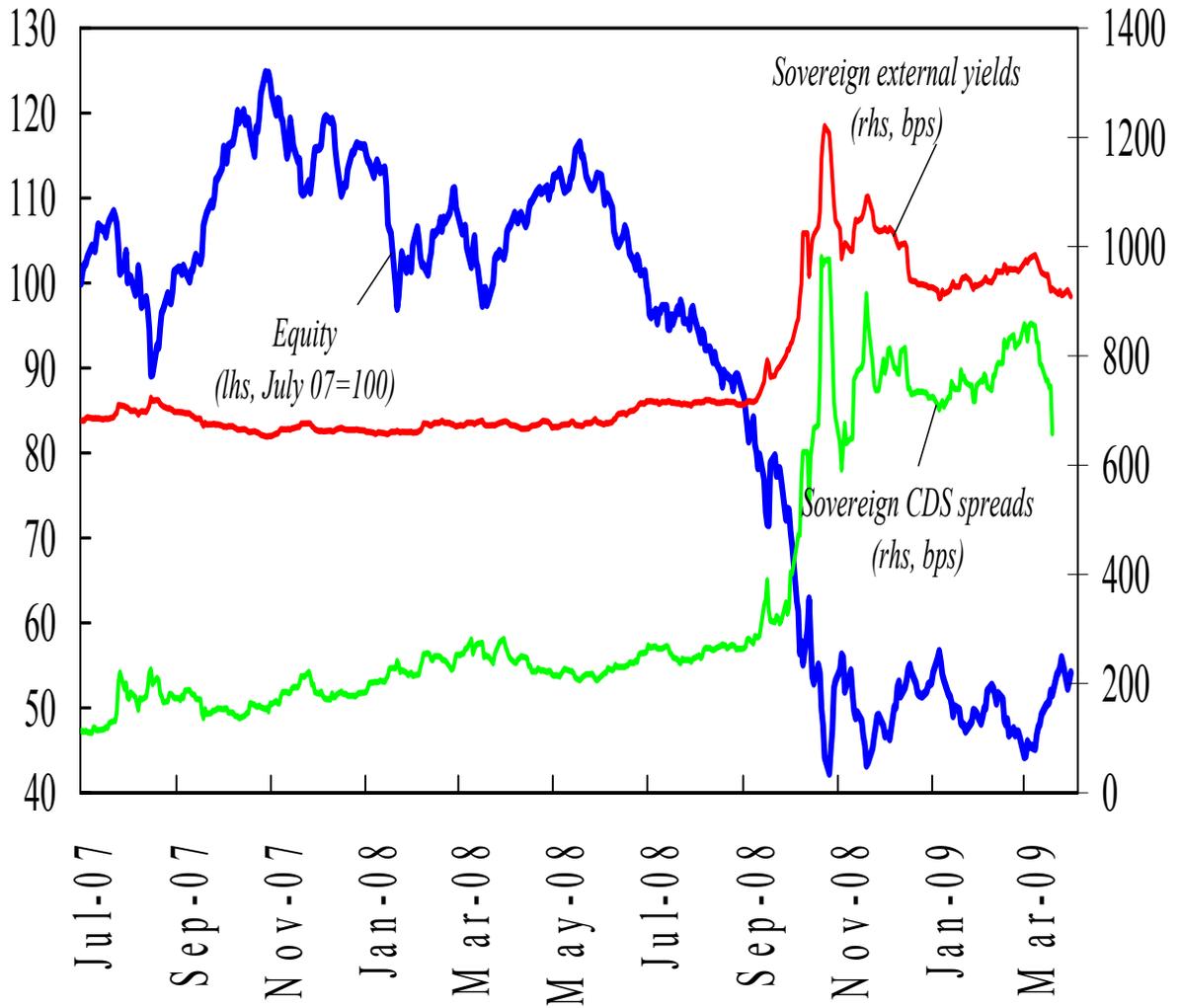
Source: Staff Calculations.

¹⁴ For more information on the SLE measures see Ishi, Stone, and Yehoue (2009b).

Chart 3.

Emerging Market Asset Classes

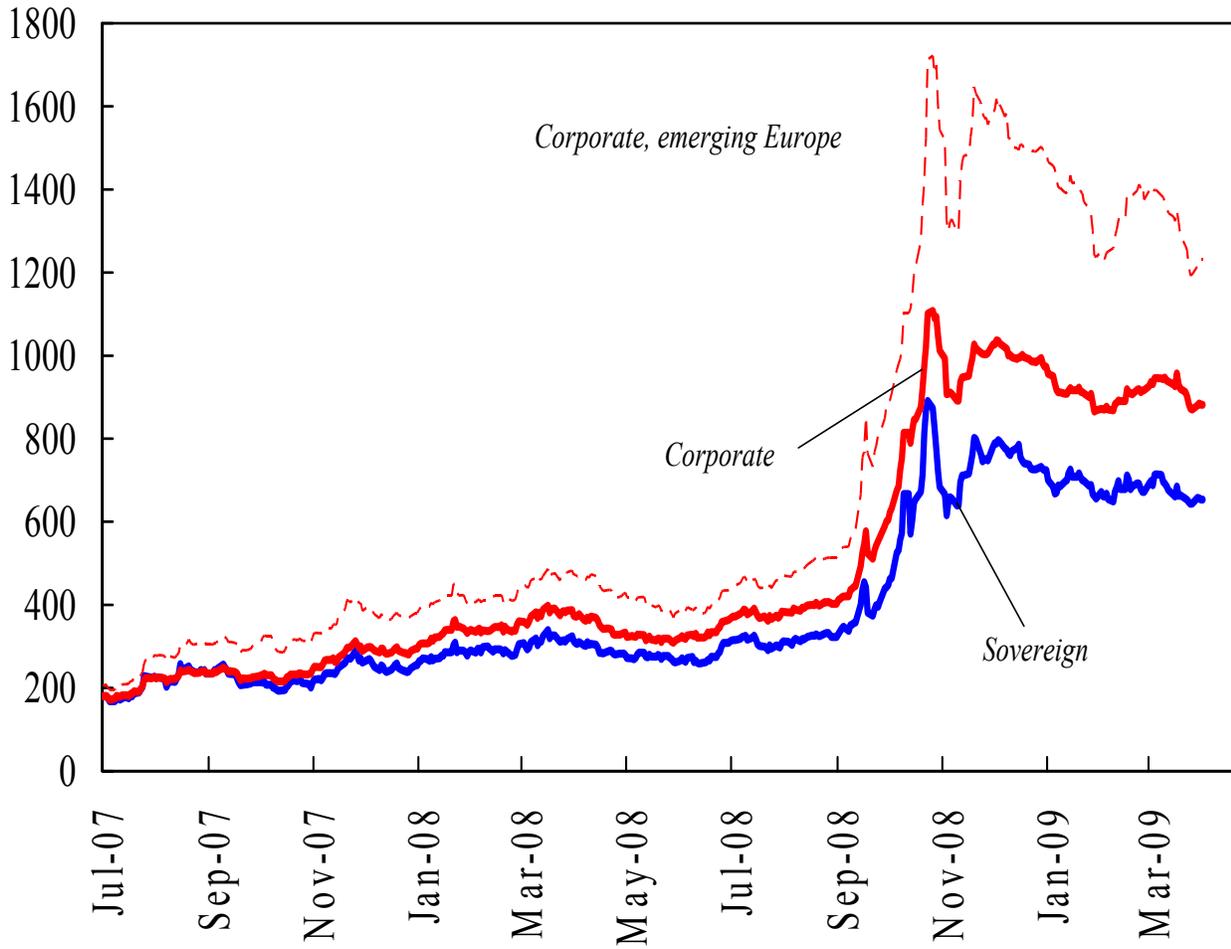
(Basis points)



Sources: Data from Bloomberg, DataStream, and Morgan Stanley.

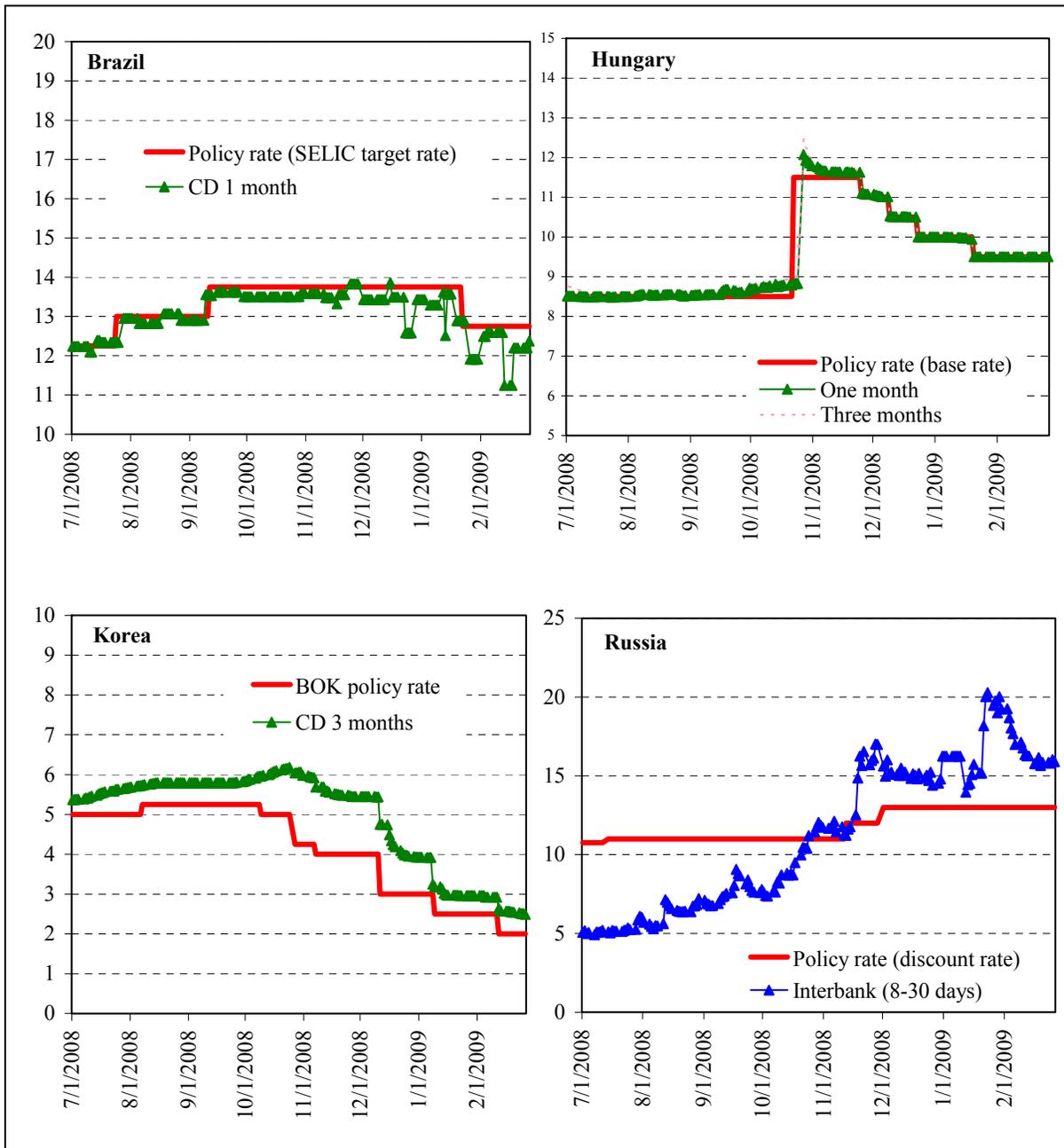
Chart 4.

Emerging Market External Bond Spreads (Basis points)



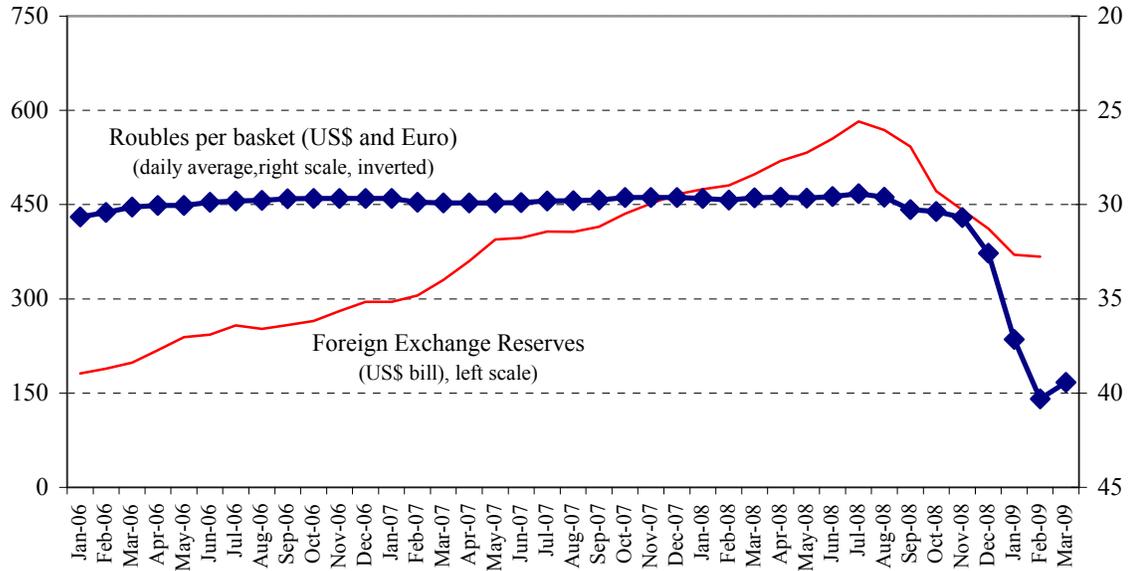
Sources: Data from Bloomberg, DataStream, and Morgan Stanley.

**Chart 5. Brazil, Hungary, Korea, and Russia Interest Rates
(In percent)**



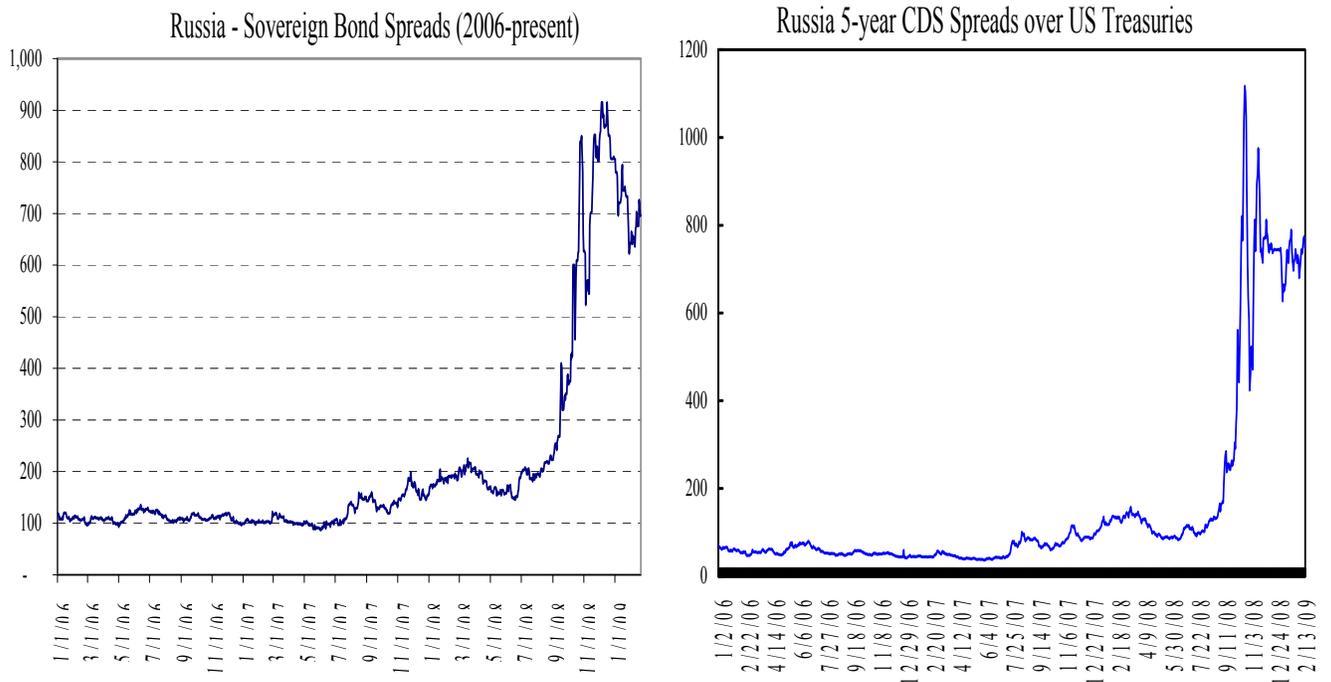
Source: Ishi, Stone, and Yehoue (2009a)

Chart 6. Russia's Foreign Exchange Reserves and Rubles per Basket, January 2006–March 2009



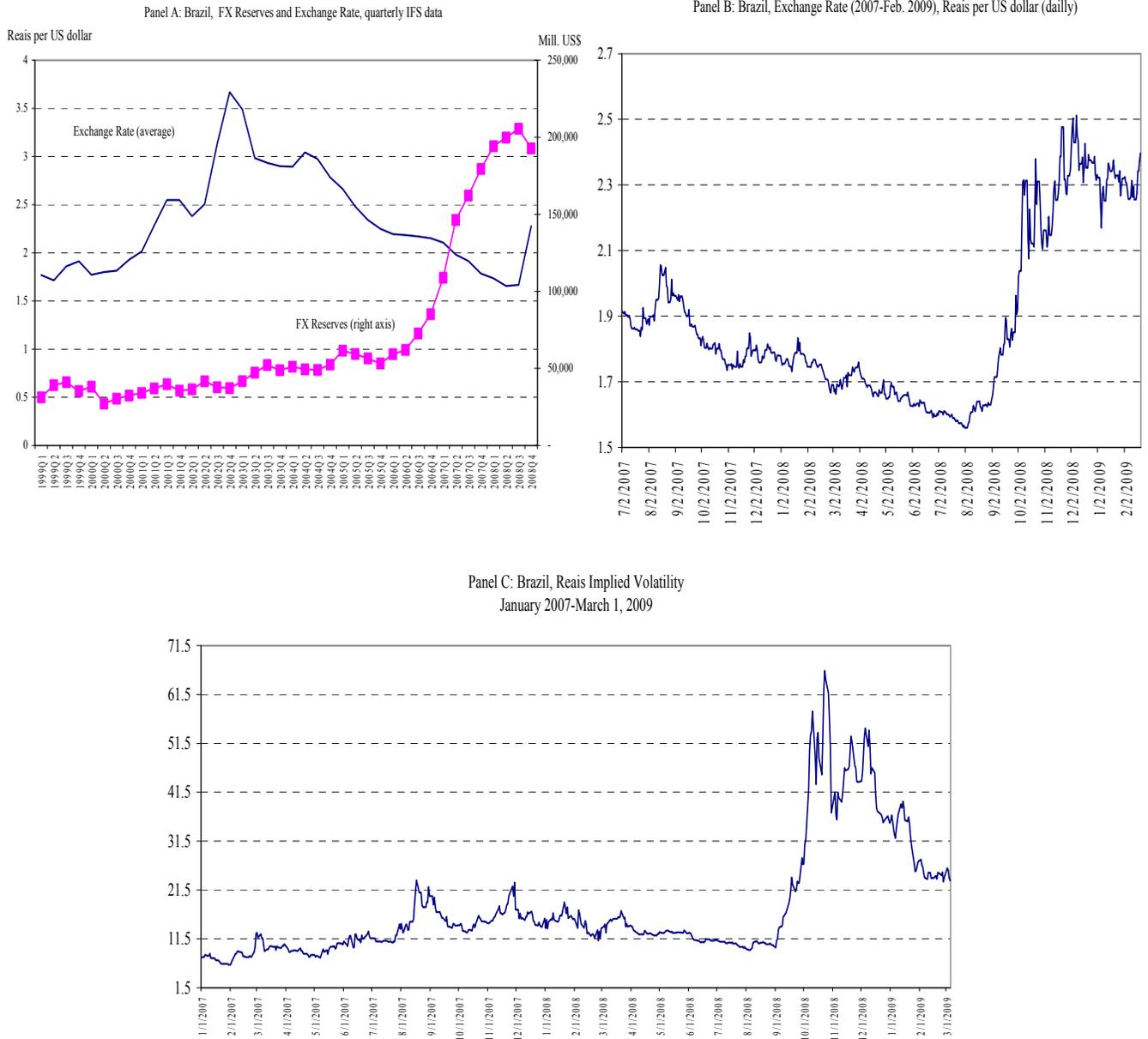
Source: DataStream.

Chart 7. Russia, Sovereign Bond and CDS Spreads over U.S. Treasuries



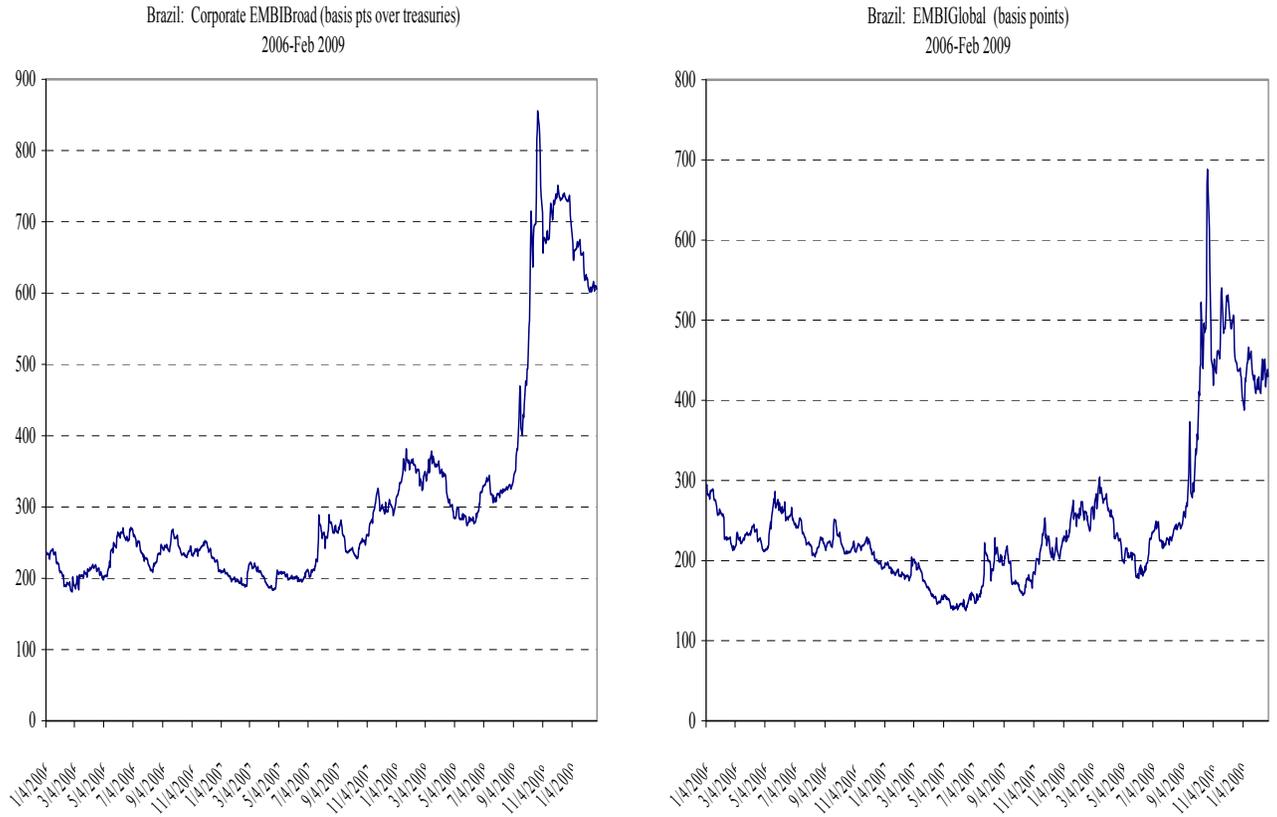
Sources: DataStream and Bloomberg

Chart 8. Brazil's Foreign Exchange Reserves, Reais per U.S. dollar, and Reais Implied Volatility January 2007–March 2009



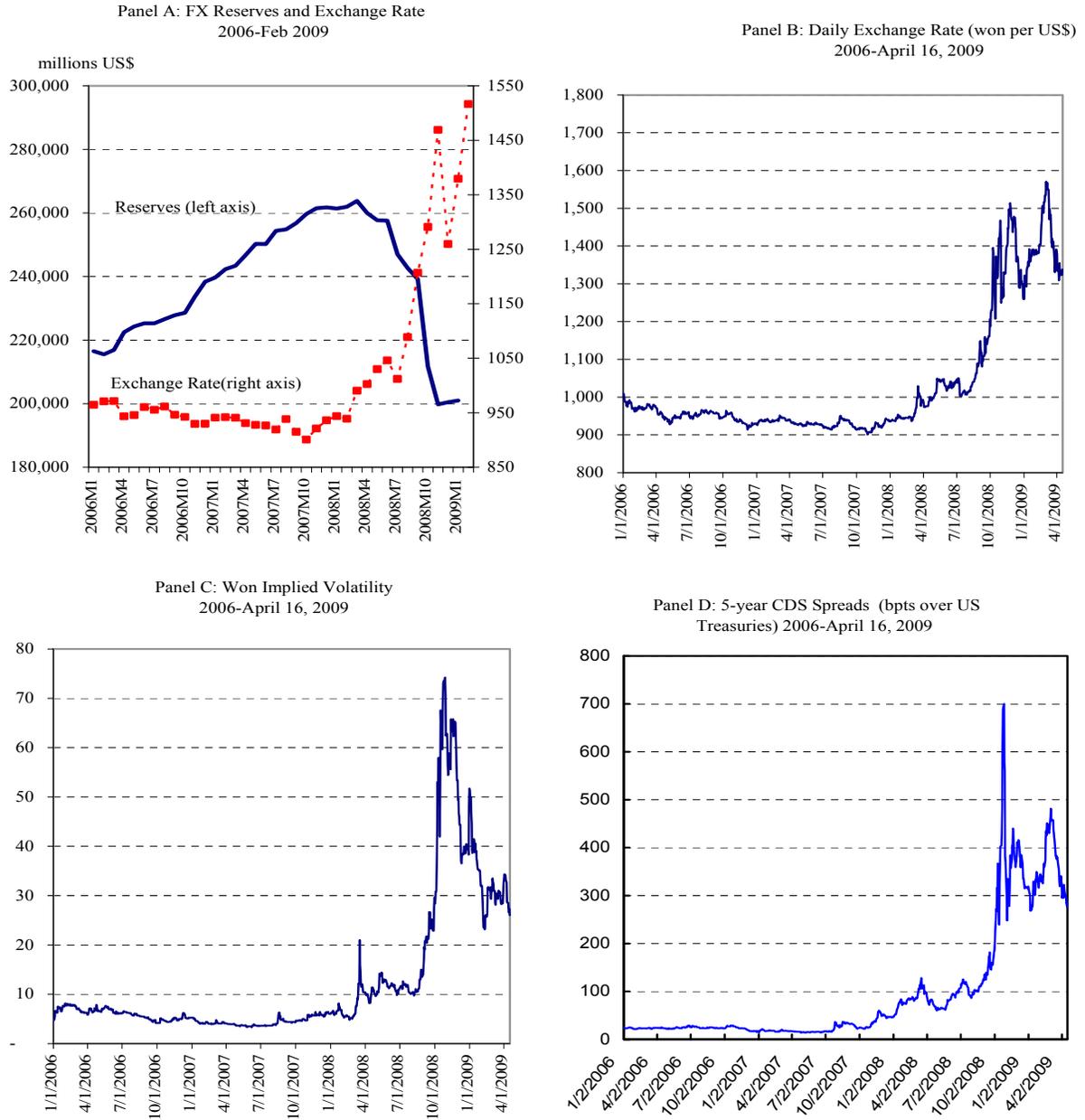
Sources: Data from International Financial Statistics and Bloomberg L.P.

Chart 9. Brazil: Corporate and Sovereign Bond Spreads over U.S. Treasuries, January 2006–February 2009



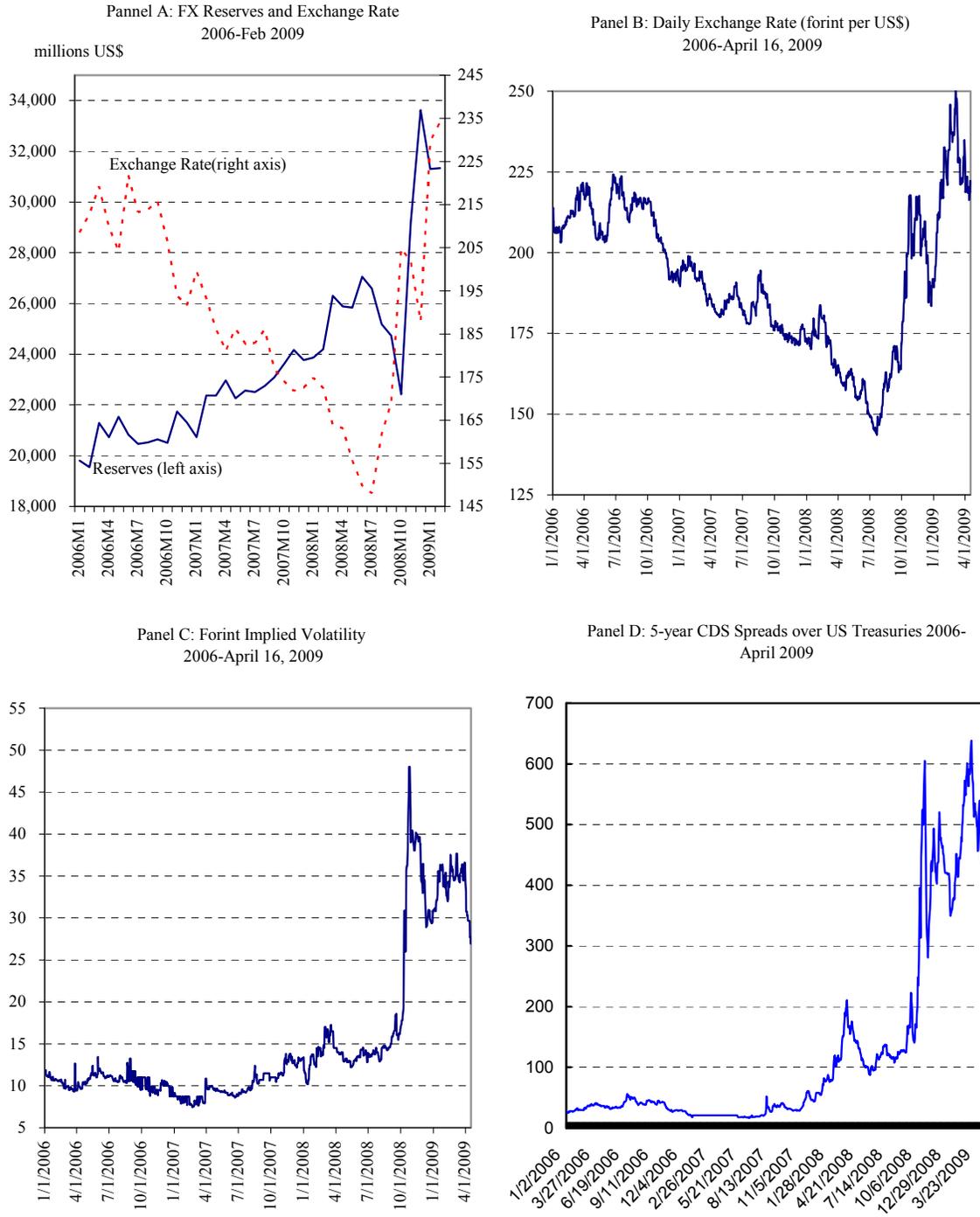
Source: Data from Bloomberg L.P.

Chart 10. Korea: FX Reserves, Exchange Rate, Currency Volatility, and CDS Spreads.



Source:Source:International Financial Statistics, monthly end of period, Bloomberg L.P., daily, and DataStream daily.

Chart 11. Hungary: FX Reserves, Exchange Rate, Currency Volatility and CDS Spreads



Source:Source:International Financial Statistics, monthly end of period , Bloomberg L.P., daily, and DataStream.