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Market Sensitivity to Global Financial Cycle: International Evidence and Implication for China's Capital Account Liberalization

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Market Sensitivity to Global Financial Cycle: International Evidence and Implication for China's Capital Account Liberalization*

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Abstract

Global financial integration has led to increasing co-movements across different cross-border capital flows and asset prices. Such co-movements have recently been identified as the "global financial cycle". Different countries, however, have exhibited different degrees of exposure to the global financial cycle. China, for example, has been relatively insulated from the global financial cycle, partly due to existing restrictions on its capital account. What determines a country's exposure to the global financial cycle? Do sound macroeconomic fundamentals allow a country to stay resilient against external volatility? In this paper, I investigate potential determinants of market sensitivity(for both stock market and currency market) to the global financial cycle, and study its implication for China's move towards capital account liberalization. I show that there is an important distinction between cross-sectional and inter-temporal determinants of market sensitivity. The empirical findings also point to the presence of non-linearity in the global factor, i.e, the "VIX", in explaining global asset prices. Somewhat counter-intuitively, a counterfactual simulation shows that higher market sensitivity to the global financial cycle would actually imply lower stock market volatility in China over the past decade. This suggests that greater exposure to the external world may not necessarily contribute to greater market volatility.

1 Introduction

Global Financial Cycle:

One notable feature of the international financial system over the past decade has been the ever-increasing interconnection across different markets around the world. This phenomenon is unsurprising, given the growing economic and financial linkages around the globe. Recent works have described the international

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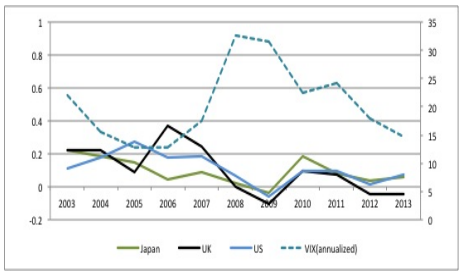
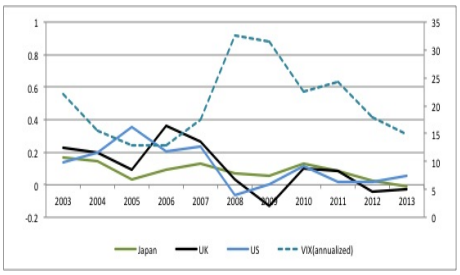
financial architecture as one characterized by the core(G8 countries, especially US, Japan, Euro and UK), surrounded by many other peripheral countries, i.e, the rest of the world. In this setup, financial conditions and economic policies in the core economies generate significant spill-over effects on the the rest of the world, creating strong market co-movements worldwide. Such description seems justifiable, given that some of the G8 countries have long been recognized as the major financing centers of the world. Their cross-border financial dominance can be seen from the importance of their currency as well as the sheer size of their various international investment poitions. The increasing exposure to the core economies, has created unprecedented challenges for the so-called peripheral economies. Rey(2013) argues that the significant exposure to monetary conditons at the financing centers has made the traditional textbook monetary "Trilemma" into a "Dilemma". The traditional "Trilemma" argument suggests that a floating exchange rate and monetary independence can be achieved simultaneously. However, exposure to external monetary conditons means that in reality, true monetary independence can be achieved "if and only if the capital account is managed, directly or indirectly via macroprudential policies." The spill-over effects of the recent unconventional monetary policy in the US and Euro area provide a vivid illustration of the "Dilemma" argument: following the aggressive monetary expansion in the core economies, in order to prevent excessive capital inflow, peripheral monetary authorities had one of the two choices: giving up monetary independence by following the core's expansionary policy, or exercise capital controls.

Increasing exposure to the core economies has caused strong co-movement in important financial indicators. On the quantity side, co-movements in cross-border capital flows across countries have received much attention in recent studies. It has been found that capital inflows and outflows are highly correlated across types and across countries. "Types" here refer to the different sub-components of gross capital flow as reported in IMF's balance of payment statistics: portfolio debt and equity flow, short term credit flow and FDI. In particular, Rey(2013) argues that there is a "global financial cycle" in cross-border capital flows. Intuitively, it refers to the synchronized expansion(or contraction) of cross-border capital flows across different types and different countries. On the price side, Rey(2014) finds that there is significant common component across a large class of asset prices globally. This common factor has been identified as the "global factor". Recent studies have found the Chicago Board Options Exchange Market Index-the "VIX"-to be a good indicator of this global factor. Rey(2014) finds the US monetary policy rate to be a key driver of the "VIX".

This synchronized rise and fall of capital flows and asset prices can be collectively refered to as the "global financial cycle". This global financial cycle can be proxied by the "VIX", a measure of global risk aversion. This paper focuses on the price side of global financial cycle. In particular, I seek to understand why stock prices and echange rates exhibit different degrees of exposures to the "global financial cycle"-the "VIX"- across countries. Using a dataset that covers 42 countries and spans over the recent decade, I find a significant distinction between cross-sectional and intertemporal determinants of market

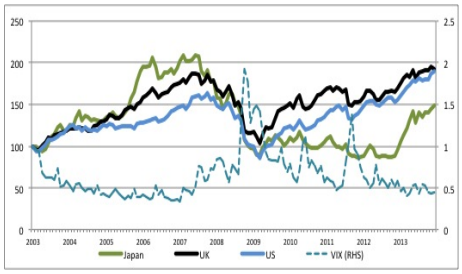


(a) Total capital inflow and VIX(annual).

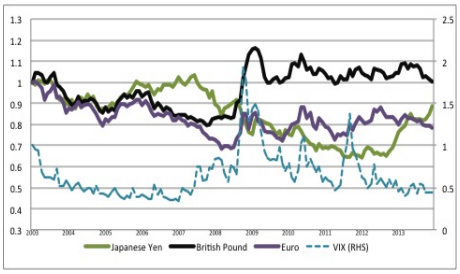


(b) Total capital outflow and VIX(annual).

Figure 1: Global Financial Cycle: Cross-border Capital Flow



(a) Stock price and VIX(monthly).



(b) Exchange rate and VIX(monthly).

Figure 2: Global Financial Cycle: Asset Price

sensitivity to the gloabl factor. Along the intertemporal dimension, I find that the global financial cycle-the "VIX"-stands out as the dominant determinant for both stock and currency market sensitivity: market sensitivity rises in financial turmoil(high VIX) and declines in financial tranquility(low VIX). Cross-sectionally, the sizes of cross-border investment positions are most closely associated with stock market sensitivity, and sound macroeconomic fundamentals do not seem to provide any external shield for the group of sampling countries. For the currency market, interest rate is a key determinant of exchange rate sensitivity to global enviroment. Countries with higher interest rate seem to respond more aggressively to the gloabl factor, suggesting that currencies that attract "carry-trade" are more sensitive to external environment. Yet, when controlling for other macroeconomic variables, government debt to GDP ratio dominates interest rate to become the major determinant of currency market sensitivity: countries with lower government debt to GDP ratio appear to have greater exchange rate sensitivity. It is worth pointing out that caution needs to be exercized while interpreting these results. Specific reasons will be discussed below.

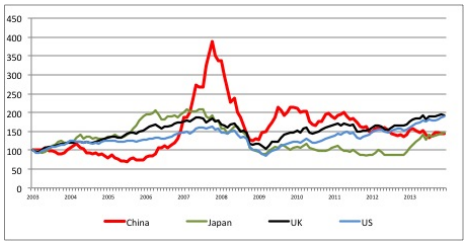
The general message I derive from the empirical study is that when we look at market sensitivity across countries, those with a larger cross-border market are more responsive to the global factor. Neither macroeconomic fundamentals nor macroeconomic policies seem helpful in mitigating their exposure to the world financial environment. When we look at a given country over time, the global factor is the main determinant of the country's market sensitivity: during

peaceful period, market sensitivity to external envrionment is mild. However, market sensitivity increases substantially during global market turmoils. Conventional wisdom may suggest that openning up of the capital account can risk generating higher market volatility. A counterfactual simulation however shows that greater stock market sensitivity in China would have actually reduced its market volatility over the past decade. Neverthelss, this is by no means suggestive of the future dynamics of China's market volatility. Going forward, uncertain domestic and global economic conditons, and the increasing use of financial tools are just a subeset of factors that will add to the complexity of market dynamics in China.

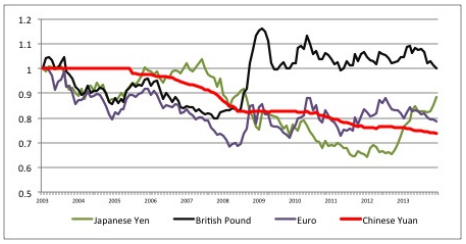
China's Relative Insulation from Global Financial Cycle:

Understanding potential factors that influence market sensitivity is important for China, given its publicly announced plan to gradually loosen restrictions on capital account and eventually achieve full liberalization. Despite the emergence of global financial cycle that has caused a strong co-movement across different markets and countries, China has appeared relatively insulated from the external world, due to existing restrictions on its capital account. This can be seen from a simple comparison across major stock and currency markets. Across U.S, UK and Japan, there appears to be a detectable correlation in stock market movement. China, on the other, shows a notable divergence from these major markets, especially during the market recovery episode following the recent financial crisis

China's currency value against U.S dollar remains relatively stable over the same period, despite the volatility in global financial environment, as measured by the VIX. This is, as we know, largely due to the government's de facto currency band to smooth currency fluctuation.



(a) China's stock market: divergence from the developed countries.



(b) China's exchange rate against the dollar: a smooth transition.

Figure 3: China: Stock Market and Currency Market

The rest of the paper is organized as follows: section 2 gives a review on recent literature on related topics, i.e, global financial cycle and China's capital account liberalization. Section 3 gives a brief description of data used in this paper. Further details on data can be found in the appendix. Section 4 descrbes empirical methodology and presents empirical findings on the determinants of market sensitivity. Section 5 gives an overview on the existing stage of capital

account liberalization in China and discussed how it will likely unfold going forward. Implications of our empirical findings on China's capital account liberalization will also be discussed. Section 6 concludes.

2 Related Literature

This paper is at the junction of two strands of literature: the global financial cycle and China's capital account liberalization. Thus far, there has been no general concensus on the theory behind global financial cycle: what drives it and how it feeds back to the global economy. Existing theoretic models that try to explain the mechanisms behind the global financial cycle involve a variety of factors such as US monetary policy and global banks' cross-border intermediation. By and large, the theory behind global financial cycle is related to the vast literature on cyclical financial intermediation and leverage cycle, usually in a single country context. The literature is too large to be covered comprehensively in this review. For example, Geanakoplos(1997) and Geanakoplos(2010) present models of leverage cycle that stems from agents' heterogeneous beliefs and their ability to lever on their purchase of assets. For works that explicitly model bank intermediation, Adrian and Shinn (2008) is one example that points to the pro-cyclical changes on US banks' balance sheet. They document that bank leverage rises during boom time and contracts during downturns, and argues that the evolution of banks' balance sheet provides the most effective measure of market liquidity.

More recently, among the international finance literature, a growing body of works point to the importance gross capital flows, and subseqently the cyclical nature of these cross-border gross flows. This is related to the aforementioned works on cyclical finanical intermediation and leverage cycle, but applied in an international context. Previously, most works focused on the interplay between current account imbalance and net capital flows across countries, while little attention has been paid to gross capital flows. Recent works that point to the importance of gross capital flows include Borio and Disyatat(2011), Gourinchas and Obstfeld(2012), Obstfeld(2012(a,b),2014) and Schularick and Taylor(2012).

In particular, Obstfeld(2014) accesses the relative importance between current account balance and gross capital flows. While he maintains that current account still serves as an important indicator that deserves close monitoring, he also recognizes the equal, if not greater, importance of monitoring gross capital flows in order to keep track of systemic financial risk. A useful thought experiment to see why gross capital flow might be more important than current account balance in an financially integrated world is presented in Borio and Disyatat(2011). They explain how an expansion(or contraction) of gross capital flow is always possible, even with the current account remaining balanced. Such expansion of cross-border balance sheet can be beneficial to international banks seeking leveraged returns, yet it is at the cost of increased systemic financial risk. Focusing solely on the current account balance would obscure our understanding of such increase in systemic global financial risk. At the theoretical front, Bruno and Shin (2014) develops a partial equilibrium model to capture cross-border gross capital flow through the working of global banks. In their

model, US banks increase wholesale US dollar funding to foreign banks during the boom period. Foreign banks in turn extend these US dollar funding to local borrowers, who would finance their local currency assets with US dollar borrowing. A reversal takes place during the burst period in which agents start deleveraging. Their model not only captures the cyclical movement in cross-border capital flow, but also offers an explanation to why US dollar tends to depreciate in good times and appreciate in economic downturns.

While the above literature point to the importance of cross-border gross capital flows, the idea of "global financial cycle" is perhaps most lucidly put forward in Rey(2013) and Aggripino and Rey(2014). Rey(2013) finds a strong comovement in cross-border capital flows across both types and countries. She finds that for a given country, different types of capital flows, (with perhaps the exception of FDI), seem to flucutuate in tandem. Furthermore, capital flows also seem to be correlated across countries. She therefore suggests the idea of a "global financial cycle": there is a global cycle in cross-border gross capital flows. On the other hand, Rey(2014) finds a common factor(the "global factor") that can explain a significant portion of price movements across a large class of assets globally. In this sense, there is also a global cycle in global asset prices. The Chicago Board Options Exchange Market Volatility Index, abbreviated as "VIX", has been found to be a good indicator of the global financial cycle.

Existing research has not delved much into the question of why countries exhibit different degrees of exposure to the global financial cycle. Eichengreen and Gupta(2014) find that emerging markets which allowed their currencies to appreciate in the midst of unconventional monetary easing at the core economies, as well as those with a large size of external financing(total liability), were most strongly hit by the Federal Reserve's tapering talk in 2013. Different from their event study, I look at data over the past decade and emphasizes on the role of the global financial cycle.

Given China's explicit stance to gradually open its capital account, there is an growing interest in how such liberalization will affect the dynamics of China's cross-border capital flows. He, et al(2012) conduct a study on the determinants of different types of capital flow based on the experiences from 25 countries and use the empirical results to estimate a projection of China's future capital flows. They assume that China's capital account will achieve full liberalization by the end of 2020, and find that outward FDI will increase substantially over the increase in inward FDI, due to a high level of existing inward FDI stock. They also find that outward fortfolio flow will increase more than inward portfolio flow. Bayomi and Ohnsorge(2013) use a multi-country international porfolio model and estimate that the lifting of existing capital controls in China would lead to an increase in portfolio outflow on the order of 10-25% of GDP, and an increase in portfolio capital inflow on the order of 2-10% of GDP. Other studies such as Sedik Saadi and Sun(2012) also estimate similar direction of capital adjustments. The empirical findings of this paper suggests that the expansion of China's cross-border balance sheet will lead to an increase to its exposure to the global financial cycle. Interestingly, a counterfactual simulation shows that greater market sensitivity to the global financial cycle would have actually reduced China's stock market volatility over the past decade.

Research on financial integration and the global financial cycle has also led to increasing discussions on their policy implications. Woodford(2010) argues that even in a world of integrated financial system, central banks still retain their conventional arsenals to achieve the objective of price stability. Rey(2013) on the other hand, argues that in a world of integrated financial system, monetary independence can only be achieved with capital controls. Obstfeld(2014) offers a middle ground view that financial integration still allows for monetary independence, but it worsens the trade-off among the multiple objectives that central banks intend to achieve. This raises the question of how the PBOC(People's Bank of China) will adapt itself to the new policy environment with an open capital account. Other policy considerations include the design of appropriate policies on international banks, which will likely make a stronger presence in China with a more liberal capital account. Brunnermeier, et al(2012) point out that the organizational structure and funding rules of international or multinational banks can affect the host country's exposure to external shocks. For instance, one reason that the Latin America was relatively resilient to the recent financial crisis might be due to the fact foreign banks operating locally are subject to strict restrictions by the local authorities, which prevents the amplification of external shocks through these foreign banks.

3 Empirical Methodology

3.1 Overview: Determinants of Market Sensitivity to Global Financial Cycle: International Evidence from Stock and Currency Markets

In this section, I explore empirically the key determinants of market sensitivity to the global financial cycle. I look at both the stock market and the currency market. Using a panel data of 42 countries (a smaller set of countries is used for exchange rate analysis since some Euro countries do not have a national currency) spanning over the recent decade from 2002 to 2013, the empirical exercise investigates the following questions:

1.What are the determinants of market sensitivity to the global financial cycle? Do sound macroeconomic fundamentals or macroeconomic policies help reduce a country's market sensitivity to global financial cycle?

2.How do different types of cross-boarder capital flows relate to market sensitivity? In other words, is there evidence that higher market sensitivity to the global financial cycle is associated with any particular type of capital flow? I investigate the relationship between market sensitivity and different types of capital flow, including portfolio debt, equity and short-term credit flow.

I find that cross-sectionally, the size of cross-border investment positions is most closely associated with stock market sensitivity, while interest rate(and potentially government debt level) is most closely associated with currency market sensitivity. However, along the intertemporal dimension, the "global factor", i.e, the "VIX", emerges as the key driver of market sensitivity for both stock

and currency markets. This suggests potential non-linearity of the global factor in an international asset price model as suggested in Rey(2014).

3.2 Two-Stage Empirical Methodology:

I proceed with the empirical analysis in a two-stage process. In the the first step, I compute a measure of market sensitivity for both stock and currency markets. In the second step I run panel regressions to investigate potential determinants on market sensitivity for both markets.

First-stage: computation of market sensitivity:

I measure market sensitivity to global financial cycle as the correlation between market price change and the change in the global factor, i.e, change in the VIX index. Previous studies have shown that cross-border capital flows comove strongly with the VIX. Rey(2014) finds that the "VIX" can also account for a significant portion of a large class of global asset prices. As mentioned earlier, VIX is an index for the implied volatility of S&P 500 index options, which has been widely used as an indicator of the level of global risk aversion. I compute market sensitivity to the global financial cycle-the "VIX"-for both stock and currency markets. More specifically, for each country and each year in the panel set, I compute the correlation between monthly change in stock price index (or exchange rate) and monthly change in the VIX.

-Stock market sensitivity to global financial cycle for country i and year t is defined as the correlation between monthly change in stock price index and monthly change in VIX in country i and year t:

$$SVIX_{it} = corr(\Delta Stock\, Index_{ij}, \Delta VIXj) \tag{1}$$

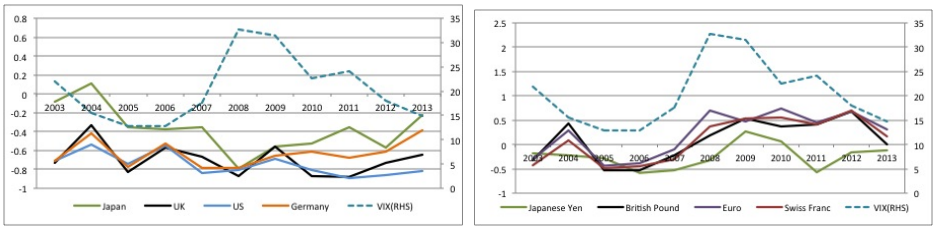
-Currency market sensitivity to global financial cycle for country i and year t is similarly defined as the correlation between monthly change in exchange rate and monthly change in VIX in country i and year t:

$$EVIX_{it} = corr(\Delta Exchange\, Rate_{ij}, \Delta VIX_j) \tag{2}$$

where "j" denotes particular months of year t. Note that exchange rate here is defined against US dollar. The per dollar exchange rate is highly correlated with other types of exchange rates such as effective real exchange rate(Eichengreen 2014) and thus the choice of exchange rate is unlikely to affect the empirical findings significantly. Another reason for the use of exchange rate against the dollar is that US monetary policy has been found to be a key driver of the global factor "VIX" (Rey,2014).

A brief overview of market sensitivity in selected countries:

The dashed line indicates the "VIX" over the past decade. It keeps track of the evolution of global risk aversion. As we can see, global risk aversion reached a peak in 2008 during the aftermath of the gloabl financial crisis and has since



(a) Selected SVIX:A negative SVIX suggests that when VIX rises, stock prices falls.

(b) Selected EVIX:A positive EVIX suggests that when VIX rises, exchange rate against the dollar increases(depreciation).

Figure 4: Counter-cyclical Market Sensitivity

been declining. Figure 4(a) shows stock market sensitivity for a few selected advanced countries. There is a visible comovement between stock market sensitivity and the "VIX": stock market sensitivity tends to be greater(more negative) as global risk aversion heightens. A negative SVIX means that stock price falls in average as the "VIX" rises. Figure 4(b) shows currency market sensitivity for a similar group of countries, excluding the US, since its per dollar exchange rate is constant at 1. There is also a visible co-movement between currency market sensitivity and the "VIX": currency market sensitivity tends to be greater(more positive) as global risk aversion heightens. A positive EVIX means that per dollar exchange rate tends to rise(depreciate) as the "VIX" rises. Figure 4(b) also sheds light on the role of the US dollar as the "safe haven" currency. In fact, only Japnese Yen's EVIX remains for a large part in the negative zone, suggesting the role of the Japanese Yen as a safer currency than the US dollar. Other conventional reserve currencies such as the Swiss franc, British pound and Euro tend to shift into the positive zone following the financial crisis, suggesting that they tend to depreciate against dollar in recent years when global risk aversion heightens.

Second stage: estimation of the determinants of market sensitivity:

I run the following regressions using the panel data set on market sensitivity and other country specific variables:

Stock market:

$$SVIX_{it} = \alpha_i + \beta \cdot VIX_{it} + \delta \cdot X_{it} + \lambda \cdot capital\ flow_{it} + \epsilon_{it} \tag{3}$$

Currency market:

$$EVIX_{it} = \alpha_i + \beta \cdot VIX_{it} + \delta \cdot Y_{it} + \lambda \cdot capital\ flow_{it} + \epsilon_{it} \tag{4}$$

where $SVIX_{it}$ and $EVIX_{it}$ are the measures of market sensitivity to global financial cycle as explained in the first stage computation. VIX_{it} stands for the level of global risk aversion, and is included here to capture how the global financial environment affects market sensitivity. X_{it} includes a set of variables that capture the domestic determinants of market sensitivity, such as GDP growth,

inflation, government debt to GDP ratio and current account balance. X_{it} also includes policy variables such foreign reserve holdings and financial openness index, which are potential determinants of market sensitivity to the global factor. The appendix includes a description of the data and their sources. $capital\,flow_{it}$ represents different types of capital inflow and outflow, such as portfolio debt and equity flow and short term credit flow. They are included here to shed light on whether different types of capital flows are associated with different intensity of market sensitivity to global financial cycle, similar to what Rey(2013) does.

The panel data allows one to capture both the cross-sectional and the intertemporal dimension of statistical effects. Different types of estimators, however, point to different interpretation of the regression coefficients. I first conduct a simple cross-sectional comparison using the between estimator, followed by a fixed effect estimator to capture result that are more reflective of effects along the intertemporal dimension. I find that determinants of market sensitivity vary between cross-sectional and intertemporal studies. From an econometric persepctive, the panel regression, with a larger number of observations, should give a more efficient estimation than the simple cross-sectional estimation. Neverthless, a simple cross-sectional regression can sometimes address particular questions more directly and its results are also easier to interpret.

Cross-sectional comparison: between estimator

Before we proceed to the panel regression, I conduct a simple cross-sectional regression by using the "between estimator". What the "between estimator" does is that it basically collapses each country specific variable along the time dimension to get a mean value. As a result, we are regressing time averages of our explanatory variables against time averages of the dependent variable. This eliminates the time-series dimension of the panel data and basically reduces the empirical investigation to a simple cross-sectional regression. It can essentially be expressed as a simple, strictly cross-sectional regression of the following form:

$$\overline{SVIX_i} = \alpha_i + \delta \cdot \overline{X_i} + \lambda \cdot \overline{capital\ flow_i} + \epsilon_i \tag{5}$$

where the barred variables represent their respective time averages over the sample period 2002-2013. The "between estimator" naturally drops out the global factor, VIX_{it}, as it is a strictly time-varying variable.

Cross-sectional findings: stock market

In the above cross-sectional regression, I do not find any statistical significance in the regressor $\overline{capital\ flow_i}$. Instead, current account balance emerges as a statistically significant factor, yet its regression coefficient is too small to deliver any economically significant interpretation. Therefore, instead of looking at the flow variable, I turn to the stock variable: the sizes of different cross-border capital stocks. For clarity, the cross-sectional regression now becomes:

$$\overline{SVIX_i} = \alpha_i + \delta \cdot \overline{X_i} + \overline{capital\ stock_i} + \epsilon_i \tag{6}$$

I find that cross-sectionally, the sizes of cross-border financial market, as measured by various types of cross-border asset and liability positions(log value), are

the key determinants of stock market sensitivity. Across the 42 countries in the sample, countries with larger cross-border investment positions display greater stock market sensitivity to global financial environment, even controlling for other macroeconomic fundamentals and capital restrictions. This holds consistently regardless of the types of capital stock used for the regression. There is little evidence that country specific fundamentals provide any effective shield from external financial turbulance. This can be seen from Table 3 in the appendix, where for all specifications, none of the macroeconomic indicators display any statistical significance on stock market sensitivity. Notice that after controlling for various types of cross-border investment positions, even capital control policies, as reflected in the financial openness index and foreign reserve holdings, do not play any statistically significant role in influencing stock market sensitivity. This is consistent with the findings of Eichengreen and Gupta(2014), where he shows that among the group of emerging markets, those with the largest size of external financing were mostly strongly hit by the Federal Reserve's tapering talk in 2013, regardless of their macroeconomic fundamentals.

Comparing the regression coefficients of different types of capital stock used in the regression, total liability stock, total asset stock and credit liability stock have the highest regression coefficients. Note that "total liability stock" is the same variable that Eichengreen and Gupta(2014) uses as what he calls "the size of external financing".

Cross-sectional findings: currency market

For the currency market, I find that when the full set of explanatory variables are controlled for, government debt to GDP ratio emerges as the key determinant of exchange rate. This is shown in Table 5, where government debt to GDP ratio are consistently significant for all specifications. Previous study shows that interest rate is the most important determinant of exchange rate sensitivity to the VIX. (Chairns, Ho and McCauley 2007) The intuition is that high interest rate attracts more speculative, or "carry-trade", investors. As a result, such currencies react more sensitively to the global environment. To check if that result also holds in our dataset, I start with a parsimonious model in which only interest rate and total liability stock are included as the regressors. I find that when other variables are not controlled for, interest rate is indeed a significant determinant of exchange rate sensitivity to the VIX, as shown in Table 6 in the appendix. However, as additional variables are added to the model, interest rate loses its statistical significance and government debt to GDP ratio emerges as the main determinant of exchange rate sensitivity. Surprisingly, the coefficient on government debt is negative, suggesting that higher levels of government debt are associated with less exchange sensitivity to global financial environment. This might be due to the fact that several important major reserve currencies in the sample, such the Japanese Yen, Euro and British Pound, all correspond to governments with high levels of debt. Despite their high debt levels, these currencies are traditionally "safe havens" during economic turbulance, and exhibit less responsiveness to the VIX.

Panel regression: fixed-effect estimator

The fixed-effect estimator allows one to capture the time-varying effect of explanatory variables on market sensitivity within an "average" country.

Panel regression findings: stock market

The fixed effect estimator shows that fluctuations of the global financial cycle, as measured by VIX_{it}, is the most important driving force of stock market sensitivity. In particular, stock market sensitivity is counter-cyclical with respect to VIX_{it}. Stock market sensitivty heightens in financial downturns, and declines in normal times. This can be seen from the significantly negative regression coefficients across all specifications.

The statistically significant impact of "VIX_{it}" on $SVIX_{it}$ suggests potential non-linearity in an asset pricing model that incorporates the global factor. For instance, Rey(2014) proposes an empirical global asset pricing model in the following form:

$$stock\,price_{it} = \mu_i + \lambda_{ig} \cdot VIX_{it} + \lambda_{ir} \cdot regional\ factor_{it} + \epsilon_{it} \tag{7}$$

where μ_i is the asset specific factor, VIX_{it} is the gloabl factor, and $regional factor_{it}$ is the regional factor. Non-linearlity of the global factor suggests that higher order terms of VIX_{it} should be included in an international asset pricing model. For instance, non-linearlity of the global factor suggests that a more robust model should look like:

$$stock\,price_{it} = \mu_i + \lambda_{ig} \cdot VIX_{it} + \lambda_{ig^2} \cdot VIX_{it}^2 + \lambda_{ir} \cdot regional\ factor_{it} + \epsilon_{it} \tag{8}$$

Is there any evidence that even after controlling for the VIX, different types of capital flows are associated with different levels of stock market sensitivity? I find that an increase in equity inflows and outflows are associated with a smaller stock market sensitivity to the VIX, as evidenced by their significant and positive coefficients in Table 4 in the appendix. One way to interpret this finding is that observed increase in equity inflows and outflows suggest that investors are confident in a particular market for reasons not captured by the macroeconomic fundamentals. This "unusual" confidence leads to market resilience to the global financial environment. Another possible explanation for the positive coefficient might be the valuation effect of equity positions. Any observed increase in equity inflow or outflow may come from equity price effect, since the international investment positions dataset of IMF only measures the nominal value of asset and liability positions. Intuitively, this suggests that an incease in the equity flow into a certain market might simply reflect an increase in the equity price of that same market. A strong equity price performance is naturally associated with less market sensitivity to the broad global environment.

Interestingly, if I drop the inclusion of VIX_{it} and re-run the fixed-effect regression, GDP growth rate stands out as the only statisitcally significant determinant of $SVIX_{it}$. For all specifications in the exercise, GDP growth rate is significantly associated with $SVIX_{it}$ with a positive regression coefficient. At first glance, it may seem that this suggests that a strong GDP growth provides

external shield by reducing the economy's stock market sensitivity. However, if we look at the correlation between GDP growth rate and VIX_{it}, we can see that they are strongly and negatively correlated, due to their cyclical comovements. Across the dataset, corr(GDP_{it},VIX_{it})= -0.43. This shows that GDPs across countries are correlated and are affected by global envrionment.

This finding, though unsurprising, points to the important distinction among different ways of normalizing capital flows in empirical studies. A common approacn in existing studies is to normalize the size of capital flows by the size of GDP. In other words, capital flows are expressed as a percentage of GDP:

$$Capital\ Flow_{it} = \frac{Asolute\ Size\ of\ Capital\ Flow_{it}}{Asolute\ Size\ of\ GDP_{it}} \tag{9}$$

This might be a good measure for cross-sectional studies, where we are interested in the size of capital flow relative to the size of the economy. However, such specification can be misleading for intertemporal studies. The high degree of correlation between capital flows and GDP growth rate can easily remove important cyclical information contained in capital flows. In this paper, I use an alternative way to specify capital flows for the panel regression:

$$Capital\ Flow_{it} = log(Stock\ of\ Captal_{it}) - log(Stock\ of\ Captal_{i,t-1}) \tag{10}$$

Again, it is worth emphasizing that different normalizations would potentially lead to different empirical findings, especially given that the cyclical factor VIX is a key determinant along the intertemporal dimension.

Panel regression findings: currency market For the currency market, cyclical global financial cycle again emerges as the key determinant of exchange rate sensitivity, as shown in Table 7 in the appendix. The positive regression coefficients suggest that when gloabl risk aversion heigtens, i.e when VIX rises, exchange rate sensitivity also rises. In addition to VIX, foreign reserve holdings appear to be another significant determinant of exchange rate sensitivity. The positive coefficient seems to suggest that intertemporally, as a given country increase its foreign reserve holdings, its currency will tend to be weaker against the US dollars. Such interpretation neverthelss requires further scrutiny. The increase in various capital inflows and outflows seems to be associated with a lower EVIX, or in other words, a stronger currency.

4 Overview of China's Capital Account Liberalization and Implications on Market Sensitivity

Despite being the second largest economy and the second largest player in international trade, China's capital account still remains relatively restricted as compared to the developed countries. This can be seen from measures of financial openness such the Chinn-Ito index, IMF's AREAER and other similar indices. These measures are usually computed by considering a large class of cross-border capital restrictions imposed by the government. China is usually

ranked among the most restricted countries.

Capital account liberalization in China has achieved significant progress over the past decade. The recent Shanghai-Hong Kong Stock Connect (took place on the the 17th of Novermber, 2014) marked another important milestone on China's path towards liberalizaing its capital account. Since Hong Kong is a fully liberalized capital market, the Shanghai-Hong Kong Stock Connect basically openned up China's equity market to all foreign investors. 568 firms listed firm in Shanghai stock market are now open to foreign investment. However, foreign inflow into the Shanghai market is subject to a daily limit of 2.1 billion US dollars, reflecting China's cautious attitude towards the liberalization of its equity market, and capital account in general.

The future development of China's capital account liberalization largely depends on the upcoming domestic and global economic environment, as well as policy makers' decision making. It is therefore important to understand corresponding authority's policy plan. The People's Bank of China released a report in 2012 that lays out a brief roadmap for the upcoming process of capital account liberalization. The report divides the liberalization process into short-term, medium-term and long-term arrangements. The following is a brief summary of the stated plan: in the short-run, i.e, the next three years, the objective is to reduce restrictions on outward FDI, the rationale being that FDI is the most stable category of international investment and is most resilient to economic volatility. The recent establishment of the Asia Infrastructure Investment Bank(AIIB) is a good example of China's commitment towards expanding its outward FDI. In the medium-term, i.e, the next five years, the plan is to loosen control on trade credit. This will help encourage cross-border trade and strengthen the development of off-shore Renmibi market. As shown in Figure 5, The off-shore Renminbi market has expanded exponentially in recent years, amidst a series of actions recently taken by the governement to promote the internationalization of RMB. Given China's under-developed financial system, the loosening of control over trade credit can also help relief SME's access to credit. The liberalization of the real estate, equity and bond market is listed as a long term plan, i.e, for the next 10 years. The report does not include specific plans, but states a few general principles that reflect the authority's approach towards liberalization. The first principle is that domestic financial market development should *precede* liberalization to foreign investment. The report in particular emphasizes the importance to further develop domestic stock and bond markets. The second principle is that the liberalization of primary market should *precede* the liberalization of secondary market. The third principle is that deregulation over inflow should *precede* deregulation over outflow.

Capital liberalization is expected to change China's cross-border financial landscape drastically. Drawing on international experiences, several recent studies have estimated the likely evolving path of China's cross-border investment positions following capital account liberalization in the upcoming decade. He, et al(2012) estimates that China's outward stock of FDI will increase from USD 311 billions (5% of GDP) to USD 5150 billions (27% of GDP) in 2020. Inward FDI will increase as well but at a much slower pace due to large stock of existing inward FDI. They also estimate that outward portfolio investment position

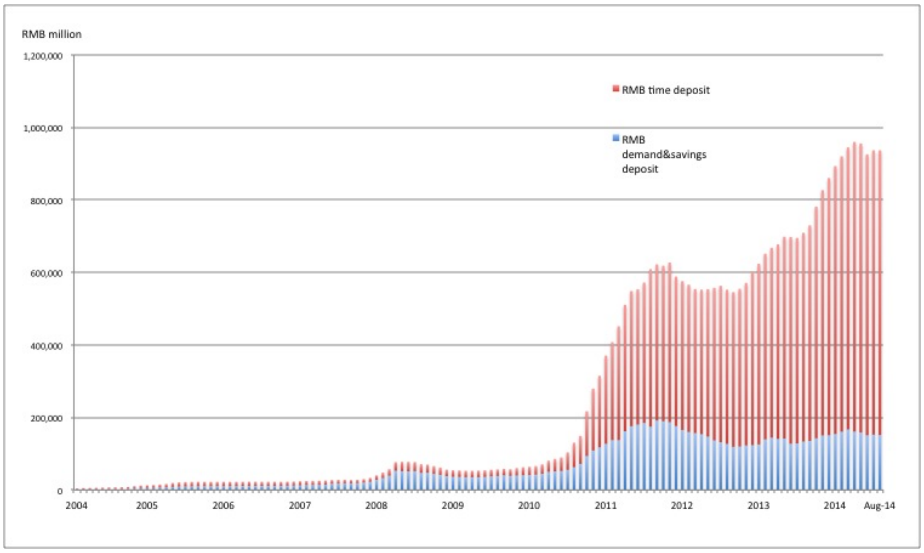


Figure 5: Off-shore RMB Market in Hong Kong *Source:HKMA*

will increase from USD 257 billions in 2010 (4% of GDP) to USD 5500 billions (29% of GDP) in 2020, inward portfolio investment position will increase from USD 222 billions in 2010 (4% of GDP) to USD 3900 billions (29% of GDP) in 2020. Bayomi and Ohnsorge(2013), using a econometric portfolio model, derives a similar estimation of capital adjustment.

Comparing with the advanced economies, cross-border investment positions are still very limited at the present. The chart below presents a cross-country comparision of different types of cross-border investment. China's small size of portfolio positions makes it almost invisible is the chart.

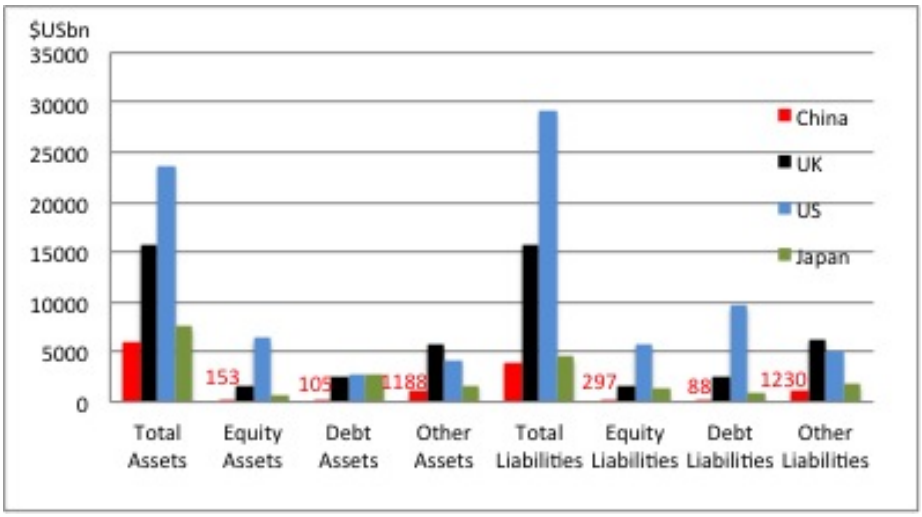


Figure 6: Comparison of Cross-border Investment Position: 2013 *Source: IMF*

The general message from the empirical studies in this paper is that market sensitivity will increase significantly as China's international investment positions expand. To better visualize the impacts of increased market sensitivity, I conduct a simple simulation to see how market sensitivity might have changed the dynamics of China's stock price dynamics. In particular, I simulate three counterfactual paths of China's stock market price over the past decade by varying its market sensitivity to levels observed in Japan, UK and US respectively.

Before the simluation, I start with a simple comparison across market sensitivity observed in the aforementioned four countries. For the sample period 2002-2013, I compute average market sensitivity for each country, i.e, correlation between monthly change in stock price and monthly change in VIX. I denote this average market sensitivity by $\overline{SVIX_i}$. As shown in TableX, China has a very low market sensitivity to VIX compared with Japan, UK and US.

China	Japan	UK	US
-0.267	-0.501	-0.742	-0.745

Table 1: $\overline{SVIX_i}$ 2002-2013

To gain a better understanding of market sensitivity in these four countries, I run a simple OLS regression as follows for each of the four countries across the sample period from 2002 to 2013:

$$\Delta Stock\,Price_{it} = \alpha_i + \beta \cdot \Delta VIX_{it} + \epsilon_{it} \tag{11}$$

Different from $\overline{SVIX_i}$, which only allows us to see market sensitivity in terms of correlation, the R^2 statistics produced by the OLS regression would also allow us to see how much of the total variation in $\Delta Stock\,Price_{it}$ is accounted for by the variation in ΔVIX_{it}. Note that it is not necessary to use adjusted R^2 ($\overline{R^2}$) here because all specifications have the same number of observations.

Statistics	China	Japan	UK	US
Coefficient	-0.00493***	-0.00617***	-0.00655***	-0.00685***
R^2	0.0714	0.251	0.55	0.56

Table 2: OLS Ststistics: ΔVIX_{it} against $\Delta Stock\,Price_{it}$

The regression results give an effective contrast in terms of the role that ΔVIX_{it} plays in each country in explaining $\Delta Stock\,Price_{it}$. Interpreting from the R^2 stattistics, ΔVIX_{it}, when included as the only regressor, only explains 7.14% of the variations in $\Delta Stock\,Price_{it}$ in China. The global factor, ΔVIX_{it}, plays a much more important role in Japan, UK and US, with a respective R^2 of 0.251, 0.55 and 0.56. This is consistent with the correlation measure $\overline{SVIX_i}$ in Table 1.

Based on the above information, I conduct a simluation to generate three countrefactual paths of China's stock price by varying its degree of exposure to ΔVIX_{it} to levels observed in Japand, UK and US. The intuition behind the simulation method is that, $\Delta Stock\,Price_{it}$ can be decomposed into two components based on equation (7): the first component is explained by the global factor ΔVIX_{it} , and the other component is the unexplained risidual term. I vary the relative importance of these two components and reconstruct a new path of stock price. The relative weight is computed based on the OLS regression coefficient and R^2 statistics. I increase the weight on the part explained by ΔVIX_{it} by matching it with levels observed in Japan, UK and US.

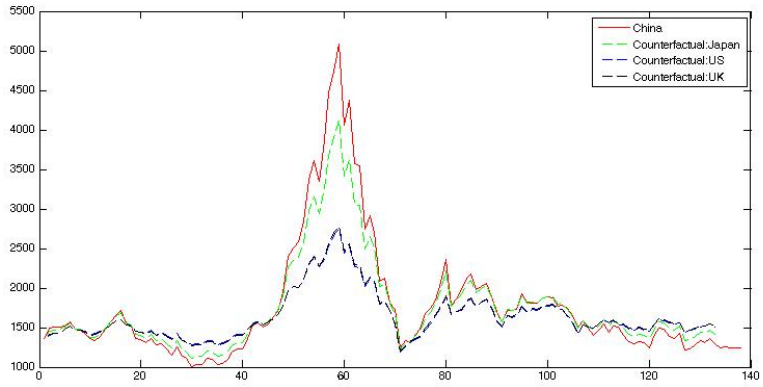


Figure 7: Simulated Paths of China'a Stock Price with Counterfactual Market Sensitivity to Global Factor 2003-2013

The red line in figure two is the original path of China's stock price from 2003 to 2013. The green dashed line is a counterfactual path for China's stock price if it were to have a market sensitivity similar to that observed in Japan, while retaining its own residual component unexplained by ΔVIX_{it}. The blue and black dashed lines are simulated in the same way. Note that the blue and black dashed lines almost entirely overlap with each other because of the similarity between the degree of market sensitivity in US and UK.

One quick observation from the simulated paths is that increased exposure to the global financial cycle would actually reduce the volatility of China's stock market. This might seem counter-intuitive at first, but not so if we compare China's much more volatile stock price to other advanced countries, as shown in Figure 3(a).

5 Conclusion

In this paper I study determinants of market sensitivity to the global financial cycle and access its implication on China's capital account liberalization. Several findings emerge from the study:

- Countries with larger cross-border investment positions exhbit greater stock market sensitivity to the global financial cycle, whereas countries with higher interest rate and lower government debt to GDP ratio exhibit greater exchange rate sensitivity. Sound macroeconomic fundamentals and macroeconomic policies do not seem to reduce market sensitivity to the global financial cycle.

- Within a country, the global factor "VIX" is the key determinant of market sensitivity over time: stock and currency market sensitivity heightens in financial turmoils and declines in normal times. I find that once the general gloabl environemnt is controlled for, increased equity inflow and outflow are associated with reduced stock market sensitivity, and increased total inflows and outflows are associated with reduced exchange rate sensitivity, or a more resilient currency. My interpretation is that once we have controlled for global risk aversion, any observed increase in capital flows signals greater market confidence, which is associated with reduced market sensitivity.

- Correlation between GDP and the "VIX" suggests that normalizing cross-border capital flows(which also correlates with the "VIX") by GDP may likely remove important cyclical information contained in capital flows.

- Non-linearity of the "VIX" exists in an asset price model that incorporates the global factor. Higher order terms of the global factors should be considered in such a model.

- Capital account liberalization will lead to greater market sensitivity to external conditions, yet it does not necessarily mean that market volatility will increase simultaneously. A counterfactual simulation shows that market volatility in China would have actually declined with higher market sensitivity to the external world. Nevertheless, this is not to suggest that capital account liberalization will lead to lower market volatility in China. To many factors will play a role in determining market dynamics in China. Uncertainties surrounding global and domestic economies, as well as the increasing use of financial tools such as margin trading and short selling, are but just two examples that will have important implications on market dynamics in China.

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A Appendix

A.1 Data:

42 Countries in the Dataset for Stock Market Analysis: Argentina, Australia, Belgium, Brazil, Canada, Colombia, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, India, indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Malaysia, Mexico, Netherland, Norway, Poland, Portugal, Russia, Singapore, Slovak, Slovenia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, UK, US.

35 Countries in the Dataset for Currency Market Analysis: Argentina, Australia, Brazil, Canada, Colombia, Croatia, Czech Republic, Denmark, EU, Hungary, Iceland, India, indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Malaysia, Mexico, Norway, Poland, Russia, Singapore, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, UK, US.

VIX: End of period reading, Chicago Board Option Exchange(CBOE).

Annual GDP Growth Rate: World Bank Development Indicators

Nominal GDP in USD: IMF Interntional Financial Statistics

Foreign Reserve Holdings: IMF Interntional Financial Statistics

Nominal Per Dollar Exchange Rate: IMF Interntional Financial Statistics

Stock Market Price: Monthly major stock price indices, end of period reading backed out from CEIC daily data, and IMF Interntional Financial Statistics

Financial Openness: Chinn-Ito Index 2012, and IMF AREAER

Inflation: IMF WEO Database

General Government Debt to GDP Ratio: IMF WEO Database

Money Market Interest Rate: IMF IFS. for those not included in the IMF IFS, data are from correponding central banks' online statistics.

Capital Stocks: Log value of: total liability, portfolio debt liability, portfolio equity liability, portfolio credit liability; total assets, portfolio debt assets, portfolio equity assets, portfolio credit assets. IMF BPM5(up to 2004) and BP6(from 2005 onwards).

Capital Flow: Log period difference of: total liability, portfolio debt liability, portfolio equity liability, portfolio credit liability; total assets, portfolio debt assets, portfolio equity assets, portfolio credit assets. IMF BPM5(up to 2004) and BP6(from 2005 onwards).

A.2 Regression Tables:

	(1) SVIX	(2) SVIX	(3) SVIX	(4) SVIX	(5) SVIX	(6) SVIX	(7) SVIX	(8) SVIX
GDP	0.0167	0.0173	0.000815	0.0204	0.0152	0.00229	0.00408	0.0145
	(1.21)	(1.21)	(0.05)	(1.32)	(1.03)	(0.13)	(0.21)	(0.88)
Inflation	-0.00211	-0.00701	0.00224	0.00154	-0.00293	-0.0181	-0.00837	0.00218
	(-0.23)	(-0.73)	(0.22)	(0.15)	(-0.30)	(-1.58)	(-0.68)	(0.20)
Government Debt	0.000943	0.000741	0.000688	0.000971	0.00104	0.000226	0.000251	0.000839
	(1.88)	(1.46)	(1.25)	(1.70)	(1.90)	(0.41)	(0.40)	(1.39)
Current Account(Lagged)	-0.00270	-0.00288	-0.00754*	-0.00450	-0.00144	-0.00765*	-0.00787	-0.00387
	(-0.81)	(-0.84)	(-2.24)	(-1.23)	(-0.38)	(-2.13)	(-1.84)	(-0.95)
Financial Openness	0.00296	-0.0883	-0.0298	0.0565	-0.00489	-0.0201	0.0460	0.0407
	(0.04)	(-1.08)	(-0.34)	(0.62)	(-0.06)	(-0.22)	(0.42)	(0.43)
Foreign Reserve Holdings	-0.0696	-0.00775	0.00648	0.0115	-0.0342	0.216	0.200	0.0577
	(-0.51)	(-0.06)	(0.04)	(0.08)	(-0.24)	(1.52)	(1.22)	(0.37)
Total Liability Stock(log)	-0.0794***							
	(-6.09)							
Equity Liability Stock(log)		-0.0474***						
		(-5.72)						
Debt Liability Stock(log)			-0.0567***					
			(-4.80)					
Credit Liability Stock(log)				-0.0733***				
				(-4.80)				
Total Asset Stock(log)					-0.0703***			
					(-5.34)			
Equity Asset Stock(log)						-0.0408***		
						(-4.16)		
Debt Asset Stock(log)							-0.0396*	
							(-2.66)	
Credit Asset Stock(log)								-0.0593***
								(-4.14)
_cons	0.496*	0.0385	0.150	0.251	0.355	-0.0397	-0.118	0.0782
	(2.56)	(0.27)	(0.84)	(1.29)	(1.82)	(-0.24)	(-0.59)	(0.42)
N	462	462	462	462	462	462	462	462

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Cross-sectional Comparison of Stock Market Sensitivity: Between Estimator

	(1) SVIX	(2) SVIX	(3) SVIX	(4) SVIX	(5) SVIX	(6) SVIX	(7) SVIX	(8) SVIX
GDP	-0.00571	-0.00378	-0.00510	-0.00481	-0.00616	-0.00486	-0.00516	-0.00565
	(-1.38)	(-0.93)	(-1.24)	(-1.14)	(-1.50)	(-1.20)	(-1.26)	(-1.38)
Inflation	-0.00564	-0.00242	-0.00629	-0.00627	-0.00418	-0.00506	-0.00629	-0.00585
	(-0.97)	(-0.42)	(-1.08)	(-1.08)	(-0.72)	(-0.88)	(-1.09)	(-1.01)
Government_Debt	0.0000651	0.0000632	-0.000156	-0.000184	0.000511	0.0000416	-0.000171	0.000224
	(0.08)	(0.08)	(-0.18)	(-0.22)	(0.59)	(0.05)	(-0.20)	(0.26)
Current_Account_Balance	-0.00216	-0.00208	-0.00242	-0.00261	-0.00235	-0.00165	-0.00243	-0.00255
	(-0.59)	(-0.57)	(-0.66)	(-0.70)	(-0.64)	(-0.45)	(-0.66)	(-0.70)
Financial_Openness	0.0622	0.0440	0.0663	0.0672	0.0140	0.0514	0.0664	0.0346
	(0.44)	(0.32)	(0.47)	(0.47)	(0.10)	(0.37)	(0.47)	(0.24)
Foreign_Reserve_Holding	-0.0596	-0.110	-0.0680	-0.0697	-0.0420	-0.0828	-0.0705	-0.0303
	(-0.34)	(-0.63)	(-0.38)	(-0.39)	(-0.24)	(-0.47)	(-0.40)	(-0.17)
VIX	-0.0132***	-0.0113***	-0.0138***	-0.0139***	-0.0123***	-0.0118***	-0.0139***	-0.0129***
	(-6.77)	(-5.70)	(-7.30)	(-7.32)	(-6.27)	(-6.00)	(-7.26)	(-6.60)
Total_Liability	0.0801							
	(1.17)							
Equity_Liability		0.0947***						
		(3.66)						
Debt_Liability			-0.00390					
			(-0.11)					
Credit_Liability				-0.0189				
				(-0.28)				
Total_Asset					0.211*			
					(2.47)			
Equity_Asset						0.0772**		
						(3.22)		
Debt_Asset							-0.00570	
							(-0.24)	
Credit_Asset								0.105
								(1.64)
_cons	-0.227	-0.264	-0.192	-0.189	-0.257	-0.254	-0.189	-0.225
	(-1.55)	(-1.84)	(-1.32)	(-1.31)	(-1.77)	(-1.77)	(-1.30)	(-1.55)
N	462	462	462	462	462	462	462	462

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Fixed Effect Panel Regression: Stock Market

	(1) EVIX	(2) EVIX	(3) EVIX	(4) EVIX	(5) EVIX	(6) EVIX	(7) EVIX	(8) EVIX
GDP	0.0354	0.0363	0.0377	0.0347	0.0352	0.0382	0.0367	0.0346
	(1.81)	(1.89)	(1.90)	(1.77)	(1.79)	(1.91)	(1.81)	(1.75)
Inflation	-0.00952	-0.00895	-0.00978	-0.00970	-0.00944	-0.00694	-0.00883	-0.00954
	(-0.73)	(-0.70)	(-0.76)	(-0.74)	(-0.72)	(-0.53)	(-0.68)	(-0.72)
Government_Debt	-0.00202**	-0.00210**	-0.00206**	-0.00199**	-0.00201**	-0.00202**	-0.00198**	-0.00197**
	(-2.99)	(-3.14)	(-3.05)	(-2.92)	(-2.93)	(-3.03)	(-2.94)	(-2.86)
Current_Account_Balance	0.000211	-0.000830	0.000298	0.000535	0.000314	0.000186	0.000421	0.000679
	(0.05)	(-0.19)	(0.07)	(0.13)	(0.07)	(0.05)	(0.10)	(0.16)
Financial_Openness	0.0167	0.0275	0.0143	0.0154	0.0182	0.0120	0.00967	0.0169
	(0.15)	(0.26)	(0.13)	(0.14)	(0.17)	(0.11)	(0.09)	(0.15)
Foreign_Reserve_Holding	-0.166	-0.134	-0.158	-0.180	-0.177	-0.182	-0.187	-0.191
	(-0.95)	(-0.77)	(-0.91)	(-1.03)	(-1.01)	(-1.09)	(-1.10)	(-1.10)
Interest_Rate	0.0183	0.0186	0.0174	0.0185	0.0183	0.0172	0.0180	0.0182
	(1.76)	(1.82)	(1.70)	(1.75)	(1.74)	(1.68)	(1.72)	(1.71)
Total_Liability_Stock	0.00549							
	(0.76)							
Equity_Liability_Stock		0.00730						
		(1.14)						
Debt_Liability_Stock			0.00636					
			(0.91)					
Credit_Liability_Stock				0.00411				
				(0.56)				
Total_Asset_Stock					0.00429			
					(0.60)			
Equity_Asset_Stock						0.00587		
						(0.90)		
Debt_Asset_Stock							0.00415	
							(0.59)	
Credit_Asset_Stock								0.00277
								(0.39)
_cons	0.167	0.145	0.166	0.195	0.186	0.174	0.199	0.214
	(0.94)	(0.88)	(0.99)	(1.14)	(1.05)	(1.06)	(1.20)	(1.26)
N	330	330	330	330	330	330	330	330

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5: Cross-sectional Comparison of Currency Market Sensitivity: Between Estimator

	(1) EVIX	(2) EVIX	(3) EVIX	(4) EVIX	(5) EVIX	(6) EVIX	(7) EVIX
Interest_Rate	0.0229*	0.0189*	0.0177	0.0186	0.0181	0.0187	0.0172
	(2.66)	(2.19)	(1.65)	(2.01)	(1.88)	(1.75)	(1.63)
Total_Liability	0.245	0.233	0.237	-0.0977	-0.0982	-0.107	0.0463
	(0.41)	(0.41)	(0.41)	(-0.19)	(-0.19)	(-0.20)	(0.08)
GDP		0.0237	0.0219	0.0219	0.0233	0.0246	0.0332
		(1.72)	(1.29)	(1.50)	(1.46)	(1.33)	(1.70)
Inflation			0.00269	-0.00597	-0.00679	-0.00654	-0.00876
			(0.20)	(-0.49)	(-0.53)	(-0.50)	(-0.67)
Government_Debt				-0.00202**	-0.00200**	-0.00201**	-0.00188*
				(-3.10)	(-2.99)	(-2.93)	(-2.75)
Current_Account_Balance					-0.000866	-0.000945	0.00129
					(-0.24)	(-0.25)	(0.32)
Financial_Openness						0.0165	0.0179
						(0.15)	(0.16)
Foreign_Reserve_Holding							-0.215
							(-1.26)
_cons	0.138	0.0767	0.0768	0.263*	0.263*	0.245	0.244
	(1.60)	(0.85)	(0.83)	(2.64)	(2.59)	(1.56)	(1.57)
N	330	330	330	330	330	330	330

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6: Cross-sectional Comparison of Currency Market: Gradually Adding Variables

	(1) EVIX	(2) EVIX	(3) EVIX	(4) EVIX	(5) EVIX	(6) EVIX	(7) EVIX	(8) EVIX
GDP	-0.00837	-0.0133*	-0.0107	-0.00550	-0.00790	-0.0115	-0.0117	-0.0103
	(-1.31)	(-2.10)	(-1.65)	(-0.82)	(-1.25)	(-1.80)	(-1.81)	(-1.58)
Inflation	-0.00493	-0.00686	-0.00105	-0.00380	-0.00681	-0.00152	-0.00145	-0.00142
	(-0.53)	(-0.74)	(-0.11)	(-0.40)	(-0.74)	(-0.16)	(-0.15)	(-0.15)
Government_Debt	0.00213	0.00263	0.00258	0.00226	0.000969	0.00217	0.00229	0.00221
	(1.22)	(1.53)	(1.45)	(1.29)	(0.55)	(1.25)	(1.29)	(1.23)
Current_Account_Balance	-0.00164	-0.00169	-0.000659	-0.00352	-0.000821	-0.00253	-0.000824	-0.0000842
	(-0.29)	(-0.30)	(-0.11)	(-0.61)	(-0.15)	(-0.45)	(-0.14)	(-0.01)
Financial_Openness	0.190	0.199	0.159	0.181	0.334	0.175	0.157	0.199
	(0.93)	(0.98)	(0.76)	(0.88)	(1.63)	(0.86)	(0.76)	(0.95)
Foreign_Reserve_Holding	0.807**	0.875**	0.862**	0.831**	0.770**	0.786**	0.801**	0.816**
	(2.90)	(3.20)	(3.05)	(2.97)	(2.81)	(2.83)	(2.84)	(2.87)
Interest_Rate	-0.0162	-0.0228*	-0.0206	-0.0147	-0.0187	-0.0262*	-0.0204	-0.0189
	(-1.45)	(-2.09)	(-1.81)	(-1.30)	(-1.71)	(-2.34)	(-1.82)	(-1.67)
VIX	0.0205***	0.0186***	0.0232***	0.0228***	0.0188***	0.0199***	0.0222***	0.0221***
	(6.51)	(5.84)	(7.43)	(7.43)	(5.96)	(6.26)	(7.09)	(6.81)
Total_Liability	-0.352***							
	(-3.50)							
Equity_Liability		-0.180***						
		(-4.53)						
Debt_Liability			-0.0343					
			(-0.69)					
Credit_Liability				-0.288**				
				(-2.79)				
Total_Asset					-0.597***			
					(-4.64)			
Equity_Asset						-0.134***		
						(-3.63)		
Debt_Asset							-0.0775*	
							(-2.23)	
Credit_Asset								-0.143
								(-1.44)
_cons	-0.402	-0.377	-0.502*	-0.493*	-0.347	-0.353	-0.442	-0.475*
	(-1.71)	(-1.63)	(-2.10)	(-2.10)	(-1.49)	(-1.49)	(-1.85)	(-1.99)
N	330	330	330	330	330	330	330	330

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Fixed Effect Panel Regression: Currency Market