DISSERTATION

THREE ESSAYS ON GLOBAL IMBALANCES

Submitted by

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ABSTRACT

THREE ESSAYS ON GLOBAL IMBALANCES

This dissertation is composed of three essays which examine the global imbalances and international private capital flows. Chapter I studies the global imbalances from an angle of triangular patterns of private capital flows among three regions, which are characterized as a 'care-free host' (the center), 'cautious supporters' (the creditors), and 'uninvited guests' (the debtors) noting the role of structural asymmetries within international financial arrangements. It uses a panel vector autoregression (VAR) approach and directed acyclical graph (DAG) theory to longitudinal quarterly data on the three regions for 1980~2012 in order to analyze international transmissions of U.S. monetary policy shocks. It shows a contrasting adjustment of the three regions. The debtors, in particular, show unstable dynamics of interest rates and exchange rates while the center and creditors see relatively stable ones. It also finds that the creditors take advantage of their foreign reserve holdings as a role of 'self-insurance' to stabilize their net capital flows and as a 'mercantilist tool' to improve their current accounts while the benefits for the debtors are limited.

Chapter II investigates the implications of the global imbalances on the Korean economy. Using a VAR approach to quarterly time series data for 1980~2012 it finds that Korea, in common with other creditor countries, also utilizes its foreign reserve holdings to stabilize its capital flows and improve its current account. Hoarding of foreign reserves, however, entails distributional consequences within economies by changing profit or wage shares through fluctuations in exchange rates. It introduces a Kaleckian open economy model to analyze the distributional impacts of an exchange rate and empirically estimates the impacts using both a

static fixed effects panel model and a panel VAR approach to Korea's firm level longitudinal annual data for 1980~2012. It finds that depreciation leads to a decline in unit labor costs or labor shares, while resulting in a rise in the mark-up rate or profit share, economic growth, and increasing employment. It also finds that the magnitude of the impacts of exchange rate fluctuations depends on the characteristics of firms. While mark-up rates and employment for large firms, domestic market oriented firms, and high productivity firms seem to be relatively immune to changes in exchange rates, these appear to have sizeable and significant effects on small firms, high exporter firms, and low productivity firms.

Chapter III studies the global imbalances from the history of economic thought. It observes that challenges for policy makers and economist' philosophical foundation on the global imbalances and international capital flows could be a parallel from the past to the present, if not an exact repetition. Using updated data it finds that a J-shaped proposition may be more relevant rather than the conventional U-shaped pattern of financial globalization because after 2000 the stock of assets has shown a drastic upward trend which is not comparable to that of the first era of financial globalization. To explain the changing pattern of financial globalization it suggests an analytical framework by combining 'Trilemma', tension between regulation and financial market, and the role of key currency or hegemonic money. It also identifies two competing views on the financial globalization by introducing the British Currency and Banking School debate in mid-19th century, analyzing their impacts on the theory of money and economic beliefs, and then tracing their trajectories to late economic thoughts such as the Neoclassical Synthesis, Modern monetarists, Modern Austrian School, Keynesian, New-Keynesian, New-Classical and Post-Keynesian economics.

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CHAPTER I

GLOBAL IMBALANCES AND INTERNATIONAL CAPITAL FLOWS:

A CAREFREE HOST, CAUTIOUS SUPPORTERS, AND UNINVITED GUESTS

I. Introduction

Global imbalances[1] have been of concern to policy makers during recent years. While the

U.S. has had large and persistent current account deficits since 1980s, the East Asian countries

have realized the opposite since the 1997 Asian financial crises. Whereas the concern was

focused on the U.S.-Japan relationship in the 1980's, it has centered on that of the U.S. and East

Asia (including China) since 2000. A virtuous cycle might have operated to sustain the

imbalances. The U.S. deficits have been a growth engine for the world economy by providing

liquidity and effective demand. The fruits of this growth have been recycled to refinance the U.S.

deficits without undermining the dollar's role as international currency.

The global imbalances, however, have also entailed risks, and widened a potential

exposure to instability in the world economy. There is a consensus that the recent global

financial crisis is closely linked to such imbalances (Lucarelli 2012, Borio 2011). The increased

role of international private capital flows which finance the imbalances in particular, is

underscored in the way that they result in increasing fragility in the international financial system

and 'boom-bust' and capital flight in the events of financial crises.[2]

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[1] Usually global imbalances are defined as current account imbalances. Various explanations for their existence
include: (i)trends in saving and investment balances, (ii) a surge of the U.S. productivity, (iii)global savings glut, and
(iv)differences in financial market development (Gruber et al. 2007, Chinn et al. 2011)

[2] Before the advent of the global financial crisis, concerns about adverse effects of volatile international private
flows are focused on emerging markets. These include: the danger of overheating, exchange rate appreciation

Figure I-1 indicates that global imbalances and private capital flows are closely linked. The U.S. has had a continuous current account deficit except in the early 1980s and 1990s. The international private capital flows of the U.S. present a positive gross capital inflow and negative gross capital outflow which implies that the U.S. has acted as a world banker by importing short-term capital and exporting capital in long-term contracts. Both gross capital flows are sharply increased after 2000 when the current account deficits steeply expanded until the global financial crisis. Though the capital flows have rebounded since 2009, they have not recovered to the pre-crisis level. Net capital flows correspond with the current account positions.
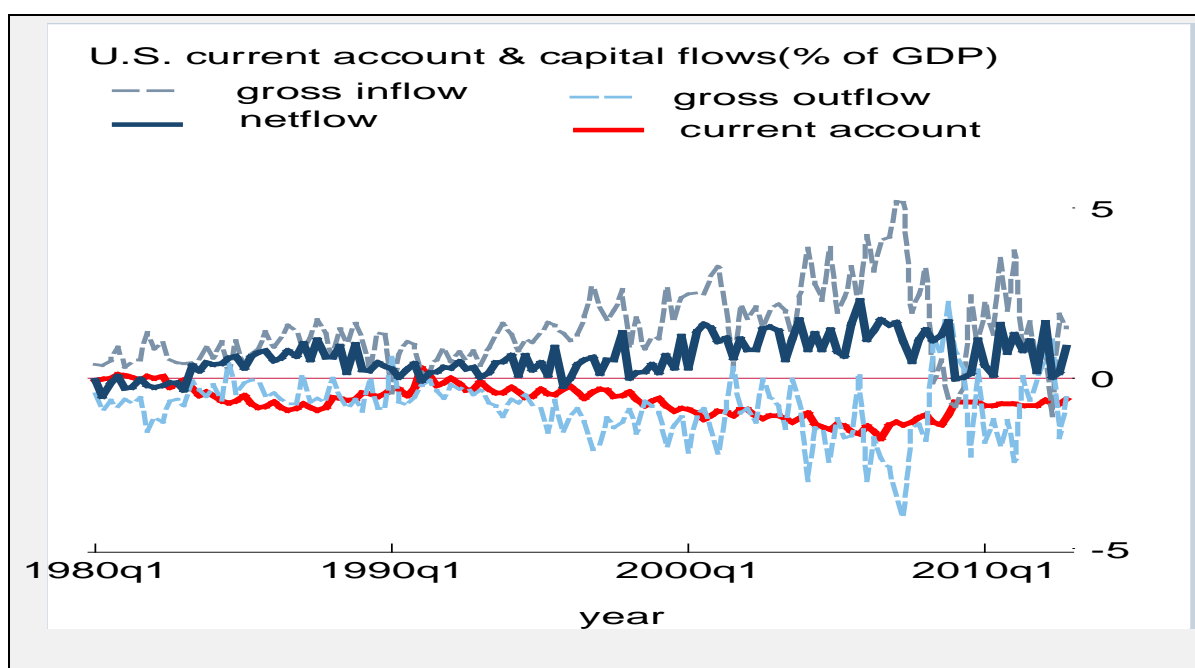
Figure I-1.The U.S. Current Account and Capital Flows

Source: IMF IFS. Netflow is the sum of the gross inflow and gross outflow.

The collapse of the Bretton Woods system in 1973 paved the way for a greater role of private capital flows which were strictly restricted under the system. In addition, with a

pressures, inflationary pressure on consumer and asset prices, the risk of a rapid reversal of capital flow, and risks to financial stability.(Ulrich Volz, 2012)

deepening of financialisation,[3] international financial markets expanded to strengthen the role of private capital flows in the new system characterized by a dollar standard and floating exchange rate regime. In contrast to a "revived Bretton Woods (Dooley et al. 2004)" arrangement which emphasized the role of official flows, a peculiar triangular pattern of international private capital flows among the U.S., East Asian countries, and Latin American countries is observed (Vasudevan 2009a). The East Asian creditors export their current account surpluses to the U.S. which is the center in the international financial system. Surpluses are then recycled to the Latin American debtors to finance their deficits. Figure I-2 shows the asymmetric current account positions of these two regions. Most East Asian countries have realized surpluses since the 1997 Asian financial crises. In contrast most Latin American countries have had deficits since the 1980s except for some oil exporters.
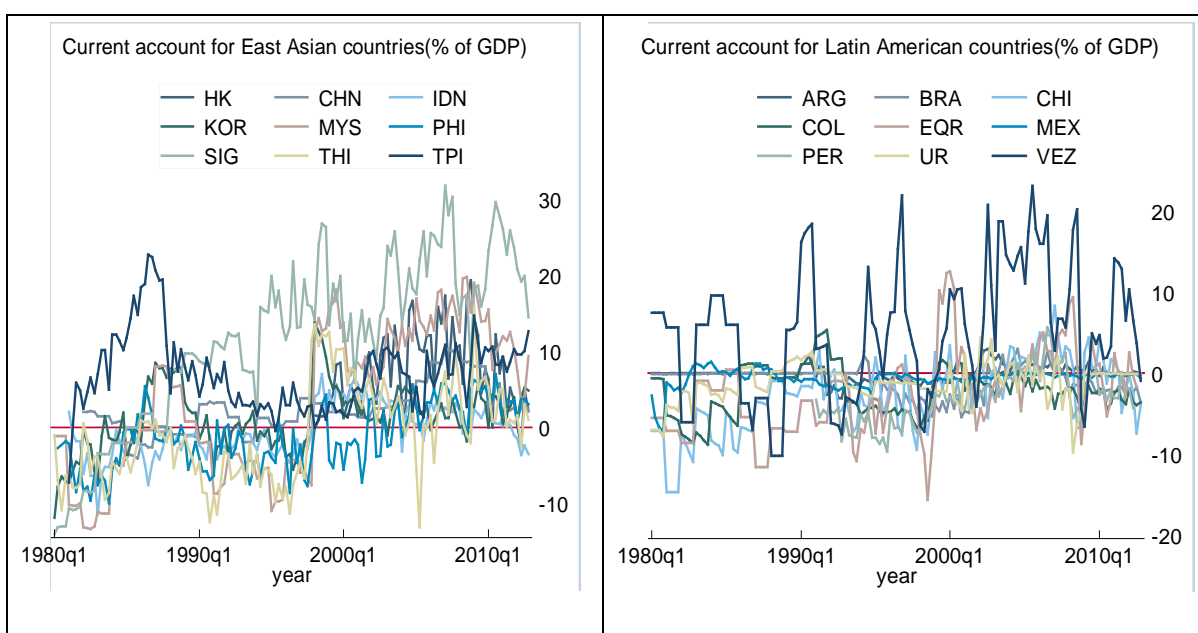
Figure I-2. Current Account of the East Asian and Latin American Countries

Source: IMF IFS

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[3] Financialisation refers to the increasing size of cross-border financial flows among countries and the growing integration of capital markets across national borders(Elson 2011).

The triangular pattern of private capital flows among the three regions may reflect asymmetric positions in the international financial arrangement (IFA). First, the center could be regarded as a 'care-free host' to global imbalances. Due to the dominant position of the U.S. dollar in the international financial system, the center can generate liquidity and recycle surpluses to the periphery without significant depreciation of its currency. With a full range of policy autonomy the center may focus on domestic targets such as stabilizing its financial markets and counteracting downturn effects of high financial stress. Below, Figure I-3 shows the U.S. policy rate steeply decreasing in early 2000 and 2008 when its financial stress, measured by the 'STLFSI' index[4] obtained from the Federal Bank of St. Louis, rose with the collapse of the dotcom bubble and the US financial crises, respectively. The lending interest rate then went along with the pattern of the Federal Reserve discount rate.
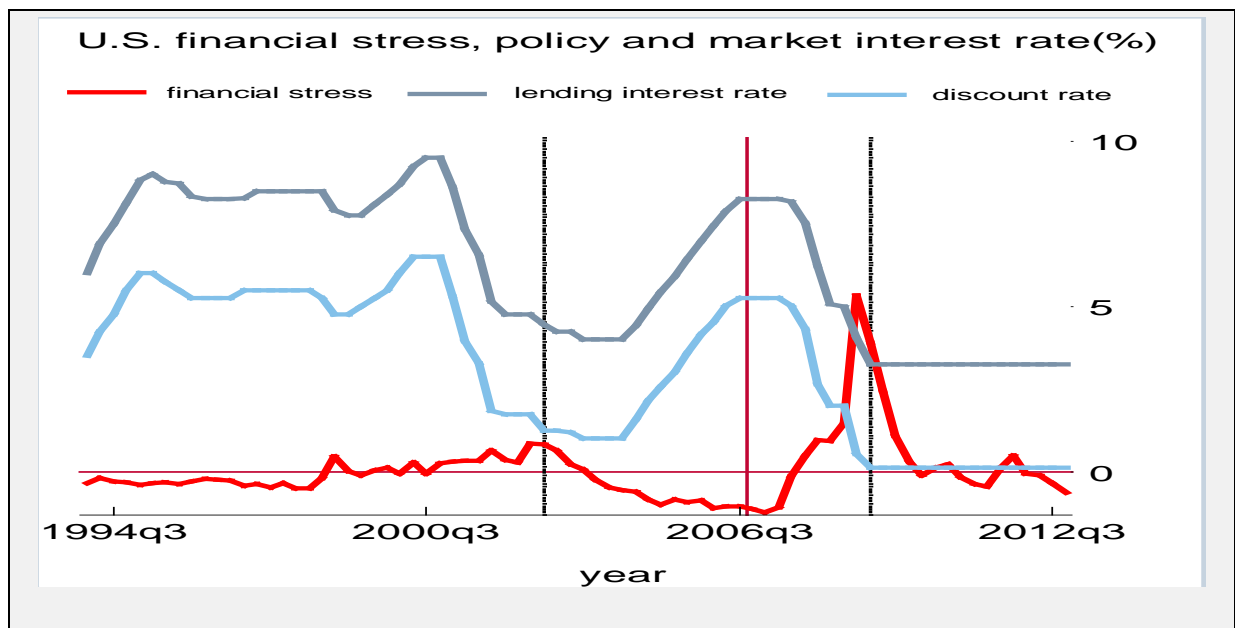
Figure I-3. The US Financial Stress, Policy Rate, and Market Interest Rate

Sources: IMF IFS, Federal Bank of St. Louis

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[4] The STLFSI index is a measure of stress in the U.S. financial system based on 11 financial market variables such as 3-month LIBOR/3-month T-bill spread(TED), six yield spread, and four other indicators. The average value of the index, which begins in late 1993, is designed to be zero.

Second, the creditor periphery may be regarded as 'cautious supporters' of global imbalances. Confronted by an appreciation pressure due to their current account surpluses, the creditors have intervened in foreign exchange markets to sustain their export-led strategy by building up immense amounts of foreign reserves as a 'self-insurance,' exporting them to the center since the 1997 Asian financial crises. Creditors also intervene in their domestic bond markets to sterilize the expansionary pressures from the foreign exchange market intervention. Such action will ultimately entail a significant cost for the creditors. In this context it may be a 'conflicted virtue' (McKinnon 2005). The creditor's behavior toward undervaluation and foreign reserve exports to the center may bring about deflationary pressures on the real sector[5] and excess demand in the financial markets of the center. To counteract those pressures the center responds by setting its interest rate low and exporting excess liquidity to the debtors who need them to finance their current account deficits and debt-led effective demand. Figure I-4 indicates that the foreign reserve holdings of East Asian countries have grown rapidly both in terms of total amount and relative to GDP. In contrast, those of Latin American countries have remained below 100 U.S. billion dollars without showing any upward trend in terms of ratio to GDP, except in the cases of Brazil and Mexico.

Third, the debtors can be viewed as 'uninvited guests' for global imbalances. Due to their current account deficits they need capital imports which are denominated foreign currency, in general the U.S. dollar ('original sin', Eichengreen et al. 2002). Despite the potential merits of these capital inflows, they may endanger the stability of the debtor economies. The debtors, however, have limited policy autonomy. Their standard prescriptions for cooling down overheating economies, such as cutting government spending or raising domestic interest rates,

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[5] Bibow(2010) argued that the undervaluation of the East Asian countries corresponds upward pressure on the U.S. dollar and produces deflationary forces in the U.S. economy

would make themselves even more attractive to global investors and risk further increases in capital inflows. The debtors may gradually tend to encounter resistance from foreign creditors to unlimited financing and have to bear the brunt of deflationary pressures and currency crises with the reversal of capital flows.
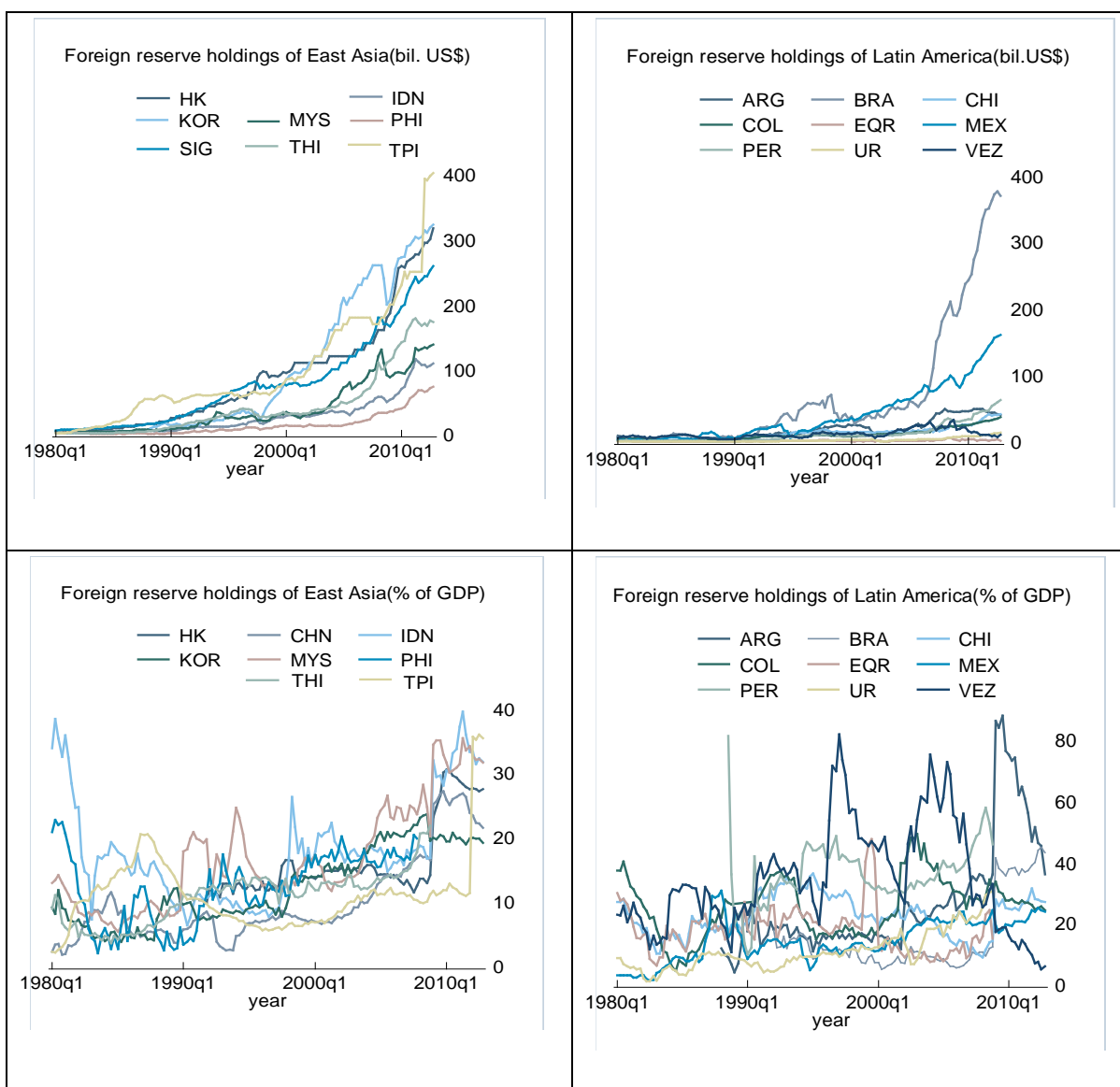
Figure I-4. Foreign Reserve Holdings of the Two Regions

Sources: IMF IFS.

Since the total sum of foreign reserve holdings for China is over 1000 billion US dollar since mid-2000, and the ratio of foreign reserve holdings to GDP for Singapore is over 40, the graph does not include them.

The asymmetries of the three regions may be reflected in different dynamics of financial variables. For example, Figure I-5 shows that the volatility, which is measured by standard deviation, of capital flows to the three regions has been significantly different. Private net capital flows to the U.S. have had the lowest volatility over the past 30 years relative to the periphery. Latin American economies had seen significantly high volatility before 2000. Although the volatility for the latter has declined after 2000 it still remains relatively high. The East Asian economies have experienced low volatility of net capital flow over time. The persistence of private capital flows to the three regions, which are calculated by their AR (1) regression coefficients, have also been significantly different. This methodology, also used by IMF (2011), implies that the higher the coefficients, the more persistent the capital flows. While net capital flows for the U.S. and the East Asian economies have been persistent over time, those of Latin American economies have shown the least persistence and have declined over time.
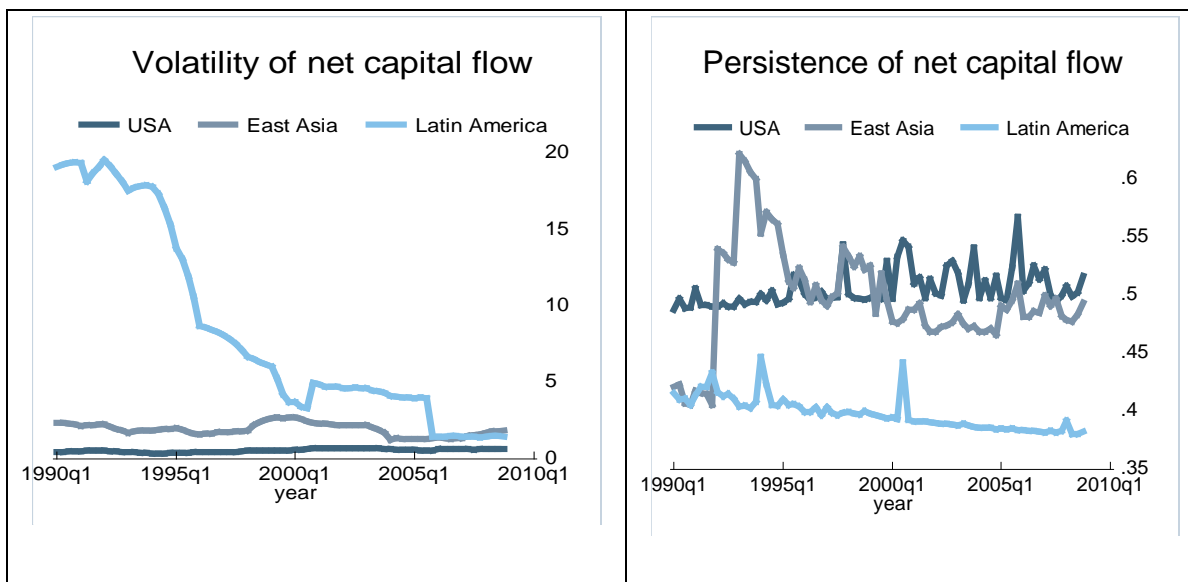
Figure I-5. The Volatility and Persistence of Private Capital Flows across Regions

Sources: IMF IFS and author's calculation. Using quarterly data, the volatility of a particular flow is computed as its standard deviation computed over the prior 5-year or 20-quarter window for each region. For example, the 1990 value corresponds to the standard deviation during 1986 1st quarter-1989 4th quarter. Similarly, the persistence of any particular flow is computed as its AR (1) regression coefficient.

The different features of capital flows among the three regions may result in asymmetric impacts on each group of countries. Figure I-6 corresponds with the argument[6] noting the contrasting dynamics of the two regions, showing that while real effective exchange rates and interest rates of the creditors have been relatively stable since 1990s; those of the debtors were more volatile.
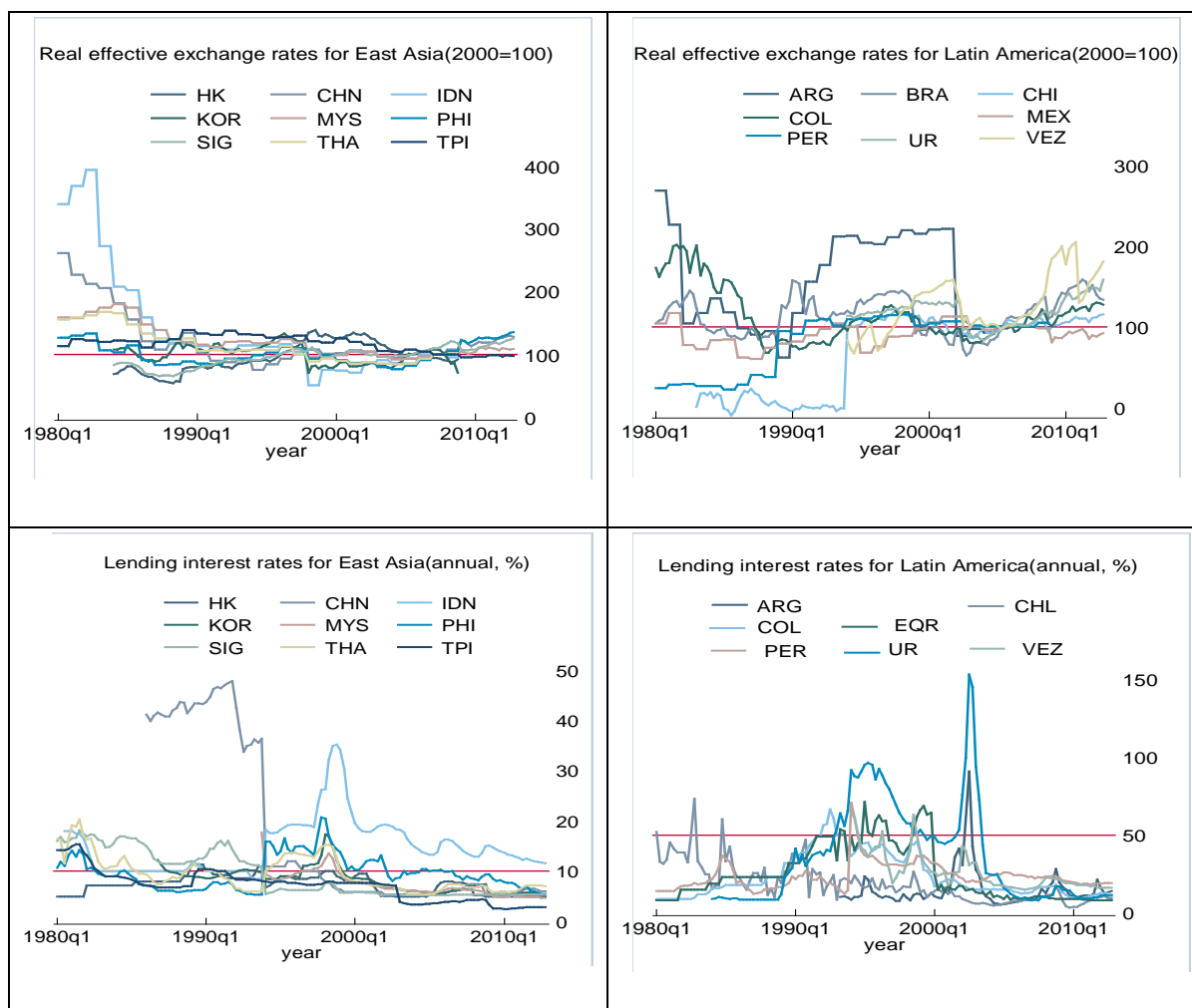
Figure I-6. Real Effective Exchange Rates and Interest Rates of the Two Regions

Sources: IMF IFS. Since the fluctuation of real effective exchange rate for Ecuador is beyond the range (0 to 300) the graph does not include it. In the same manner the interest rates for Brazil and Mexico are not included.

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[6] Vasudevan(2010) showed that while the exchange rate and interest rate of the creditor stabilize due to a shock in asset preference in the center, those of debtor destabilize using a stock-flow consistent model.

Against this background, I now investigate the triangular pattern of adjustment among the three regions that allows the center to set its policy interest rate level[7]. In particular, I address the following elements; (i) how the monetary authorities in the center respond to the conditions of its financial markets, (ii) how the shock in policy rate of the center results in different impacts on the economies of the center, creditors, and debtors, and (iii) to what extent the differential impacts can be explained by policy tools such as foreign reserve holdings. To assess these dynamic effects, I employ a panel vector autoregression (VAR) approach. This is a flexible method that treats all the variables in the system as endogenous and independent, without worrying about directions of causality. The technique is suited to trace how shocks in the monetary policy of the center are transmitted across the three regions by capturing both static and dynamic interdependence in an unrestricted fashion, and estimating time variations in the coefficients and cross sectional dynamic heterogeneities among the three regions. I also employ Directed Acyclic Graph (DAG) theory to examine the causal pattern of contemporary relationships among the innovations in the panel VAR. The causality relationships between the variables under consideration are investigated and identified by means of TETRAD IV (http://www.phil.cmu.edu/projects/tetrad/) software which detects the causal relationship inside the set of data. This paper contributes to illuminating the links between global imbalances and private capital flows by emphasizing the role of structural asymmetries in the IFA and providing new empirical evidence.[8]

The essay is organized as follows: In section II, it brings together the literature regarding the IFA and the structural asymmetries of the three regions, and the causes and impacts of

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[7] Bernanke(2004) denied the exogeniety of the low U.S. interest rate arguing that it endogenously determined by global saving glut.

[8] To my knowledge there has not been any panel VAR research analyzing the effects of U.S. monetary shock across the three groups.

international private capital flows. Section III discusses hypotheses and empirical models to test them. Based on the empirical facts I set up three hypotheses which include (i) an increase in financial stress in the center leads to a decrease in the policy rate and market interest rates in the center, (ii) an increase in the policy rate in the center has asymmetric impacts on the three regions; while the interest rates and exchange rates of the center and creditors stabilize, those of debtors destabilize, and (iii) foreign reserve holdings in the periphery have asymmetric impacts on the creditors and debtors. Section IV describes the dataset and discusses applying a panel VAR (vector autoregression) model. Section V presents the results of the empirical analysis and checks robustness of the estimates, Section VI concludes.

II. Literature Review

The followings review the literature regarding the international financial arrangement (IFA) and structural asymmetries among the three regions, and the determinants and impacts of international private capital flows.

1. The IFA and Structural Asymmetries among the Center, Creditors, and Debtors

In section one I argued that the triangular pattern of private capital flows among the three regions may reflect asymmetric positions in the international financial arrangement (IFA). Specifically I assigned asymmetric behavioral rules for the them; the center as a 'care-free host', the creditors as 'cautious supporters', and the debtors as 'uninvited guests' in the triangular pattern of capital flows associated with global imbalances. This section aims to provide an

analytical framework for this characterization. It has been argued that the current dollar standard international financial system generates structural asymmetries between the center and the periphery. Due to a natural monopoly position in the international financial system as 'a world single transaction, policy intervention, and invoice currency' the U.S. could enjoy 'exorbitant privilege' (McKinnon 2004). The center has acted the roles of 'world banker' borrowing short term capital form the rest of the world and lending long term to the rest of world (Depres et al. 2000), and 'world venture capitalist,' enjoying valuation gains on foreign assets and liabilities (Gourinchas and Rey). In the process, the center runs balance of payments deficits providing international reserves to other countries, and acting as 'an import market of last resort' for the ROW (Dooley et al. 2004), and at the same time as 'the borrower of last resort' (Vasudevan 2009). Due to its hegemonic status the center has a 'full range of policy autonomy' such that policy decisions may focus on domestic targets subordinating external targets. Contrary to the center the periphery has to lay more stress on controlling external shocks which may have serious impacts on its economy (Dooley et al. 2004, Boorman 2006, Schnable et al. 2009, and Bibow 2010).

Besides the asymmetries between the center and the periphery, literature notes the asymmetries within the periphery itself. In contrast to the Latin American debtor periphery, which imports capital to finance their current account deficits, East Asian creditor periphery has had current account surpluses and recycled them to the U.S. financial market. Their distinct behaviors such as building up immense amounts of foreign reserves since the 1997 Asian financial crises for 'self-insurance' from external shocks and pegging their currencies to the U.S. dollar for 'fear of floating,' are observed as one of salient characteristics of the 'revived Bretton Woods system' (Eichengreen 2003, Aizenman 2003, Dooley et al. 2004). This self-insurance or

fear of floating may be rational from a macroeconomic perspective. Pegging to the U.S. dollar could stabilize international competitiveness related to exchange rate fluctuations due to volatile capital flows. The creditors enjoy a 'certain degree of policy autonomy' to control the impacts of volatile international private capital inflows on the economies for stabilizing their foreign exchange rates, interest rates, consumer prices, and stock prices (Elson 2011, Lucarelli 2012). This, however, would require compensating action on the part of monetary policy to absorb or sterilize the expansion in domestic money supply associated with the accumulation of foreign reserves through the issue of domestic bonds. Such action will ultimately entail a significant cost for the central bank or treasury, which pays the interest burden on this debt. In this context it may be a 'conflicted virtue' (McKinnon 2005) with consequent costs on their economies.

Contrary to the creditors, Latin American debtors are more vulnerable to the external factors evidenced in the 'Volcker shock (1982)' which was a program of monetary austerity and interest rate hikes to stabilize the U.S. dollar. The shock led to a consecutive debt crises starting with Mexico and spreading to Brazil, Argentina, and Venezuela. They liberalized their external accounts and built up foreign currency denominated debts, especially the U.S. dollar. Due to this 'original sin', the inability of a country to borrow abroad in its own currency, they had to bear the 'pain' of greater output and capital flow volatilities, lower credit ratings, and the brunt of deflationary pressures and currency crises with the reversal of capital flows at the end of the boom[9]. Contrary to the creditors, the debtors may have a 'fear of depreciation' because the value of dollar denominated debts would grow in terms of domestic currency (McKinnon and Schnable 2004). In addition, they have only limited policy autonomy to control capital inflows since they are needed to sustain their current account deficits (Lucarelli 2012). It is argued that the debtors

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[9] Creditors could accumulate foreign reserves to match their foreign obligations. This implies that the creditors can eliminate their currency mismatch by eliminating their net debts.(Eichengreen et, al, 2003)

may be 'trapped by global liquidity' (Korinek 2012) in such a way that the standard prescriptions for cooling down their overheating economies, e.g. cutting government spending or raising domestic interest rates, would make them even more attractive to global investors and a further increase in capital inflows.

2. Causes and Impacts of the International Private Capital Flows

Noting the role of structural asymmetries in the international financial arrangements, this paper assesses global imbalances from an angle of a triangular pattern of private capital flows among the center, creditor, and debtor periphery. This section reviews the previous theoretical and empirical studies for the causes and impacts of international private capital to provide deep insights. With the collapse of the Bretton Woods system in 1973, international financial arrangements changed to a dollar standard system and a floating exchange rate regime. The role of private capital flows increased to provide and circulate global liquidity in the new system (Vasudevan 2009a, d). Both global push factors and domestic pull factors have influenced the private capital flows (Bird 2004, Chuhan 1995, Fernandez et al 1996, Taylor and Sarno 1997, Fratzscher 2011). Global factors include the change of monetary policies in the center. Expansionary monetary policies in the center, including lowering interest rates and providing higher liquidity by large scale-buying programmes, led to large interest rate differentials between the center and the peripheries, resulting in a surge of capital inflows into the periphery's markets. High liquidity may also bring about a decline in asset investment returns in the center and increase demand for periphery-market portfolio assets. Additionally, carry trades are another important push factor as investors hold high-yielding target currency assets in the periphery and

finance them with a low-yield funding currency in the center. Domestic pull factors reflect the degree of heterogeneity among countries. These include economic fundamentals such as fiscal positions and overall risks of debt crises, the degree of public debt to the GDP, and terms of trade and productivity levels. The depth and the degree of fragility of a country's financial system and the extent of financial market liberalization and integration with global financial markets are also important country-specific factors. These factors suggest a possibility of a certain degree of domestic control over the influence of private capital flows. The literature observes in general, that global push factors are more influential and domestic pull factors have only threshold effects. In this context, the periphery economies "may have less to do with the receiving countries' long-term prospects than with temporary factors such as unusually loose rich world monetary policy, over which they have no control" (Economist 2011). The conclusion may imply a relevance of the essay which focuses on the contrast adjustment in net capital flows, interest rate, and foreign exchange rate of the three regions due to a global common factor such as the U.S. monetary policy change.

It is documented that since the 1980s, global liquidity has rapidly increased and large-scale capital flowed into the emerging markets, including East Asian and Latin American countries. In the process it is observed that a triangular pattern of adjustment with the periphery that allows the U.S. to borrow from the East Asian creditors and pass the burden of deflationary adjustments shocks to the Latin American debtors (Vasudevan 2009a, b, c, 2010). The literature also investigates the danger of volatile capital flows on these economies, such as overheating, foreign exchange rate appreciation pressure, inflationary pressure on consumer and asset prices, risks to financial stability, and a rapid reversal of capital flows, which could lead to financial and currency crisis (Reinhart & Reinhart 2008). The traditional Minsky-Kindleberger model analyzes

the stages of boom-bust and capital flight. This model shows five stages such that: (i) capital inflows bring about a new stimulus on the economy ('displacement'), (ii) the inflows result in domestic credit expansion ('boom'), (iii) the credit expansion increases domestic consumption and investment ('overtrading'), (iv) with growing current account deficit and asset bubbles, the economy sends negative signals to foreign investors, resulting in capital reversals and bubble collapse due to the investors' panic or contagion ('revulsion'), and (v) confronted with such crisis, a lender-of-last-resort convinces the market of sufficient cash supply and the market recovers stability ('tranquility'). According to the Minsky-Kindleberger model the previous financial crisis share the common characteristics that 'over-lending' and 'over-borrowing' are basically endogenous market failures of over-liquid and under-regulated financial markets (Palma 1998). The literature has applied the traditional model to investigate the impacts of the capital flows on the emerging market economies and observed 'surges' of a rapid capital inflows (Reinhart & Reinhart 2009, Caballero 2010, Cardarelli et al. 2009, Gourinchas et al. 2001, Mendoza 2008), followed by 'sudden stops' or 'reversal' of foreign capital inflows (Calvo 1998 , Calvo et al. 2004, 2008, 'capital flights' of domestic investors (Dooley 1988, Khan 1985, Lessard 1987 , Faucette 2005, Cowan 2007, Cowan et al. 2008, Rothenberg2010), 'current account reversals'(Adalet 2007, Edward 2005, Frewd 2007, Ilesi 2010), and sizable 'output losses'(Calvo 1998, Hutchison and Noy 2002, Edwards 2005). It is also argued that international liquidity has been fuelled by growing global imbalances resulting in an increasingly fragile international financial system and the brunt of financial fragility was borne disproportionately by countries in the periphery (Bordo & Eichengreen 2002, Vasudevan 2009a). In the times of crises the behavior of seeking 'safe haven'[10] assets has also been observed. Even though the U.S. was

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[10] There are several different definition of "safe haven", including an asset with low risk and high liquidity, what

the epicenter of the crisis, the global flight to safety into U.S. treasury bills along with a reversal of carry trade, led to large capital inflows into the U.S. during the crisis and caused a strong appreciation of the U.S. dollar (Dooley et al. 2008, McCaudey & McGucre 2009).

Are creditors safer than debtors from the danger of volatile capital flows? There is no general conclusion. One view sees the role of global factors being so dominating that the boom-bust and capital flight hit indiscriminately all countries in the periphery[11]. Another view argues that the impacts of capital flows may be not the same among the creditors and debtors due to their structural asymmetries in the international financial system[12]. A compromise view argued that "although neither initial current account surplus positions nor large foreign reserve holding properly insulated countries from the common external shock, it may provide a particular country's policy space for implementing countercyclical policies on their own" (Bibow 2010). One of the aims of the essay is to provide evidence to this question of how shocks in the policy rate of the center result in different impacts on the economies of the creditors and debtors, to what extent can be explained by policy tools such as foreign reserve holdings.

III. Hypotheses and Empirical Models

From the empirical facts and literature, I introduce three hypotheses, that: (i) analyze the relationship between financial stress and monetary policy in the center, (ii) compare the impacts

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investors buy in uncertain times, a hedge asset which one is a return unrelated to that of the reference portfolio, and a rainy day asset which one that performs well when the reference portfolio suffers significant losses

[11] Berkman et, al(2009) did not find a statistically significant effect of the stock of foreign reserves on growth revisions.

[12] Gourinchas & Obstfeld (2011) find that higher foreign reserves predict a sharply reduced probability of a subsequent crisis.

of monetary policy in the center among the three regions, and (iii) assess the significance of foreign reserve holdings for the periphery.

1. Financial Stress and Monetary Policy in the Center

I start by tracing how the U.S. monetary authorities respond to the condition of the U.S. financial market. Financial stress can be defined as an interruption to the normal functioning of financial markets. It involves increased uncertainty about fundamental values of financial assets and the behavior of other investors, increased asymmetry of information, and decreased willingness to hold risky assets ('flight to quality') or illiquid assets ('flight to liquidity')[13]. An increase in financial stress can lead to contractionary effects on the economy by increasing uncertainty and costs of economic activities. To counteract these downturn effects, the U.S. Federal Reserve may implement expansionary policy such as lowering the federal funds rate target. In general, it can be expected that an increase in the U.S. policy rate may have a positive impact on the market interest rate in the U.S. Thus, I postulate hypothesis (1) as follows: *"An increase in the financial stress in the center leads to a decrease in the policy rate and market interest rate in the center."*

To test hypothesis (1) I use the following VAR model (1) which includes the data vector of the index of the US financial stress obtained from the Federal Bank of St. Louis ('USFS'), the U.S. Federal discount rate (USPRATE), and the U.S. lending interest rate ('INTL'). Under hypothesis (1) the expected impacts in the VAR model (1) would be as follows.

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[13] Hakkio & Keeton(2009)

Table I-1. VAR Model (1) and Expected Impacts under the Hypothesis (1)

[USFS, USPRATE, INTL]   (1)

$$\frac{\partial \text{USPRATE}}{\partial \text{USFS}} < 0 \ , \ \frac{\partial \text{INTL}}{\partial \text{USFS}} < 0, \text{ and } \frac{\partial \text{INTL}}{\partial \text{USPRATE}} > 0$$

2. The Impact of the U.S. Monetary Policy

Next, I compare the impact of a change in the U.S. policy rate on economic variables such as interest rates, net capital flows, and exchange rates across the center, creditors, and debtors. The U.S. policy rate could have international spillover effects on the periphery. If policy rates among countries are more synchronized, the increase in the U.S. policy rate may also increase policy rates in the periphery[14]. The increased policy rates may then result in raising market interest rates in the periphery. Further, the increased market interest rates may impact capital flows. This impact, however, may depend on the relative magnitude of increases in the market interest rates among the center and periphery. If the increase in interest rate in the center is less than that of the periphery, investors are likely to adjust their portfolios to include more periphery market assets of similar maturity and risk characteristics. This results in a fall in net capital flows through declining capital inflows into the center and at the same time expanding capital outflows of the domestic investors in the center markets. As net capital inflows decrease, the U.S. dollar may be depreciated. Then, the depreciated exchange rate may have a positive impact on the current account in the center.

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[14] For example, Arouri et al(2013) evidenced a monetary policy synchronization and interdependence over the 2007 US financial crisis.

In contrast, investor demand for periphery market portfolio assets may increase given a relatively higher increase in interest rate in the periphery. This may result in a rise in net capital flows by increasing capital inflows into the periphery markets and at the same time declining capital outflows of the domestic investors in periphery markets. The increase in net capital flows may result in appreciation in local currencies in the periphery. Then, the appreciated exchange rate may have negative impact on the current account in the periphery. For the same reasons, this may entail the opposite impact on net capital flows, exchange rates, and current accounts if the interest rate in the center is increased more than that of the periphery.

In sum, it is crucial to identify the relative magnitudes of responses of interest rates among the three groups to develop a hypothetical expectation of the impact of U.S. monetary policy[15]. In this context I first examine the impact of the U.S. policy rate on interest rate differences among the center and periphery. In line with an argument of destabilizing dynamics of interest rates for the debtors and stabilizing dynamics for the creditors (Vasudevan 2010), it is expected that an increase in the U.S. policy rate results in a higher increase in the debtors' interest rate compared to the increase in the creditors' interest rate. To test this expectation, I use the following VAR model (2)-1, which includes the data vector of a change in the U.S. policy rate ('USPRATE'), a change in the policy rates of a country ('PRATE'), a change in the lending interest rate of a country ('INTL'), and the change in the difference of lending interest rate between the US and a country ('INTD'). Under model (2)-1, the expected signs for creditors and debtors are as follows.

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[15] Since the relative rather than absolute magnitudes of response of interest rates matter it is sufficient to compare only two of them.

Table I-2. Panel VAR Model (2)-1 and Expected Impacts

[USPRATE, PRATE, INTL, INTD] (2)-1

$$\frac{\partial \text{PRATE(creditor)}}{\partial \text{USPRATE}} > 0, \frac{\partial \text{INTL(creditor)}}{\partial \text{USPRATE}} > 0, \frac{\partial \text{INTL(creditor)}}{\partial \text{PRATE(creditor)}} > 0, \frac{\partial \text{INTD(creditor)}}{\partial \text{USPRATE}} < 0$$

$$\frac{\partial \text{PRATE(debtor)}}{\partial \text{USPRATE}} > 0, \frac{\partial \text{INTL(debtor)}}{\partial \text{USPRATE}} > 0, \frac{\partial \text{INTL(debtor)}}{\partial \text{PRATE(debtor)}} > 0, \frac{\partial \text{INTD(debtor)}}{\partial \text{USPRATE}} > 0$$

The results of the model (2)-1, which are presented in detail in section IV, generally correspond with the expectations. Based on the results of the model (2)-1, I postulate hypothesis (2) as follows: *"An increase in the policy rate in the center has asymmetric impacts on the three groups; while the interest rates and exchange rates adjustments of the center and creditors stabilize, those of debtors destabilize due to the shock."*

For the creditors, there is an expected decrease in net capital flows and depreciation. Contrary, it may result in an increase in net capital flows and an appreciation for debtors. The impact for the center may depend on the relative size of impacts with respect to creditors and debtors. If capital outflow from the center to the debtors is greater than the capital inflow from the creditor, net capital flows in the center will decrease. Then, it may result in depreciation in the center.

To test the hypothesis (2), I use the following panel VAR model (2)-2 which includes the data vector of the change in the US policy rate ('USPRATE'), the change in the ratio of country's net private capital inflow to its GDP ('NETFLOW'), and the change in the nominal

effective exchange rate of a country ('NEER')[16]. In line with the current literature, the panel VAR model (2)-2 assumes that the center can exogenously set its interest rate target in responding to its own financial stress. The U.S. policy rate then impacts net capital flows. In addition, it is supposed that the exchange rate is determined by the net capital flow[17].

Table I-3. Panel VAR Model (2)-2 and Expected Impacts under the Hypothesis (2)

$$[\text{USPRATE, NETFLOW, NEER}] \ (2)\text{-}2$$

$$\frac{\partial \text{NETFLOW(center)}}{\partial \text{USPRATE}} < 0, \ \frac{\partial \text{NEER(center)}}{\partial \text{USPRATE}} < 0$$

$$\frac{\partial \text{NETFLOW(creditor)}}{\partial \text{USPRATE}} < 0, \ \frac{\partial \text{NEER(creditor)}}{\partial \text{USPRATE}} < 0$$

$$\frac{\partial \text{NETFLOW(debtor)}}{\partial \text{USPRATE}} > 0, \ \frac{\partial \text{NEER(debtor)}}{\partial \text{USPRATE}} > 0$$

3. The Significance of Foreign Reserve Holdings for the Creditors and Debtors

Hypothesis (2) notes an asymmetric impact of U.S. monetary policy on the creditors and debtors due to the different responses of interest rates between the two groups. What causes this difference in interest rate responses? The literature indicates that it is originated from structural asymmetries between groups in the international financial system, which allows a higher degree of policy autonomy for the creditors compared with the debtors. If interest rate differential for the creditors is increased, the demand on the creditors' assets will be increased. Without any policy intervention, this will lead to capital inflow and appreciation pressures on the creditors'

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[16] Due to limited data availability, on real effective exchange rates in particular, I use nominal effective exchange rate for the debtors.

[17] The causality could be different. For example, interest rates could be determined by net capital flows and exchange rates could impact the net capital flow. Section V discusses the causality relationships in detail using Directed Acyclic Graph (DAG) theory.

currencies resulting in aggravation in trade and further capital inflows. The authorities of the creditors, however, intervene to stabilize capital inflows and exchange rate appreciation to sustain their export-led growth. With the foreign exchange market intervention and sterilization policy to provide an additional supply of domestic bonds, the interest rate of the creditors' will decline. The intervention policy will result in an increase of foreign reserve holdings. The foreign reserve holdings then have acted as a 'mercantilist tool' (Dooley et Al 2004, Summers 2004) to improve its current account through keeping their exchange rate undervalued as well as a 'self-insurance' (Feldstein 1999) mechanism to defend against the risks of speculative attacks and capital flow volatilities. In contrast, debtors have only limited autonomy because they need a continuous capital inflow for sustaining deficits. In this context, I postulate hypothesis (3) as follows: *"While creditors benefit from their foreign reserve holdings to stabilize their net capital flows and improve their current accounts, the debtors do not."*

To test hypothesis (3) I use the following panel VAR model (3) which assumes that percentage changes in the ratio of foreign reserve holdings to GDP is exogenously determined and affects net capital flows and current accounts. According to the hypothesis, for creditors it is expected that the impulse in the reserve holdings brings about minimal impacts on net capital flows with improving current accounts. In contrast, for debtors it may entail a relatively large impact on net capital flows without improving current accounts.

Table I-4. Panel VAR Model (3) and Expected Impacts under the Hypothesis (3)

[RESERVE, NETFLOW, CA] (3)

$$\frac{\partial \text{NETFLOW(creditor)}}{\partial \text{RESERVE(creditor)}} \cong 0, \frac{\partial \text{CA(creditor)}}{\partial \text{RESERVE(creditor)}} > 0$$

$$\frac{\partial \text{NETFLOW(debtor)}}{\partial \text{RESERVE(debror)}} > 0 \text{ or } <0, \frac{\partial \text{CA(debtor)}}{\partial \text{RESERVE(debror)}} \cong 0 \text{ or } < 0$$

IV. Empirical Strategy and Data

1. Panel Vector Autoregression (VAR) Model

To test the three hypotheses I employ a panel vector autoregression (VAR). The approach extends the traditional VAR approach, which treats all the variables in the system as endogenous (Sims 1980) to a panel data setting and allows controlling for unobserved country level heterogeneity. Recently the model has been extensively used as a tool to analyze the macroeconomic effects of monetary policy innovations. For example, it has analyzed how the U.S. shocks are transmitted to eight Latin American countries during 1990 to 2002 using quarterly data (Canova 2005). Similarly, it also studies how shocks in the U.S. interest rate impact the ten European countries during 1970 to 2010 using quarterly data (Canova et al. 2012). Recently, others estimate the impacts of central bank balance sheet policies on output and consumer prices of eight advanced countries after the global financial crisis using monthly data (Gambacorta et al, 2012). A survey on the panel VAR models summarizes that these models are suited to: "(i) Capture both static and dynamic interdependence, (ii) Treat the links across units in an unrestricted fashion, (iii) Easily incorporate time variations in the coefficients and in the variance of the shocks, and (iv) Account for cross sectional dynamic heterogeneities" (Canova and Ciccarelli 2013).

The panel VAR approach might be suited to test the hypotheses and trace how shocks in monetary policy of the center are transmitted across the three regions by capturing both static and dynamic interdependence in an unrestricted fashion, and by estimating time variations in the coefficients and cross sectional dynamic heterogeneities among the three regions. Cross country interdependencies are likely to be crucial in explaining the triangular pattern of private capital

flows and contrasting adjustments of foreign exchange and interest rates of the three regions considering recently deepening financialization and globalization. Time variations may be the natural consequence of dynamic adjustments. In addition, the technique will be utilized to test whether the three regions respond differently to the shock in U.S. monetary policy by comparing the mean coefficients of the three regions. The assumption of common slope coefficients of countries within each region reflects that countries within each region share a common feature in international financial arrangements.

I utilize the methodology proposed by Holtz-Eakin et al (1988), Canova and Cicarelli (2004), and Love and Zicchino (2006) to estimate the following, reduced form, specifications incorporating both country level and time fixed effects.

Table I-5. Panel VAR Specifications

$$Y_{it}^j = \Gamma_0 + \sum_{s=1}^{n} \Gamma_s \, Y_{t-s}^j + f_i + d_{c,t} + e_{it},$$

where j=1 is the U.S., j=2 is East Asian countries, j=3 is Latin American countries, f_i is country dummy to reflect a country level heterogeneity, $d_{c,t}$ is time dummy to reflect

country level shocks to macroeconomic conditions, $\mathrm{E}[Y_{t-s}^j \, e_{it}] = \mathrm{E}[f_i \, e_{it}] = \mathrm{E}[\, d_{c,t} e_{it}] = 0$

which implies satisfying orthogonality condition to allow consistency of the estimator, and

$$Y_{it}^{j=1} = \begin{bmatrix} USFS_{it}^{j=1} \\ USPRATE_{it}^{j=1} \\ INTL_{it}^{j=1} \end{bmatrix} \text{ for model(1)}, \quad Y_{it}^{j=1,2,3} = \begin{bmatrix} USPRATE_{it}^{j=1} \\ PRATE_{it}^{j=2,3} \\ INTL_{it}^{j=2,3} \\ INTD_{it}^{j=2,3} \end{bmatrix} \text{ for model(2)-1}$$

$$Y_{it}^{j=1,2,3} = \begin{bmatrix} USPRATE_{it}^{j=1} \\ NETFLOW_{it}^{j=1,2,3} \\ NEER_{it}^{j=1,2,3} \end{bmatrix} \text{ for model(2)}, \quad Y_{it}^{j=2,3} \begin{bmatrix} RESERVE_{it}^{j=2,3} \\ NETFLOW_{it}^{j=2,3} \\ CA_{it}^{j=2,3} \end{bmatrix} = \text{ for model(3)}$$

In applying the VAR procedure to panel data, we need to impose the restriction that the underlying structure is the same for each cross-sectional unit in East Asian countries or in Latin American countries. Since this constraint is likely to be violated in practice, one way to overcome the restriction on parameters is to allow for 'country-level heterogeneity' in the levels of the variables by introducing fixed effect dummy, denoted by f_i in the model. Since the country level fixed effects are correlated with the regressors due to lags of the dependent variable, a forward mean-differencing, known as the 'Helmert procedure,' proposed by Arellano and Bover (1995) is used. In addition, the time dummy is removed by subtracting the means of each variable for each country. After removing the fixed effect and time dummies we estimate the panel VAR. Then, the estimated coefficients of the panel VAR are the same for all countries in the same region reflecting regional homogeneity.

The panel VAR specification allows producing impulse-response functions that describe the reaction of one variable to the shocks in other variables in the system, while holding all other shocks equal to zero. The shocks in the panel VAR are orthogonalized by adopting a particular ordering and allocating any correlation between the residuals of any two elements to the variable that comes first in the ordering.[18] The identifying assumption is that 'the variables that come earlier in the ordering affect the following variables contemporaneously, as well as with a lag, while the variables that come later affect the previous variables only with a lag' (Love and Zicchino 2006). Thus, the above panel VAR specifications assume that the center exogenously sets its interest rate target in responding to its financial stress, the U.S. policy rate then impacts market interest rates, net capital flows, exchange rates, and current accounts of the three regions. Similarly, this specification assumes that the level of foreign reserve holdings is exogenously

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[18] The procedure is known as Choleski ordering which is a method used to orthogonalize the error term in a VAR or VECM to impose a recursive structure on the dynamic model, so that the resulting impulse-response functions can be given a causal interpretation.

determined and then impacts interest rate differentials and exchange rates of the creditors and debtors. Confidence intervals of the impulse-responses are generated by Monte Carlo simulations using the standard errors from the estimated VAR coefficients.

2. Directed Acyclic Graph (DAG) Methodology

To test the causality ordering of the panel VAR models I employ the directed acyclic graph (DAG) methodology.

The causality relationships between the variables under consideration are investigated and identified by means of TETRAD IV software (http://www.phil.cmu.edu/projects/tetrad/) which detects the causal relationship inside the set of data. The software was first implemented by Spirtes et al.(1993) and its use, initially limited to psychology, biometrics, medicine, etc., has more recently spread to economics such as price discovery between spatially separated commodity markets and the transportation market linking them together (Haigh & Bessler 2002) and the impact of the oil sector on commodity prices (Saghaian 2010). The advantages of the TETRAD with respect to the usual regression techniques are that (i) very low a priori constraints are required in investigating causality relations, and (ii) all possible alternatives are automatically considered by the procedure.

The covariance matrix of the panel VAR model is used to investigate the causal relationships among the variables by the DAG, which is a picture representing the causal flow among a set of variables called nodes. Lines with arrowheads are used to represent causal directions so that an arrowhead from node A to node B means variable A causes variable B. In contrast, a connecting line with no arrowhead indicates the two variables are connected by

information flow, but we cannot say which are caused the other. To finds a directed acyclical graph the TETRAD IV provides different algorithms, which are better suited to a particular data setting. For example, PC algorithm uses an algorithm that first assigns undirected lines in all the nodes and then removes adjacent edges when partial correlations are not statistically significant and determines causal flow directions for the remaining edges based on the partial correlation of the residuals. In contrast, GES (Greedy Equivalence Search) algorithm searches over patterns by scoring the patterns themselves using a forward sweep and a backward sweep. In the former, GES tries to find the edge which, once added, increases the score the most over not adding any edge at all. Once the algorithm gets to the point where there is no edge that can be added that would increase the score, the backward sweep begins to find the one edge it can remove that will increase the score of the resulting the most over the previous pattern.

3. Data

I employ quarterly macroeconomic information since 1980 for the U.S., 9 East Asian and 9 Latin American countries[19] from the international monetary fund (IMF)'s international financial statistics(IFS) and other relevant sources.[20] This data includes international capital flows which are recorded in economies' external financial account, current account, policy interest rate and market interest rate, real or nominal effective foreign exchange rate and the ratio of the local currency to the U.S. dollar. Capital flows, which is the major concern of the essay includes gross

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[19] East Asian countries include the Hong Kong China, mainland China, Indonesia, Korea, Malaysia, Philippine, Singapore, Thailand, and Taipei China. Latin American countries include the Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela

[20] The essay does not cover oil exporters and Euro land countries considering that the former's surpluses depend on commodity prices rather than exchange rate or other economic variables, and the latter, in general, relocates the surplus in "core Europe" to "peripheral Europe" where current account deficits started to rise.

capital inflows for which external liabilities are incurred by the recipient economy, outflows that are purchases of external assets from the view point of the purchasing economy, and net flows that are the sum of gross inflows and gross outflows. Official foreign reserve assets accumulation is excluded from the computation of these flows. I focus on net flows which are a natural counterpart to the current account or global imbalances.[21]

Table I-6 provides the definitions of the variables used. Capital flows and current accounts are measured in relation to the GDP. Foreign reserve holdings are also measured as a ratio of GDP. Interest rates and U.S. financial stress are expressed as annual percent. Foreign exchange rates are expressed by index. The data covers from the first quarter of 1980 to the fourth quarter of 2012, covering the relevant financial crises episodes including the Latin America debt crisis, the East Asia financial crisis, and the recent global financial crisis.

Table I-6. Definitions of the Variables

Variables	Definition	Source
NETFLOW	The sum of gross private capital inflows which are the sum of foreign liabilities and gross private capital outflows which are the sum of foreign assets in the form of foreign direct investment, portfolio investment, and other transaction as the ratio of GDP(%)	IMF IFS Online, The Bank of China(Taipei)
CA	Current account as the ratio of GDP (%)	IMF IFS Online, The Bank of China(Taipei)
USPRATE	The U.S. policy rate which is expressed by the Federal fund target rate (%)	IMF IFS Online, The Bank of China(Taipei)
PRATE	Domestic policy rates of a country which are expressed by central bank's target rate or discount rate or money market rate (%)	IMF IFS Online, The Bank of China(Taipei)
INTL	Domestic lending interest rate (%)	IMF IFS Online, The Bank of China(Taipei)
INTD	The difference between domestic interest rate and the US lending interest rate (%),	IMF IFS Online, The Bank of China(Taipei)

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[21] It is argued that gross positions may better reflect the impact on national balance sheet of various economic shocks (Forbes 2011, Broner 2011, Forster 2012, Obstfelt 2012)

	i.e. INTD = (lending interest rate of a country) – (the U.S. lending interest rate)	
NEER[22]	The value of the index of nominal effective exchange rate(2000=100)	IMF IFS Online, The Bank of China(Taipei)
REER	The value of the index of real effective exchange rate(2000=100)	IMF IFS Online, The Bank of China(Taipei)
RESERVE	The stock of official foreign reserve holdings as the ratio of GDP (%)	IMF IFS Online, The Bank of China(Taipei)
USFS	The financial stress index of the U.S. (%)	The Federal Bank of St. Louis

Table I-7 suggests contrasting characteristics of the three regions. East Asia accumulated relatively large foreign reserves through their current account surpluses compared to the U.S. and Latin America. Moreover, Latin America has shown much more volatility in their policy interest rates, market interest rates, exchange rates, and interest rate differentials than the U.S. and East Asia. Appendix 1 provides summary statistics for the three regions. I use transformed data in percent changes or first differenced values to guarantee stationary. Appendix 2 presents results of the Dickey-Fuller unit root test suggesting that the transformed data satisfy stationary.

Table I-7. Summary Statistics

	USA	East Asia	Latin America
ca/GDP	-0.0065(0.0004)	0.0312(0.0750)	-0.0083(0.0457)
reserve/GDP	0.0007(0.0020)	1.1731(1.0300)	0.3160(0.2568)
% policy rate	-0.0178(0.1529)	-0.0007(0.1572)	-0.9999(191.78)
% market rate	-0.0088(0.0833)	-0.0040(0.1006)	-0.9937(0.3788)
% neer	0.0083(0.0308)	-0.0044(0.0420)	-0.9849(0.1387)
% intd	-	-0.0375(2.8091)	-590.78(18.877)

Mean value. Standard deviation in parentheses.

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[22] An increase in REER or NEER implies appreciation.

V. Results

1. Financial Stress and Monetary Policy in the Center

(1) Panel VAR Analysis

The results in Table I-8 and Figure I-7 correspond with hypothesis (1). The estimated coefficients do not provide any statistically significant estimate for the U.S. policy rate or market interest rate due to the change in U.S. financial stress.

Table I-8. The Result of Model (1): [USFS, USPRATE, INTL][23]

Response of	Response to		
	usfs(t-1)	usprate(t-1)	intl(t-1)
usfs(t)	0.114(1.43)	1.144(0.75)	-1.236(-0.28)
usprate(t)	0.0008(0.10)	0.460(1.20)	0.321(0.45)
intl(t)	0.0009(0.24)	0.055(0.45)	0.581(2.21)**
N of Obs.	73		

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The impulse-responses present complementary outcomes. The first column of Figure I-7 suggests that an increase in the U.S. financial stress decreases the U.S. policy rate or market interest rate by about 2.2% in the present period and 1.0% after the 1st quarter, and that this impact decays over time. In the second column, results also suggest that an increase in the U.S.

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[23] Correct lag length selection is essential for panel VAR. While too short lags fail to capture the system dynamics, leading to omitted variable bias, too many lags suffer from a loss of degrees of freedom, resulting in over-parameterization. I produce selection order criteria in STATA using 'varsoc' command for each country.

The result in Appendix 3 shows the optimal lag length for each country based on HQIC criterion. I choose the most frequent lag as the optimal lag for the panel VAR models. For model (1), [USFS, USPRATE, INTL], the optimal lag is one for the US. For model (2)-1, [USPARTE, PRATE, INTL, INTD], the optimal lag mode is one for 7 East Asia countries, and 6 Latin America countries. Similarly, for model (2)-2 and model(3), the optimal lag modes are one and two respectively.

policy rate raises the market interest rate by about 4.3% in the present period and 3.3% after the 1st quarter.
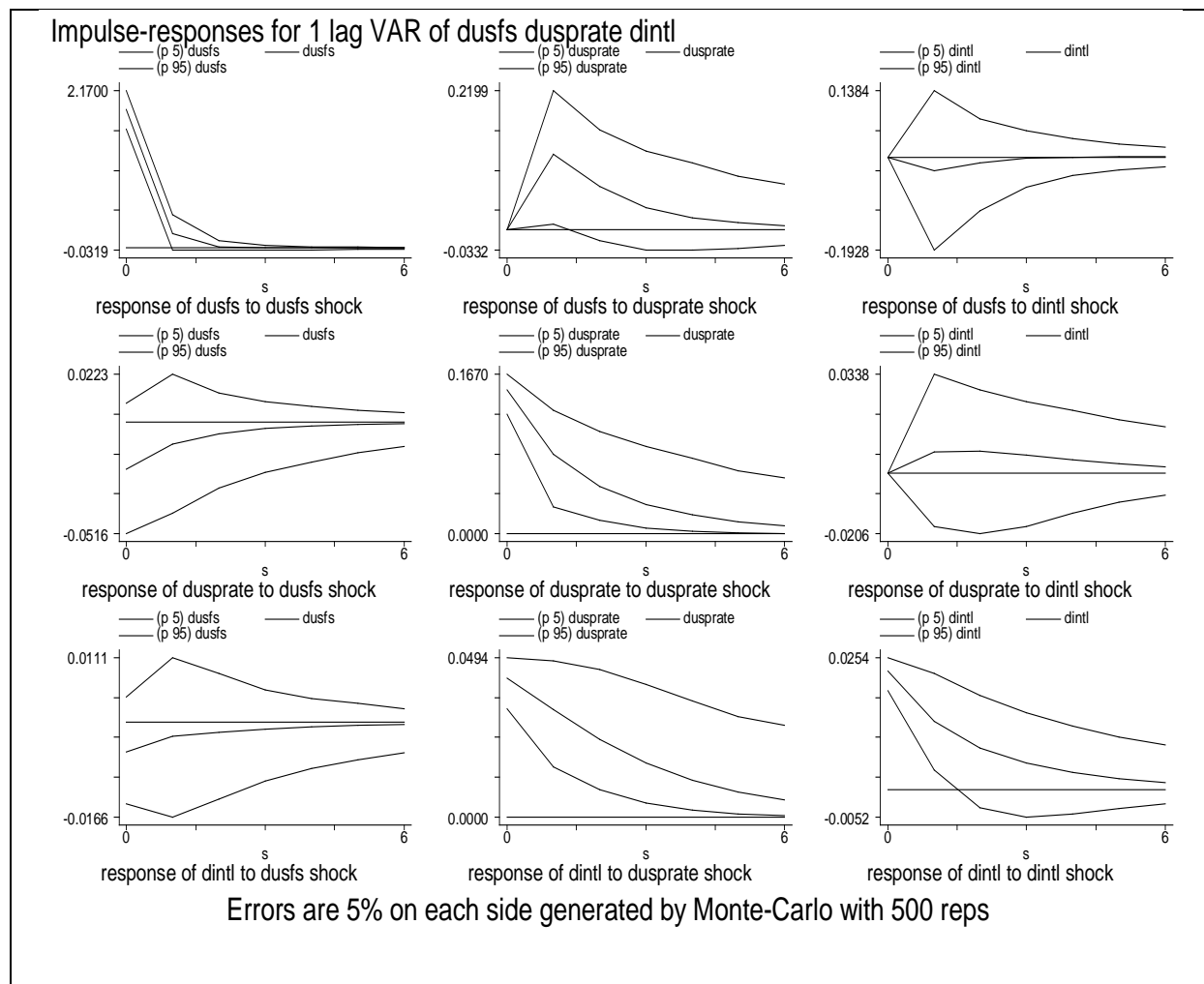
Figure I-7. The Impulse-responses for Model (1): [USFS, USPRATE, INTL]

(2) Directed Acyclical Graph (DAG) Analysis

The panel VAR model(1), [USFS, USPRATE, INTL], assumes the causality ordering in such way; (i) the financial stress of the US('USFS') affects both the policy rate('USPRATE') and market interest rate('INTL'), and (ii) the policy rate('USPRATE') affects market interest rate('INTL'). To test the casuality ordering of the model I use the GES(Greedy Equivalence

Search) algorithm. The assumptions of the GES are; (i) the true causal hypothesis is acyclic, (ii) there are no unobserbed confounders. The GES tends to work better when the variables are not normally distributed. But, it is unsuitable for data sets with very large numbers of variables. The GES algorithm might be appropriate to test the model(1) since all the three variables fail to accept normality hypothesis under the Kolmogorov Smirnov test.

The results in the Table I-9 and Figure I-8 suggest the causality relations of 'USFS → USPRATE' and 'INTL → USPRATE'. In contrast, the causality relation of 'INTL → USFS' is relatively not certain. More explicitly, the GES algorithim indicates that:

$$\text{USPRATE} = \beta_1 \text{ USFS} + \varepsilon_1$$

$$\text{USPRATE} = \beta_2 \text{ INTL} + \varepsilon_2$$

Thus, the DAG analysis suggests an ordering of [USFS, INTL, USPRATE] or [INTL, USFS, UAPRATE], which are different ordering from the panel VAR model(1).

Table I-9. The Results of the GES Algorithm : USFS, USPRATE, INTL

Causality relations	Penality discount(α)		
	0.01	0.02	α ≥ 0.03
USFS → USPRATE	○	○	○
USFS → INTL	×	×	×
USPRATE → USFS	×	×	×
USPRATE → INTL	×	×	×
INTL → USFS	○	○	×
INTL → USPRATE	○	○	○

* The number of the penality discount(α) affects which edges are discarded; the higher the penality discount, the more robust(i.e. certain) an edge must be to be remain in the graph.

* 'a → b' implies a causality relation from a to b.

* '○' implies a casuality relation exist, while '×' suggests no casuality relation.
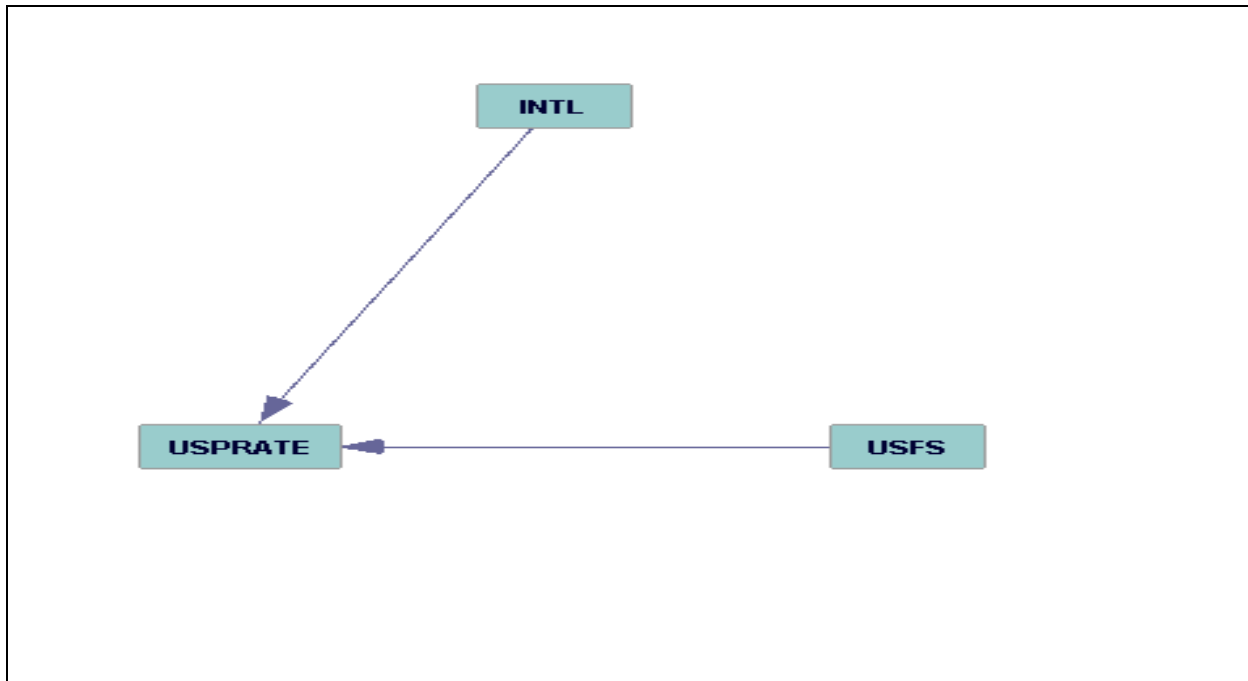
Figure I-8. DAG(Directed Acyclic Graph) : USFS, USPRATE, INTL

The penality discount(α) is 0.03.

I execute the different orderings suggested by the DAG, and then compare the results of them to that of the original model focusing on the magnitude of impulse-responses. First, the alternative model(A) in the Table I-11 showes that the impulse of the interest rate(INTL) leads to an increase in financial stress(USFS). In contrast, according to the original model(1) in the Table I-10, the INTL results in decrease in USFS. Second, the alternative model(B) implies that the USFS has no impact on the INTL while the original model suggest the USFS causes a decline in the INTL. Third, both the alternative model(A) and model(B) suggest that the INTL results in a relatively large increase in the USPRATE, while the USPRATE has a limited impact on the INTL. In contrast, the original model(1) shows that the USPRATE causes significant impact on the INTL, and not vice versa.

Table I-10. The Impulse-responses of Model(1) : [USFS, USPRATE, INTL]

	USFS	USPRATE	INTL
USFS	2.11	0.25	-0.04
USPRATE	-0.04	0.35	0.03
INTL	-0.01	0.14	0.06

The column is impulse and the row is responses.

Table I-11. The Impulse-responses of Alternative Models Suggested by DAG

Model(A) : [USFS, INTL, USPRATE]				Model(B) : [INTL, USFS, USPRATE]			
	USFS	INTL	USPRATE		INTL	USFS	USPRATE
USFS	2.11	0.21*	0.15	INTL	0.15	0.00*	0.02*
INTL	-0.01	0.15	0.02*	USFS	-0.02	2.12	0.15
USPRATE	-0.04	0.33*	0.14	USPRATE	0.33*	-0.01	0.14

The (*) indicates that the number is significant different from the original model(1).

In sum, the original model(1) assumes that the US monetary policy, which is the function of the financial stress, is exogenous to the market interest rate. In contrast, the DAG analysis denies the exogeniety of the US monetary policy. Instead, it suggests that the US moneatry policy is endogenously determined by the changes in both the financial stress and market interest rate. The growth in the financial markets might be an explanation for the market-driven determination of interest rate and inability of the monetary policy to impact on the market interest rate.

2. The Impact of U.S. Monetary Policy

(1) Panel VAR Analysis

The results in the Table I-12, Figure I-9 and I-10 also correspond with the hypothetical expectations, indicating an asymmetric response of interest rates to the shock in the U.S. policy rate between the creditors and debtors. In the Table I-12 the estimated coefficients of the U.S.

policy rate to domestic policy rates for both creditors and debtors are statistically significant

positive numbers, implying a certain degree of synchronization of policy rates among countries.

The estimated coefficients of the U.S. policy rate to domestic market interest rates and domestic

market interest rate to domestic policy rate for creditors are statistically significant positive

numbers as expected. While the coefficient of the U.S. policy rate to interest rate differentials for

creditors is minus 0.219 that for debtors is 1.237.

Table I-12. The Result of Model (2)-1: [USPRATE, PRATE, INTL, INTD]

Response of	Response to			
	usprate(t-1)	prate(t-1)	intl(t-1)	intd(t-1)
Panel A: East Asian countries				
usprate(t)	0.561(10.13)***	-0.065(-1.88)*	-0.012(-0.25)	0.0004(0.3)
prate(t)	0.192(5.84)***	0.043(0.88)	0.1(1.61)	0.0006(0.66)
intl(t)	0.478(3.48)***	0.088(5.19)***	0.075(1.87)*	0.0001(0.37)
intd(t)	-0.219(-0.34)	0.221(0.61)	-0.121(0.37)	-0.001(-0.08)
No obs	915			
Panel B: Latin American countries				
usprate(t)	0.536(9.7)***	0.008(0.64)	-0.141(-0.91)	0.0004(8.53)***
prate(t)	0.145(2.42)***	0.078(0.67)	0.271(1.33)	0.0002(1.85)*
intl(t)	0.06(1.33)	0.003(0.03)	0.285(2.13)**	0.00001(0.19)
intd(t)	1.237(0.94)	-0.7032(-0.9)	0.815(1.35)	0.002(0.64)
No obs	924			

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The impulse-response also presents similar results. For creditors in the Figure I-9, an

increase in the U.S. policy rate raises domestic policy rates by about 0.7% and domestic market

interest rate by about 2.3% at present period while it decreases interest differentials by about 4.6%

in the present period and after the 1st quarter. In contrast, for debtors in the Figure I-10, an

increase in the U.S. policy rate raises interest rate differentials by about 4.2% in the present

period and about 1.7% after the 1st quarter. This result implies that the increase in the debtors'

market interest rates due to the shock in US monetary policy is greater than that of the creditors

or the center, while the increases in the creditors' market interest rates is less than that of the

center.

response of dusprate to dusprate shock

response of dusprate to dprate shock

response of dusprate to dintl shock

response of dusprate to dintd shock

response of dprate to dusprate shock

response of dprate to dprate shock

response of dprate to dintl shock

response of dprate to dintd shock

response of dintl to dusprate shock

response of dintl to dprate shock

response of dintl to dintl shock

response of dintl to dintd shock

response of dintd to dusprate shock

response of dintd to dprate shock

response of dintd to dintl shock

response of dintd to dintd shock

Errors are 5% on each side generated by Monte-Carlo with 500 reps

Figure I-9. The Impulse-responses for Model (2)-1 for Creditors [USPRARE, PRATE, INTL, INTD]

Impulse-responses for 1 lag VAR of dusprate dprate dintl dintd

response of dusprate to dusprate shock

response of dusprate to dprate shock

response of dusprate to dintl shock

response of dusprate to dintd shock

response of dprate to dusprate shock

response of dprate to dprate shock

response of dprate to dintl shock

response of dprate to dintd shock

response of dintl to dusprate shock

response of dintl to dprate shock

response of dintl to dintl shock

response of dintl to dintd shock

response of dintd to dusprate shock

response of dintd to dprate shock

response of dintd to dintl shock

response of dintd to dintd shock

Errors are 5% on each side generated by Monte-Carlo with 500 reps

Figure I-10. The Impulse-responses for Model (2)-1for Debtors [USPRARE, PRATE, INTL, INTD]

The results in the Table I-13~15, Figure I-11~13 correspond with hypothesis (2). In the Table I-13 the estimated coefficients do not provide any statistically significant estimate for the impact of the U.S. policy rate on net capital flows or nominal effective exchange rates for the three regions except the coefficient of the U.S. policy rate on exchange rate of debtors in the first column of panel 3. This suggests that an increase in the U.S. policy rate leads to a 4.2% appreciation in debtors' exchange rate.

Table I-13. The Result of Model (2)-2: [USPRATE, NETLOW, NEER]

Response of	Response to		
	usprate(t-1)	netflow(t-1)	neer(t-1)
Panel 1 : The U.S.			
usprate(t)	0.490***(3.49)	0.000(0.41)	-0.590(-1.41)
netflow(t)	-3.924(-1.05)	-0.002(-0.39)	-7.421(-0.13)
neer(t)	0.001(0.10)	-0.000(-0.86)	0.415***(4.89)
N Obs	129		
Panel 2: East Asian countries			
usprate(t)	0.601***(12.45)	0.000(0.18)	0.020(0.31)
netflow(t)	-5.847(-1.23)	-0.012**(-2.10)	-5.760(-1.08)
neer(t)	-0.0001(-0.019)	0.000(1.01)	0.115**(2.13)
N Obs	1084		
Panel 3: Latin American countries			
usprate(t)	0.583***(11.62)	-0.0001(-1.14)	-0.011(-0.47)
netflow(t)	1.752(0.95)	0.012(0.94)	5.760**(2.30)
neer(t)	0.042*(1.70)	0.0003(1.58)	0.369***(5.72)
N obs	1069		

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The impulse-responses present complementary outcomes. First, for the center, the first column of the impulse-responses in Figure I-11 indicates that an increase in the U.S. policy rate decreases the net capital flow to the U.S. after the 1st quarter. It also decreases the nominal effective exchange rate of the U.S as expected. Second, for the creditors, the first column of the impulse-responses in Figure I-12 suggests that an increase in the U.S. policy rate decreases net capital flows to the creditors after the 1st quarter. The shock increases the exchange rate, which contradicts the hypothetical expectation. The magnitude of it, however, is very small, implying

that the exchange rate of creditors is relatively stable despite the shock. Third, for the debtor, the first column of the impulse-responses in Figure I-13 shows that an increase in the U.S. policy rate has a relatively large impact on the net capital flows and exchange rates of the debtors for the entire period except the present one.

Figure I-11. The Impulse-responses for Model (2)-2 for Center [USPRATE, NETLOW, NEER]

Figure I-12. The Impulse-responses for Model (2)-2 for Creditors [USPRATE, NETLOW, NEER]
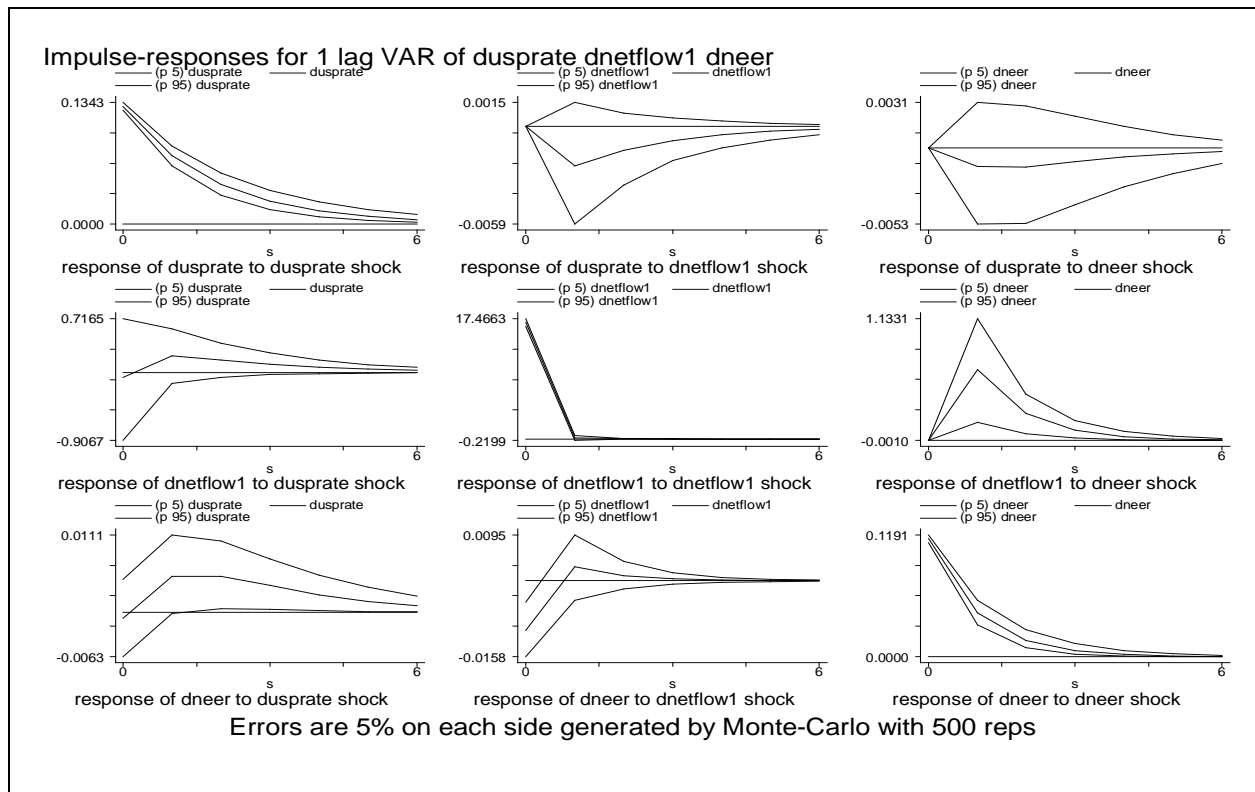
Figure I-13. The Impulse-responses for Model (2)-2 for Debtors [USPRATE, NETLOW, NEER]

Table I-14 suggests an asymmetric adjustment of the three regions. While the U.S. policy rate leads to an increase in net capital inflows to the debtors, it results in a decline in net capital inflows to the creditors and the center. It also indicates that the shock brings about an appreciation for the creditors and debtors while resulting in depreciation in the center. The magnitude of this appreciation in the debtors, however, is almost ten times greater than that of the creditors implying that the dynamics of exchange rates for debtors are unstable.

Table I-14. The Magnitude of Impulse-responses of Model (2): [USPRATE, NETLOW, NEER]

	center	creditor	debtor
netflow	-0.0715	-1.3984	0.5602
neer	-0.0023	0.0018	0.0184

The impulse is the U.S. policy rate. Calculated by the sum of responses for the entire periods.

Table I-15 summarizes the results of the model (2) and model (2)-1. While an increase the U.S. policy rate results in a decline in interest rate differentials for the creditor, it increases them for debtors. The shock leads to an increase in net capital flows for the debtors while decreases in that for the center and creditors. The shock leads to appreciation for the periphery and depreciation for the center.

Table I-15. The Summary of the Result of Model (2) and Model (2)-1

Impulse of USPRATE	INTD	NETFLOW	NEER
Center	·	Decline(limited)	Decline(limited)
Creditor	Decline	Decline(large)	Increase(limited)
Debtor	Increase	Increase(large)	Increase(large)

(+) means positive, and (-) negative impact

(2) Directed Acyclical Graph (DAG) Analysis

The panel VAR model(2)-1, [USPRATE, PRATE, INTL, INTD], assumes the causality ordering in such way; (i) the policy rate of the US('USPRATE') affects the policy rate of the periphery('PRATE'), market interest rate of the periphery('INTL'), and interest rate differential('INTD'), (ii) the policy rate('PRATE') affects market interest rate of the periphery('INTL'), and interest rate differential('INTD'), and (iii) market interest rate('INTL') affects interest rate differential('INTD').

Since all the four variables fail to accept normality hypothesis under the Kolmogorov Smirnov test, I again use the same GES(Greedy Equivalence Search) algorithrm to test the casuality ordering of the model. Since the main interest is to assess whether the casuality relationships are different between creditios and debtors I report the results by the two regions.

The results in the Table I-16 and Figure I-14 suggest the causality relations of 'USPRATE → PRATE → INTL → INTD' for the East Asian countries. The causality relation of 'USPRATE → INTL' and 'USPRATE → INTL' are relatively not certain. Thus, the DAG analysis suggests an ordering as [USPRATE, PRATE, INTL, INTD] for the creditors, which is the same in the original model(2)-1. In contrast, for the Latin American countries the results suggest the casuality relations of 'USPRATE → INTL' and 'PRATE → INTL → INTD', while it does not show cauality from the USPRATE to PRATE. The results may imply contrasting adjustments between creditors and debtors: the US monetary shock directly affects the interest rate of the debtors, while it indirectly affects the interest rate through the monetary policy of the creditors. Thus, monetary policies in the creditors act as a external shock absorber while those in debtors do not.

Table I-16. The Results of the GES Algorithm : USPRATE, PRATE, INTL, INTD

Causality relations	East Asian countries			Latin American countries	
	Penality discount(p)			Penality discount(p)	
	0.01	0.02	p ≥ 0.04	0.01	p ≥ 0.02
USPRATE →PRATE	○	○	○	×	×
USPRATE → INTL	○	○	×	○	○
USPRATE → INTD	○	×	×	×	×
PRATE → USPRATE	×	×	×	×	×
PRATE → INTL	○	○	○	○	○
PRATE → INTD	×	×	×	○	×
INTL → USPRATE	×	×	×	×	×
INTL → PRATE	×	×	×	×	×
INTL → INTD	○	○	○	○	○
INTD → USPRATE	×	×	×	×	×
INTD → PPRATE	×	×	×	×	×
INTD → INTL	×	×	×	×	×

* The number of the penality discount(α) affects which edges are discarded; the higher the penality discount, the

   more robust(i.e. certain) an edge must be to be remain in the graph.

* 'a → b' implies a causality relation from a to b.

* '○' implies a casuality relation exist, while '×' suggests no casuality relation.
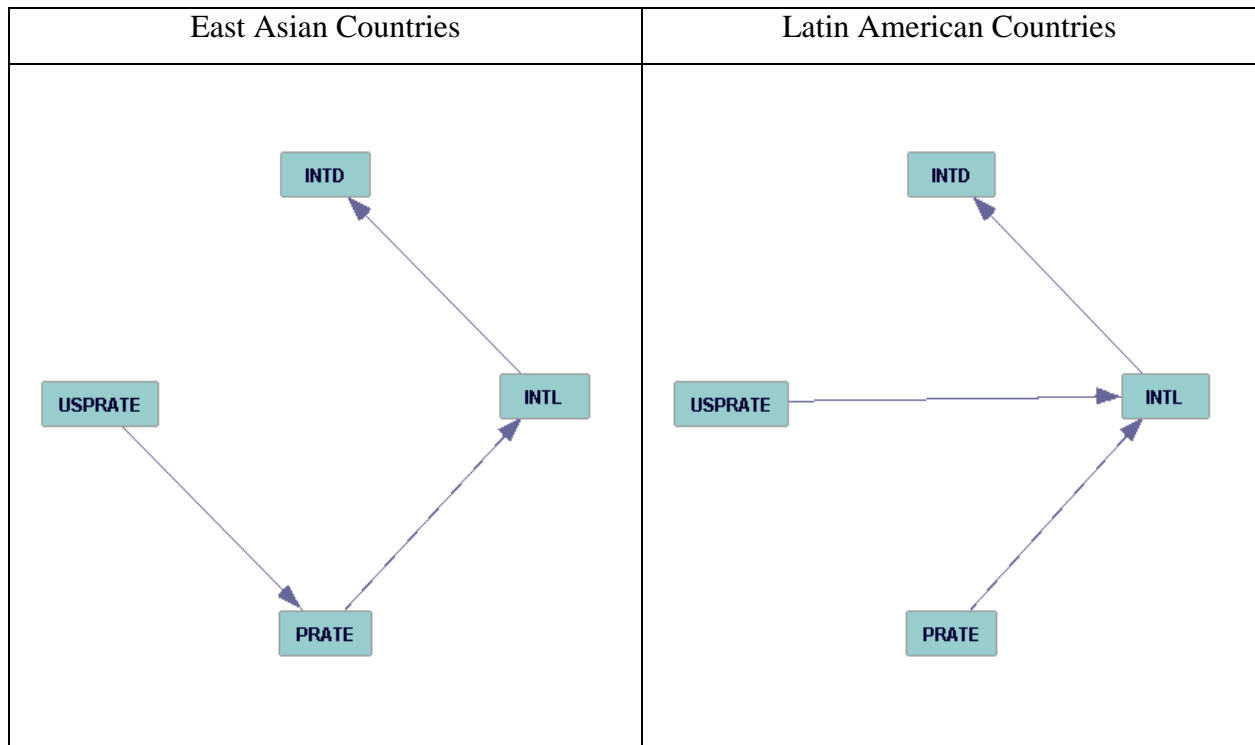
Figure I-14. DAG(Directed Acyclic Graph) : USPRATE, PRATE, INTL, INTD

The penality discount(α) is 0.04 for the East Asian countries, and 0.02 for the Latin American countries.

Another panel VAR model(2)-2, [USPRATE, NETFLOW, NEER], assumes the causality ordering in such way; (i) the policy rate of the US('USPRATE') affects the net capital flow of the periphery('NETFLOW') and nominal effective exchange rate of the periphery('NETFLOW'), (ii) the net capital flow of the periphery('NETFLOW') affects nominal effective exchange rate of the periphery('INTL').

Since all the three variables fail to accept normality hypothesis I again use the GES algorithrm to test the casuality ordering of the model. The results in the Table I-17 and Figure I-15 suggest the causality relations of 'USPRATE → NEER' and 'NETFLOW → NEER' for the East Asian countries. In contrast, for the Latin American countries the results suggest the causality relations of 'USPRATE → NEER → NETFLOW']. The results may also imply contrast adjustments between creditors and debtors: the US monetary shock affects the net capital flows through exchange rate of the debtors, while it does not affect those of the creditors.

Table I-17. The Results of the GES Algorithm :USPRATE, NETFLOW, NEER

Causality relations	East Asian countries			Latin American countries		
	Penality discount(p)			Penality discount(p)		
	0.01	0.02	p ≥ 0.2	0.01	0.2	p ≥ 0.3
USPRATE →NETFLOW	×	×	×	×	×	×
USPRATE → NEER	○	○	×	○	×	×
NETFLOW → USPRATE	×	×	×	×	×	×
NETFLOW → NEER	○	×	×	×	×	×
NEER → USPRATE	×	×	×	×	×	×
NEER → NETFLOW	×	×	×	○	○	×

* The number of the penality discount(α) affects which edges are discarded; the higher the penality discount, the more robust(i.e. certain) an edge must be to be remain in the graph.

* 'a → b' implies a causality relation from a to b.

* '○' implies a casuality relation exist, while '×' suggests no casuality relation.

East Asian Countries	Latin American Countries

Figure I-15. DAG(Directed Acyclic Graph) : USPRATE, NETFLOW, NEER

The penality discount(α) is 0.01.

3. The Significance of Foreign Reserve Accumulation for the Periphery

(1) Panel VAR Analysis

The results in the Table I-18~19, Figure I-16~17 also largely correspond with hypothesis (3). The estimated coefficients do not provide any statistically significant estimate for the impact of foreign reserve holdings on net capital flows or current accounts for both the creditors and debtors. The first column of the Table I-18 suggests an increase in current accounts leads to a rise in foreign reserve holdings by 0.466 for the creditors with two lags in panel A, and by 0.211 with one lag and 0.162 with two lags for the debtors in panel B. It implies that the two regions

have accumulated reserves arising from current account surpluses. Moreover, the second column in panel B indicates that an increase in current accounts leads to a decline in net capital inflows by 0.312 with one lag, as expected.

Table I-18. The Result of Model (3): [RESERVE, NETFLOW, CA]

Response of	Response to		
	reserve(t)	netflow(t)	ca(t)
Panel A: East Asian countries			
reserve(t-1)	-0.052(-1.04)	-0.033(-0.63)	0.005(0.48)
netflow(t-1)	-0.003(-0.05)	-0.348***(-4.64)	-0.020(-1.20)
ca(t-1)	0.212(1.50)	0.161(1.34)	-0.271***(-6.48)
reserve(t-2)	-0.147***(-3.08)	-0.038(-0.79)	0.013(1.12)
netflow(t-2)	-0.024(-0.47)	-0.059(-0.70)	-0.009(-0.63)
ca(t-2)	0.466***(3.73)	0.063(0.50)	-0.171***(-5.19)
N obs	1054		
Panel B: Latin American countries			
reserve(t-1)	-0.170***(-3.60)	0.047(1.17)	-0.005(-0.28)
netflow(t-1)	-0.023(-0.58)	-0.595***(-3.68)	-0.034**(-2.10)
ca(t-1)	0.211**(2.23)	-0.312**(-2.31)	-0.075*(-1.74)
reserve(t-2)	-0.092*(-1.77)	0.074(0.83)	-0.018(-1.09)
netflow(t-2)	0.040(0.86)	-0.264**(-1.99)	-0.003(-0.16)
ca(t-2)	0.162*(1.71)	0.054(0.51)	-0.202***(-4.37)
N obs	1105		

t-statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

The impulse-responses suggest contrasting dynamics for/in the two regions. First, for creditors, the first column of the impulse-responses in Figure I-16 indicates that an increase in the foreign reserve holdings largely leads to a rise in current accounts. In contrast, for debtors, the first column of Figure I-17 suggests that an increase in the foreign reserve holdings largely leads to a decline in current accounts. Second, for the creditor, the first column of the Figure I-16 suggests that the shock in reserve holdings brings about a relatively limited impact on net capital flows, showing that the effect quickly decays after the 3rd period. Third, the third column of both Figure I-16 and I-17 show that an increase in current accounts results in an increase in foreign reserve holdings of the two regions, which is consistent with the estimated coefficient.
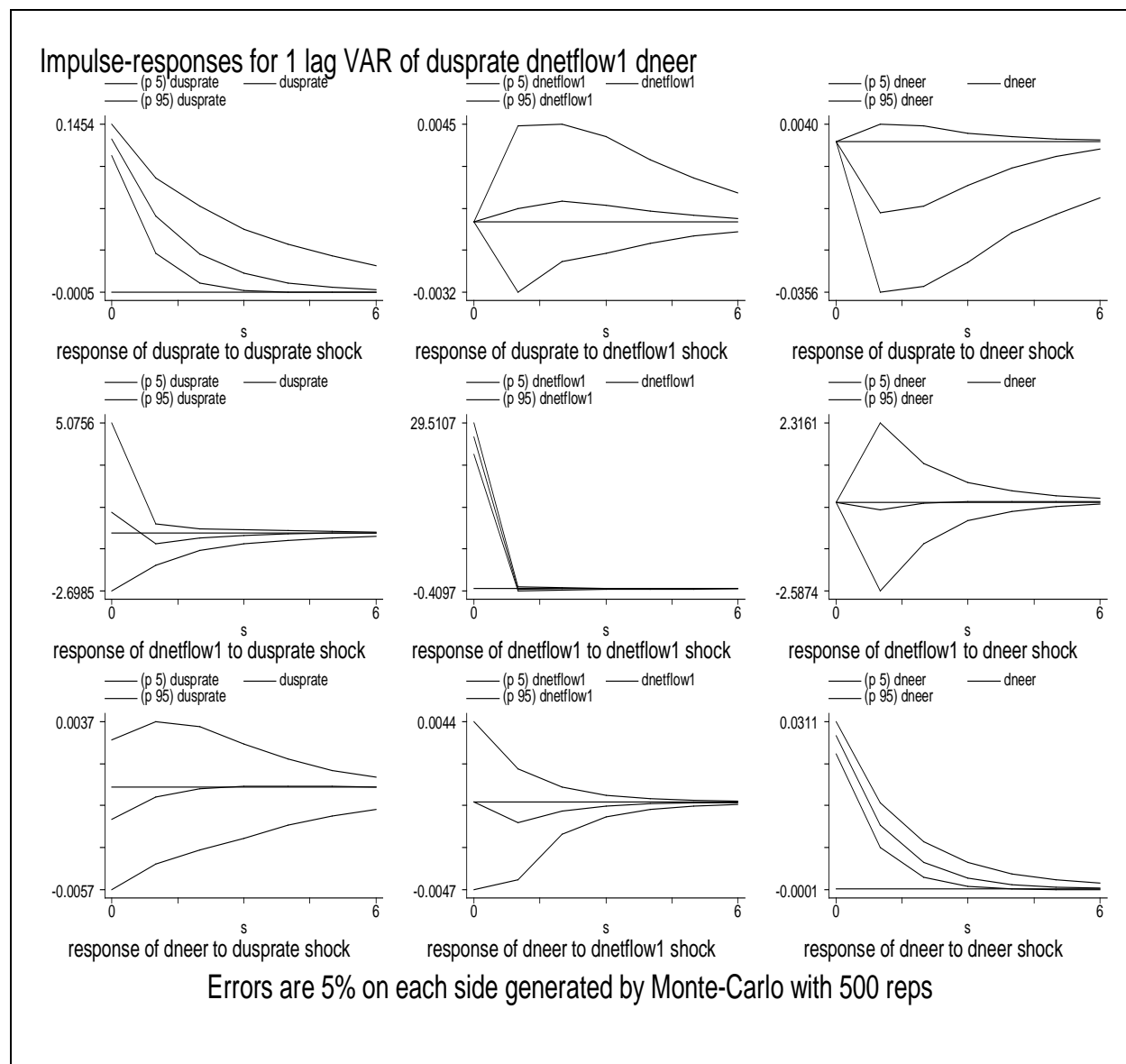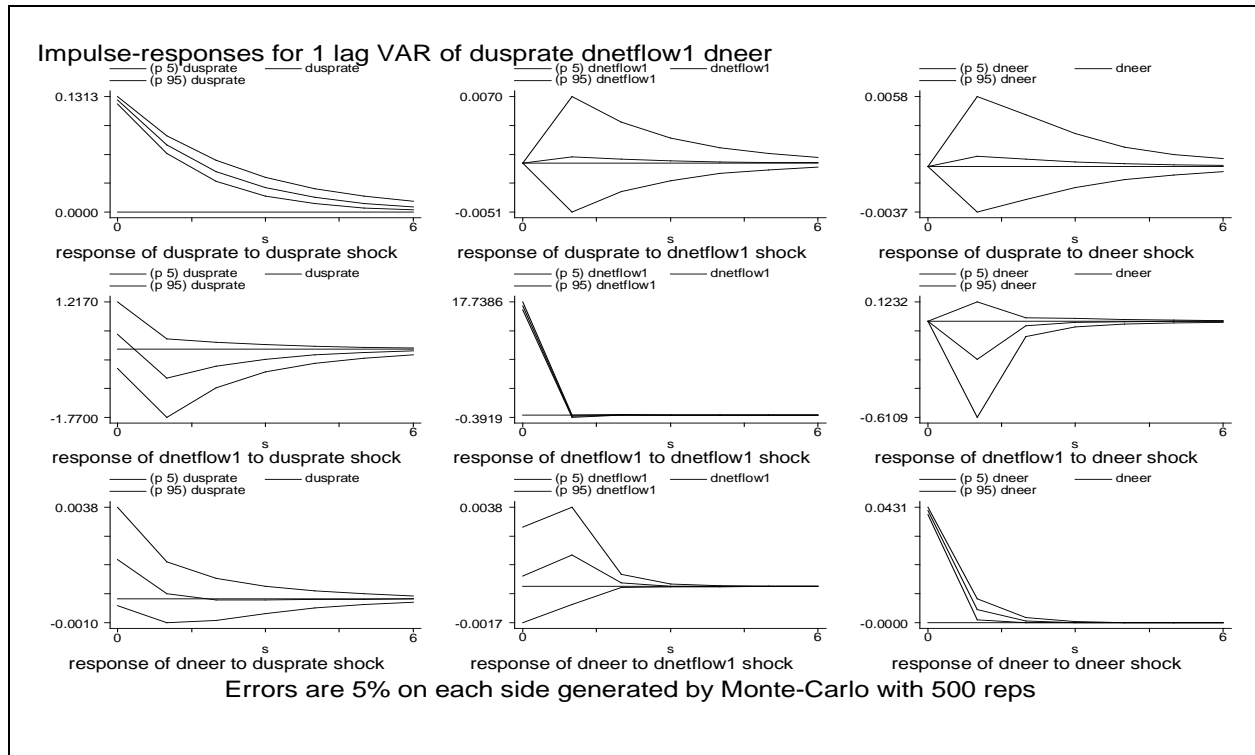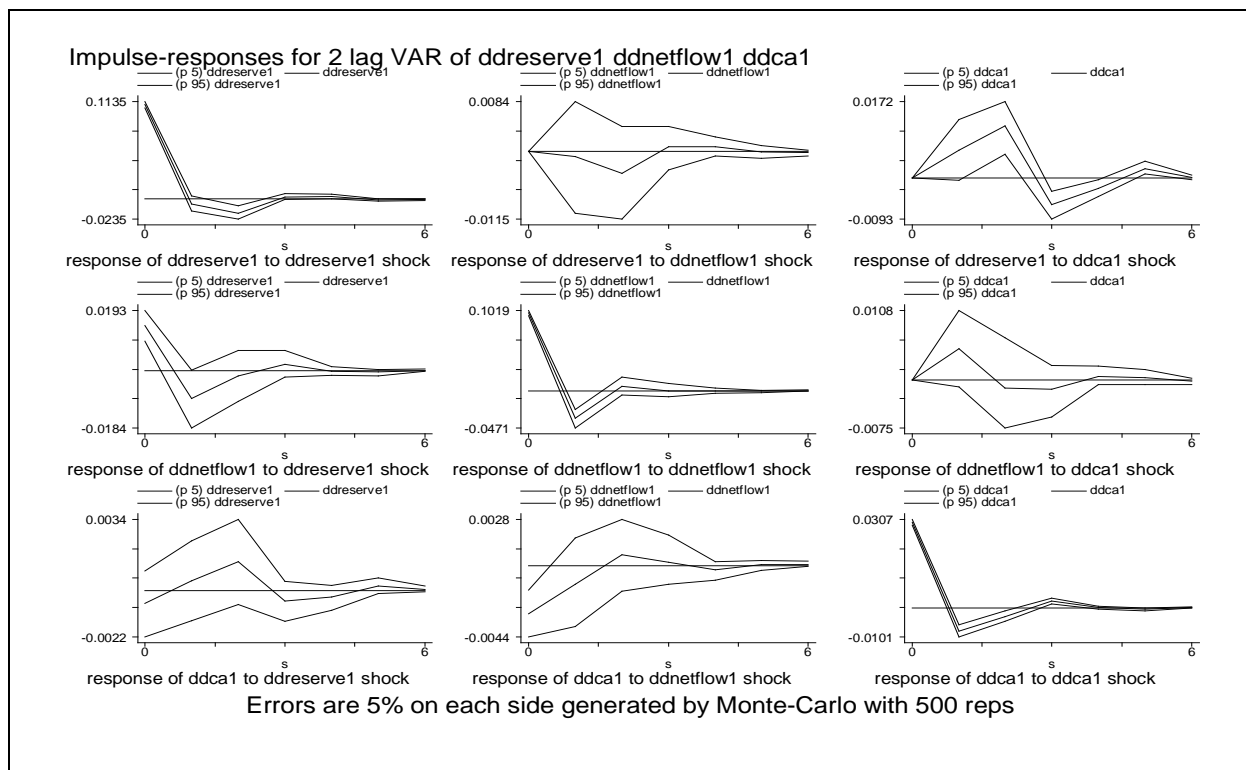
Figure I-16. The Impulse-responses for Model (3) for Creditors [RESERVE, NETFLOW, CA]
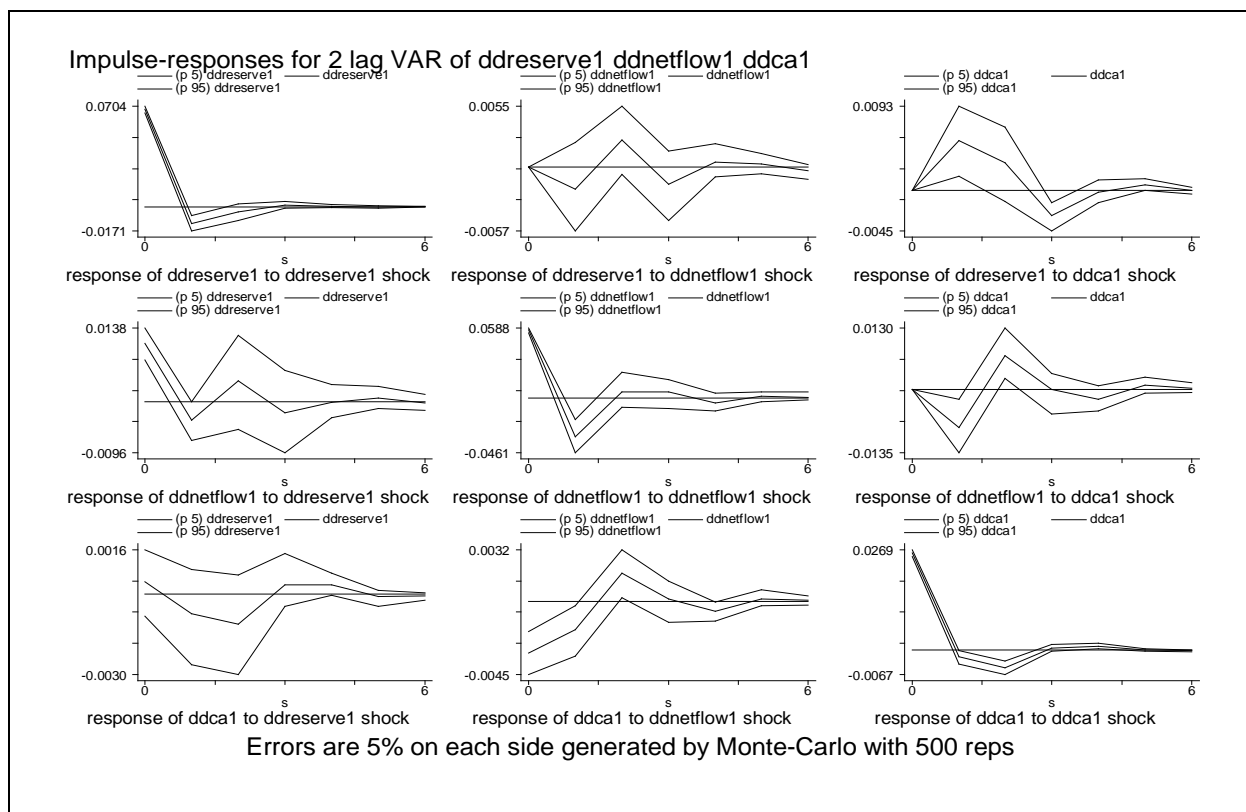
Figure I-17. The Impulse-responses for Model (3) for Debtors [RESERVE, NETFLOW, CA]

Table I-19 shows that the total impact of the shock in foreign reserve holdings on net capital flows for creditors are smaller than that for debtors. Moreover, it also indicates that the total impacts of the shock on the current accounts are an improvement by 0.7% for the creditors while they are an aggravation by 1% for the debtors. The evidence here may imply that the creditors take advantage of their foreign reserve holdings as a role of 'self-insurance' to stabilize their net capital flows and as a 'mercantilist tool' to improve their current accounts while the benefits for the debtors are more limited.

Table I-19. The Magnitude of Impulse-responses of Model (3): [RESERVE, NETLOW, CA]

	creditor	debtor
netflow	0.0057	0.0095
ca	0.0007	-0.001

The impulse is the foreign reserve holdings. Calculated by the sum of responses for the entire periods.

(2) Directed Acyclical Graph (DAG) Analysis

The panel VAR model(3), [RESERVE, NETFLOW, CA], assumes the causality ordering in such way; (i) the foreign reserve holdings of the periphery('RESERVE') affects the net capital flow of the periphery('NETFLOW'), and current account of the periphery('CA'), (ii) the net capital flow('NETFLOW') affects current account of the periphery('CA').

Since all the three variables fail to accept normality hypothesis I use the GES(Greedy Equivalence Search) algorithrm to test the casuality ordering of the model. Since the main interest is to assess whether the casuality relationships are different between creditios and debtors I report the results by the two regions.

The results in the Table I-20 and Figure I-18 do not suggest any causality relations for the East Asian countries. In contrast, for the Latin American countries the results suggest the causality relations of 'NETFLOW → RESERVE' and 'CA → RESERVE'. It may imply that the reserve holding is not exogenous policy variable, rather determined by the net capital flow and current account for the debtors.

Table I-20. The Results of the GES Algorithm : RESERVE, NETFLOW, CA

Causality relations	East Asian countries			Latin American countries		
	Penality discount(p)			Penality discount(p)		
	0.001	0.02	p ≥ 0.04	0.001	0.02	p ≥ 0.06
RESERVE →NETFLOW	×	×	×	×	×	×
RESERVE → CA	×	×	×	×	×	×
NETFLOW → RESERVE	×	×	×	○	○	×
NETFLOW → CA	×	×	×	×	×	×
CA → RESERVE	×	×	×	○	×	×
CA → NETFLOW	×	×	×	×	×	×

* The number of the penality discount(α) affects which edges are discarded; the higher the penality discount, the more robust(i.e. certain) an edge must be to be remain in the graph.

* 'a → b' implies a causality relation from a to b.

* 'o' implies a casuality relation exist, while '×' suggests no casuality relation.

East Asian Countries	Latin American Countries

Figure I-18. DAG(Directed Acyclic Graph) : RESERVE, NETFLOW, CA

The penality discount(α) is 0.001.

4. Robustness Analysis

In order to assess the robustness of my results to alternative specifications, I replicate the empirical analysis using a different econometric estimator[24]. First, the results of the OLS estimator for the center generally accord with the previous results of the panel VAR model (1). Table I-21 suggests that an increase in the U.S. financial stress leads to a decline in the U.S. policy rate. It also indicates that a rise in the U.S. policy rate results in an increase in U.S. market rates.

Table I-21. The Result of OLS Estimator for Center (1)

	(1) usprate	(2) intl
usfs	-0.2790**	
	(0.0868)	
usprate		0.9731***
		(0.0822)
_cons	-0.0461	-0.0047
	(0.0521)	(0.0560)
N	75	131
r2	0.1240	0.5204
F	10.33	139.99

First difference data used. Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Moreover, Table I-22 suggests that an increase in the U.S. policy rate leads to a depreciation of 4.2% controlling other variables such as net capital flow, GDP growth, and current account growth. The results, however, do not suggest any statistically significant estimate for net capital flows due to the U.S. policy rate.

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[24] I use first difference or percent change data and they satisfy stationariety under the Dickey-Fuller test.

Table I-22. The Result of OLS Estimator for Center (2)

	(3) netflow	(4) neer
usprate	0.5031	-0.0422*
	(-22.8458)	(-0.0203)
intl	7.8819	
	(-41.9143)	
netflow		0.0000
		(-0.0001)
gdp		0.8707*
		(-0.3645)
ca		-0.0008
		(-0.0005)
_cons	2.3769	-0.0046
	(-2.3914)	(-0.0058)
N	131	131
r2	0.0007	0.0676
F	0.045	2.284

Percent change date used. Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001

Second, the results of a fixed effect panel regression for the creditors in the Table I-23 are similar to the previous results of the panel VAR model (2)-1, suggesting an increase in the U.S. policy rate leads to rises in the creditors' policy rates and a rise in the policy rate results in an increase in lending interest rates of the creditors. It also suggests that an increase in the lending interest rate brings about a decline in interest rate differentials of the creditors, implying that the increase in creditors' lending rates due to the shock in the U.S. policy rate is smaller than that of the center.

Table I-23.The Result of Fixed Effect Panel Estimator for Creditors

	(5) prate	(6) intl	(7) intd
usprate	0.2802***	-0.0933	-0.3082
	-0.0294		-0.5726
prate		0.1691***	0.4554
		-0.0199	
intl			-1.9248*
			-0.9272
_cons	0.0043	-0.005	-0.047
	-0.0046	-0.0031	-0.0914
N	1087	1003	1007
r2	0.0777	0.068	0.0045
F	90.7951	72.4435	2.2306

Percent change date used. Standard errors in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

In contrast, a fixed effect panel regression for the debtors in the Table I-24 suggests that an increase in the U.S. policy rate brings about a rise in interest rate differentials of the debtors, though the estimate is not statistically significant. This implies that the increase in debtors' lending interest rates due to the shock in the U.S. policy rate is larger than that of the center.

Table I-24.The Result of Fixed Effect Panel Estimator for Debtors

	(8) prate	(9) intl	(10) intd
usprate	-0.7185		2.1245
	(-37.2378)		(-3.745)
prate		0.5349***	0.9499
		(-0.0203)	
intl			0.8281
			(-1.5948)
_cons	7.1213	0.0139	-0.5644
	(-5.7982)	(-0.009)	(-0.6045)
N	1108	944	1005
r2	0	0.4273	0.0006
F	0.0004	696.8754	0.2885

Percent change date used. Standard errors in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Third, Table I-25 also presents similar results to the previous panel VAR model (2), suggesting that an increase in the U.S. policy rate leads to a decrease in net capital flows into the creditors' market while it results in a rise in net capital flows into the debtors' market, though the coefficients are not statistically significant.

Table I-25. The Result of Fixed Effect Panel Estimator for Model (2)

	Creditor		Debtor	
	(11)	(12)	(13)	(14)
	netflow	neer	netflow	neer
usprate	-0.3812	0.0115	0.0865	0.0069
	(3.2704)	(-0.0087)	(3.2032)	(0.0244)
netflow		0.0000		-0.0005*
		(-0.0001)		(0.0002)
gdp		0.0444**		-0.0002
		(-0.0146)		(0.0015)
ca		0.0001		0.0005
		-0.0001		(0.0003)
_cons	-1.3373**	-0.0055***	-0.4075	-0.0402***
	(0.4978)	(-0.0014)	(0.4975)	(0.0037)
N	1153	1033	1132	1087
r2	0.0004	0.0125	0.0000	0.0082
F	0.0136	3.2272	0.0007	2.2100

Percent change data used. Standard errors in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

Fourth, Table I-26 presents similar results to the previous panel VAR model (3), suggesting that an increase in the foreign reserve holdings leads to a decrease in net capital flows into the creditors' market and a rise in current accounts, while it results in a rise in the net capital flows into the debtors' market and a decline in current accounts, though the coefficients are not statistically significant.

Table I-26. The Result of Fixed Effect Panel Estimator for Model (3)

	Creditor		Debtor	
	(15)	(16)	(17)	(18)
	netflow	ca	netflow	ca
reserve	-1.6263	0.0284	0.9507	-1.0904
	(-3.0213)	(-2.0833)	(-0.7617)	(-0.5667)
gdp		-2.3372		-0.0278
		(-3.8395)		(-0.1521)
neer		7.8473		4.483
		(-7.3115)		(-3.0762)
_cons	-1.2909**	-0.0536	-0.4677	0.5588
	(-0.4998)	(-0.3349)	(-0.496)	(-0.3881)
N	1153	1040	1132	1087
r2	0.0003	0.0015	0.0014	0.0063
F	0.2898	0.5004	1.5581	2.2815

Percent change data used. Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001

VI. Conclusion

I study global imbalances from an angle of a triangular pattern of private capital flows among the center, creditor, and debtor periphery. Three hypotheses are set to note the role of structural asymmetries in the international financial arrangements (IFA) and to contrast adjustments of the three regions. They include: (i) an increase in the financial stress in the center leads to a decrease in the policy rate and market interest rate in the center, (ii) an increase in the policy rate in the center has asymmetric impacts on the three regions; while the interest rates and exchange rates of the center and creditors stabilize, those of debtors destabilize, and (iii) foreign reserve holdings in the periphery have asymmetric impacts on the creditors and debtors.

I apply panel vector autoregression (VAR) and directed acyclical graph (DAG) approach to quarterly macro data from the U.S., 9 East Asian, and 9 Latin American countries to test the

hypotheses. The results generally support the hypotheses. An increase in the U.S. financial stress decreases the U.S. policy rate or market interest rate by about 1.5% in the present period. The policy rates of creditors and debtors show a certain degree of synchronization with the U.S. policy rates. However, while the U.S. policy rate decreases interest rate differentials for creditors it causes the opposite for debtors. The shock in the U.S. policy rate results in a decline in net capital flows for the center and creditors, and increases in net capital flow for the debtors. The shock leads to depreciation for the periphery and appreciation for the center. The findings may evidence contrasting adjustments of the three regions. The debtors in particular, show unstable dynamics in interest and exchange rates, while the creditors indicate relatively stable ones. The paper also finds that an increase in foreign reserve holdings also has an asymmetric impact on the net capital flows and current accounts between the creditors and debtors. Specifically, the creditors take advantage of their foreign reserve holdings as 'self-insurance' to stabilize their net capital flows and as a 'mercantilist tool' to improve their current accounts, while the benefits for the debtors are limited.

These results have important policy implications. First, they suggest that global factor influences overall capital flow cycles, but leaves a large degree of heterogeneity attributable to regional determinants. This suggests that domestic policy has considerable room to affect capital flows to limit the negative externalities that make such economies more prone to financial instability. As evidenced in the East Asian countries, hoarding of foreign reserve may be helpful to mitigate disruptions caused by external shocks from the center. It, however, should not be overlooked that whatever benefits may seem to be the case for the creditors individually, their 'self-insurance' has not reduced global financial system risks, but merely transferred them from one party, the creditors and the center, to another, the debtors. Moreover, their 'mercantilist tools'

may also entail negative externalities leading to competitive hoarding beyond the desired level, thereby bringing about significant social costs. Given the limitations of the decentralized efforts by individual country international coordination seems to be inevitable to minimize the negative externalities of the capital flows in the world economy.

Second, the asymmetric features of the three regions may suggest a direction for such international coordination. Recognize that the greater fragility of financial systems on the periphery may put forward asymmetric approach; more stringent rule in the center. Given the influence of the US policy it needs to considering that managing excessive capital outflows from the center by establishing prudent capital regulations or levy taxes on the outflow of speculative capital. At the same time, the asymmetry between the debtors and creditors may case for the discussion that the Latin American countries, which do not have 'self-insurance', use capital controls to address both macroeconomic and financial stability concerns in the face of inflow surges which bypass regulated markets.

CHAPTER II

FOREIGN RESERVES, EXCHANGE RATE, AND DISTRIBUTION IN KOREAN

ECONOMY

I. Introduction

After the 1997 Asian financial crisis, several East Asian countries have accumulated official foreign reserves as a form of defense against the risks of speculative attacks and capital flow volatilities (Ben-Bassat & Gottlieb 1992, Feldstein 1999). Moreover, it has been argued that the foreign reserve holdings are byproducts of their exchange rate intervention policies to sustain their export-led growth (Dooley et al 2004, Summers 2004).

Korea, one of the East Asian countries, has a substantial portion of the world economy with the relatively large amount of foreign reserve holdings, export, and current account surplus. Table II-1 indicates that Korea's GDP is over 2%, its foreign reserve holdings is over 6%, total export is over 5%, and current account surplus is about 4% of the eight combined economies[25] respectively.

Table II-1. The Portion of the Korean Economy in the World Economy (Average, 2000~2011)

foreign reserve	export	current account	GDP
204,634	310,113	18,751	810,125
(0.061)	(0.051)	(0.037)	(0.022)

Source: IMF IFS, Unit: Mil. U$.

The ratios of Korea to total of eight combined economies in parentheses, the ratios of a country in current account are separately calculated by surplus and deficit countries. All values are averaged from 2000 to 2011.

In fact, Korea shows distinctive features in foreign reserve holdings, net capital flow, and current account after the Asian financial crisis. The left hand side of the Figure II-1 presents that

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[25] They include Korea, the U.S., Japan, China, U.K. EURO, Germany, and Taiwan.

Korea's foreign reserve holdings had remained below 20% of its GDP before the crisis, but they have sharply expanded since then, and now reach at almost its GDP level. Current account had largely been deficits before the crisis, but has shown mostly surpluses after then. Corresponding to the deficits position net capital flows had largely been positive before the crisis. After then net capital flows have been mostly positive and stable despite the surplus position except during the crisis and the 2007 global financial crisis. The right hand side of the Figure II-1 indicates that real effective exchange rate have largely been devalued after the crisis when Korea began to accumulate immense amount of foreign reserves. In this respect it is supposed that Korea's foreign reserve holdings have acted the role of 'self-insurance (Feldstein 1999)' to stabilize its net capital flows [26] and 'mercantilist tool (Dooley et al 2004, Summers 2004)' to improve its current account through maintaining its exchange rate undervalued. In this paper I will test the supposition by employing a vector autoregression (VAR) to quarterly time series data from Korea for 1980~2012 to illuminate the links among Korea's foreign reserve holdings, net capital flows, and current account.
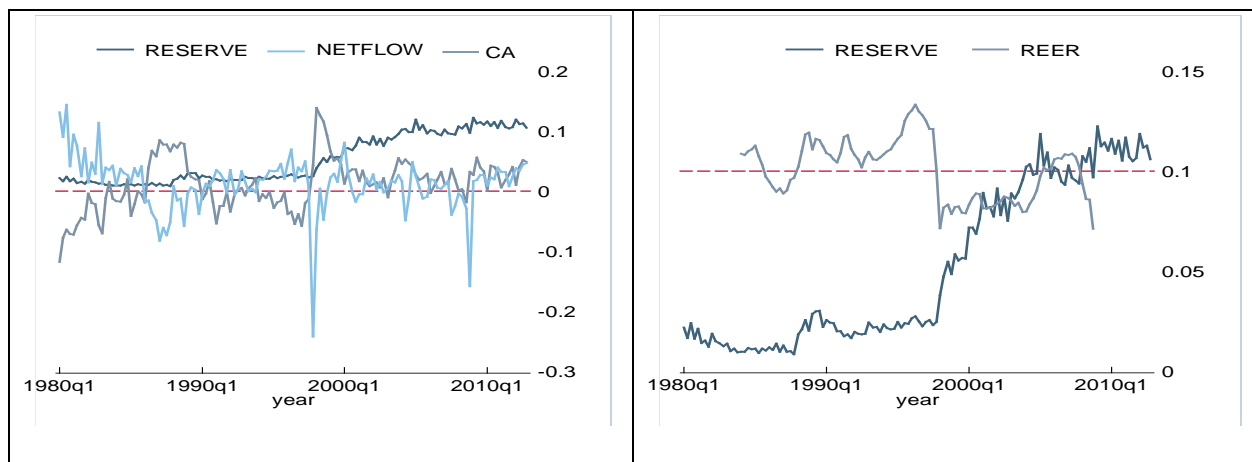
Figure II-1. Korea's Foreign Reserve Holdings, Capital Flows, Current Account, and Exchange Rate

Source: IMF IFS. Foreign reserve, net capital flow, and current account are defined by the ratio of GDP. Foreign reserve is scaled by 0.1. Real effective exchange rate is index (2005=0.1).

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[26] The self-insurance, however, could not depend against massive capital flow reversals during the two crises.

Even if the foreign reserve holdings may work as 'self-insurance' to stabilize capital flows and 'mercantilist tool' to sustain international competitiveness it would entail distributional consequences within economies by changing profit or wage share and import prices or export prices. The left hand side of the Figure II-2 shows the relationship among real effective exchange rate (REER), unit labor cost (ULC), and import prices (IMP). The REER and ULC generally move together while the REER and the import prices (IMP) mostly move the opposite direction. It implies that depreciation will result in a decline in unit labor cost and an increase in import prices while an appreciation will lead to a rise in unit labor cost and a decrease in import prices. The right hand side of the Figure II-2 shows the relationship among the REER, profit rate (PROFIT), and export prices (EXP). The REER largely moves counter to both the PROFIT and EXP. It suggests that depreciation will bring about a rise in the profit rate and export prices while an appreciation will lead to a decline in the profit rate and export prices. Thus, it is supposed that depreciation may result in distributional impact which is favorable to the capitalists while an appreciation is beneficial to the workers.
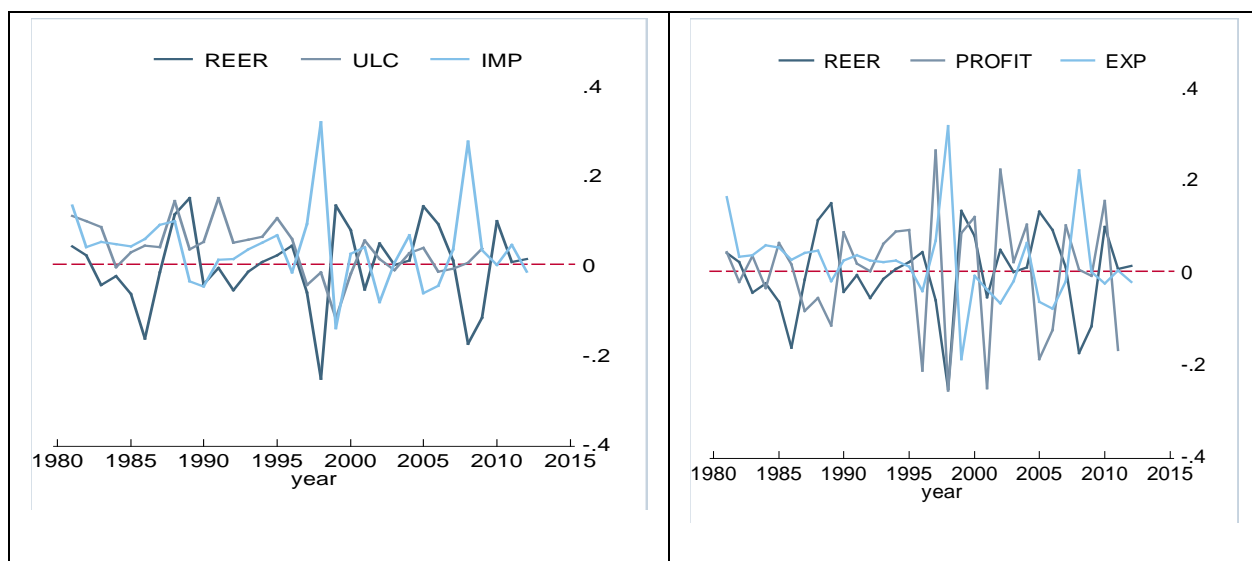
Figure II-2. Korea's Exchange Rate, Unit Labor Cost, Profit, and Import and Export Prices

Source: IMF IFS, The Bank of Korea. All variable is annual growth rate.

58

Together with the impact on economic growth the exchange rate may also have on impact on manufacturing labor markets by relocating resources between sectors of an economy as they reflect changes in relative prices of domestic and foreign goods. The left hand side of the Figure II-3 suggests that the ratio of manufacturing production to GDP has been relatively stable around or above 25% while the ratio of manufacturing employment to national employment has been decreased from about 20% to 15% after 2000. Skill-biased technological changes and globalization could be explanations for the decline in manufacturing employment. The former may decrease the demand for unskilled relative to skilled workers, and the latter have negative impact on manufacturing employment through an increased competition from emerging countries whose labor cost is relatively low. Moreover, exchange rate may also be an alternative explanation for the decline in manufacturing employment. The right hand side of the Figure II-3 shows the relationship between the REER and manufacturing employment. Before 2007 global financial crisis the REER largely moves counter to the manufacturing employment. It suggests that depreciation will bring about a rise in the employment while an appreciation will lead to a decline in the employment.
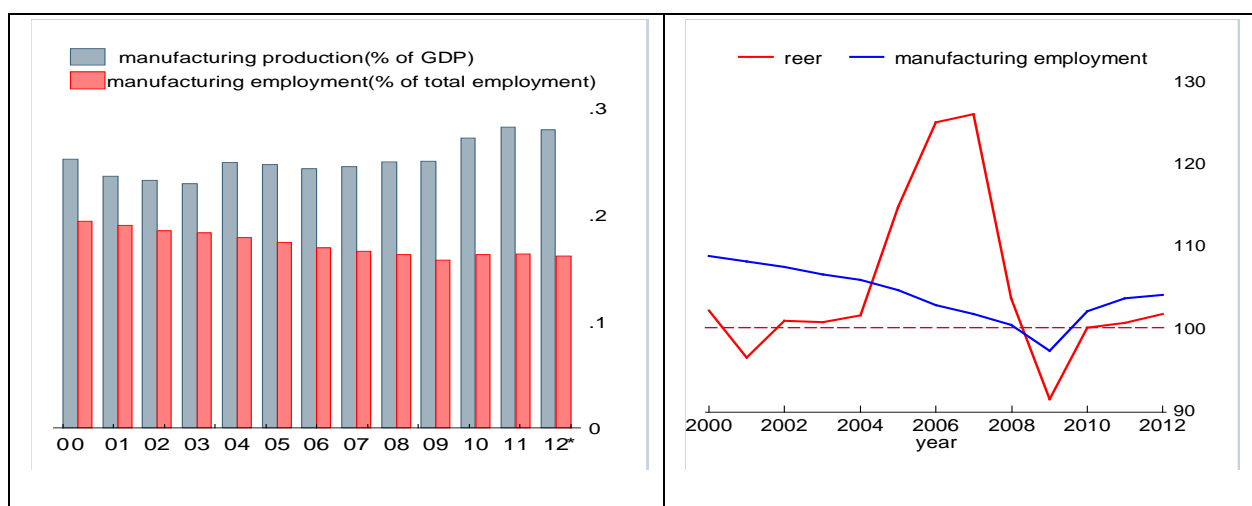
Figure II-3. Korea's Exchange Rate, Manufacturing Production, and Manufacturing Employment

Source: IMF IFS, The Bank of Korea. All variable is annual growth rate.

I will present a model to analyze the distributional consequences of the exchange rate within the Kaleckian open economy tradition and then test the supposition by employing both a static panel data analysis and a panel vector autoregression(VAR) approach to Korea's firm level annual panel data for 1980~2012. The main issue in the empirical analysis may be an inherent endogeneity in the relationship among exchange rate, labor or profit share, employment, and economic growth. Theoretical work provides arguments why exchange rate may affect labor or profit share, employment and economic growth, but also suggests that the distribution and growth may affect the exchange rate. In this context, the panel VAR approach may be suited to test the supposition. It is a flexible method that treats all the variables in the system as endogenous and independent, without worrying about causality direction.

I also employ Directed Acyclic Graph (DAG) theory to examine the causal pattern of contemporary relationships among the innovations in the panel VAR. While the previous studies largely focused on the macroeconomic aspects of exchange rate policies there have been relatively scarce in literature to deal with distributional outcomes of them. This paper contributes to fill the gap and provides new evidence.

The essay is organized as follows: Section II will review the literature both theoretical contributions and empirical studies. In Section III I will introduce a VAR model and macro quarterly dataset to examine the role of foreign reserve accumulation in Korean economy and presents the empirical results. Section IV discusses to setup a model for analyzing the distributional impacts of exchange rate within the Kaleckian tradition and introduces micro annual dataset and then presents the results of a static panel data analysis and panel vector autoregression (VAR) approach. Section VI concludes.

II. Literature Review

The following reviews literature regarding the role of foreign reserve accumulation, exchange rate exposure, and the impact of the exchange rate on distribution.

1. The Role of Foreign Reserve Accumulation

The sizable accumulation of foreign exchange reserves by the East Asian countries has been observed as a 'self-insurance' to the external shocks. For example, Ben-Bassat & Gottlieb (1992) viewed foreign reserves as output stabilizer which can reduce the probability of an output drop induced by a sudden stop. According to Feldstein (1999), they can provide self-protection through increased liquid foreign assets, which are better able to withstand panics in financial markets and sudden reversals in capital flows. The self-insurance may be rational from a macroeconomic perspective. It may not only reduce the costs of financial crisis, it may also make such crises less likely. It, however, will require compensating action on the part of monetary policy to absorb or sterilize the expansion in the domestic money supply associated with the accumulation of foreign reserves through the issue of domestic bonds. Such action ultimately will entail a significant cost for the central bank or treasury, which has to pay the interest burden on this debt. In this context it may be a 'conflicted virtue (McKinnon 2005)' with consequent costs on their economies. According to Rodrik (2006), the social cost of foreign reserves, which is the difference between the yield on reserve assets and the cost of foreign borrowing, is income loss amounts to close to one percent of GDP to the reserve holding countries.

Empirical studies on the role of foreign reserve holdings have no general conclusion. For example, Berkman et al (2009) did not find a statistically significant effect of the stock of foreign

reserves on growth revisions. On the other hand, Gourinchas & Obstfeld (2011) found that higher foreign reserves predict a sharply reduced probability of a subsequent crisis. A compromise view argued that "although large foreign reserve holding properly insulated countries from the common external shock, it may provide a particular country's policy space for implementing countercyclical policies on their own" (Bibow 2010).

An alternative interpretation for the foreign reserve holdings is a 'mercantilist tool' to facilitate growth by maintaining an undervalued real exchange rate. For instance, Eichengreen (2003), Dooley et al (2004), and Summers (2004) opined that hoarding foreign reserves is an integral part of a deliberate development strategy in the 'revived Bretton Woods system'. Aizenman & Lee (2006) argued that several East Asian countries switched to a 'monetary mercantilism' – hoarding foreign reserves in order to improve competitiveness- from the heritage of past financial mercantilism-subsidizing the cost of capital (Rodrik 1995). The mercantilist tool may lower the cost of hoarding through stabilize their international competitiveness related with exchange rate fluctuations due to volatile capital flows(Elson 2011, Lucarelli 2012). It, however, may entail negative externalities leading to competitive hoarding beyond the desired level (Aizenman & Lee 2007).

2. Exchange Rate Exposure

The impacts of exchange rate have been intensively studied in the 'exchange rate pass-through' and 'exchange rate exposure' literature. While the former examines change in foreign currency price of a firm the latter identify the responsiveness of its profits due to changes in exchange rate. The previous studies on the exchange rate exposure, which is main interest of this

essay, have provided theoretical models of firm behavior as a way of obtaining insights on the impacts of the exchange rate (Alder and Dumas 1989). Changes in exchange rate may influence firm's profit in a number of ways. For example, an appreciation will result in a loss of international price competitiveness of an exporting firm. To counteract the loss the firm may absorb part of the exchange rate change through a reduction in its mark-up rate, thereby decreasing its export prices in domestic currency through a 'competition effect channel'. At the same time, an appreciation will reduce the cost of imported intermediates. The decline in cost may mitigate the decline in mark-up rate and thereby profit rate through a 'sourcing effect channel'. Thus, the overall impact of an exchange rate shock depends on the extent to which a firm is involved in international transactions, either on the output or on the input side (Mauro et al 2008). Exposure may also be affected by the characteristics of a firm and competitive structure at the industry level. According to Dominguez (2008), exposure appears to be more prevalent in firms that are small or those involved in more competitive industrial structure, which are less likely to engage in hedging activities or adjust prices in response to exchange rate.

Empirical studies reported estimates of exposure elasticity. For example, using vector error correction model Clarida (1992) found that the long-run elasticity of real profits with respect to the real exchange exceeds 0.8. Hung(1992) presented that a 1 percent change in the U.S. dollar value(appreciation) decreases the profit of the U.S. manufacturing firm by 0.6 percent using 1970~1990 annual macroeconomic data. Kim and Davidson (1996) also reported a similar result suggesting the elasticity is 0.56 using 1975~1993 quarterly macroeconomic data. Klitgaard (1999) found that a 1 percent change in the Japanese yen leads to a 0.4 percent decline in export margins using annual macroeconomic data. In addition, Filippo et al (2008) suggested that the

response of firm profit to exchange rate changes is relatively stable over time for most countries using 1973~2007 annual data of 12,159 firms from six industrial countries.

3. The Impact of the Exchange Rate on Growth, Employment, and Distribution

Early studies largely focused on the macroeconomic aspects of exchange rate such as the impact on the current account, national income, and economic growth. For example, the elasticity approach focused on the impact of the exchange rate on national income through current account channel. The approach shows that devaluation can improve a country's trade balance only if the quantities of exports and imports respond sufficiently to the price changes brought about by the devaluation('Marshall-Lerner condition'). Monetarists view that devaluation can have only a transitory impact on the BOP because the BOP is a monetary phenomenon and not a real one (Whiteman, 1975). Krugman & Taylor (1978) is one of the few who noted the redistributive effects of exchange rate which are needed to be taken into account in evaluating the effectiveness of devaluation. They argued that devaluation could be deflationary especially under certain conditions such as (i) imports initially exceed exports, (ii) there are differences in consumption propensities from profit and wage, and (iii) government revenues are increased by devaluation, for example, when there are significant export taxes. The Washington Consensus (Williamson 1989) insists that real exchange misalignment imply macroeconomic imbalances that are themselves bad for growth. Rodrik (2008) defied the Washington Consensus arguing that undervaluation stimulate economic growth.

While the previous studies are inconclusive about the impact of exchange rate on growth they largely have in consensus on the effect of exchange rate on employment. For example,

Branson & Love(1988) found that an appreciation of the U.S. dollar had a strong negative effect on manufacturing employment using data for 70s and 80s for the U.S. Burgess & Knetter(1998) also concluded that an appreciation were associated with declines in manufacturing employments in G-7 countries.

There has been a relative scarcity of literature dealing with distributional outcomes of the exchange rate. To this Kalecki's work may provide a theoretical ground for the analysis to deal with the distributional aspect. The main determinant of the profit rate or profit share in Kaleckian closed economy model is the mark-up that firms impose on wage and material costs. The model can be applied to an open economy to deal with issues such as how exchange rate may affect the international competition and the distribution of income within a country, and how the distributional consequences affect the national income or economic growth. For example, depreciation may lead to a rise in profit share due to a gain of international price competitiveness. As income is redistributed to capitalists who have a lower marginal propensity to consume than workers, national income will tend to decline. On the other hand, the gain of international price competitiveness increases the current account with a raising effect in national income. Depending on the size of the impacts it may make the case for 'stagnationism' or 'wage-led demand' and 'exhilarationism' or 'profit-led demand' (Blecker 1999).

III. The Significance of Foreign Reserve Holdings on Macro Economy

1. VAR Model and Data

I assess the significance of foreign reserve holding on the Korean economy using the following VAR model.

$$Y_t = \Gamma_0 + \sum_{s=1}^{n} \Gamma_s \, Y_{t-s} + e_t,$$

where Y_t is data vector which includes foreign reserve holdings (RESERVE), net capital flow (NETFLOW), and current account (CA), and E[$Y_{t-s} e_{it}$] = 0, which implies satisfying orthogonality condition to allow consistency of the estimator.

Specifically I use the following sequencing:

[RESERVE, NETFLOW, CA]

The model assumes that the level of Korea's foreign reserve accumulation(RESERVE) is exogenously determined and then affects net capital flow(NETFLOW) and current account(CA). The assumption is in the same line with the literature which argues that creditor peripheries have a certain degree of policy autonomy in a regard that they can set the level of foreign reserve accumulation to stabilize capital flows (Eichengreen 2003, Mackinnon 2005, Vasudevan 2009, Elson 2011, Lucarelli 2012). Then, I observe whether Korea's foreign reserve holdings have acted the role of 'self-insurance' to stabilize its net capital flows[27] and 'mercantilist tool' to improve its current account.

I use the Korea's quarterly macroeconomic time series data for 1980~ 2012 obtained from the International financial statistics(IFS) of the International Monetary Fund. This data includes the stock of foreign reserve holding, net private capital flow, and current account. While the ratio of net capital flow and current account to the GDP satisfy stationarity condition, the ratio of foreign reserve holding to the GDP does not satisfy it.

I use first difference data for the latter to ensure stationary. The mean of the ratio of foreign reserve to GDP is 0.517 ranging from 0.081 to 1.223, that of net capital flow is 0.012 ranging from minus 0.243 to 0.143, and that of current account is 0.011 ranging from minus 0.118 to

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[27] I viewed that the foreign reserve acted the role of self-insurance if it results in limited impact on either net capital inflow or net capital outflow.

0.138. Appendix 4 illustrates the result of stationarity test and a full list of variables being used and provides summary statistics.

2. Result

The result in Table II-2 and Figure II-4 suggests that Korea's foreign reserve holdings, in general, have acted the role of 'mercantilist tool' to improve its current account as well as 'self-insurance' to stabilize its net capital flows.

The estimated coefficient of the foreign reserve holdings to the current account is 0.025 in the first column of the Table II-2, which suggests that a percent increase in foreign reserve holdings results in 2.5 percent improvement in the ratio of current account to GDP. The coefficient of the current account to the reserve holdings is 1.809 in the third column, which implies that Korea have accumulated reserves arisen from current account surplus. Moreover, the coefficient of the current account to the net capital flows is minus 0.250 in the third column as expected. The result, however, does not suggest statistically significant estimate for the net capital flow due to the change in exchange rate.

Table II-2. The Results of VAR : [RESERVE, NETFLOW, CA][28]

Response of	Response to		
	reserve(t-1)	netflow(t-1)	ca(t-1)
reserve(t)	-0.414(-2.84)***	0.062(0.06)	1.809(2.11)**
netflow(t)	-0.005(-0.33)	0.316(2.90)***	-0.250(-1.86)*
ca(t)	0.025(2.80)***	-0.312(-3.75)***	0.560(7.07)***
N obs	129		

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

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[28] The optimal lag selection is based on HQIC criterion.

The impulse-responses also suggest similar patterns. Moreover, they provide complementary outcomes for the impact of exchange rate on net capital flow. The first column of the Figure II-4 suggests that the shock in the reserve holdings increases net capital inflows into Korea at the current and first period and the impact decays after second period. This implies that the foreign reserves acted as a role of 'self-insurance'. The first column also suggests that the shock raises current account during the all period except the second period, which implies that the foreign reserves acted as a role of 'mercantilist tool'. The second column indicates that the impulse in the net capital flow decreases foreign reserve holding and current account. Furthermore, the third column presents that the impulse in the current account leads to a rise in reserve holdings while it cause a decline in net capital flows during the entire periods.
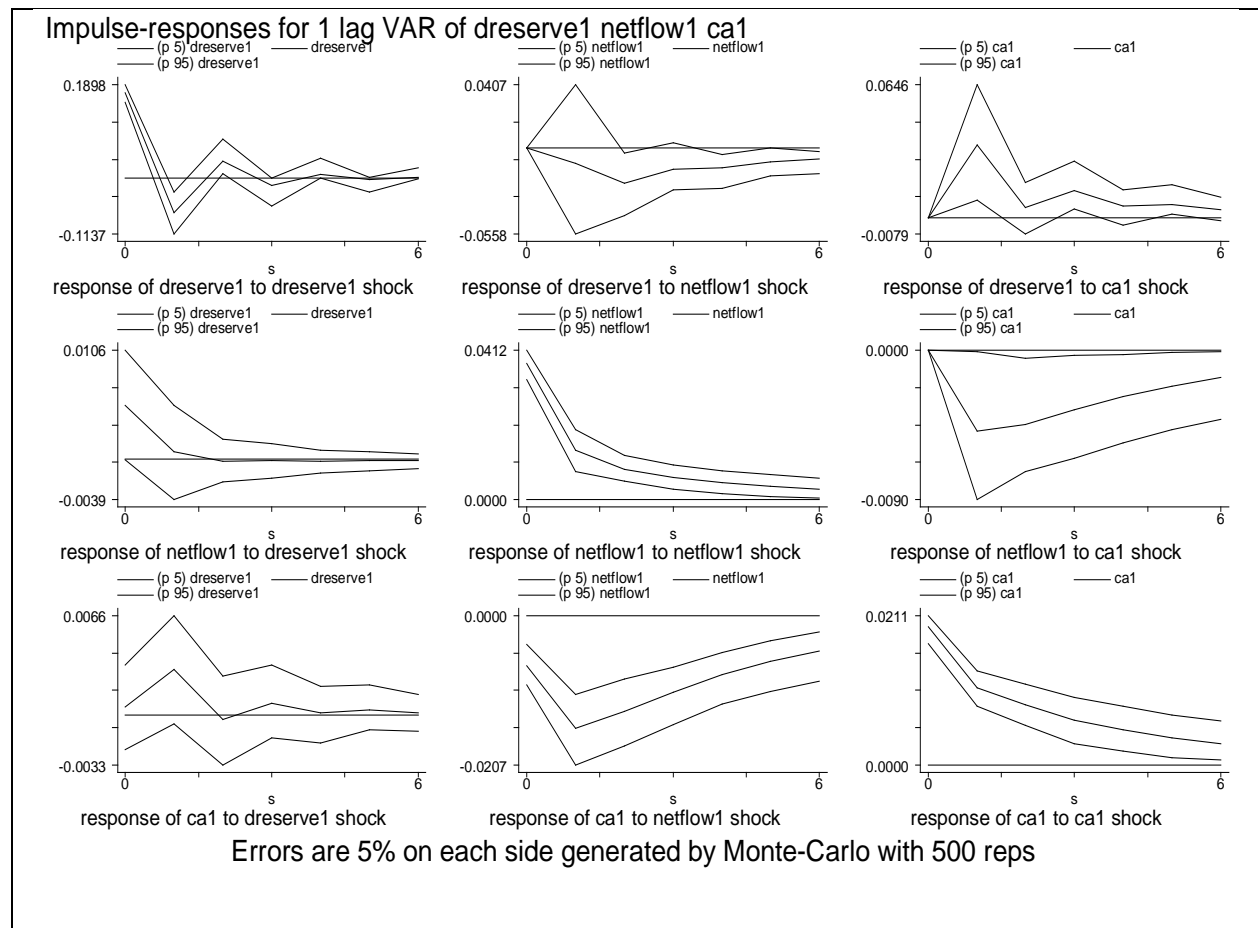
Figure II-4. The Impulse-responses of VAR : [RESERVE, NETFLOW, CA]

IV. The Impact of Exchange Rate on Distribution, Growth and Employment

1. A Kaleckian Open Economy Model

The previous section suggests that Korea's foreign reserves have acted the role of a booster for international competitiveness as well as a stabilizer for international capital flows. The consequence of the roles, however, is undervaluation, which may entail distributional impacts within economies by changing profit and wage share. The distributional outcomes then may impact on employment and economic growth by changing aggregate demand of an economy. To trace the impact of exchange rate on distribution and growth I employ Kalecki's theory of mark-up pricing by oligopolistic firms.[29] The extension of the Kaleckian model into open economy may be suited to analyze the impacts of exchange rate on income distribution, growth, and employment. In the open economy setting, exchange rate impacts on the mark-up pricing of firms in the markets. According to Kalecki, the level of mark-up determines functional income distribution between labor share and capitalist share in the industrial sector of the economy. Then, the income distribution impacts on the economic growth and employment through change in the investment and international price competitiveness of firms. This section provides an analytical framework for the impacts of the exchange rate on mark-up rate and wage share. SectionIV.4 presents empirical results on the impacts of the exchange rate on growth and employment.

The basic settings are as follows. Firms are characterized by their investment behavior and pricing behavior; i.e. firms set price as a mark-up over unit labor cost, reflecting an oligopolistic market structure.

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[29] The model developed here largely the same equations presented in Blecker(1999), but adds some modifications.

$$p = (1 + \tau)(wa) \tag{1}$$

$$\pi = [p - wa] / p \tag{2}$$

$$\pi = \tau/(1 + \tau) \tag{3}$$

$$\omega = 1/(1 + \tau) \tag{4}$$

Equation (1) represents the mark-up pricing formula, where $\tau > 0$ is the mark-up rate, w is the nominal wage rate and a is the labor coefficient. Thus, wa implies unit labor cost[30]. The profit share(π) is defined by the ratio of unit value added($p - wa$) to unit price(p). Substituting (1) into (2) suggests that the profit share is an increasing function of mark-up as in (3). Since the sum of profit share and wage share is unity, the wage share(ω) is defined by an decreasing function of mark-up as in equation (4), $[\omega = 1 - \pi = 1/(1 + \tau)]$.

Firm are assumed to have a target wage share$[\omega^f = 1/(1+\tau^f)]$ and a target exchange rate(ρ^f). The price adjustment function for firms is assumed to be specified in terms of differences in natural logarithms:

$$\hat{p} = \varphi(\ln \omega - \ln\omega^f) + \theta(\ln\rho - \ln\rho^f) \tag{5}$$

where φ is the speed of adjustment of the price when the actual wage share exceeds the firm's target wage share ω^f; and θ is the sensitivity of price increase when the actual exchange rate exceeds the target exchange rate ρ^f. It is assumed that both φ and θ is positive, which imply that firms respond to raise its price to absorb an increased wage cost and to make use of an improved international competitiveness.

$$\rho = ep^*/p \tag{6}$$

$$\rho = z\omega \tag{7}$$

---

[30] For simplicity it is assumed that there is no raw material cost.

The real exchange rate(ρ) is defined by equation $(6)^{31}$. Substituting (1) and (3) into (6) suggests that the exchange rate is the ratio of the domestic currency price of imports to the sum of unit labor cost($z= ep^*/wa$) multiplied by wage share(ω).[32] By substituting (7) into (5) I obtain:

$$\hat{p} = \varphi(\ln \omega - \ln \omega^f) + \theta(\ln z\omega - \ln z^f \omega^f) \tag{8}$$

Then, by setting $\hat{p} = 0$, a steady-state solution is obtained as follows:

$$\ln \omega = \ln \omega^f + \theta (\ln z - \ln z^f)/(\varphi + \theta) \tag{9}$$

From the equation (9) I get the following implicit functions:

$$\ln\omega = \omega (\omega^f, z^f), \quad \text{where } \frac{\partial ln\omega}{\partial ln\omega^f} = 1 > 0, \ \frac{\partial ln\omega}{\partial lnz^f} = -\theta/(\varphi + \theta) < 0 \tag{10}$$

Similar to the price adjustment function the exchange rate adjustment function is also assumed to be specified in terms of differences in natural logarithms;

$$\hat{\rho} = k(\ln \rho - \ln\rho^f) \tag{11}$$

where k is the speed of adjustment of the real exchange rate when the actual exchange rate(ρ) exceeds the firm's target exchange rate(ρ^f).

By setting $\hat{\rho} = 0$, a steady-state solution is obtained as follows.

$$\ln \rho = \ln\rho^f \tag{12}$$

By substituting (7) into (12) I obtain:

$$\ln z = \ln\omega^f + \ln z^f - \ln \omega \tag{13}$$

From (13) I get the following implicit functions:

$$\ln z = z (\omega^f, z^f), \quad \text{where } \frac{\partial lnz}{\partial ln\omega^f} = 1, \ \frac{\partial lnz}{\partial lnz^f} = 1 \tag{14}$$

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[31] Thus, an increase in ρ implies depreciation whereas a decrease in ρ appreciation.
[32] Z could be interpreted as terms of trade. Moreover, since Z = ρ/ω it is called the real exchange rate in efficiency-wage units(Blecker 1999).

Finally, I assume that the time derivatives $d(ln\,\omega^f)/dt$ and $d(ln\,z^f)/dt$ depend on the functions of $ln\omega = \omega\,(\omega^f, z^f)$ and $lnz = z\,(\omega^f, z^f)$. Then, by the implicit-function rule I get the following two demarcation curves in (ω^f, z^f) space.

$$\frac{dln\omega^f}{dlnz^f}\Big|_{ln\omega^{f'}=0} = -\frac{\partial\tau^e}{\partial\tau}\Big/\frac{\partial\tau^e}{\partial z} = \frac{\varphi+\theta}{\theta} > 1 \tag{15}$$

$$\frac{dln\omega^f}{dlnz^f}\Big|_{lnz^{f'}=0} = -(1/1) = -1 < 0 \tag{16}$$

While $\omega^{f'} = 0$ curve is positively sloped with its slope$(= \frac{\varphi+\theta}{\theta})$ is greater than one, $z^{f'} = 0$ curve is negatively sloped with its slope is equal to one.

The phase trajectories in Figure II-5 map out the dynamic movements of wage rate and exchange rate from any conceivable initial point. Here the equilibrium point E is a saddle point since the system has positive and negative real eigenvalues; small perturbations in z^f are stable while perturbations in ω^f are unstable. The point A, where the actual exchange rate exceeds the equilibrium rate implies depreciation. In that case the trajectories move from A to E suggesting that the wage share decreases and then increases to target wage share as the exchange rate decreases to target terms of trade level. In contrast, in the case of the point B, which implies appreciation, the trajectories move from B to E suggesting that the wage share increases and then decreases to target wage share as the exchange rate increases to target terms of trade level.

Based on the analysis I expect that a raise in exchange rate(depreciation) will results in a decrease of labor share(or unit labor cost) and an increase of mark-up rate or profit rate while appreciation will lead to a rise of labor share(or unit labor cost) and a decrease of mark-up or profit rate.
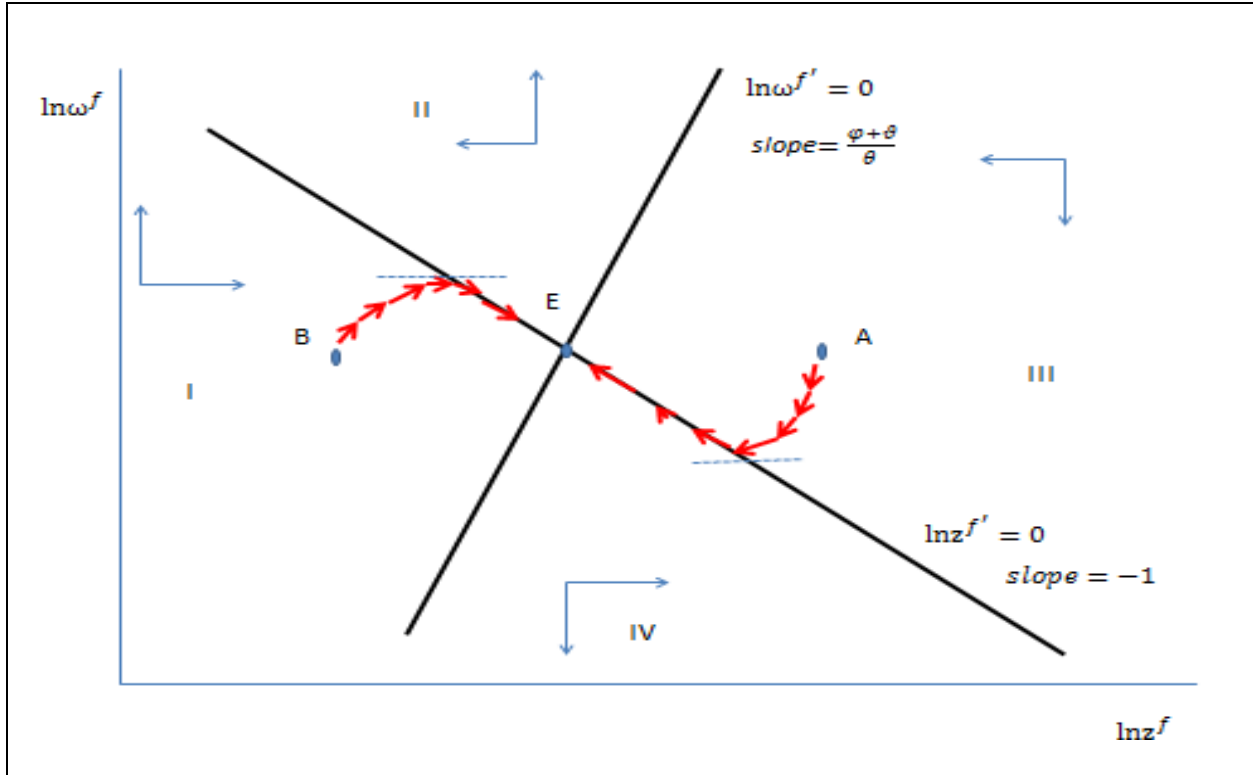
Figure II-5. The Phase Trajectories of Wage Share and Terms of Trade

While phase I and III are stable, phase II and IV are unstable.

2. Empirical Model and Data

I employ both a static panel data analysis and panel vector autoregression(VAR) model in order to estimate the impact of exchange rates on international competitiveness, income distribution, economic growth, and employment in the Korean economy. For the benchmark analysis, I first estimate the following relationship in the static fixed effect[33] panel data setting:

$$profit_{i,t}^{j} = \beta_0 + \beta_1 exchange\ rate + \sum_{k=2}^{n} \beta_k\ X_{ki,t}^{j} + \theta_i + \varepsilon_{i,t}$$

Here, for firm i in year t, $profit_{i,t}$ refers to operating profit rate, exchange rate indicates real effective exchange rate(reer) or nominal effective exchange rate(neer) or Korean won to U.S.

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[33] The results of Hausman test suggest that the null hypothesis that difference in coefficients not systematic is rejected at 1% level.

dollar exchange rate(wd), $X_{k\,i,t}$ are control variables, and θ_i is firm level fixed effect. For control variables I use both a firm specific factor such as unit labor cost and macro factors such as industry product growth rate, GDP growth rate, and world GDP growth rate.

Then, to assess the dynamic effects of exchange rate fluctuation on income distribution and growth I utilize the panel VAR methodology proposed by Holtz-Eakin et al(1988), Canova and Cicarelli(2004), and Love and Zicchino(2006). I estimate the following reduced form specifications incorporating both firm level and time fixed effects:

$$Y_{it}^j = \Gamma_0 + \sum_{s=1}^{n} \Gamma_s\, Y_{t-s}^j + f_i + d_{c,t} + e_{it},$$

where f_i is country dummy to reflect a firm level heterogeneity, $d_{c,t}$ is time dummy to reflect firm level shocks, $E[Y_{t-s}^j\, e_{it}] = E[f_i\, e_{it}] = E[\,d_{c,t} e_{it}]=0$ which implies satisfying orthogonality condition to allow consistency of the estimator. The data vector Y_{it}^j includes real effective exchange rate(REER), unit labor cost(ULC), profit rate(PRO), the number of employees(EM), and GDP growth rate(GDP). Specifically I use the following sequencing:

[REER, ULC, PRO, EM(or GDP)]

Since the firm level fixed effects are correlated with the regressors due to lags of the dependent variable, a forward mean-differencing, known as the 'Helmert procedure' proposed by Arellano and Bover(1995) is used. In addition, the time dummy is removed by subtracting the means of each variable for each country. The panel VAR specification allows producing impulse-response functions that describe the reaction of one variable to the shocks in other variables in the system, while holding all other shocks equal to zero. The shocks in the Panel VAR are orthogonalized by adopting a particular ordering and allocating any correlation between

the residuals of any two elements to the variable that comes first in the ordering. [34] The identifying assumption is that 'the variables that come earlier in the ordering affect the following variables contemporaneously, as well as with a lag, while the variables that come later affect the previous variables only with a lag' (Love and Zicchino 2006). Thus, the above panel VAR specification assumes that the exchange rate, which is exogenously set, has an impact on the labor cost and profit. Moreover it also assumes that the income distribution, which is determined by the exchange rate, impacts on growth. Confidence intervals of the impulse-response are generated by Monte Carlo simulations using the standard errors from the estimated VAR coefficients.

Together with examining the overall impacts of exchange rate fluctuations I also investigate how the impacts are different according to the characteristics of firms. For this I segment the data set according to firm's scale(large or small firm which is defined by Korea's competition law), export ratio in relation to the total sales(above and below the mean of export ratio), and productivity level which is measured by a ratio of sale in relation to the number of full time employees(above and below the mean of productivity).

I combine macro-economic annual time series data and firm level micro annual panel data. Macro annual time series data from 1980 to 2012 are taken from the IMF IFS, World Bank WDI, and the Bank of Korea. They include information on annual growth rate of Korea's industry production by sectors, GDP growth, world GDP growth, real effective exchange rate, nominal effective exchange rate, and Korean won to U.S. dollar exchange rate[35].

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[34] The procedure is known as Choleski ordering which is a method used to orthogonalize the error term in a VAR or VECM to impose a recursive structure on the dynamic model, so that the resulting impulse-response functions can be given a causal interpretation.

[35] While an increase in the real effective exchange rate and nominal effective exchange rate imply appreciation, an increase in Korean won to US dollar exchange rate implies depreciation.

Micro panel data are obtains from the annual financial statements of the listed firms in Korea. The data covers 1,127 manufacturing firms which are listed in 2013 and it dates back to 1980. The number of small firms is 548 among total 1,127 firms[36]. The mean values of the ratio of export to sale, mark-up rate which is measured by the ratio of operating profit to sale, and unit labor cost which is defined by the ratio of labor cost to sale are 46.8% and 6.2%, and 5.5% respectively.

Table II-3 presents the mean values by firm's scale, export ratio, and productivity level. The average number of full time employees of large firms is almost 7 times bigger than that of small firms. While large firms are higher in productivity and profit rate than small firms, there is no big difference in export ratio between them. Employment and profit rate show relatively small difference by the export ratio or productivity level.

Table II-3. Summary Statistics by Scale, Export Ratio, and Productivity

Variable	Scale		Export ratio		Productivity	
	Large firm	Small firm	High export	Low export	High prod.	Low prod.
Large firm ratio	1 (0.00)	0 (0.00)	0.470631 (0.50)	0.627421 (0.48)	0.490737 (0.50)	0.546109 (0.50)
Export ratio	0.45013 (5.68)	0.497766 (9.39)	1.059813 (12.49)	0.160275 (0.14)	0.404794 (0.37)	0.503006 (9.10)
Productivity	3.93E+08 (5.89E+08)	2.8E+08 (3.72E+08)	3.43E+08 (5.28E+08)	3.5E+08 (4.92E+08)	7.87E+08 (7.48E+08)	1.52E+08 (9.09E+07)
Employment	1324.048 (4311.31)	189.7304 (1155.02)	938.2354 (4136.40)	735.5103 (2191.04)	1040.886 (4802.58)	762.9002 (2564.87)
Profit rate	0.072477 (0.09)	0.049158 (0.15)	0.061948 (0.12)	0.06363 (0.11)	0.061514 (0.09)	0.063234 (0.13)

Mean value. Standard deviation in parentheses.

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[36] The definition for large firms is firms which are under the regulation on mutual investments among each other in a corporate group which is designated by the Korea's Monopoly regulation and Fair trade Act. The definition for small firms is firms whose full-time employees are under 300 or whose gross capital is under 8 bil. Korean won.

Appendix 5 illustrates the list of variables being used and provides summary statistics. All of the firm level data are ratios while all the macro data are annual growth rates[37]. In line with previous empirical studies I use the original data in the static fixed effect panel analyses. In dynamic panel VAR analysis I transformed the micro data into annual growth rates to ensure stationary.

3. Results of Fixed Effect Panel Regressions

(1) The Result for the Entire Firms

The results presented in Table II-4 generally correspond with the theories suggesting that depreciation(appreciation) is beneficial(harmful) to the performance of the Korean manufacturing firms. A percent increase of real effective exchange rate or nominal effective exchange, i.e. appreciation, degrades mark-up rate [38] by 8.63% or 9.92%. In contrast, a percentage increase of Korean Won to US dollar exchange rate, i.e. depreciation, improves the mark-up rate by 10.7%.

The size of the elasticity is bigger than the previous studies implying that exchange rate has more significant impacts on firm's performance in Korea than other countries. For example, Hung(1992) and Kim & Davidson(1996) reported the elasticity is 6~8% for the U.S. manufacturing firms. Moreover, Klitgaard(1999) suggested the elasticity is 4% for the Japanese

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[37] Thus, all the macro data are percentage change they revealed stationary under the Dicky-Fuller test.

[38] Since the profit rate is an increasing function of mark-up rate I use the two terms equivalently.

manufacturing firms. While the coefficient of unit labor cost is negative all the other coefficients

such as industry product, domestic and world GDP growth indicate positive as expected[39].

Table II-4. The Result of Fixed Effect Regression for the Entire Firms

	(1)	(2)	(3)
	profit	profit	profit
ulc	-0.0861***	-0.0863***	-0.0864***
	(-0.0015)	(-0.0015)	(-0.0015)
ip	0.0381***	0.0382***	0.0456***
	(-0.0075)	(-0.0075)	(-0.0075)
gdp	0.3599***	0.3780***	0.4604***
	(-0.0248)	(-0.0248)	(-0.0261)
wgdp	0.1106*	0.1651**	0.1389**
	(-0.0512)	(-0.0517)	(-0.0494)
reer	-0.0863***		
	(-0.0085)		
neer		-0.0992***	
		(-0.0083)	
wd			0.1070***
			(-0.0069)
_cons	-0.2416***	-0.2466***	-0.2517***
	(-0.0052)	(-0.0052)	(-0.0052)
N	23886	23886	23886
r2	0.1421	0.1436	0.1472
F	753.7621	763.3372	785.7584

Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001

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[39] The dependent variable is profit rate. The independent variables include the log value of unit labor cost, growth rate in industry production, GDP growth, world GDP growth, and exchange rate. Thus, all the coefficients can be interpreted as the response of profit rate due to a percentage in the independent variables.

(2) The Result by Firm's Scale(Large vs. Small firms)

The effects of exchange rate fluctuations on the firm's profit depend on the characteristics of firms. First, the magnitude of the exchange rate exposure is different between large firms and small firms[40]. The result in Table II-5 suggests that the small firms are more sensitive to the exchange rate fluctuation than the large firms. While the impacts of exchange rates on profit for the large firms range from minus 8.2% to plus 8.2% those for the small firms range from minus 11.7% to plus 13.1%. This may imply that large firms have more ability to hedge the changes of exchange rate or pass-through them on export prices than the small firms. The result also suggests that the size of (negative) impact of unit labor cost on profit for small firms is more than three times bigger than the size for the large firms. It may imply that labor costs are more important factor in production for small firms than large firms.

Table II-5. The Result of Fixed Effect Regression by Large and Small Firms

	Large firms			Small firms		
	(4)	(5)	(6)	(7)	(8)	(9)
	profit	profit	profit	profit	profit	profit
ulc	-0.0445***	-0.0447***	-0.0450***	-0.1334***	-0.1334***	-0.1332***
	(-0.0016)	(-0.0016)	(-0.0016)	(-0.0027)	(-0.0027)	(-0.0027)
ip	0.0503***	0.0502***	0.0561***	0.0163	0.0168	0.0256
	(-0.0077)	(-0.0077)	(-0.0077)	(-0.0139)	(-0.0139)	(-0.0139)
gdp	0.3172***	0.3294***	0.3863***	0.3816***	0.4059***	0.5148***
	(-0.0245)	(-0.0245)	(-0.0259)	(-0.0491)	(-0.0492)	(-0.0514)
wgdp	0.0145	0.0599	0.0282	0.2152*	0.2708**	0.2429**

[40] See footnote 13 for the definition of small and large firm.

	(-0.0525)	(-0.0532)	(-0.0511)	(-0.0951)	(-0.0958)	(-0.0907)
dreer	-0.0721***			-0.1029***		
	(-0.0084)			(-0.0168)		
dneer		-0.0819***			-0.1168***	
		(-0.0082)			(-0.0161)	
dwd			0.0818***			0.1312***
			(-0.007)			(-0.013)
_cons	-0.1035***	-0.1079***	-0.1118***	-0.3719***	-0.3770***	-0.3823***
	(-0.0058)	(-0.0059)	(-0.0059)	(-0.0085)	(-0.0085)	(-0.0085)
N	13814	13814	13814	10072	10072	10072
r2	0.0839	0.0857	0.0882	0.2191	0.2203	0.2242
F	242.4031	247.9316	256.0759	534.1925	538.0065	550.3988

Standard errors in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

(3) The Result by Firm's Export Ratio

Second, the impact of the exchange rate change on firm's profit is also different according to the level of export ratio. The result in Table II-6 shows that high exporters whose export ratios are above the mean are more sensitive to the exchange rate fluctuation than low export ratio firms. While the impacts of exchange rates on profit for the former range from minus 11.9% to plus 12.2% those for the latter range from minus 6.3% to plus 7.6%. The result also suggests that the size of (negative) impact of unit labor cost on profit for high export firms is slightly smaller than that of the low export firms. It may imply that labor costs are more important factor in production for domestic market oriented firms than high export firms. Moreover, world GDP growth has more significant effects on high export firms as expected.

Table II-6. The Result of Fixed Effect Regression by Export Ratio

	Export ratio ≥ mean			Export ratio < mean		
	(10)	(11)	(12)	(13)	(14)	(15)
	profit	profit	profit	profit	profit	profit
ulc	-0.0886***	-0.0888***	-0.0892***	-0.0929***	-0.0929***	-0.0927***
	(-0.002)	(-0.002)	(-0.002)	(-0.0026)	(-0.0026)	(-0.0026)
ip	0.0394***	0.0386***	0.0438***	0.0319**	0.0327**	0.0413***
	(-0.01)	(-0.0099)	(-0.0099)	(-0.0113)	(-0.0113)	(-0.0114)
gdp	0.3020***	0.3257***	0.4278***	0.3862***	0.4023***	0.4737***
	(-0.0347)	(-0.0349)	(-0.0371)	(-0.0361)	(-0.0361)	(-0.0385)
wgdp	0.0378	0.0942	0.0776	0.0978	0.1441*	0.1264
	(-0.0724)	(-0.0733)	(-0.0704)	(-0.0686)	(-0.0693)	(-0.0656)
dreer	-0.0974***			-0.0502***		
	(-0.0121)			(-0.0115)		
dneer		-0.1108***			-0.0634***	
		(-0.0118)			(-0.0112)	
dwd			0.1218***			0.0758***
			(-0.0099)			(-0.0098)
_cons	-0.2507***	-0.2563***	-0.2639***	-0.2557***	-0.2592***	-0.2627***
	(-0.007)	(-0.0071)	(-0.0071)	(-0.0084)	(-0.0084)	(-0.0084)
N	13377	13377	13377	10509	10509	10509
r2	0.1508	0.1524	0.1568	0.1473	0.1485	0.1509
F	436.1444	441.4977	456.5531	330.8237	333.927	340.4699

Standard errors in parentheses, * p<0.05, ** p<0.01, *** p<0.001

(4) The Result by Firm's Productivity Level[41]

Third, the level of productivity also results in different magnitude of exchange rate exposure. The result in Table II-7 shows that high productivity firms whose sale to employees ratios are above the mean are less sensitive to the exchange rate fluctuation than low productivity firms. While the impacts of exchange rates on profit for the former range from minus 4.9% to plus 5.2% those for the latter range from minus 8.5% to plus 10.5%. The result also suggests that the size of (negative) impact of unit labor cost on profit for low productivity firms is larger than that of the high productivity firms. It may imply that labor costs are more important factor in production for low productivity firms than high productivity firms. Moreover, environmental factors such as domestic and world GDP growth have more significant effects on low productivity firms than high productivity firms.

Table II-7. The Result of Fixed Effect Regression by Productivity

	Productivity ≥ mean			Productivity < mean		
	(16)	(17)	(18)	(19)	(20)	(21)
	profit	profit	profit	profit	profit	profit
ulc	-0.0553***	-0.0553***	-0.0553***	-0.1128***	-0.1126***	-0.1115***
	(-0.0025)	(-0.0025)	(-0.0025)	(-0.0021)	(-0.0021)	(-0.0021)
dip	0.0553***	0.0540***	0.0549***	0.0274**	0.0274**	0.0348***
	(-0.0121)	(-0.0121)	(-0.012)	(-0.0091)	(-0.0091)	(-0.0091)

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[41] Productivity, in general, is defined by the ratio of output to inputs. I use the labor productivity measured by the ratio of sale to the number of employees. The measure, however, does not exactly correspond with the productivity concept because sale is influenced by not only labor inputs but also demand.

	(1)	(2)	(3)	(4)	(5)	(6)
gdp	0.1657***	0.1825***	0.2092***	0.3238***	0.3476***	0.4675***
	(-0.0422)	(-0.0429)	(-0.043)	(-0.0318)	(-0.032)	(-0.0351)
wgdp	-0.0752	-0.0543	-0.0445	0.135	0.1979**	0.1778**
	(-0.0626)	(-0.0632)	(-0.0609)	(-0.0708)	(-0.0719)	(-0.0689)
dreer	-0.0430**			-0.0683***		
	(-0.0131)			(-0.0106)		
dneer		-0.0491***			-0.0845***	
		(-0.0128)			(-0.0104)	
dwd			0.0517***			0.1051***
			(-0.0102)			(-0.0091)
_cons	-0.1468***	-0.1489***	-0.1504***	-0.3061***	-0.3106***	-0.3154***
	(-0.0093)	(-0.0093)	(-0.0093)	(-0.0066)	(-0.0067)	(-0.0067)
N	7695	7695	7695	16191	16191	16191
r2	0.0782	0.0788	0.0802	0.1821	0.1834	0.187
F	114.0676	114.9243	117.271	673.133	679.0044	695.3593

Standard errors in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

(5) The Result by Sectors

The results of the regression by sector verify the previous outcomes. Sectors whose sensitivity of exchange rate is high include 4(textiles), 6(tanning and dressing of leather, luggage, and footwear), 12(pharmaceuticals, medicinal chemicals and botanical product), 17(electronic

components, computer, radio, television and communication equipment and apparatus), and 19(electrical equipment). Those sectors generally accompany high export ratio, small and low productivity firms. For example sector 17 shows its export ratio is 84%, large firm ratio is 39% or equivalently small firm ratio is 61%, and the productivity level is below the mean of the entire firms.

On the other hand, sectors whose sensitivity of exchange rate is low suggest 8(pulp, paper and paper products), 11(chemicals and chemical products), 15(basic metals), 16(fabricated metal products), and 21(motor vehicles, trailers and semitrailers). Those sectors largely go with low export ratio, large and high productivity firms. For example sector 15 shows its export ratio is 30%, large firm ratio is 71%, and productivity is above the mean of the entire firms. Sector 21 suggests that large firm(the ratio is 63%) can mitigate the impact of exchange rate fluctuation though it is high exporter(69%) and low productivity industry.

Moreover, sector 2(beverage products) and 3(tobacco products) presents the impact of exchange rate is the opposite of general cases. For the sectors appreciation results in improving profit while depreciation leads to degrading profit. It implies those sectors largely depend on imported intermediate goods for their production and operate mainly in domestic markets and very low export ratio. The cases suggest that the 'sourcing effect' outweighs the possible 'competition effect'.

Table II-8. The Result of Fixed Effect Regression by Sector

sector[42]	(22)		(23)		(24)		Exp[43]	Scale[44]	Prod[45]
	_b_reer	se	_b_neer	se	_b_wd	se			
1	-0.0154	0.02	-0.0164	0.02	0.0224	0.01	0.12	0.81	1.01
2	0.1525**	0.05	0.1556**	0.05	-0.1556***	0.04	0.05	0.67	0.87
3	0.3451	0.31	0.3404	0.30	-0.4660*	0.17	0.13	1.00	1.35
4	-0.1277**	0.04	-0.1376**	0.04	0.1283***	0.04	0.61	0.47	0.60
5	0.0866	0.04	0.0726	0.04	-0.0618	0.04	0.26	0.79	0.99
6	-0.1483*	0.07	-0.1459*	0.06	0.1034	0.05	0.74	0.40	0.75
7	-0.1043	0.06	-0.1142	0.06	0.1041*	0.05	0.12	1.00	0.91
8	-0.0243	0.03	-0.0417	0.03	0.0470*	0.02	0.19	0.65	1.11
9	-1.0132	0.51	-1.0069	0.49	1.0148	0.48	0.16	0.00	0.71
10	0.0048	0.04	-0.0057	0.04	-0.0008	0.03	0.33	1.00	4.71
11	-0.0909***	0.02	-0.0994***	0.02	0.1013***	0.02	0.38	0.65	1.43

[42] Sector 1.Food Products(1,226), 2.Beverage Products(258), 3.Tobacco Products(20), 4.Textiles(507), 5.Wearing apparel, Clothing Accessories and Fur Articles(506), 6.Tanning and Dressing of Leather, Luggage and Footwear(148), 7.Wood and Products of Wood and Cork(Except Furniture)(83), 8.Pulp, Paper and Paper Products(875), 9.Printing and Reproduction of Recorded Media(14), 10.Coke, hard-coal and lignite fuel briquettes and Refined Petroleum Products(117), 11.Chemicals and chemical products(2,282), 12.Pharmaceuticals, Medicinal Chemicals and Botanical Products(2,001), 13.Rubber and Plastic Products(751), 14.Non-metallic Minerals(917), 15.Basic Metals(2.032), 16.Fabricated Metal Products(1,007), 17.Electronic Components, Computer, Radio, Television and Communication Equip(4,473), 18.Medical, Precision and Optical Instruments, Watches and Clocks(681), 19. Electrical equipment(1,149), 20.Other Machinery and Equipment(2,419), 21.Motor Vehicles, Trailers and Semitrailers(1,741),, 22.Other Transport Equipment(360), 23.Furniture(232), 24.Other Products(87). The number of observations of each sector is in parenthesis.

[43] The mean of export ratio
[44] The mean of scale (large firm=1, small firm=0)
[45] The mean of productivity

12	-0.1142***	0.03	-0.1362***	0.03	0.1266***	0.02	0.56	0.51	0.46
13	-0.0433	0.03	-0.0465	0.03	0.0583*	0.03	0.46	0.46	0.71
14	-0.023	0.03	-0.0319	0.03	0.0487	0.03	0.10	0.76	0.94
15	-0.0714***	0.02	-0.0821***	0.02	0.0449***	0.01	0.30	0.71	1.84
16	-0.0905***	0.02	-0.0837***	0.02	0.0602**	0.02	0.28	0.47	0.94
17	-0.1789***	0.03	-0.1899***	0.03	0.2359***	0.02	0.84	0.39	0.92
18	-0.0981	0.07	-0.0986	0.07	0.096	0.05	0.40	0.11	0.61
19	-0.1754***	0.04	-0.1677***	0.04	0.1633***	0.03	0.38	0.44	0.88
20	-0.1070***	0.03	-0.1129***	0.03	0.1054***	0.03	0.29	0.38	0.85
21	-0.0401	0.02	-0.0439*	0.02	0.0438*	0.02	0.69	0.63	0.82
22	-0.0454	0.06	-0.0371	0.06	0.087	0.05	0.60	0.61	0.98
23	0.0381	0.04	0.0245	0.04	-0.0174	0.04	0.13	0.60	0.86
24	0.1121	0.20	0.1049	0.19	-0.0775	0.15	0.43	0.25	0.80

* p<0.05, ** p<0.01, *** p<0.001.

4. Results of Panel VAR Models

(1) The Result for the Entire Firms

The results presented in Table II-9 generally correspond with the theoretical expectation suggesting that depreciation leads to a decline in unit labor cost and a rise in profit rate and growth rate. The second column in the Table II-9 suggests that an increase of real effective

exchange rate, i.e. appreciation, results in an increase of unit labor cost by 0.237 with one lag and 0.116 with two lags. The third column presents that an increase of unit labor cost leads to a decline of profit rate by 0.01 with two lags. The fourth column suggests that an appreciation bring about decline in GDP growth rate by 18.861 with one lag and increase by 1.998 with two lags. The fourth column also indicates that an increase in unit labor cost results in decrease in growth rate by 0.124 with one lag and increase by 0.004 with two lags. The result, however, does not suggest any statistically significant estimates for the impact of exchange rate on profit.

Table II-9. The Result of Panel VAR Model(1): [REER, ULC, PRO, GDP]

Response to	Response of			
	reer(t)	ulc(t)	pro(t)	gdp(t)
reer(t-1)	0.477***(110.15)	0.237***(6.23)	0.695(0.30)	-18.86***(-67.2)
ulc(t-1)	-0.003***(-2.50)	-0.054***(-3.82)	-0.999(-0.07)	-0.124**(-1.96)
pro(t-1)	0.000(-1.42)	0.000(0.43)	-0.001(-0.86)	0.000(-0.01)
gdp(t-1)	0.014***(93.33)	0.001(0.70)	-0.027(-0.38)	0.217***(24.31)
reer(t-2)	-0.281***(-71.90)	0.116***(3.66)	-3.296(-1.24)	1.998***(10.93)
ulc(t-2)	0.000**(-1.98)	-0.002***(-8.69)	-0.010**(-2.23)	0.004***(13.80)
pro(t-2)	0.000(1.45)	0.000(1.63)	-0.001(-0.47)	0.000(0.88)
gdp(t-2)	-0.014***(-97.18)	-0.002***(-2.71)	-0.012(-0.21)	0.450***(49.30)
N. Obs	18250			

t-statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

The impulse-responses in Figure II-6 present largely similar results and they also provide complementary outcomes for the impact of exchange rate on profit. The first column suggests that an increase of real effective exchange rate results in an increase of unit labor cost for the first three periods. Profit rate fluctuated, but overall declined due to the impact of exchange rate. GDP growth rate is declined due to the shock. The second column presents that an increase of unit labor cost leads to a decline of profit rate. GDP growth fluctuated, but largely declined due to the

shock in unit labor cost. The third column suggests that an increase of profit rate bring about rise in GDP growth rate.
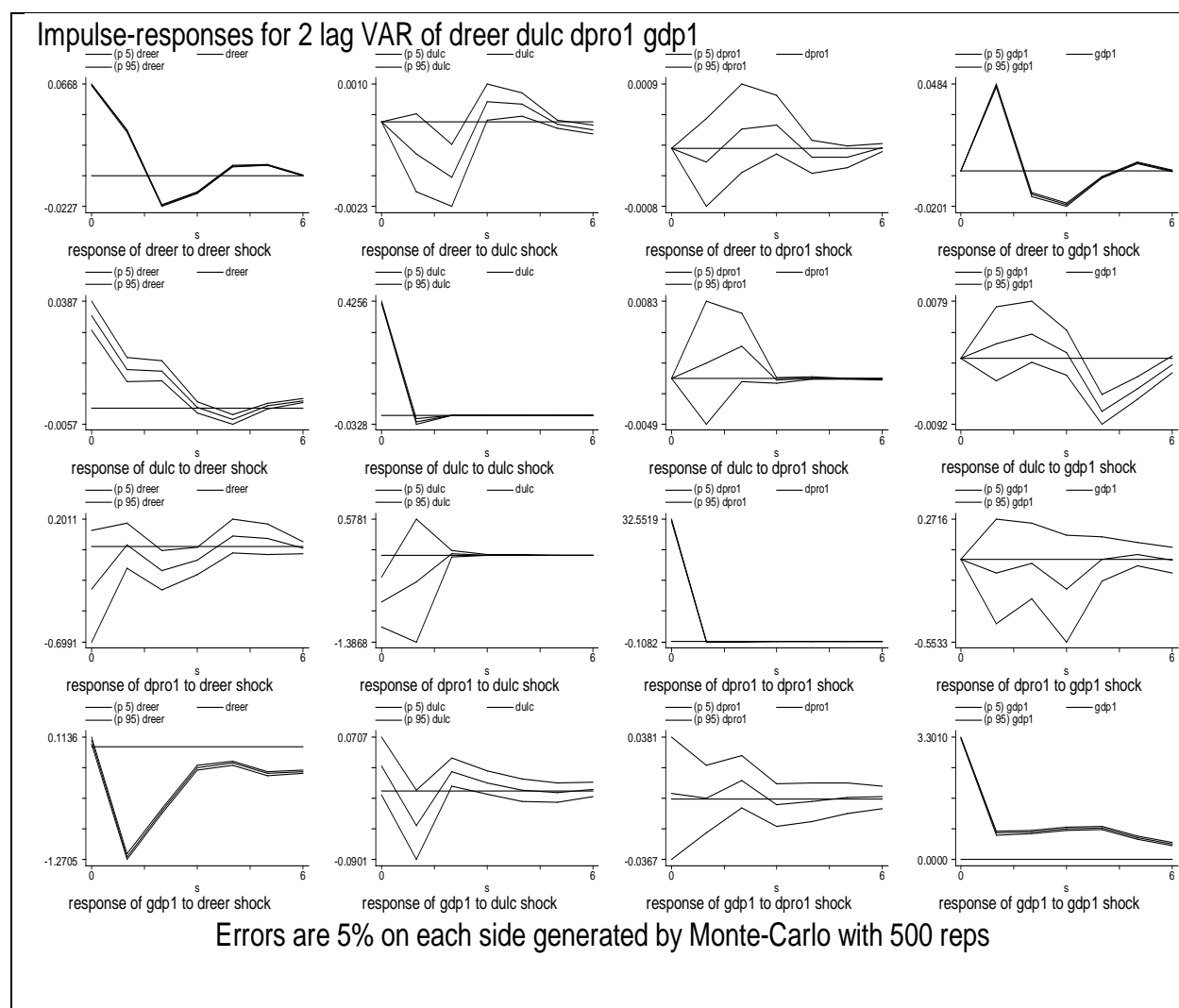
Figure II-6. The Impulse-responses for Panel VAR Model(1) [REER, ULC, PRO, GDP]

The theoretical expectation for the impact of exchange rate on employment is also verified. The fourth column in Table II-10 suggests that an appreciation bring about decline in manufacturing employment rate by 0.243 with two lags. The fourth column also indicates that an increase in unit labor cost results in decrease in manufacturing employment by 0.043 with one lag. The impact of exchange rate on unit labor cost in the second column and the impact of unit labor cost on profit in the third column are very close to the previous results.

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Table II-10. The Result of Panel VAR Model(2): [REER, ULC, PRO, EM]

	reer(t)	ulc(t)	pro(t)	em(t)
reer(t-1)	0.189***(25.64)	0.175***(5.12)	0.504(0.24)	-0.024(-0.67)
ulc(t-1)	0.004**(2.14)	-0.055(-0.24)	-1.074(-0.64)	-0.043***(-3.08)
pro(t-1)	0.000(-0.42)	0.000*(1.67)	-0.001(-0.84)	0.000(0.94)
em(t-1)	0.002(1.49)	0.007(0.73)	-0.022(-0.06)	0.011(1.03)
reer(t-2)	-0.355***(-79.37)	0.111***(3.22)	-2.732(-1.54)	-0.243***(-7.06)
ulc(t-2)	0.000***(6.40)	-0.002***(-12.32)	-0.011**(-2.12)	0.000***(-2.90)
pro(t-2)	0.000(0.74)	0.000(1.53)	0.000(-0.09)	0.000(0.74)
em(t-2)	0.003**(2.25)	-0.009(-1.17)	-0.879(-1.04)	0.014**(2.11)
N. Obs	18505			

t-statistics in parentheses, * $p<0.05$, ** $p<0.01$, *** $p<0.001$

The impulse-responses in Figure II-7 also present similar results. The first column suggests that an increase of effective exchange rate results in a decline in employment from the first to third periods. The second column presents that an increase of unit labor cost leads to a decline of employment. In contrast, the third column suggests that a rise of profit rate results in a rise in employment.

To sum up, depreciation leads to a decline in unit labor cost and a rise in profit rate, economic growth, and employment. It may imply that depreciation enhances international price competitiveness, thereby contribute to increase profit. The distributional consequence of the depreciation is that income distribution toward more unfavorable to workers and favorable to capitalists. The increased profit then may positively impact on aggregate demand leading to an increase in economic growth and employment. In contrast, an appreciation results in a rise in unit labor cost, and the increased unit labor cost may negatively impact on aggregate demand leading to a decline in growth and employment. In this context, Korea may make the case for 'exhilarationism' or 'profit-led demand' rather than 'stagnationism' or 'wage-led demand'.
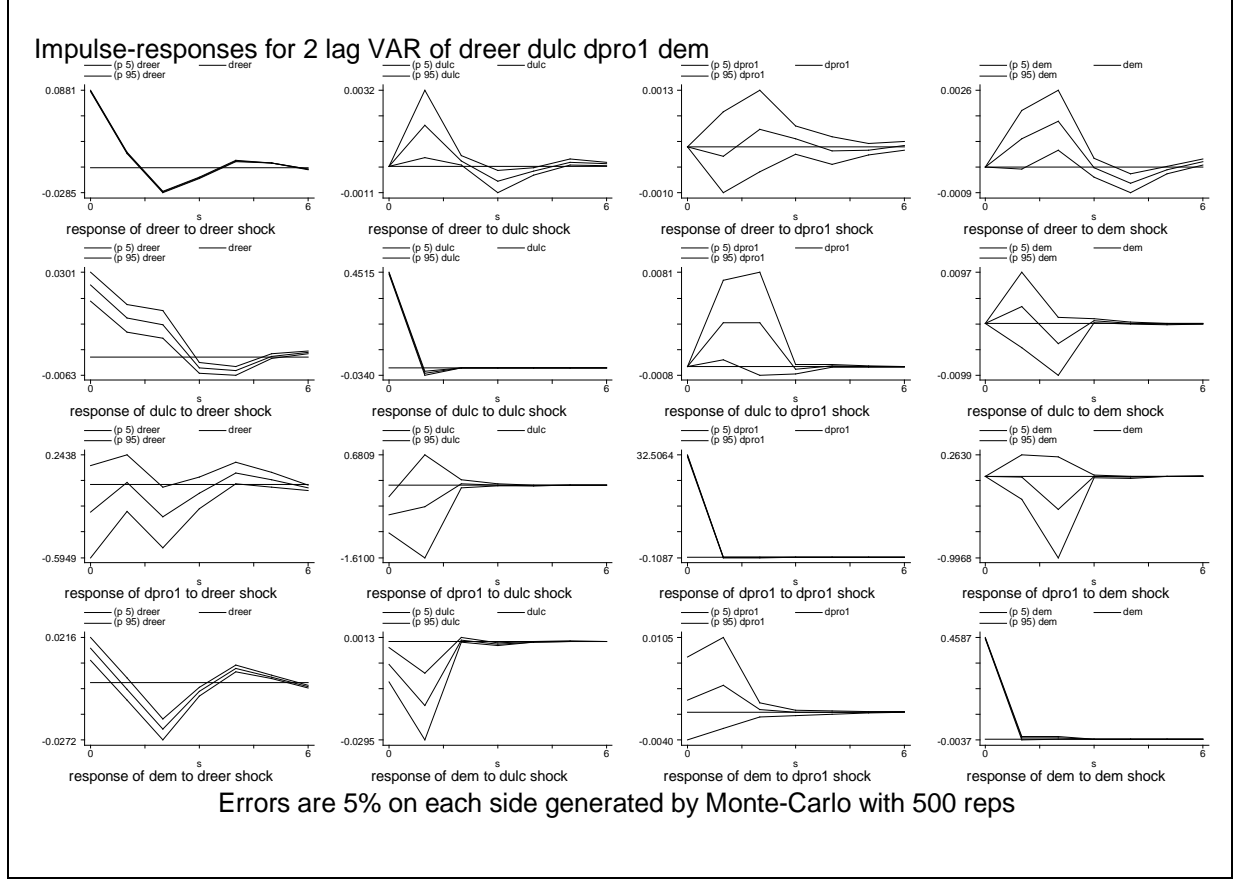
Figure II-7. The Impulse-responses for Panel VAR Model(2): [REER, ULC, PRO, EM]

(2) Directed Acyclical Graph (DAG) Analysis

The panel VAR model(4), [REER, ULC, PRO, EM], assumes the causality ordering in such way; (i) the real effective exchange rate('REER') affects the unit labor cost('ULC'), the profit or mark-up rate('PRO'), and the number of full-time employees('EM'), (ii) the unit labor cost('ULC') affects the profit or mark-up rate('PRO') and the number of full-time employees('EM'), and (iii) the profit or mark-up rate('PRO') and the number of full-time employees('EM').

To test the casuality ordering of the model I use LiNGAM algorithm.The assumptions of LiNGAM(Linear Non-Gaussian Acyclic) model are; (i) the data generating process is linear, (ii)

the true causal hypothesis is acyclic, (iii) there are no unobserbed confounders, (iv) disturbance terms have non-Gaussian distribution of non-zero variances. LiNGAM begin with a completely dependent graph; it then prunes inaccurate dependencies one by one. Thus, the prune factor is the threshold for pruning edges. The LiNGAM algorithm is proved to be effective, in particular, for large number of micro observations.

The results in the Table II-11 and Figure II-8 suggest the causality relations of 'REER → PRO → EM' or 'REER → ULC → PRO → EM', which is similar to the panel VAR model(4). Moreover, the results imply that exchange rate remains most exogeneous variable while the employment is most endogenous variable despite changing the prune factor.

Table II-11. The Results of the LiNGAM Algorithm : REER, ULC, PRO, EM

Causality relations	Prune factor(β)				
	0	0.001	0.1	0.3	$\beta \geq 0.6$
REER → ULC	○	○	×	×	×
REER → PRO	○	○	○	×	×
REER → EM	○	○	○	○	○
ULC → REER	×	×	×	×	×
ULC → PRO	○	○	○	○	×
ULC → EM	○	○	○	○	○
PRO → REER	×	×	×	×	×
PRO → ULC	×	×	×	×	×
PRO → EM	○	○	○	○	○
EM → REER	×	×	×	×	×
EM → ULC	×	×	×	×	×
EM → PRO	×	×	×	×	×

* The number of the prune factor(β) affects which edges are discarded; the higher the prune factor, the more robust(i.e. certain) an edge must be to be remain in the graph.

* 'a → b' implies a causality relation from a to b.

* '○' implies a casuality relation exist, while '×' suggests no casuality relation.
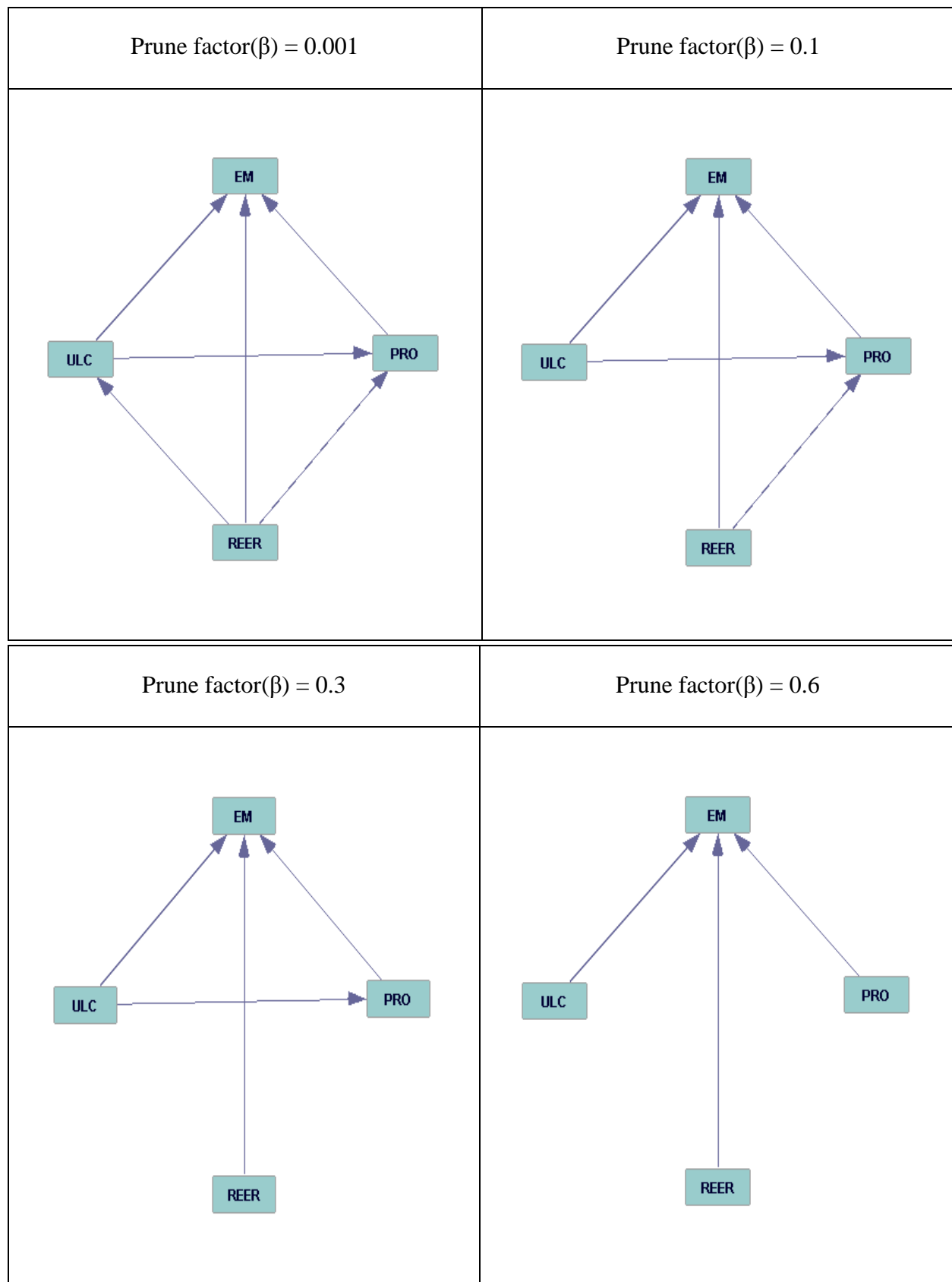
Figure II-8. DAG(Directed Acyclic Graph) : : REER, ULC, PRO, EM

(3) The Result by Firm's Scale(Large vs. Small firms)

I apply the basic panel VAR model to the different characteristics of firms such as firm's scale, export ratio, and productivity which are defined the same way in the previous static fixed effect panel regressions.

First, the magnitude of the exchange rate exposure is different between large firms and small firms. The second columns of large firms in Table II-12 suggests that an increase of real effective exchange rate results in an increase of unit labor cost by 0.124 with one lag and 0.122 with two lags. The magnitude of the impact is greater for the small firms indicating that an increase of real effective exchange rate results in an increase of unit labor cost by 0.230 with one lag and 0.104 with two lags. Although the result does not suggest any statistically significant estimates for the impact of exchange rate on profit, it is supposed that the small firms' profits decline more than those for the large firms based on the different impact on the unit labor costs. The fourth column of the large firms shows that an appreciation leads to a decline in employment by 0.101 with one lag and 0.21 with two lags. In contrast, in case of small firms an appreciation results in a rise in employment by 0.082 with one lag followed by a decline by 0.26 with two lags.

Table II-12. The Result of Model(2) by Scale: [REER, ULC, PRO, EM]

	Large firms				Small firms			
	reer(t)	ulc(t)	pro(t)	em(t)	reer(t)	ulc(t)	pro(t)	em(t)
reer(t-1)	0.190***	0.124***	-2.035	-0.101*	0.189***	0.230***	3.549	0.082*
	(19.65)	(2.64)	(-1.18)	(-1.93)	(16.46)	(4.58)	(0.90)	(1.82)
ulc(t-1)	0.000	-0.029	0.146	-0.054*	0.005***	-0.07***	-2.035	-0.04***
	(0.15)	(-1.43)	(0.18)	(-1.82)	(2.43)	(-4.11)	(-0.75)	(-3.27)
pro(t-1)	0.000**	0.000	0.002	0.001	0.000	0.000***	-0.002	0.000
	(-2.05)	(-0.68)	(1.06)	(1.14)	(0.96)	(2.99)	(-0.98)	(0.54)
em(t-1)	0.001	-0.007	-0.122	0.002	0.005**	0.036*	0.158	0.027*
	(0.35)	(-0.68)	(-0.82)	(0.15)	(2.05)	(1.91)	(0.14)	(1.93)

reer(t-2)	-0.35***	0.122***	-1.754	-0.2***	-0.35***	0.104**	-2.601	-0.26***
	(-60.17)	(2.53)	(-1.42)	(-4.68)	(-50.99)	(2.19)	(-0.86)	(-5.63)
ulc(t-2)	-.006***	-0.036**	-1.932	-0.06**	0.000***	-0.00***	-0.009	0.000***
	(-2.41)	(-2.24)	(-1.07)	(-2.05)	(11.42)	(-18.07)	(-1.63)	(-4.22)
pro(t-2)	0.000	0.000	-0.002	0.000	0.000	0.000**	0.000	0.000
	(1.07)	(-0.46)	(0.56)	(-0.72)	(0.48)	(2.28)	(0.03)	(0.67)
em(t-2)	0.002	-0.018**	0.009	0.006	0.006**	0.013	-2.905	0.030***
	(1.13)	(-2.13)	(0.10)	(0.79)	(2.01)	(0.88)	(-1.07)	(2.58)
N. Obs	11145				7360			

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The first columns of impulse-responses of large firm in Figure II-9 and those of small firms in Figure II-10 suggest that a shock in the real exchange rate leads to a greater decline of profit for the small firms than that of the large firms. In contrast, the shock results in a rise in employment for the small firms while it leads to a decline in employment for the large firms. Moreover, the shock brings about a smaller rise in unit labor cost for the small firms than that of the large firms. Table II-13 presents that the total impact of exchange rate shock on profit for the large firms is minus 0.359, for the small firms is minus 0.5713. The total impact on employment for the large firms is minus 0.021, for the small firms is 0.0134. In addition, the total impact on unit labor cost for the large firms is 0.0535, for the small firms is 0.0401.

Table II-13. The Impulse-responses for Model(2) by Scale: [REER, ULC, PRO, EM]

Period	Large firms			Small firms		
	ULC	PRO	EM	ULC	PRO	EM
0	0.0378	0.0158	0.0084	0.0168	-0.5533	0.0274
1	0.0097	-0.1726	-0.0108	0.0199	0.2832	0.0072
2	0.0109	-0.2570	-0.0231	0.0120	-0.2887	-0.0218
3	-0.0017	0.0135	-0.0021	-0.0062	-0.1898	-0.0076
4	-0.0047	0.0512	0.0064	-0.0056	0.1071	0.0058
5	-0.0002	0.0060	0.0020	0.0011	0.0893	0.0037
6	0.0017	-0.0159	-0.0018	0.0021	-0.0191	-0.0013
Total	0.0535	-0.359	-0.021	0.0401	-0.5713	0.0134

The impulse is real effective exchange rate.
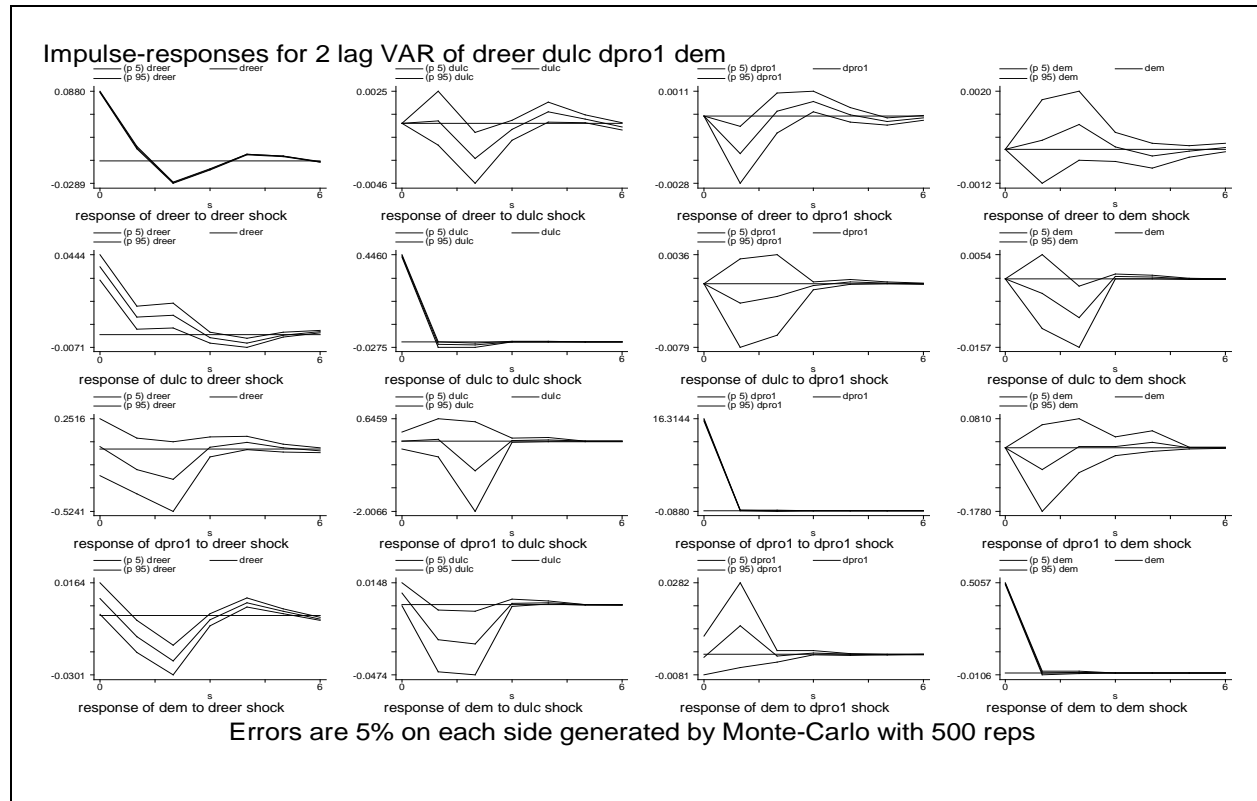
Figure II-9. The Impulse-responses for Model(2) by Small Firms: [REER, ULC, PRO, EM]

Figure II-10. The Impulse-responses for Model(2) by Large Firms: [REER, ULC, PRO, EM]

(4) The Result by Firm's Export Ratio

Second, the size of the exchange rate exposure is different according to firms' export ratio. The second columns of high export firms in Table II-14 suggests that an increase of real effective exchange rate results in an increase of unit labor cost by 0.185 with one lag and 0.115 with two lags. The size of the impact is weaker for the low export firms indicating that an increase of exchange rate results in an increase of unit labor cost by 0.129 with one lag and 0.115 with two lags. Although the result does not suggest any statistically significant estimates for the impact of exchange rate on profit, it is supposed that the high export firms' profits decline more than those for the low export firms based on the different impact on the unit labor costs. The fourth column of the high export firms suggests that an appreciation leads to a decline in employment by 0.24 with two lags. In case of low export firms an appreciation results in a decline by 0.20 with two lags.

Table II-14. The Result of Model(2) by Export Ratio: [REER, ULC, PRO, EM]

	Export ratio ≥ mean				Export ratio<mean			
	reer(t)	ulc(t)	pro(t)	em(t)	reer(t)	ulc(t)	pro(t)	em(t)
reer(t-1)	0.194***	0.185***	5.818	0.028	0.198***	0.129***	-0.660	0.010
	(16.88)	(2.68)	(1.21)	(0.60)	(16.98)	(3.63)	(-0.56)	(0.20)
ulc(t-1)	-0.001	-0.012	-3.190	-0.033*	0.009***	-0.11***	-0.154	-0.07***
	(-0.21)	(-0.52)	(-0.83)	(-1.76)	(2.42)	(-5.74)	(-0.21)	(-2.44)
pro(t-1)	0.000	0.000***	-0.001	0.000	0.000	0.000	-0.004	0.002
	(-0.43)	(2.48)	(-0.88)	(0.94)	(0.09)	(-1.38)	(-0.51)	(0.62)
em(t-1)	0.004*	0.025	-0.207	0.054***	-0.006**	-0.007	0.054	0.013
	(1.66)	(1.37)	(-0.22)	(2.46)	(-2.27)	(-0.43)	(0.29)	(0.90)
reer(t-2)	-0.35***	0.115*	-1.537	-0.24***	-0.36***	0.115***	-2.120*	-0.20***
	(-50.14)	(1.68)	(-0.46)	(-4.94)	(-49.60)	(3.40)	(-1.86)	(-4.06)
ulc(t-2)	-.006***	-0.017	0.216	0.005	-0.01***	-0.06***	0.248	-0.055
	(-2.60)	(-1.05)	(0.22)	(0.18)	(-3.45)	(-3.62)	(0.38)	(-1.59)
pro(t-2)	0.000	0.000*	0.000	0.000	0.000	0.000	0.028	0.000
	(0.44)	(1.90)	(-0.12)	(0.93)	(1.24)	(-1.16)	(1.31)	(0.16)
em(t-2)	0.006**	-0.017	-3.140	0.024*	0.001	-0.003	0.026	0.010
	(2.20)	(-1.24)	(-1.08)	(1.85)	(0.52)	(-0.18)	(0.25)	(1.09)
N. Obs	7755				7360			

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The impulse-responses also provide similar results. The first columns of impulse-responses of high export firms in Figure II-11 and those of low export firms in Figure II-12 suggest that a shock in the real exchange rate leads to a greater decline of profit for the high export firms than that of the low export firms. In contrast, the shock results in limited impact on employment for the low export firms while it leads to a decline in employment for the high export firms. Moreover, the shock brings about a smaller rise in unit labor cost for the high export firms than that of the low export firms. Table II-15 presents that the total impact of exchange rate shock on profit for the high export firms is minus 0.4754, for the low export firms is minus 0.3538. The total impact on employment for the high export firms is minus 0.0031, for the low export firms is 0.0003. In addition, the total impact on unit labor cost for the high export firms is 0.0702, for the low export firms is 0.0283.

Table II-15. The Impulse-responses for Model(2) by Export Ratio: [REER, ULC, PRO, EM]

| Period	Export ratio ≥ mean			Export ratio<mean		
	ULC	PRO	EM	ULC	PRO	EM
0	0.0498	-0.6274	0.0145	0.0143	-0.143	0.0179
1	0.0156	0.3408	0.0016	0.0096	-0.0581	-0.0001
2	0.0117	-0.1202	-0.0206	0.0103	-0.1971	-0.0188
3	-0.004	-0.2189	-0.0063	-0.0031	-0.0192	-0.0056
4	-0.0052	0.0578	0.0057	-0.0049	0.0636	0.0049
5	0.0004	0.0935	0.0033	0.0003	0.019	0.0031
6	0.0019	-0.001	-0.0013	0.0018	-0.019	-0.0011
Total	0.0702	-0.4754	-0.0031	0.0283	-0.3538	0.0003

The impulse is real effective exchange rate.
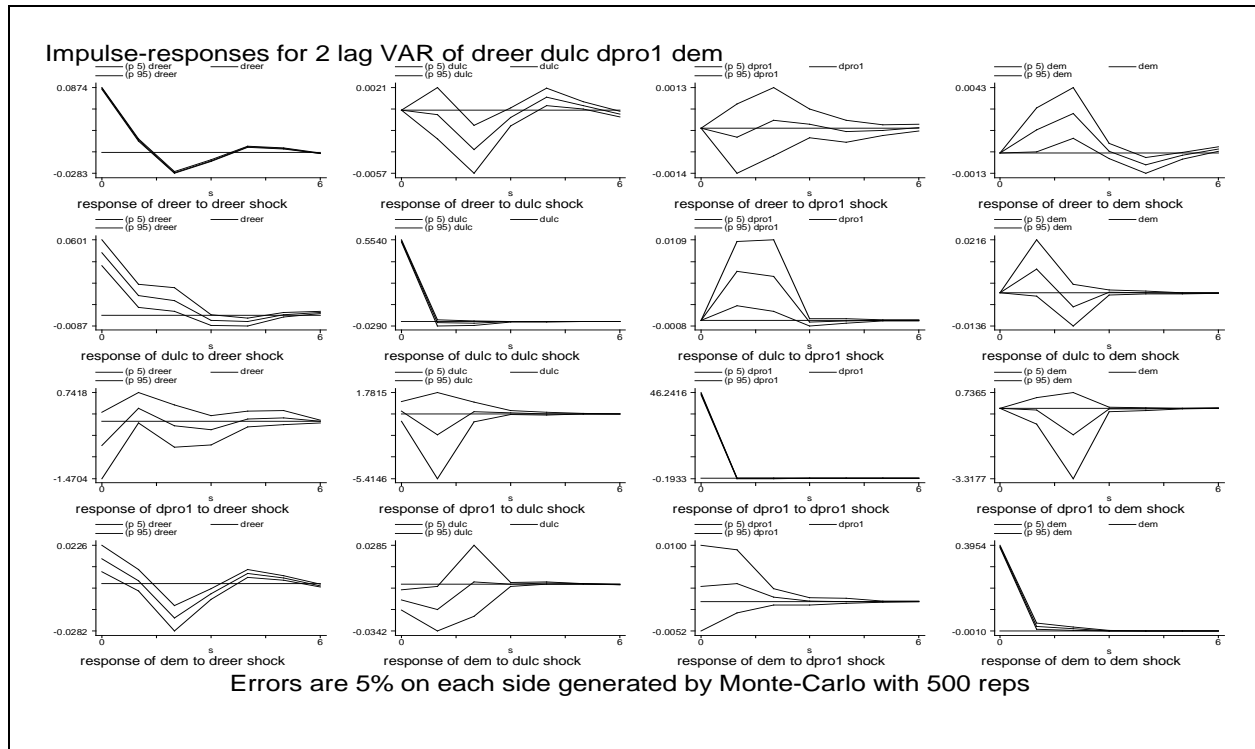
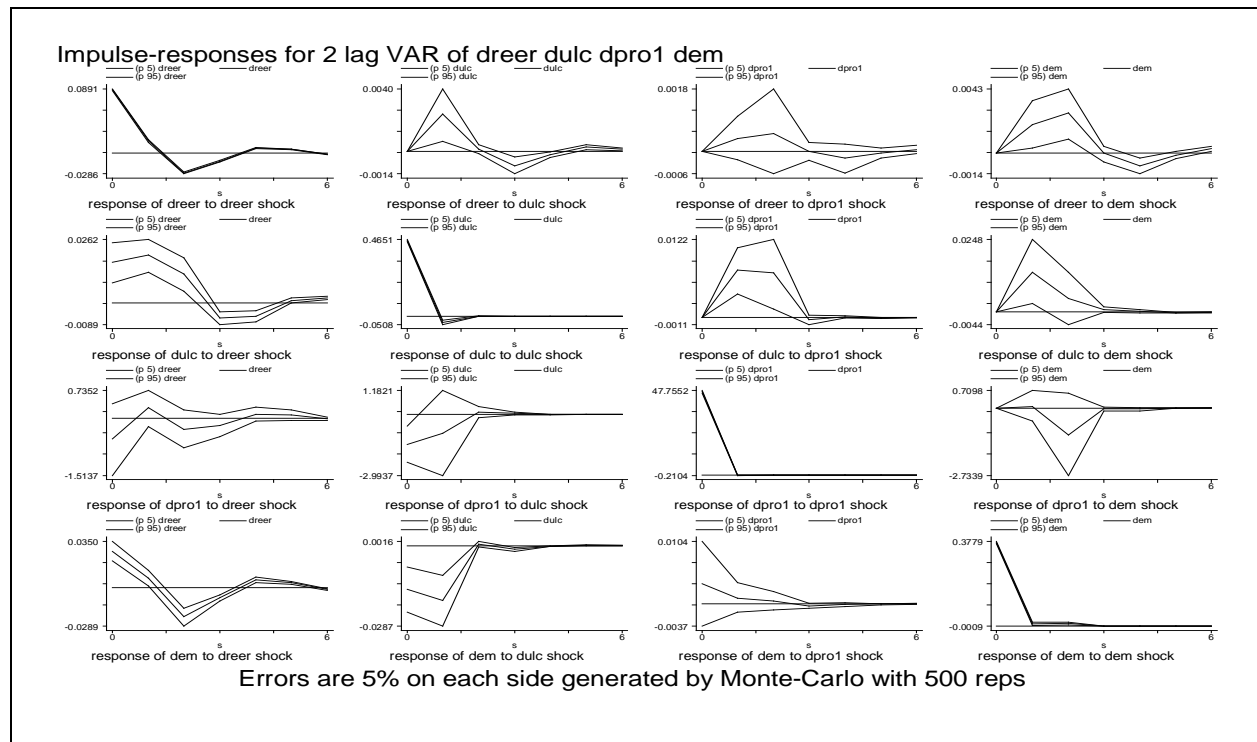Figure II-11. The Impulse-responses for Model(2) by High Export Firms: [REER, ULC, PRO, EM]

Figure II-12. The Impulse-responses for Model(2) by Low Export Firms: [REER, ULC, PRO, EM]

(5) The Result by Firm's Productivity Level

Third, the size of the exchange rate exposure is also different according to firms'

productivity. The third column of high productivity firms in Table II-16 suggests that an

appreciation results in a decline in profit rate by 2.790 with one and a decline in employment by

0.17 with two lags. The second column of low productivity firms suggests that an appreciation

leads to an increase of unit labor cost by 0.185 with one lag and 0.115 with two lags while it

decreases employment by 2.54 with two lags. Thus, an appreciation brings about a larger decline

in employment for the low productivity firms than high productivity firms. It is hard to compare

the impacts on unit labor cost or profit rate between high and low productivity firms because the

estimated coefficients do not suggest any paired statistically significant estimates for the two

groups.

Table II-16. The Result of Model(2) by Productivity: [REER, ULC, PRO, EM]

	Productivity ≥ mean				Productivity<mean			
	reer(t)	ulc(t)	pro(t)	em(t)	reer(t)	ulc(t)	pro(t)	em(t)
reer(t-1)	0.238***	-0.05	-2.790**	0.025	0.162***	0.233***	3.344	-0.020
	(17.73)	(-0.57)	(2.23)	(0.34)	(16.61)	(6.76)	(1.09)	(-0.66)
ulc(t-1)	0.004	-0.061	0.832	-0.035	0.002	-0.06***	-2.481	-0.03***
	(0.86)	(-1.32)	(0.96)	(-0.79)	(1.07)	(-4.57)	(-0.97)	(-2.89)
pro(t-1)	0.000	0.000	-0.089	-0.001	-0.000	0.000**	-0.000	0.000
	(0.81)	(-0.13)	(-1.04)	(-0.50)	(-0.44)	(2.33)	(-0.62)	(1.00)
em(t-1)	-0.001	-0.012	0.195	0.021	0.005*	0.037**	-0.434	0.136**
	(-0.51)	(-0.97)	(1.03)	(1.42)	(1.74)	(2.23)	(-0.55)	(2.18)
reer(t-2)	-0.34***	0.121	-1.030	-0.17***	-0.36***	0.082***	-3.69	-2.54***
	(-38.12)	(1.39)	(-0.91)	(-2.52)	(-61.46)	(2.39)	(-1.39)	(-7.20)
ulc(t-2)	-.011***	-0.036	0.978	-0.108*	0.000***	-0.00***	-0.013	-0.00***
	(-2.59)	(-0.95)	(1.08)	(-1.81)	(15.06)	(-16.86)	(-2.01)	(-3.94)
pro(t-2)	0.000	-0.001	-0.026	0.000	0.000	0.000***	0.001	0.000
	(0.48)	(-0.99)	(-0.41)	(-0.14)	(0.47)	(2.59)	(0.90)	(0.06)
em(t-2)	-0.002*	-0.011	0.112	0.008	0.006***	-0.001	-2.043	0.030**
	(-1.67)	(-0.94)	(1.59)	(1.12)	(2.72)	(-0.99)	(-1.02)	(2.08)
N. Obs	4114				11915			

t-statistics in parentheses, * p<0.05, ** p<0.01, *** p<0.001

The impulse-responses provide supplementary results for this. The first columns of each firm suggest that an increase of real exchange rate leads to almost three times more decline of profit for the low productivity firms than for the high productivity firms. In addition, the second columns of each firm present that a rise is unit labor cost results in an increase in the profit rate of high productivity firms while it decreases the profit of low productivity firms. Table II-17 presents that the total impact of exchange rate shock on profit for the high productivity firms is minus 0.1677, for the low productivity firms is minus 0.4483. Moreover, an appreciation results in greater negative impact on employment of low productivity firms than the high productivity firms while it leads to an equal amount of increase of unit labor cost for both high and low export firms. It may imply that high productivity firms have more ability to absorb the burden of raising unit labor cost due to an appreciation to stabilize their profits and employments than low productivity firms.

Table II-17. The Impulse-responses of Model(2) by Productivity: [REER, ULC, PRO, EM]

| Period	Productivity ≥ mean			Productivity<mean		
	ULC	PRO	EM	ULC	PRO	EM
0	0.046	0.0314	0.0179	0.0203	-0.354	0.0164
1	-0.0077	-0.2012	0.0009	0.0194	0.2302	-0.0019
2	0.0079	-0.0883	-0.0181	0.009	-0.3523	-0.0226
3	0.004	0.0563	-0.0038	-0.0069	-0.154	-0.0042
4	-0.0025	0.0663	0.0025	-0.0044	0.1364	0.007
5	-0.0019	-0.0071	0.0018	0.0017	0.0793	0.0026
6	0.0004	-0.0251	-0.0003	0.0018	-0.0339	-0.002
Total	0.0462	-0.1677	0.0009	0.0409	-0.4483	-0.0047

The impulse is real effective exchange rate.

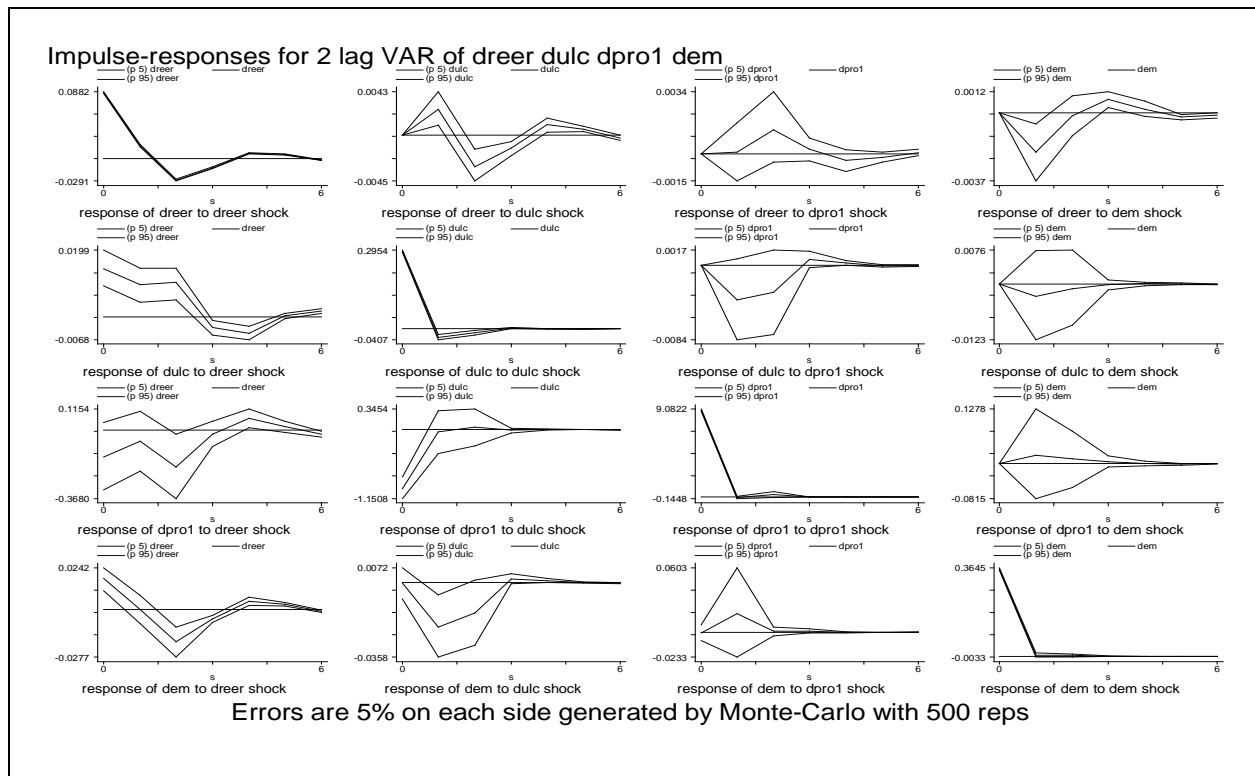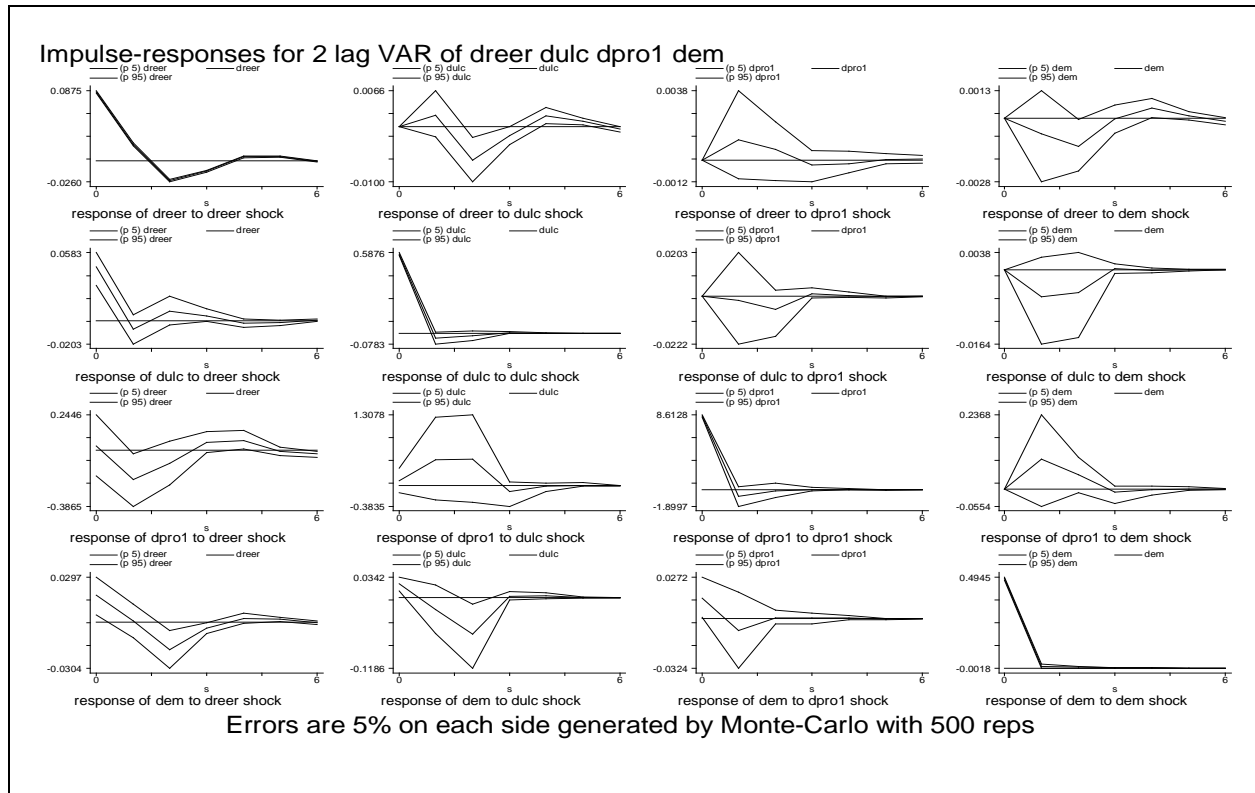Figure II-13. The Impulse-responses for Model(2) by High Productivity Firms: [REER, ULC, PRO, EM]
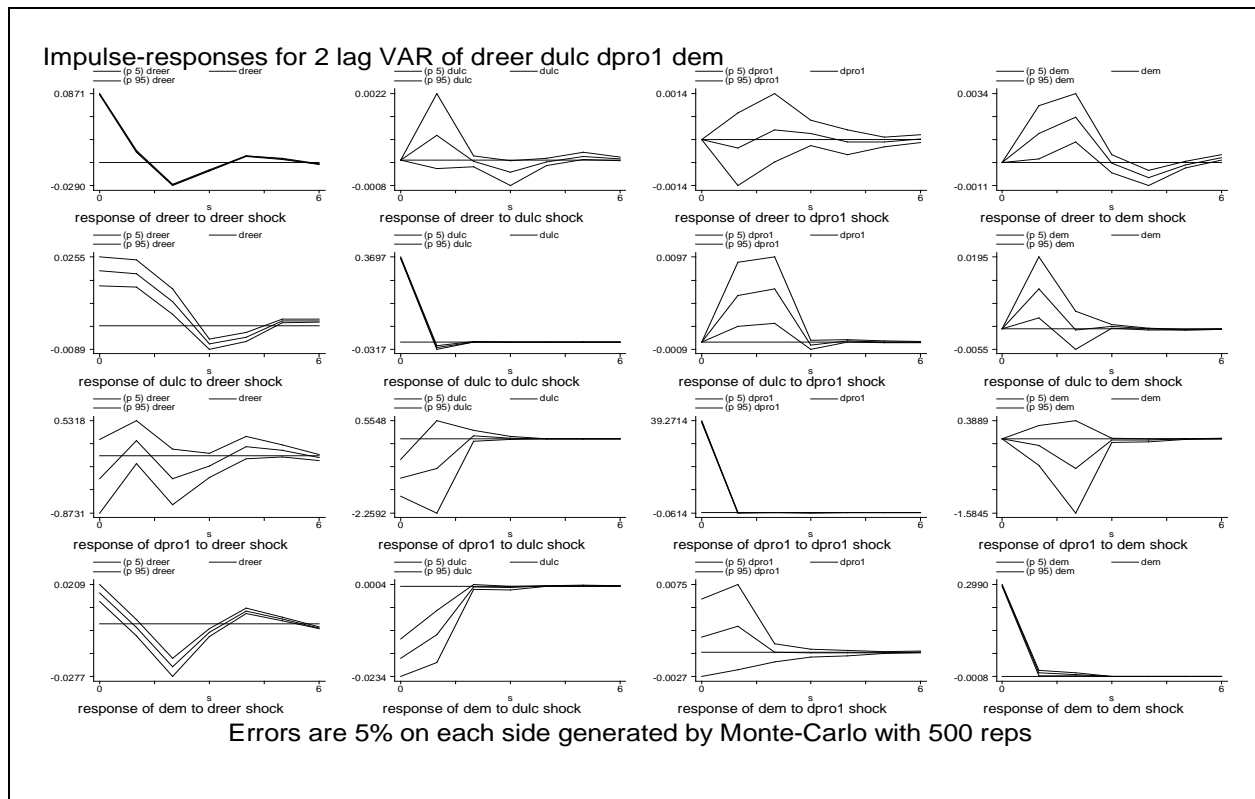
Figure II-14. The Impulse-responses for Model(2) by Low Productivity Firms: [REER, ULC, PRO, EM]

Table II-18 summarizes the impact of an appreciation on unit labor cost, profit rate, and employment by firms' characteristics. An appreciation results in an increase in unit labor cost, while it brings about a decline both in profit rate and employment for the entire firms. An appreciation leads to a relatively higher increase in unit labor cost for large firms and high export firms than small firms and low export firms. It also results in a significantly higher decline in profit rate for small firms, high exporters, and low productivity firms. The findings correspond with the results of the previous static analysis. Moreover, an appreciation brings about a decline in employment for large firms, high exporter, and low productivity firms while it leads to a rise in employment for small firms, low exporters, and high productivity firms.

Table II-18. Summary of the Results

	ULC	PRO	EM
Large firms	0.0535	-0.3590	-0.0210
Small firms	0.0401	-0.5710	0.0134
High export	0.0702	-0.4754	-0.0031
Low export	0.0283	-0.3538	0.0003
High productivity	0.0462	-0.1077	0.0009
Low productivity	0.0409	-0.4483	-0.0047
Entire firms	0.0449	-0.4243	-0.0052

The impulse is real effective exchange rate.

V. Conclusion

In this essay I investigate whether Korea's foreign reserve holdings have acted the role of 'self-insurance' to stabilize its net capital flows and 'mercantilist tool' to improve its current account. The result of vector autoregression(VAR) approach suggests that a one percent increase

in foreign reserve holdings results in 2.5 percent improvement in the ratio of current account to GDP while it stabilizes the net capital flow in Korea.

I also test an argument that the consequence of Korea's foreign reserve holdings is undervaluation to sustain its international competitiveness. One of the outcomes of the international competitiveness may be higher economic growth. Together with macroeconomic measurement I also use the information on Korea's firm level profit rate and employment. The static panel regression presents that depreciation(appreciation) is beneficial(harmful) to the performance of the Korean manufacturing firms. A percent increase of real effective exchange rate or nominal effective exchange(appreciation) degrades operating profit rate by 9.06% or 10.04%. In contrast, a percentage increase of Korean Won to US dollar exchange rate(depreciation) improves the profit rate by 10.81%. Moreover, the size of impacts of exchange rate fluctuations on the firm's profit depends on the characteristics of firms; it is bigger for small firms, low exporting firms, and low productivity firms. The result also suggests that an increase in unit labor cost leads to a higher negative impact on profit for small firms, low export firms, and low productivity firms. It may imply that labor costs are more important factor in production for small, low export, and low productivity firms than large, high export, and high export firms.

Even if the foreign reserve holdings may work to stabilize private capital flows and sustain international competitiveness, it would entail distributional consequences within Korean economy by changing wage or profit share and import prices or export prices. I present a model to analyze the distributional impacts of exchange rate within the Kaleckian open economy tradition and then estimate the impacts by panel vector autoregression(VAR) approach. The results suggest that depreciation leads to a decline in unit labor cost or labor share while it results in a rise in profit rate or profit share, economic growth, and employment. It may imply that

depreciation enhances international price competitiveness, thereby contributes to an increase profit. The distributional consequence of the depreciation is that income distribution goes toward more unfavorable to workers and favorable to capitalists. The increased profit then may positive impact on aggregate demand leading to an increase in economic growth and employment. In contrast, an appreciation results in a rise in unit labor cost, and the increased unit labor cost may negative impact on aggregate demand leading to a decline in growth and employment. In this context, Korea may make the case for 'exhilarationism' or 'profit-led demand' rather than 'stagnationism' or 'wage-led demand'. In the same manner with the static analysis the size of the dynamic impacts of exchange rate on profit and employment also depends on the characteristics of firms. An appreciation results in a significantly higher decline in profit rate for small firms, high exporters, and low productivity firms. The results also suggest that employment in high productivity firms seems to be relatively immune to changes in exchange rate, this appear to have sizeable and significant effects on high exporter and low productivity firms.

The findings may have important policy implications. First, they suggest that the macroeconomic benefits of undervaluation in Korea may have been achieved at the expense of labor interest. In fact, this aspect has not been brought to public notice to the fore by either labor unions or policy makers. It, however, may be received attention if the income distribution in Korea aggravates. From a political economy context, this may pose a substantial constraint to the foreign reserve and exchange rate policies in the future.

Second, the distributional outcomes of the undervaluation are more favorable to the small firms, exporters, and low productivity firms. The consequences may bring about side effects in Korean industry. For example, those firms, which are satisfied with the favorable results of the undervaluation policy, might not make sufficient efforts to strengthen their exchange rate

management system, to improve their quality of export goods, and to enhance their productivity. In this context, the policymakers ought to adopt a broader point of view when assess the desirability of foreign reserve holdings and exchange rate market intervention.

CHAPTER III

GLOBAL IMBALANCES AND INTERNATIONAL CAPITAL FLOWS

: WHAT HISTORY TELLS US?

I. Introduction

Mark Twain, who has been quoted as saying that 'history does not repeat itself, but it often rhymes', appreciated the idea of historic recurrence. This also seems to apply to global imbalances and international capital flows. From a historical perspective they are not a new phenomenon, but reflect repetitive patterns of the historical changes in the international financial arrangement (IFA)[46] and the swings in the financial globalization[47].

In fact, the history of IFA might be interpreted as designing and implementing an effective system that allows for the orderly adjustment of current account imbalances among countries, at the same time provides confidence on its stability, and generates sufficient liquidity for supporting an expansion in world trade (Elson 2011). In this respect, the gold standard or the UK sterling standard during late 19th and early 20th century and the current US dollar standard have a 'striking similarity' to successfully deal with adjustment, confidence, and liquidity. In both periods two center countries generated international liquidity through their official and private liabilities and injected them into the rest of the world through their central role in international

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[46] IFA refers to the collective governance arrangements that governments have put in place to safeguard the operations of the international monetary and financial system. It includes the exchange rate, payments arrangements, and the network of governments, financial institutions, private investors which engage in international financial market (Elson 2011).

[47] Literature defines financial globalization not only in the aspects of the scale of flows, but also policy orientation. The former refers to the increasing size of cross-border financial flows among countries and the latter implies policy decisions of individual governments to relax administrative restrictions on international financial transactions and to remove controls on inward or outward capital movement.

financial intermediation or the international lender of last resort. In addition, economic historians have documented that the current pattern of current account dynamics and international capital flows has great 'resonance' with the first era of financial globalization from around 1870 to 1913 (Baldwin & Martin 1999, Taylor 2002, Obstfeld & Taylor 1998, 2000, 2004, Bordo, Eichengreen & Kim 1998). The two periods showed relatively high mobility of capital across countries in terms of a hike in stocks of foreign assets and liabilities, convergence of real and nominal interest rate differentials among countries, and increase in gap between domestic savings and investment. Beyond the similarities, a 'U-shaped pattern' of international capital flows, where high capital mobility prevails at the beginning and the end with a trough in the middle, is seen to describe the evolution of global financial markets. These markets were globally integrated during pre-1914 era; the integration collapsed in the period between the wars; after a gradual post-war recovery they reached a higher level of integration, reaching again, in 1990s, the high levels of flows which surpassed the level attained before 1914 (Bordo 2000, 2006, Obstfeld & Taylor 2004, Catao 2005). An examination of the evolution of global financial markets and comparison of similarities and differences of the two eras of financial globalization may allow us to draw useful lessons from the past, for the present. In this sense, the first part of this essay focuses on analyzing the historical pattern of financial globalization using updated data, which include recent global financial crisis.

After identifying the changing pattern of global financial markets, it may be pertinent to ask what forces drive the ups and downs of global financial markets. Conventional wisdom provided an explanation in terms of swings in policy combinations imposed by the macroeconomic 'Trilemma' (Eichengreen 1998, Obstfeld and Taylor 2004). It is well known that policymakers in open economies are confronted with three typically desirable, yet contradictory,

objectives: (i) to stabilize the exchange rate; (ii) to enjoy free international capital mobility; (iii) to engage in a monetary policy oriented toward domestic goals. Since policymakers can sustain only two of these policies simultaneously, the economic policy scope is especially limited depending on political economic environment. Then, capital flows have progressed and regressed over time according to decisions made under the 'Trilemma'. Although the 'Trilemma' suggests a straightforward yet consistent explanation for the historical evolution of global capital markets in the context of conflict among rival policy choices, it also has limitations that neglect other important aspects of the evolution such as the nature of financial markets, the role of IFA, and varying political and economic beliefs to assess the benefits and costs of international capital flows.

The aim of this essay is to provide an organizing framework in a broader political-economy context for understanding the evolution and the forces that shaped the international capital markets since the late 19th century. For this I extend the conventional 'Trilemma' argument to combine alternative suggestions such as tension between regulation and financial markets (D'Apice 2013, Bordo 2006, Taylor 2002) and the role of key currency or imperial hegemonic money (McKinnon 2003, Fields & Vernengo 2011, Vasudevan 2009b). Moreover, beyond the usual extension of the previous studies this essay also looks at the patterns of global capital flows from the perspective of history of economic thought. Specifically, I aim to answer the following questions; (i) Does the expansion and plunge of financial globalization really correspond with the swings in economic beliefs towards international capital flows, and (ii) What are the philosophical foundations of the beliefs? By leveraging the history of economic thought with a comparative literature review I argue that there has existed two competing views on the international capital flows and global imbalances and that the history of financial globalization

has alternated phases between a view which gives the importance to financial liberalization to promote market efficiency (a 'benign view' or 'currency view') and a view that gives the weight to systems of governance to limit the negative effects of unfettered markets (a 'gloomy view' or 'banking view')[48]. The 'benign view' or 'currency view' sees that IFS is self-stabilizing to ensure global imbalances adjustment in an orderly manner without violently unstable variations in exchange rate. The view assumes that international financial markets are beneficial and stable in the long run. In contrast, the 'gloomy view' or 'banking view' concerns about disorderly adjustment with financial instability and it supposes that such financial market disturbances can have significant impact on world output, employment and trade in short term. Those two views not only reflect their different economic beliefs, but also show distinct variation in the context of policy questions. For example, while the former emphasizes 'rules' for proper functioning of efficient markets the latter stresses 'discretion' to discipline the inherent instability of the markets. The key contribution of this essay is to provide new insights on the financial globalization and global imbalances by linking them to the swings of two competing views, and tracing their thought trajectories in the history of economic thought. These views have worth, in particular, understanding the functioning of money and financial markets which its theoretical origin goes back to the Currency School and Banking School debate in mid-19th century in England.

The organization of the essay as follows. Section II observes the pattern of financial globalization both in data and historical perspective and analyzes similarities and differences of the two eras of financial globalization focusing on the level of capital mobility and overall

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[48] Section IV. 3 discusses in detail the alignment of 'currency view' with 'benign view' and 'banking view' with 'gloomy view' in the context of the history of economic thought. It should be emphasized that this alignment has exceptions for individuals. For example, although McKinnon is in the line with the Currency School tradition he has gloomy rather than benign view on the global imbalances.

economic stability. Section III discusses underlying factors such as 'Trilemma', tension between regulation and financial market, and the role of key currency or hegemonic money for the changing pattern of financial globalization and suggests an analytical framework by combining them. To identify competing views on the financial globalization Section IV introduces the British Currency and Banking School debate in mid-19th century, analyzes their impacts on the theory of money and economic beliefs, and then traces their trajectories to late economic thoughts such as the Neoclassical Synthesis, Modern monetarists, Modern Austrian School, Keynesian, New-Keynesian, New-Classical and Post-Keynesian economics. Section V concludes and suggests policy implications.

II. The Pattern of Financial Globalization

1. A U-shaped or J-shaped?

The previous studies have suggested that financial market integration from late 19th century to today performed a 'U-shaped pattern'. In other words, contemporary financial globalization has precedents in the era of the gold standard or the UK sterling standard, thus the current level of financial market integration is not unprecedented. In contrast, several studies have proposed an alternative depiction of financial globalization arguing that today's financial integration has surpassed the pre-1914 period from the second half of 1990s and onwards. According to them the current phase could be seen as a third wave of financial globalization indicating a 'J-shaped pattern' (Martell 2007, Salles 2009, and Straw & Glennie 2012). In fact, in most of the 'U-

shaped pattern' literature, the data does not include after 2000 period which is characterized by a huge surge of financial activity.

To assess the 'U-shaped' or 'J-shaped pattern' of financial globalization arguments I update the data of foreign assets in the world economy, which used in Obstfeld & Taylor (2004) to include the recent global financial crisis. Shown in Figure III-1, a 'U-shaped pattern' of financial globalization is verified from the late 19th century and up to mid-1990s. However, after 2000, the stock of asset has shown a drastic upward trend which is not comparable to that of the first era of financial globalization. In this sense a 'J-shape' may be more relevant to describe the pattern of financial integration after 2000. Then, will the acceleration of integration continue? The future is by no means of simple prediction. The upward trend may continue to the foreseeable future, but crisis could mark the end of the acceleration. For example, the recent global financial crash in 2009 led to a downturn in the ratio of the stock of foreign asset to world GDP from the highest point 2.12 before the crisis to 1.89 in 2010 implying that the world economy slow down the pace of financial globalization to reduce the stability risks it creates.
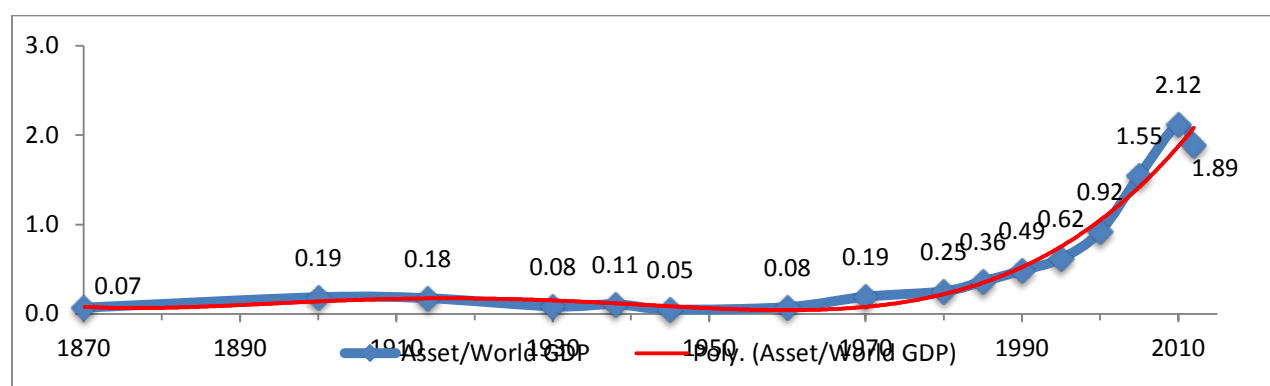
Figure III-1. Foreign Assets in the World Economy: 1870-2010

Sources: 1870~2000 (Obstfeld & Taylor 2004). During 1870 to 1980 they use diverse sources; for example, Woodruff(1967) and Lewis(1945) for total asset, Maddison(1995) for world GDP. During 1980 to 2000 they use IMF IFS and World Bank data. I update the data after 2001 using the same sources(IMF IFS and World Bank). The data of after 1980 covers foreign investment position which is claims in the form of bond placements and bank loans, FDI, equity holding, and a residual category, including derivatives and official foreign reserves.

2. Historical Perspective on Financial Market Integration

To link the previous data to a historical examination this section provides a long-run narrative for the pattern of financial globalization under the four different phases of international financial arrangements in history: (i) the era of classical gold standard (1870~1914), (ii) interwar period (1919~1939), (iii) the original Bretton Woods system (1945~1973), and (iv) post-Bretton Woods era (1973~present).

(1) The Era of the Classical Gold Standard (1870-1914)

International capital markets in late 19th century presented high level of integration under the classical gold standard centered on London. Reflecting the dominant laissez-faire political environment of the day capital moved freely internationally without restrictions on financial transactions. Private capital flowed from rich core in Europe to the periphery in the new world in the form of bonds financing railroads and other infrastructure investments and long term government debts. Between 1880 and 1914, Britain exported on average between 4% and 5% of her GDP abroad (Bordo 2000). J.M. Keynes depicted the time in his famous words saying that "the resident of London could adventure his wealth in the natural resources and new enterprises of any quarter of the world, and share, without exertion or even trouble, in their prospective fruits and advantages" (Keynes 1920).

One view of the gold standard claims that it was 'self-regulating' system based on playing by the 'rules of the game', which includes strict commitment both in exchange rate behavior and current account adjustment among countries. Countries were locked together by making their

currencies convertible into gold in the sense of subordinating domestic policy to the dictates of gold convertibility. The emerging countries also enforced credible gold standard adherence by the desire to have access at favorable terms to the capital markets of the core countries[49]. Under these circumstances short-term capital movements would be stabilizing when currency fluctuations did occur; investors usually reacted in stabilizing ways. And in particularly difficult times, national central banks helped each other, as in the Baring crisis in 1890. With the absence of both significant movements in the price of financial assets and of crises impairing the solvency of institutions operating in the banking and financial intermediate markets, a relative smooth adjustment to imbalances occurred through the 'specie-price flow mechanism'. Thus, the stability of the overall system together with high capital mobility was the key feature of this period (Bordo 2005).

In contrast, there also exists an alternative view that the gold standard was not the self-regulating system in which rules were always followed without pain. For example, Keynes argued that a country running deficit would have to raise interest rates, which would cause a recession and unemployment in the country. Then, trade deficit would be corrected not by flexible prices but painfully through recession and unemployment. According to him, the stability of the gold standard did not come from its 'self-regulating' nature, but it was ascribed to the management of the system by the UK and the Bank of England. The UK did not drain gold from debtor nations, rather she promoted the reflow of international finance. This contrasts with the experience of the interwar period when both the US and France drained gold from other members of the system (Hallwood & MacDonald, 2003). At the same time, the Bank of England played the role of 'the conductor of the international orchestra' and was able to calibrate

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[49] An empirical study evidenced that participants in the international capital markets in that those capital-importing countries that had a strong record of adherence to the gold standard rules enjoyed lower interest charges on their debt than other countries with a poorer record of adherence (Bordo & Kydland 1996).

international movements of gold, on the basis of relatively small gold reserves, by manipulations on bank rate (Vasudevan 2009a).

(2) Interwar Period (1919-1939)

The interwar period witnessed a retreat into disintegration and imperfect capital mobility with economic turbulence, political disarray, and rising nationalism. Burdened by war debts as well as chronic balance of payment disequilibria due to misaligned real exchange rates-overvalued UK pound versus undervalued US dollar, French franc, and Germany mark- the credibility of the gold standard was much weakened. In addition, a rise in the interest of labor made it difficult to always subordinate domestic policy goals to the dictate of external balance. Without international cooperation competitive currency devaluation and trade protectionism prevailed, in particular, during the Great Depression. Due to the failure of convertibility in the core Europe financial flows were often seen as 'speculative' and 'destabilizing'. Then, speculative attacks against countries that used expansionary monetary policy to stabilize the real economy forced country after county to abandon the gold standard.

It should be noted that although this period showed a drastic decline in capital flows there yet no restrictions on international financial transactions. A comprehensive control on capital flows introduced only after the launch of the Bretton Wood system in 1945. Overall, this period provided 'gloomy view' on global imbalances; the UK could not play its role to stabilize the international financial system and 'the rules of the game' were not followed by countries; monetary authorities subordinated external balance to domestic considerations and key surplus countries were unwilling to allow necessary adjustment of rising prices (Bordo 2005).

(3) Bretton Woods System (1945-1973)

The negative experiences of the interwar period informed the postwar Bretton Woods order. Global capitalism was seen an inherently unstable system; prone both to periods of volatility and inflation and at the same time, having recessionary trends without self-correcting mechanisms that assure full employment. The benefits of capital mobility were also seen unlikely to outweigh the costs in terms exchange rate volatility and financial instability.

Against the background, the BW system introduced a gold-dollar standard, where the US dollar was pegged to gold and other countries were pegged to the US dollar. The system restricted international private capital mobility to prevent them from undermining the pegs and gave more priority to the achievement of domestic goals to the national governments. With the capital controls the balance of payments adjustment was not self-equilibrating through private capital flows among countries. Rather, the role of official flows dominated at that time. At the same time, a country running a large trade deficit would normally, in agreement with the IMF, engineer a devaluation of its currency in order to regain competitiveness. Stability and comprehensive control on capital mobility was the characteristic of this period. The system, however, has an intrinsic inconsistency between adjustment, liquidity, and confidence in such way that supplying global liquidity through the US deficit had gradually undermined the confidence on convertibility of the US dollar during late 60s and early 70s, and ultimately leading to the collapse of the Bretton Woods system (Schulmeister 2000).

(4) Post Bretton Woods Era (1973-Present)

Since the collapse of the Bretton Woods system in 1973 the international financial system evolved into a dollar standard. Capital accounts were liberalized from the late-1970s in the OECD and in the developing world starting in the late 1980s. With the deregulation, the international financial markets have presented a mushroom growth toward the second era of the financial globalization. While the original BW period was dominated by a 'gloomy view' on ground that capital flows were seen to bring about instability, after collapse of the BW a 'benign view' has been more pervasive (Bordo 2005). Removing restrictions on capital mobility was seen as a tool to enable emerging market to tap into the pool of global savings and import capital for development. Market forces were assumed to allocate capital efficiently to its most productive uses across the globe. Like the preceding the era of the classical gold standard this period was also characterized by a stable system with high capital mobility.

The stability in both two periods, however, was mainly for the center and not necessary for the periphery. Since the Latin America crises in early 1980s and the Asian financial crises in late 1990s, a competing view have risen that global capital flows were too fickle to be relied upon as part of a development strategy and private capital flows, and especially portfolio investments were volatile and pro-cyclical to generate monetary and financial instability. To prevent the stability risks emerging markets, including East Asian countries, have accumulated foreign reserves as a 'self-insurance'. After 2000 currency intervention and foreign reserve accumulation were wide spread although capital accounts remained open and financial globalization continued at a rapid pace. In this sense, the process of financial globalization after the Asian crisis has

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shown complicated aspect rather than unilateral proliferation of financial integration which prevailed before the crisis.

3. Similarities and Differences of the Two Waves of Financial Globalization

Further analysis of the two eras of financial globalization, in particular, may allow us to draw useful lessons from the past for the present. The 'resonance' of the two eras, in particular, is reflected in the functioning of IFA to deal with the orderly adjustment of current account imbalances among countries, provide confidence on its stability, and generate sufficient liquidity to allow for support an expansion in world trade. In fact, the two center countries were relatively effective to provide a stable system by acting as the international lender of last resort, and generated international liquidity through their official liabilities and private liabilities and injected them in the rest of the world through their central role in international financial intermediation (Vasudevan 2009a).

The stability in both periods, however, involved an intrinsic instability in the way that the two centers draw short term capital flows and stem the efflux of capital in the face of growing trade deficits and dwindling reserves as the international borrower of last resort (Vasudevan 2009a). During the first era of financial globalization the UK, based on imperial hegemony or political cooperation, was able to transform the surpluses of India and Japan into sterling balances and at the same time, transmitted the burden of adjustment to debtor countries in the New world. Similarly, after the collapse of the Bretton Woods system the US draw the surpluses of the OPEC countries, Japan and more recently East Asian countries including China, and transmitted the burden of adjustment to the emerging markets in Latin America. At the same

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time, the stability was mainly for the center and not necessary for the periphery. In fact, both periods essentially have a strong financial system in the center and fragile financial system on the periphery. The center has single strong money which is used as a transaction, reserve, interventional, and invoice currency, while the periphery has only provisional money (McKinnon 2003). The asymmetry in the IFA may impart a degree of elasticity to adjustment in the center, but generate instability on the periphery. When crisis strikes, a rush to the UK pound or the US dollar and 'flight to quality' allowed for much greater elasticity in adjustment in the core country, and the fragility of the center was exported to the periphery (Vasudevan 2010). Empirical studies observed that the unfettered private capital flows in the two period resulted in the similar pattern of capital flows; surges, sudden stops, and financial crises in the periphery (Bordo 2006, Catao 2005).

Aside from the similarities, we need to cautious about the differences between two periods. First, a conventional wisdom concludes that both periods had different approaches to the 'Trilemma' with fixed exchange rate regime and limited policy autonomy during the first era of financial globalization or with flexible exchange rate regime and policy autonomy during the second era of financial globalization. The level of policy autonomy, however, needs further discussion since the center countries did not have any constraints to it. In fact, during the gold standard the UK exerted autonomy with the ability of issuing the international money to sustain a deficit without eroding its status as a reserve currency and the efficacy of the instrument of the Bank rate. Second, the content, the form, and the destination of the capital flows are different. During 19th century international capital flowed from the core countries of Western Europe to overseas regions of recent settlement in America and Australia in the form of bonds financing railroads and other infrastructure investment and long-term government debt mainly through

private-to-private lending (Stone 1999). International investment at that time conformed to the expectations of neoclassical growth theory in that it flowed to destinations where capital was scarce and marginal returns were highest, thus fulfilling the role of development finance. In contrast, currently most capital flows take the form of risk sharing and diversification instead of long term financing. In this sense, 'development finance' prevailed during the first era of financial globalization capital flows, while today are heavily oriented to 'diversification finance' (Obstfeld & Taylor 2004, Schularick 2009). Moreover, under the 'Revived Bretton Woods system (Dooley et al 2004)' while the US has had a large and mount current account deficit the creditors in the periphery have had surpluses and export them to the center. The surpluses then have recycled to debtors in the periphery to finance their deficits. In this sense the 'Lucas paradox' of capital failing to flow from rich to poor has grown much stronger today.

4. Summary

Focusing the scale of capital flows and stability of the overall system in the center and the periphery this section compares the four phases of the international financial arrangement. As summarized in Table III-1, both two eras of financial globalization are characterized by stability with large scale of capital flows for the center. The two periods, however, did not bring about stability for the periphery. Both periods showed recurrent financial crises in the periphery. The scale of capital flows was restricted during both the interwar period and the Bretton Woods period. It should be noted that the causes and results for the decline in capital flows were fundamentally different. While the former yet had no restrictions on international financial transactions and resulted in instability both in the center and the periphery, the latter laid a

comprehensive control on capital flows for the exchange rate stability and monetary policy autonomy and led to stability both in the center and the periphery. Still we do not have an IFA which secure stability both in the center and the periphery together with large scale of capital flows. Then, how can we assess current phases of international financial arrangement after the recent global financial crisis? It may be characterized by still relatively high scale of the capital flow, but weakened stability both in the center and periphery.

Table III-1. The Characteristics of the Four Phases of IFA

Scale of capital flows	Stability			
	Center		Periphery	
	Unstable	Stable	Unstable	Stable
Low	Interwar	BW	Interwar	BW
High	Recent crisis	Gold standard Post BW	Gold standard Post BW Recent crisis	

(1) The gold standard (1870~1913), (2) The interwar period (1919~1939), (3) Bretton Woods system (1945~1973), (4) Post BW (1973~), (5) Recent financial crisis (2008)

III. Analytical Framework for the Changing Pattern of Financial Globalization

This section reviews literature for explaining driving forces for the ups and downs of global financial markets. Along with the conventional argument of swings in policy combinations imposed by the macroeconomic 'Trilemma' I extended alternative suggestions such as tension between regulation and financial market, and the role of imperial hegemonic money. Then, by combining the three factors I propose an analytical framework for the changing pattern of financial globalization.

1. The 'Trilemma' : Capital Mobility, the Exchange Rate, and Monetary Policy

The changing pattern of financial globalization might be explained in terms of the policy 'Trilemma' (Eichengreen 1998, Obstfeld and Taylor 2004). The previous studies provided a stylized description of the 'Trilemma' for the financial market evolution as follows; (i) During the gold standard era, countries accepted a binding commitment to maintain fixed exchange rates for their currencies in terms of gold and full freedom for capital movements subordinating domestic policy objectives. (ii) During the interwar period, except for a relatively brief period in the second half of the 1920s when gold standard was reinstated in somewhat modified form, countries pursued competitive exchange rate depreciation to achieve domestic stabilization objective. (iii) Under the Bretton Woods system, it was agreed that fixed exchange rates were necessary to support a revival of international trade, along with capital controls to maintain domestic policy autonomy in support of full employments. (iv) Under the current dollar standard a regime of flexible exchange rates and capital account liberalization prevailed to allow for domestic monetary policy autonomy.

Table III-2 summarized the stylized description of the global financial market evolution in the context of the 'Trilemma'. The description, however, needs further discussions, in particular, about the policy autonomy. As I mentioned in section II.3, the limitation of policy autonomy was not applied to the center countries. During the gold standard the UK exerted autonomy with the ability of issuing the international liquidity and the efficacy of the instrument of the Bank rate. In contrast, peripheral countries tend to confront certain degree of limitations in policy autonomy under any international financial arrangement with large scale of financial flows. With global financial linkages, interest rates will exhibit more co-movement across countries through

international shock transmission. Under the circumstance the ability of countries in the periphery to conduct autonomous monetary policy might be restricted, in particular, under the post Bretton Woods period when they have been pushed to target inflation.

Table III-2. The 'Trilemma' in the Evolution of Financial Market

Period	Included	Excluded
Gold standard	Fixed exchange rate, Capital mobility	Policy autonomy[1]
Interwar period	Capital mobility, Policy autonomy	Fixed exchange rate
Bretton Woods System	Fixed exchange rate, Policy autonomy	Capital mobility
After the BW	Capital mobility, Policy autonomy[2]	Fixed exchange rate

(1) The UK exerted policy autonomy, (2) The periphery has limitation on policy autonomy

Then what are underlying factors which enforce policy makers to lay different weights on the components of the 'Trilemma'? According to Eichengreen (1998), the change in political economic environment impacts on the economic policy scope. For example, during the classical gold standard government and central banks were protected from political pressures for sacrificing exchange rate stability for domestic economic stability. He identified two factors as critical to this protection; (i) political participants was limited and labor unions and parties were weak, (ii) Keynesian economics was ill understood and impact of fiscal policy on employment, output and process, was not fully articulated. O'Rourke & Williamson (1999) also provided a similar explanation of the change in the political economic environment during the first era of financial globalization in a broad context of the effect of globalization on growth, factor price, and income distribution. While the integration of capital, labor and goods markets in the first era of globalization brought about sizable growth effect it also led to factor price equalization and convergence of real wages and real per capita incomes in the Atlantic economy. These changes in relative factor prices and incomes had an important impact on policy. In the U.S. the rise in income inequality contributed to pressures for anti-immigration legislation in the late 19th and

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early 20th centuries. It also fostered the anti-trade sentiments in Europe in the form of increased tariff protection of agriculture. The turbulent interwar period witnessed the virtual termination of capital mobility as a consequence of risk aversion due to loss of confidence of the gold standard and increasing trade protectionism. The two explanations suggested that the change in political economic environment causes an uneven tendency for capital mobility, and thereby capital flows have progressed and regressed over time according to decisions made under the 'Trilemma'.

2. Tension between Regulations and Financial Markets

The pattern of capital market was also analyzed from a perspective of political economy cycle of finance focusing on tension between regulations and financial markets. The Minsky-Kindleberger framework suggests that the level of tension may vary due to a pro-cyclical credit expansion and contraction. Large exogenous shocks such as industrial innovations could often trigger an exuberant attitude and expectation of higher profits in certain favorably affected sectors of an economy ('displacement'). Credit is then generously extended, increasingly toward those profitable sectors, creating a speculative boom ('boom'). Under the circumstance imprudent bank lending is not often controllable or managed wisely by monetary authorities. In addition, innovation in financial markets usually runs ahead of the ability of monetary authorities to monitor and regulate them. The process might be easily transmitted cross-border through; change in commodity and industrial input prices, currency movements, interest rates movements, and capital flows. Then, the process endogenously generates instability in the economy as a consequence of (i) the credit expansion increases domestic consumption and investment ('overtrading'), (ii) with growing current account deficit and asset bubbles, the economy sends

negative signals to foreign investors, resulting in capital reversals and bubble collapse due to the investors' panic or contagion ('revulsion').

Financial history may suggest that capitalism has alternated 'regulation' and 'deregulation', depending on tension between regulation and financial market. Regulatory framework tends to lose its consistency when financial innovation, market extension, and ideology of free market visions, deregulation and liberalization tend to dominate and become increasingly outreached. Moreover, financial institutions took advantage of a number of gaps in the coverage of financial supervision to operate largely outside the normal scope of prudential regulation. For example, with the revival of foreign trade and investment activity, the situation began to change during the 1960s as offshore trading in Eurodollar and Eurocurrency market took hold in an effort by international banks and firms to bypass national controls on capital movements.

Financial crises might be a reflection of such intrinsic instability of capitalism. For example, it is argued that 19th century crises were directed toward the private sector, generally in poorly-managed, poorly regulated banking systems and in the boom-and bust- prone real estate and property markets. Fuel was poured on the fire by foreign lending encouraged by open capital markets and buoyant export growth (Eichengreen & Bordo 2001, Bordo 2006). Similarly, Taylor (2002) also argued that boom and bust episodes in Latin America and Asian over the past 20 years pivoted around the government withdrawal from regulating the real side of the economy, the financial sector, and especially the international capital market, and this premeditated laxity created strong incentives for destabilizing private sector financial behavior.

An analytical narrative described the dynamic process between financial market and regulation as follows; (i) Free market expands and deepens due to financial innovation, market extension, and deregulation, (ii) With the growth of free market financial instability aggravates

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over time at the periphery, and (iii) When the final critical crisis hits the center only radical re-regulation can be the solution, completing the political economy cycle of finance, then, (iv) A phase characterized by more regulated markets when rules and/or state intervention in the economy tend to be more pervasive (D'Apice 2013). In fact, the history of international financial arrangement(IFA) might have reflected the tension between financial markets and their impact on the stability of IFA. According to Saccomanni(2008), the IFA has changed its pattern from a 'market-led IFA' during the two eras of financial globalization to a 'government-led IFA' during the BW system, and then reverted to a 'market-led IFA' after the post-BW. Under the 'market-led IFA' global financial markets would determine the creation and distribution of international liquidity and exchanger rate, while under the 'government-led IFA' the liquidity, exchange rate, and financial markets are conditioned by monetary authorities at both a national and international level.

3. The Role of Key Currency or Imperial Hegemonic Money

Another approach noted the role of key currency in the international monetary system or imperial hegemonic country which can provide an asset free of risk of default to promote global demand expansion without balance of payment constraints. A key currency international monetary regime is one in which a national currency, or a basket of key currencies is universally accepted as a medium for international transactions and international reserve. The former is related to the UK pound and the US dollar, and International Monetary Fund's Special Drawing Rights is an example of the latter. The key currency arguments typically rested on the idea of asymmetry of the international financial system. According to McKinnon(2003), the world

essentially has a strong financial system in the center and fragile system in the periphery due to the role of key currency of the center which is used as a transaction, reserve, interventional, and invoice currency. According to him, the central position of key currency is natural due to the network externality in the international financial system. The key currency may suffer from the Triffin (1960) dilemma: it must be plentiful to be an effective world reserve, but to remain a key currency it must be strong. Seigniorage benefits to the issuer of key currency, however, are significant, and when periphery countries are accumulating in key currency the center can effectively pass adjustment cost on to the periphery (Ussher 2009). For example, the role of the key currency enabled the US to finance growing external deficits through 'dollar export' since late 60s (Schulmeister 2000). History suggests that there has been continuous competition for key currency status and at some points several currencies can shared the status as evidenced in the interwar periods (Eichengreen 2007).

The UK sterling standard and the US dollar standard also could be interpreted as emerging dominance of the credit money of a single hegemonic country in the settle of international payment balances. From this perspective financial globalization is a process of expansion of imperial hegemony and uneven development where there is an easing of the external constraint on the advanced countries in the core with the impact of the debt-deflationary spiral and financial fragility being borne disproportionately by the periphery (Vasudevan 2009b). In the sterling standard, "peripheral countries obtain credit in British banks, use it to demand manufacturing goods from Britain, and pay for them (Fields & Vernengo 2011)". The view links the changing pattern of financial globalization to the rise and decline of the hegemonic money. With the expansion of asset emanated from the UK hegemon the global capital market was highly integrated. The interwar periods, however, the integration sharply declined with the weakening

of the UK hegemonic position. After the collapse of the BW the US dollar become world credit money and the hegemonic position allows the US to be a global debtor and to provide a default risk free asset to facilitate global capital flows.

4. An Analytical Framework

By combining the three underlying factors I propose a suggestion that both the role of hegemonic money and the tension between regulations and financial markets have provided environmental or institutional constraints for countries to approach the 'Trilemma'. When the constraints are loose to allow high capital mobility they have to make choices between fixed exchange rate subordinating domestic policy objectives and float exchange rate with policy autonomy. In contrast, when the constraints are tight to restrict capital flows there might be no policy trade-offs, according to the 'Trilemma', between exchange rate stability and policy autonomy.

From this perspective the four phases of financial globalization can be analyzed as follows: (i) During the first era of financial globalization a rise of the UK sterling as hegemonic money position provided stability in international financial markets while the tension between a regulation and markets was limited due to the relative well-functioning of gold standard. These loose constraints led to high capital mobility. Under these circumstance countries accepted a binding commitment to maintain fixed exchange rate which, according to the 'Trilemma', necessarily subordinated domestic policy objectives. The role of the UK sterling and the level of tension, however, have not remained unchanged during entire the period. As global financial markets expanded tension began to rise and the UK's hegemonic position gradually declined. (ii)

The interwar period showed a decline of the UK sterling as hegemonic money position. The weakening anchor role of hegemonic money made it difficult for countries to sustain exchange rate stability. At the same time, the stock of capital flows was also sharply declined due to risk aversion, the loss of confidence in the gold standard and increasing trade protectionism. Under these circumstance countries pursued competitive exchange rate depreciation to achieve domestic stabilization objective. (iii) The Bretton Woods system introduced a comprehensive regulatory framework on international capital flows, and at the same time, authorized the US dollar as a key currency. With the anchor role of the key currency, countries sought the exchange rate stability. At the same time, domestic policy autonomy also could be included since, according to the 'Trilemma', there is no policy trade-offs between fixed exchange rate and policy autonomy under the restricted capital mobility. (iv) After the collapse of Bretton Woods the US dollar have established its hegemonic money position and provided stability in international financial markets. Before the advent of Latin America crises in 1980s and Asian crises in 1990s tension between regulations and financial markets have remained low level with high capital mobility. Under these circumstance countries allowed for domestic policy autonomy and moved toward flexible exchange rate regime. This high capital mobility, however, again led to a gradual increase in tension as the unfettered markets evade the regulation framework. With the increasing tension countries started to limit capital mobility to enjoy exchange rate stability and policy autonomy, in particular, after the late 1990s. Figure III-2 summarizes the analytical framework of the process of hegemonic money, tension between financial markets and regulations, and the 'Trilemma.'.
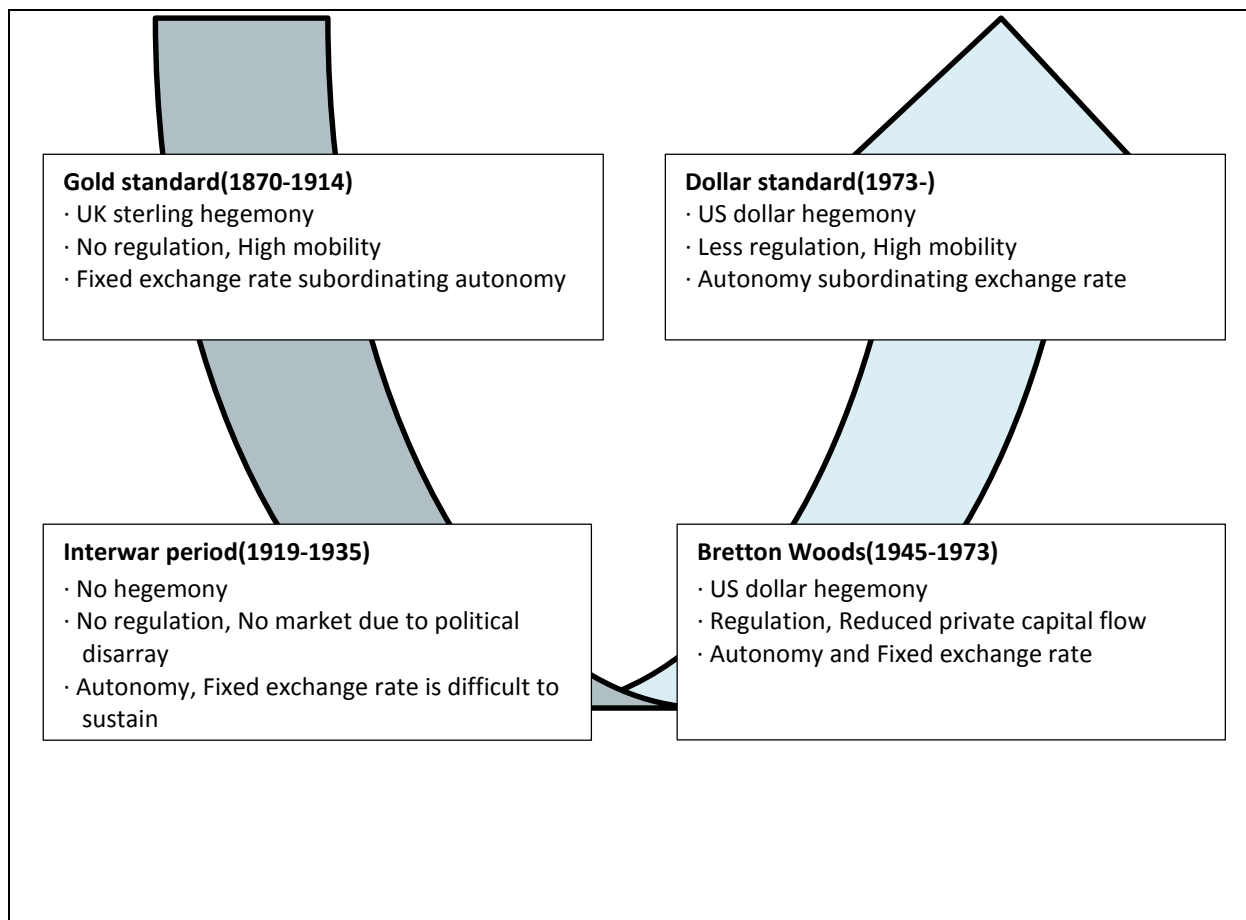
Figure III-2. An Analytical Framework of the Process of Hegemony, Tension, and 'Trilemma'

The arrow stands for U-shaped pattern of financial globalization. The vertical of the shape implies the amount of the stock of international financial flows.

IV. Two Competing Views and Their Philosophical Bedrock

Beyond the usual extension of the previous studies this section links the evolution of financial markets into economic beliefs toward international capital flows and global imbalances. By leveraging the history of economic thought (HET) I identify two competing views, and trace their philosophical bedrock and thought trajectories.

The role of the HET is particularly important in the context of 'competitive view', which is opposed to the 'cumulative view'. The cumulative view, which is now prevailing, regards the

HET as having only limited meaning because it sees that contemporary economic theory incorporates all the previous contributions. The view treats the path of study of economics with linearly progressive one, so that it makes us focus only on the theoretical frontier connected to positivism. By narrowing down the scope of study to the level of 'objective' or 'logical consistency' or 'empirical relevance', it gives convenience for us to exclude the complexity of historical, and philosophical and politico-social context from the study of economics. In contrast, the 'competitive view' sees the HET as an essential element for clarifying and evaluating the different economic theories which are based on different conceptual foundations (Roncaglia 2005). The view intends to capture the process by which economists articulate, adopt, and retain 'hard core principles', which run deep and do not stray significantly from their bedrock or trajectories of thought including propositions, styles and rules of reasoning, methodologies for collecting and assessing evidence, and inherent belief system (Endres 2011). The view also is in company with the notion of "comparisons of economic doctrines, which are economists' explanations of the working of the international financial system based on some unifying principles, reasoning style, and research methodologies" (Schumpeter 1954). To formally deduce two competing views from the history of economic thought I introduce the British Currency and Banking School debate in mid-19th century, analyze their impacts on the theory of money and economic beliefs, and then trace their trajectories to late economic thoughts such as the Neoclassical Economics, Modern monetarists, Modern Austrian School, Keynesian, New-Keynesian and Post-Keynesian economics. I will discuss a number of arguments from both Schools, and distinguish several fundamental economic beliefs and principles which have a particular importance for the later economic debate.

1. The Currency School and Banking School Debate in Mid-19th Century in England

(1) Institutional Background and Problems of Interpretation

The Currency-Banking School debate took place in the 30-year period following Britain's return to the gold convertibility after the 'Bullionist controversy'. The major monetary problem in England at that time related to the maintenance of external equilibrium and the automatic gold convertibility of the pound. In particular, the successive economic crises of 1825, 1832 and 1836 spurred increasing interest in the working of the English monetary system[50] and plans for reforming it.

The central dispute between the Currency School and Banking School can be divided into their theoretical and political segments. The theoretical segments were basically related to the theory of money which included issues such as 'the definition of money and money-substitutes', 'endogenous or exogenous nature of money', and 'the relationship money and real sector'. In addition, there were various problems of economic policy relating to the question of how to limit the inflationary expansion of currency issues and thus ensure economic stability, and whether policy should be governed by 'rules', or whether authorities should be allowed 'discretion' (Schwartz 2008). While both sides of the dispute supported a currency convertible into specie, they differed on the question as to whether it was necessary to impose further restrictions on banks of issue, in addition to convertibility. The previous studies suggested that those theoretical and political segments reflect their different economic beliefs or principles which were

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[50] The 19th century English monetary system consisted of three main entities; (i) the Bank of England which was privately owned with limited liability having monopoly over note issuing in London and its vicinity, (ii) country banks outside London's perimeter who could issue notes with some restrictions, and (iii) London banks who only played intermediate role such as deposit and credit creation (Schwartz 2008).

condensed in the 'quantity theory of money ('QTM') versus the 'real bills doctrine ('RBD'). The former was espoused by adherents of the Currency School while the latter was supported by adherents of the Banking School.

The result of the debate was the adoption of the Bank Charter Act of 1844 and was seen as a victory of the Currency School (Diatkine & Boyer 2008). The Act split the Bank of England into two branches; one branch to issue notes, and the other to handle the deposit business of the bank. Also, the Act imposed what was essentially a 100-percent reserve requirement onto the note-issuing department. The victory, however, in practice was short-lived, since there was a run against banks in 1947. The Bank of England acted as Walter Bagehot's lender of last resort principle, which stated that 'lend freely at a high rate against good collateral'. In fact, the movement of international capital was increasingly outside the regulatory control of the Bank of England and the constraints of the Banking Act of 1844. Liquidity in the monetary system was sustained by parallel unregulated private flows, which was envisioned by the Banking School principle rather than the Currency School principle (Vasudevan 2009a).

(2) The Currency School : QTM, Hume, Ricardo, and Mises

The Currency School and its representatives (Samuel Jones Loyd, J.R. McCulloch, Robert Torrens, and George Ward Norman etc.) accepted the classical quantity theory of money (QTM) that the stock of money(M) determines price level(P). The QTM, the orthodox view of money at that time, includes important propositions such as; (i) the proportionality of M and P based on stable demand for money and stable circulation velocity of money, (ii) the active or causal role of M in the monetary transmission mechanism, (iii) the neutrality of money, i.e. money is veil,

(iv) the monetary theory of the price level, i.e. price level instability stems from monetary rather than non-monetary disturbance, and (v) the exogeneity of the nominal stock of money (Humphrey 1974). In gold standard money stock was regarded as mainly predetermined by the past and current production of gold and by the state of the external account.

The QTM was the key ingredient in the classical explanation of the operation of the price-specie-flow mechanism (PSFM) presented by David Hume. He refined the QTM to apply the problems of international economics arguing that increase in the domestic money supply would result in a proportional rise in wages and prices, thereby making British goods more expensive than foreign goods, and thus causing import to rise, export to fall, and gold to flow out. The external drain, in turn, would tend to moderate prices in Britain and raise them elsewhere until eventually restoring equilibrium. Hume's PSFM is an automatic self-regulating adjustment mechanism that insures the restoration and preservation of balance of payments equilibrium. In the mechanism, money has a role as the active causal variable which disturbs initial equilibrium, drives up prices, generates trade imbalances forcing an efflux of specie, and eventually restores equilibrium. [51] Paper money issued by banks was regarded as much a contributor to the fluctuation in prices as a newly discovered silver mine in the Americas. Thus, he advocated a central bank that limits the creation of credit to prevent the excessive creation of money, which would lead to inflation (Diatkine & Boyer 2008).

The QTM and PSFM were foundation of David Ricardo's theory of money. He argued that the fluctuations in prices were completely due to the over-issue of bank notes from the Bank of England during the period of suspended convertibility providing an mechanism as follows; the quantity of money determines domestic prices; domestic prices affect the exchange rate; and the

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[51] According to PSFM the expansion in the money supply is given by specie inflow resulting from trade surplus, in this sense money is passive or endogenous, which is in contrast with the Currency School's beliefs (Taylor 1991).

exchange rate between in convertible paper and gold standard currencies determines the premium on gold. To him convertibility would ensure PSFM and would be an adequate safeguard against over-issue of bank notes and lead to lowered prices without an exodus of bullion (Humphrey 1974, Roncaglia 2005).

The Currency School, applying the percepts of QTM and PSFM, viewed that the excessive issue of notes by the Bank of England and its subsidiaries was the cause of following unfortunate consequences: rising domestic prices relative to foreign prices; unfavorable balance of payments; weakened foreign exchange; gold outflow and depletion of gold reserves; and ultimately economic and financial crisis. In contrast to Ricardo's view, for the Currency School convertibility was not sufficient to check over-issue because of time lags and destabilizing policy responses. The School held that preservation of the gold standard could be only through tightly constrain the issue of private bank notes by requiring that private banks hold specie or Bank of England notes in an amount equivalent to their private bank note issue. This required reserve would give to the central bank control over that portion of the money supply that is privately created, and that this would in turn allow the central bank to limit inflationary pressures that would cause trade deficits. The school was guided by what become known as the 'Currency Principle', which stated that "note issues would be correctly regulated if they were made to fluctuate in volume exactly as a purely metallic currency would have done (Daugherty 1942). Another way of putting the Principle would be to say that "there is always a danger of an over-issue of bank notes, which therefore should be strictly regulated-so regulated that the notes might become merely taken for metallic money (Wu 1939, 2007).

The Currency School argued that, unlike bank notes, demand deposits were not money, and thus were of no importance as far as bank policy and financial crises were concerned.

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Consequently, the Bank Charter Act of 1884, which incorporated the 'Currency Principle', completely avoided any regulation whatever of the deposit-bank branch of the Bank of England, as the School considered there was no need in that direction. They defended their sharp distinction between money(coin and notes) and near-money(deposits and bills) on two grounds.; (i) the low circulation velocity of near-moneys rendered those instruments quantitatively insignificant relative to notes as exchange media, (ii) in times of financial crises near-moneys were poor substitutes for money because only the latter would be accepted in final payment. They deny that near-moneys can frustrate the effects of changes in the money supply (Humphrey 1974).

Ludwig von Mises, who is one of early Austrian school theorist, systematically corrected the currency school's error and expanded their theories, producing the consistent explanation of business cycle that the currency school lacked. He viewed that bank notes and demand deposits do perform the same economic function and thus should receive the same treatment from the perspective of monetary policy. Mises' theory of money and business cycle relies on the 'entrepreneur-capitalist' who saves in order to expand production. In the same line with currency school, he argues that credit expansion is inimical to the process of sustainable economic growth because it results in 'mal-investment' by increases a divergence between the real and money rates of interest. In other words, new money generated by the credit expansion fools entrepreneurs into acting as if there had been a general, voluntary increase in saving (McCaffrey 2010).

(3) The Banking School: RBD, Smith, and Marx

The Banking School, represented by Thomas Tooke, John Fullarton, James Wilson and others, emerged in response to the Currency Principle. The banking position was summed up in the 'Banking Principle', which states "the amount of paper notes in circulation is adequately controlled by the ordinary process of competitive banking, and if the requirement of convertibility was maintained, could be controlled for any appreciable length of time (Viner 1937)". Banks are, therefore, purely passive instruments, expanding and contracting the supply of credit to meet the 'needs of businesses', and any excess funds loaned out would simply be returned to the bank. This elasticity was regarded as the fundamental characteristic of bank note issue, and no regulation of the currency is necessary to prevent over-issue. The School viewed that any additional restrictions would hamper the ability of the banks to expand credit to meet an increase in demands of business. The School also attacked the distinction between notes and deposits, arguing that both performed the same economic function and neither notes nor deposits should be subject to any restriction other than convertibility into specie.

The principle has its root on Adam Smith's real bill's doctrine ('RBD'), which was a competing theory of money to the QTM. According to the doctrine, the money supply is an endogenous variable that responds passively to shifts in the demand for it. Being demand-determined, the stock of money cannot exceed or fall short of the quantity of money demanded. And with the quantity of money supplied always identical to the quantity demanded, no situation of excess supply or redundant of money can ever develop to stimulate spending and force up prices. According to Smith, such a 'law of reflux' might be an adequate safeguard against the over-issue of bank notes through a channel in which excessive lending would drive up activity

and/or prices and lead the private sector to pay off loans and buy gold. The logical extension of the RBD was to deny the direction of the causal effects of money on prices. In contrast to the QTM prices do not respond to changes in the quantity of money, but rather the amount of the circulation responds to the supply and demand in real sectors (Foley 2006). In this context, the School looks to real factors for the explanation of economic crises, as opposed to the monetary theory of crises advanced by the Currency School. Karl Marx also agreed with the RBD on his anti-QTM stance, and provided theoretical foundations for the view that the prices of commodities determine the quantity of the circulating medium by deducing the key features of capitalist monetary circulation and the analysis of the reproduction of capital (Lapovitsas 1999).

2. The Impact of the two Schools on the Theory of Money

The previous studies segmented the two School's position according to their different theoretical bases and policy implications such as the rationale of monetary policy and rules versus discretion. First, the Currency School supported monetary policy for price stability based on two important assumptions embodied in QTM: (i) the exogeneity of money and (ii) the causality running from money to price. In contrast, the Banking School argued that any attempts to regulate prices via monetary control were both futile and pointless, based on two assumptions of the RBD: (i) the money supply is an endogenous variable not subject to exogenous control, (ii) it is prices that determine the quantity of money and credit, and not vice versa. Second, while the Currency School advocated a fixed rule, i.e. the 100 percent marginal reserve requirement for banknote issues, the Banking School were in support of not regulating money supply, and leaving it at the discretion of banks because the optimum quantity of money would be forth

coming automatically if the banks themselves regulated their note and deposits liabilities by responding to the needs of trade.

For further discussion on the impacts of the two Schools on the theory money I employ the analytical framework in Lance Taylor (1991). Taylor presented an outline of positions of different monetary analysts from three angles: (i) causal status of money/credit, whether it is 'active' (exogenous and determined prior to other variables) or 'passive' (endogenous), (ii) main effect of money/credit, whether it is on prices or output, and (iii) channels of the effect, whether via money (banking system liabilities) or credit (banking system assets). I adopt the original Taylor's classification to include economic schools or economists whose positions are, in particular, of importance from the context of global imbalances and financial globalization which is the main focus of this essay. Table III-3 outlines positions of different monetary analysts.

Table III-3. Positions of Different Monetary Analysts

Causal status of money/credit	Main effects of money/credit			
	On prices		On quantities	
	Via money	Via credit	Via money	Via credit
Passive	Hume	Wicksell Schumpeter	Banking School	Smith Marx Post-Keynesian
Active	Ricardo Currency School Monetarists New-Classical	Mises	Keynes Neoclassical Syn. New-Keynesian	Minsky

Sources : Taylor(1991) p24, The positions of the Neoclassical Synthesis, Monetarists, New-Classical Synthesis, New-Keynesian, and Post-Keynesian are included by author.

(1) Currency School Tradition: Modern Monetarist and New Classical Economics

I start by tracing the impact of the Currency School. Both Ricardo and the Currency School viewed that money is exogenous and has on impact on prices. It incorporated 'dichotomy' or 'neutrality' in that money can affect only the prices level without any influence on the volume of production. This is the ultimate monetarist position, with echoes in Modern Monetarists' position and New-Classical economics. For example, foreshadowed by the Currency School's argument, Milton Friedman posited a doctrine that the prevalence of long lags in the response of spending and prices to changes in money supply, in the policymakers' response to changes in the economy, tend to render discretionary stabilization effort destabilizing. He also developed the Currency School's concept of 'rule of the game', which implied that the supply of banknotes should be tied to the actual amount of gold in the value of the central banks, i.e., the convertibility of note into gold at a fixed rate. For Friedman the 'rule of the game' includes three principles: (i) The central banks and government should make no attempt to influence the exchange rate of their currencies by selling or buying foreign currencies or gold (no 'dirty float'), (ii) There is a constant rate of growth in the money supply ('k-percent rule'), and (iii) Neither government or central banks should hold reserves of foreign currencies or gold. Then the 'clean float' of the exchange rate would emerge will be exactly the rate that are necessary to balance international trade and the operation of law of comparative advantage (Friedman 1953). For international monetarists such as Martin Whitman, David Stockman, and Robert Lucas balance of payment is basically a monetary problem reflecting monetary disequilibria, and there is no need to have an international coordination policy since such payments imbalances are transitory and will automatically correct themselves (Whitman 1975). Ronald McKinnon also can be positioned

along the Currency School tradition in the way that he has emphasized the role of 'rule' in reforming the IFA[52].

The tradition of the Currency School also streamed down to the New Classical economics. It involves the application of intertemporal optimization and rational expectations of the neoclassical economics and the insight of the Modern Monetarists to apply the pricing and output decisions (Goodfriend & King 1998). Although it admitted that monetary policy actions can have an important effect on real economic activity over several years, it viewed that there was little long-run trade-off between inflation and real activity. Thus, monetary was seen to essentially unimportant for real output, which is the same line with the Currency School tradition. Moreover, it stressed the 'credibility' of the monetary policy to eliminate inflation which is comparable to the Modern Monetarist who emphasized the 'rules'.

(2) Banking School Tradition: Keynes, Neoclassical Synthesis, New-Keynesian and Post-Keynesian Economics

Defying the Currency School's 'neutrality' proposition, the Banking School noted the impact of money on quantities and the interaction between financial market and real sector. This Keynesian position echoed in both New-Keynesian and post-Keynesian economics.

For Keynes monetary changes may have a permanent effect on output, interest rate, and other real activities rather than a rise in prices. If there is large-scale unemployment, and if money wages cannot fall so as to employ the unemployment, an injection of new money will set the unemployed to work. The resulting price rises will be lessened by the increase in output and

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[52] To positioning McKinnon into the Monetarist trajectory is rather complicated. In contrast the Monetarist' unilateral rule he proposed a two-tier rule, which imposes stricter rules for the center and more loose rules for the developing countries.

therefore in demand for money. Keynes describes what he calls an 'entrepreneur economy' in which the reward of the factors of production is not set *a priori* in real terms; on the contrary, as payments to households are made with money, neither the workers, the renters, nor the entrepreneurs know their final share of the national output. In this 'entrepreneur economy' money arises as a result of credit, from the need of firms to pay their factors of production, which is consistent with the 'real bill doctrine' of the Banking School (Lavoie 1984).

Neoclassical Synthesis absorbed the macroeconomic thought of Keynes into the microeconomic thought of neoclassic economics. It stressed the 'short-run non-neutrality of money', which was neglected by the Currency School. It also spelled out precisely the conditions that must hold if the Currency Principle is to be valid, namely the constancy of the velocity of money and of real output using mathematical framework such as Irving Fisher's equation of exchange MV=PT, and Cambridge cash balance equation M=kPy[53] (Humphery 1974). New-Keynesian economists provided micro-foundations for the Keynesian economics. Noting the role of wage and price stickiness and the other market failures they argued that government regulation and macroeconomic stabilization can lead to more efficient outcomes than a laissez faire policy.

In contrast to the New-classical Synthesis argument, Post-Keynesian economists viewed that the velocity of money is a volatile, unpredictable variable, influenced by expectations, uncertainty, and by changes in the volume of money substitutes. The erratic behavior of the velocity makes it impossible to predict the effect of that a given monetary change will have on prices. They proposed a characterization of the economic system based on a sequence of cause and effect relations; speculative demand for money affects the interest rate; this in turn, together

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[53] Where M is the stock of money, V is velocity of circulation, P is the price level, T is the volume of money in transaction, k is the desired cash balance ratio, and y is output.

with expectations, affects the level of investments; in turn investments, through the multiplier, determine income and employment. Thus, in the Post-Keynesian approach, the influence exercised by monetary and financial markets on income and employment was stressed. Moreover, the supply of money is endogenous that is, the quantity of money in circulation is not rigidly controlled by monetary authorities, but depends at least in part on the decisions of other agents (Roncaglia 2005).

Knut Wicksell and Joseph Schumpeter might be in between the two Schools. Wicksell argued that the demand for credit on the part of business is not independent of bank interest rate policy, but relies heavily upon it. The money rate of interest can be reduced below the natural rate, thus artificially increasing the demand for credit. Therefore, according to him there is no restriction on the extension of credit of the sort imagined by the banking school. Schumpeter's 'innovator-entrepreneur' uses credit in order to introduce new combinations of the factors of production. His view of credit expansion was something of a cross between the currency and banking views; while credit expansion was inflationary in the currency sense in the short run, in the long run, which allows for the competition of production, expansion of the supply of credit beyond the supply of commodities was essentially impossible (Taylor 1991).

To sum up, the 'dichotomy' or 'neutrality' tradition has remained intact from the Currency School to Modern Monetarists and New-Classical Synthesis. For them a 'rule' based monetary policy is sufficient to secure economic stability. In contrast, the Banking School legacy which emphasizes the interaction between financial markets and real sectors has even strengthened in the Keynesian, Neoclassical Synthesis, New-Keynesian, and Post-Keynesian economics. For the Banking School the interaction has only limited importance as a demand factors in money or credit creation. For Keynes it implies money as a means of providing effective demand in

economic recession, for New-Keynesian it means a tool for macroeconomic stabilization, and for Post-Keynesian economists it suggests an endogenous financial fragility which can generate economic crisis.

3. The Impact of the two Schools on Economic Beliefs

Along with the impact of the two Schools on monetary theory another important aspect is their impact on economic beliefs on how financial markets operate. For distinguishing several fundamental economic beliefs of the two Schools and their traditions I examine theories of financial stability or instability. They include efficient market hypothesis(EMH) which is associated with Eugen Fama(197) and financial instability hypothesis(FIH) proposed by the literature of Hyman Minsky(1978) and Charles Kindleberger(1978).

The EMH, which is developed by mainstream economics, relied on the rational behavior of agents and on market discipline as a mechanism to efficiently allocate financial assets. It assumes that any and all information that is required for rational economic decisions is contained in prices which are determined in competitive markets. Current price of a financial asset traded in competitive markets will reflect all the relevant information about current conditions and future prospects for the assets, and thus its price is not subject to any misalignment between its current and true underlying value. Consumers and investors in financial markets operate as 'representative agents' on the basis of 'rational expectation' about the future, and therefore would not be fooled by bubble phenomena. Since there is no friction in financial markets, financial cycles of booms and bust should not exist. In this context, a standard theory of the EMH emphasizes the positive effects of free markets in terms of promoting better global

allocation of capital. It is claimed that an increase in the breath, depth, and completeness of financial markets allows hedging the uncertainty surrounding future commitments. Thus, the EMH views that an optimal system would be one with minimum public sector involvement both in regulation and supervision. Government should only provide the appropriate regulatory framework to ensure market economic transactions produces acceptable result. In this sense they support a strict 'rule' based monetary policy which includes inflation target and money supply for monetary stability, but disagree with the need of financial policy because they view that the efficient market would automatically secure financial stability.[54] In the context of international financial arrangement (IFA) this view argues that the IFA could function satisfactory and self-regulating manner, and the key to the stability of the IFA is the application of national monetary policy rules targeting price level stability. A policy of price level stability of a key currency nation, in particular, may have the positive spillover effect of creating monetary and price stability in the world economy (Endres 2011).

Conversely, the FIH is skeptical about the efficiency of markets as an institution capable of creating a stable economic environment arguing that financial markets are inherently unstable and the asset prices can deviate substantially from their fundamental or intrinsic value. It proposes that markets can on occasions act in destabilizing ways and reach multiple equilibria, frequently sub-optimal (Kindleberger 1978). Consequently, the approach claims that markets need extra-market coordination from national or international authorities in order to deliberately attempt to smooth the market deficiencies and inherent instability. For example, for

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[54] 'Monetary policy' refers to central bank's monetary policy to secure 'monetary stability' which implies the absence of inflation or deflation in the prices of goods and services. In contrast 'financial stability' implies the absence both of significant movements in the price of financial assets and of crises impairing the solvency of institutions operating on the banking and financial intermediation markets. 'Financial policy' includes regulation on the business operation of financial companies which includes prudential regulation, lender of last resort, and deposit insurance (Saccomanni 2009).

Minsky(1991) the solution was both a big government that acts as 'spender of last resort' and a big bank as 'lender of last resort'. The Minsky-Kindleberger framework noted that crises are an inherent feature of financial markets at both the domestic and international levels and the general contours of any crisis involve; speculation, monetary expansion, significant price changes in real assets, followed by an eventual sharp exit of market participants into liquid assets and a deflationary trend in asset prices. In the context of IFA, the FIH notes that foreign exchange are not like any other commodity markets since speculative activity on foreign exchange markets was inherently destabilizing and that instability is transferred across national borders and to the real economy ('financial contagion'). In this sense, completely free market-based currency markets was seen to increase the extent to which short-term capital movements are accommodated at the expense of more productive long-term cross-border capital flows[55].

The results of the previous analyses could suggest that the Currency School is connected to the EMH while the Banking School is related to the FIH. In fact, the Banking School advocated regulation in financial markets to limit their negative effects on real sector than did the Currency School. While the Currency School emphasized a strict rule on the supply of money, which is narrowly defined to include only gold and bills, it was benign on the activities of markets both in the domestic and the international level. In fact, the Currency School did not advocate restrictions on the creation of deposits and regulation on banking activities both in deposits and loans. Even if over-issue by the banking system was a potential danger, the Bank Charter Act of 1884 which incorporated the Currency Principle, leaving the creation of deposits totally unconstrained, did nothing to prevent expansion giving the banks the power to create vast

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[55] For example, Kindelberger(1972) defied Friedman's 'stabilizing speculation' argument saying that fully floating, market-determined exchange rates were uncertainty-creating because they often fluctuated violently.

amount of new credit at will. In contrast, while the Banking School opposed any regulation on

money which is broadly defined to include deposits, it noted potential risks due to the interaction

between financial markets and real sector. Two evaluations are worth quoting, in this context.

> "Rather than focus on controlling the quantity of money, the banking school tradition focuses on controlling the quality of money by making sure that the credit-backed currency is backed by credits of the highest quality. It is impossible to regulate the quantity of a circulating currency of credit. Attempts to do so by imposing reserve requirements on banks either do not bind or they disrupt the monetary system and stimulate financial innovation. Even worse, the misguided focus on the quantity of money turns attention away from the regulation of credit through control of the interest rate, and so opens the door to uncontrolled speculative booms and their inevitable aftermath (Mehrling 1996)".

> "Although Adam Smith admitted that the use of notes is a matter of natural right, and restriction on such free exchange is a manifest violation of that natural liberty, he also noted that there remain forces exogenous to the banking sector which may compel over-issue, and that necessitates Smith's proposed bank regulations. In fact, Smith advocated regulations whose effect was to limit entry into banking; banks should be restrained from issuing notes of small denominations (a lower limit of 5 pound), and banks should be required to repay all bank notes in demand. Smith's advocacy of both competition and regulation is not a contradiction. He recognized an important role for competition while maintaining that unfettered competition is undesirable (Carlson 1998)".

The Currency School's tradition of efficient market hypothesis has been conveyed to the

Chicago School, the Modern Monetarist, the Newclassical economics, and the Austrian School,

which emphasize the financial market efficiency with limited regulation based on strict rules. For

example, Milton Friedman viewed that financial markets operate smoothly even in times of a

crisis, thus supporting individual banks is unnecessary and only brings about negative

externalities arising from moral hazard even in crisis (Endres 2011). Similarly, Friedrich

Hayek(1975) and Gottfried Harberler(1973) also claimed that currency exchange rates are like

any other commodity price, and thus they should be market-determined; when exchange rates are

market-determined they change in a manner that does not connote instability in the overall

economic structure. For Maurice Obstfeld(1998) and Kenneth Rogoff(1996) the global capital

market was seen as a benefactor to all parties as far as long term world economic growth was

concerned because freer international capital flows enable greater geographical diversification of risk, mobilize international savings, smooth conception, macroeconomic policy discipline(because unsound policies would be punished by capital outflows). Martin Feldstein(1999) who oppose capital controls and recommend building foreign exchange reserves as a type of insurance could be the same line with those schools.

Conversely, the Banking School legacy has been conveyed in the Keynesian, the Neoclassical Synthesis, the New-Keynesian, and the Post-Keynesian economics, which note the financial instability with more regulated approach. For example, Keynes was also aware of the irrationality of markets in time of distress and the dangers of leaving the system of payments arising from financial transactions unregulated and argued often for intervention and coordination, both domestically and internationally. When the risks are incalculable there is no rational basis on which to value assets, and market valuations can swing widely as a result of fashion, herd instincts, or panic, destabilizing investment and the real economy in the process (Foley 2008). In addition, Keynes believed that economic interdependence requires policy responses based on the principle of 'shared responsibility' rather than on unilateralism. For him, temporary disequilibria in global economy should be corrected by expansionary policies in the surplus countries and not by belt-tightening measures in the deficit countries. [56] The ICU(International Clearing Union) reflected Keynes' belief that the key problem in the international system was the lack of liquidity. He saw the need to construct a system that would favor expansion rather than contraction and one that would not restrain domestic policy. In addition, the ICU was structured to avoid creating a system that relied on one or more dominant currencies as reserve assets to minimize governmental influence and prevent a repetition of the

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[56] In the 'Overseas financial policy in stage III' Keynes discussed threefold dramatization of choice for world's economic future, namely 'starvation corner', 'temptation', and 'justice', and ranked them in sequence as a third-best, second-best, and best option (Carebelli & Cedrine 2010).

collapse of foreign exchange reserves that had occurred in 1928-32 (Schulmeister 2000). The idea of ICU has on impact on the following Keynesian economist such as Triffin's suggestion to link SDR to development finance, Kaldor's international commodity reserve currency, and Stiglitz's global greenbacks system (D'Arista 2009).

The legacy of inherent financial instability echoes both New-Keynesian and Post-Keynesian economist. For example, Stiglitz(1994, 1998) viewed that inadequate financial regulation allowed banks to make excessively risky loans without adequate monitoring. According to him, deep, efficient, and robust financial system are essential for growth and stability; but left to themselves, financial markets will not become deep, efficient, or robust; thus the government should play an essential role, both in directly overseeing and regulating the financial system and also in establishing the correct incentives to encourage prudential and productive behavior. According to Paul Davidson(1998) and Lance Taylor(1998), speculative activity on foreign exchange markets was inherently destabilizing and financial contagion effect could expand to real economy. They insisted that foreign exchange markets are not like any other commodity market because they trade financial capital and securities across national borders and those markets are only effective when allocating short term capital because they operate on a short term horizon. Eatwell and Taylor (2001, 2002) also argued that divergences between an increasingly globalized economy and only nationally regulated currencies and banking system threatens global financial stability. The Banking School tradition refuted the 'self-regulating' power of IFA and concerned the instability of the IFA. For Kindleberger (1982) the Bretton Woods II system was intrinsically unstable since the US, which provided stabilization function through her leading role in the first postwar decades, had neither the will nor the international acceptance to play the leading role. Similarly, Eichengreen (2004) also pointed out that the

image of Bretton Woods II confuses the incentives that confronted individual countries with the incentives that confronted groups of countries and concluded that the new Asian periphery countries are unlikely to subordinate their individual interest to the collective interest.

The tradition was also skeptical about the benefits of the financial globalization, in particular, in less developed and emerging economies (Rodrik 1998). Instead, noting the potential costs of financial globalization it recommended government intervention and control on capital market to limit such risks. They included, for instance, a support for tax policy on international financial transactions (Tobin 1974, Dornbush 1980, Eichengreen 200, and Stiglitz 2000), a need for global governance structures formally to regulate international capital flows (Eatwell and Taylor 2000), and sequencing capital account liberalization (Krugman 2000).

Linking the impacts of the two Schools on monetary analysis and economic belief I provide an outline of thought trajectories as in Table III-4.

Table III-4. The Trajectories of the Competing Views on Global Imbalances and Capital Markets[57]

		British Classical School			1800
Currency School				Banking School	1845
				Marx	
		Marginalist Revolution			1860
Austrian Stream		Neoclassical Stream			1900
		Schumpeter	Wicksell	Keynes	1925
Hayek		Neoclassical Synthesis	New-Keynesian		1945
Harberler	Friedman Whitman Stockman Lucas		Triffin Tobin Krugman Kindleberger Stiglitz	Minsky	1970
		Dornbush Eichengreen		Post Keynesian	
Obstfeld Rogoff Feldstein	McKinnon	Goodfriend King		Davidson Taylor Eatwell	1990
Austrian School	Chicago School	New Classical	Neoclassical Synthesis	New Keynesian	Post Keynesian

← Benign view   → Gloomy view

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[57] The followings are chronicles of episodes in international finance; (1)international gold standard(1870~1913), (2)the interwar period(1919~1939), (3)Bretton Woods system(1945~1973), (4)Break down the BW and post BW(1973~), (5)oil crises(1970s), (6)debt crises(1980s), (7)Asian financial crises(1998), (8)US financial crisis(2008)

In the context of global imbalances and financial globalization the two Schools' tradition may reflect two competing economic beliefs. They include a 'benign view' which gives the importance on financial liberalization to promote market efficiency in line with the Currency School tradition, and a 'gloomy view' which gives the weight on systems of governance to limit the negative effects of unfettered markets in company with the Banking School tradition. The former sees that global imbalances and capital flows are self-stabilizing based on the beliefs that markets are efficient, prices are flexible due to deepening financial markets reflecting true underlying value, and representative agents optimize based on rational expectations. In contrast, the latter suggests that global imbalances and capital flows are not self-stabilizing founded on the conviction that international financial markets are inherently unstable, and prices can deviate substantially from the fundamental or intrinsic value due to institutional and policy differences among countries.

While the former sees that the process of the imbalances adjustment will be harmonious and the U.S. current account deficits can be smoothly financed by capital flows from the surplus countries, the latter concerns market disturbances and economic crisis due to a disorderly adjustment. Consequently, the 'benign view' recommends policies such as promoting further liberalization and abolition of the capital control while the 'gloomy view' emphasizes enhancing international coordination and intervention and control on capital market to limit negative effects of unfettered markets.

The 'benign view' prevailed in the first era of financial globalization (1870~1914) with the rise of the British Classical School and the Currency School, and second era of financial globalization before the Asian crisis (1973~1997) with the dominance of the Chicago School and the Austrian School. The 'gloomy view' became widespread in the original Bretton Woods

system (1945~1973) with the spread of the Keynesian and the New-Keynesian economics, and post Asian crisis period (1997~present) with the rise of the Post-Keynesian economics. Table III-5 summarizes the two competing views on the global imbalances and capital market.[58]

Table III-5. Two Competing Views on the Global Imbalances and Capital Market

	Benign View: Global imbalances and capital flows are self-stabilizing	Gloomy View: Global imbalances and capital flows are not self-stabilizing
Core principles	Efficient Market Hypothesis(EMH) : Market efficiency, self-regulating power of market	Financial Instability Hypothesis(FIH) : Intrinsic instability of financial market
Flexibility of prices	Due to deepening financial markets price would be more flexible	Institutional and policy differences among countries would hamper price flexibility
Adjustment	Both trade and capital flows will adjust in an orderly manner	Market disturbance would impact significantly as shown in recurring crisis
Recommend	Promote liberalization and abolition of capital control	Coordination, intervention and control to limit negative effects of unfettered financial markets
Link	Currency School Chicago School Austrian School New-classical Economics	Banking School Keynes Neoclassical Synthesis New-Keynesian Economics Post- Keynesian Economics

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[58] It should be emphasized that just because I have aligned particular thought trajectories with the two competing views, this does not mean that individuals always have no exceptions. For example, although McKinnon is in the line with the Currency School he has gloomy rather than benign view on the global imbalances.

V. Conclusion

I observed that from the historical perspective challenges for policy makers and economist' philosophical foundation on global imbalances and international capital flows could be a parallel from the past to the present, if not an exact repetition. Using updated data I found that a J-shaped proposition may be more relevant rather than the conventional U-shaped pattern of financial globalization because after 2000 the stock of assets has shown a drastic upward trend which is not comparable to that of the first era of financial globalization. To provide an analytical framework to understand the driving forces for the ups and downs of global financial markets I suggest that both the role of hegemonic money and the tension between regulation and financial markets have provided environmental or institutional constraints to the 'Trilemma'.

After then, I tried to link the underlying forces into the role of varying political and economic assessments of the benefits of capital mobility and economic beliefs and trace their thought trajectories in the history of economic thought starting from the mid-19th century British banking debate. I found that throughout history there has been a tension in development of global finance between the importance given to financial liberalization to promote market efficiency and the weight to given to systems of governance to limit the negative effects of unfettered markets. The Currency School tradition, which is conveyed in the Chicago School, the Austrian School, and the New-Classical economics, emphasized the financial market efficiency with limited regulation and prevailed in the first era of financial globalization (1870~1914) and second era of financial globalization before the Asian crisis (1973~1997). Conversely, the Banking School legacy, which is conveyed in the Keynesian, the Neoclassical Synthesis, the

New-Keynesian and the Post-Keynesian economics, noted the financial instability with more regulated approach and has been wide-spread in the original Bretton Woods system (1945~1973).

Then, how can we assess current phases of international financial arrangement (IFA) after the 1997 Asian crisis? The capital mobility is still relatively high, but the level of stability of IFA might be significantly decreased. From a historical perspective it is similar to the late period of the first era of financial globalization. At that time there were little international coordination to deal with increased instability risks and as a result, financial globalization broke down in the inter-war years with economic turbulences, political disarray, and rising nationalism. Will the history rhyme itself then? There may be no easy way to answer it. Yet considering the increased instability emerging markets may need to accumulate foreign reserves to insure against the risks of global imbalances and financial integration. However, it is also necessary to note that the reserve accumulation has generated an unintended consequences ('the paradox of reserve accumulation' Schulerick 2009). These rational attempts to make individual economies safer have contributed to the build-up of global imbalances and financial risk for the world economy in such a way that capital flows from emerging markets to the U.S. helped create the macroeconomic backdrop for the recent financial crisis by distorting interest rates and subsidizing consumption in the U.S. (Calvo 2009). In this sense, the best policy advice might turn out to lie somewhere in the middle. In a national economy context, emerging markets, together with putting the house in order with effective instruments as a preventative medicine, may need to throw sand in the wheels of global finance to slow down the pace of financial globalization. In a global economy context, international coordination needs to be strengthened to reform the IFA based on the recognition of a fundamental asymmetry and certain inequalities in the current international monetary system centered on the US dollar as the dominant reserve

currency. In this sense, Stiglitz's recommendation to expand the use of SDR as the central reserve asset of the international system needs to be considered. At the same time, the management of global effective demand and liquidity in the spirit of Keynes's 'shared responsibility'; i.e. fiscal policies to boost the saving rate in the US while expanding domestic effective demand elsewhere in the world. In addition, from a history of economic thought an alternative paradigm to the mainstream economics, which emphasizes the benefits of efficient financial markets, is necessary to properly assess the growth effects, gains, and losses of the financial globalization. Depending on context and country, the appropriate role of policy will be as stem or encourage the tide of capital inflow. Recognize that the greater fragility of financial systems on the periphery requires prudential financial regulations more stringent than those appropriate within the industrial economies; to supplement domestic regulatory restrictions on foreign exchange exposure by banks, capital controls may be needed (McKinnon 2003). To all of these the Banking School legacy together with Post-Keynesian approaches may provide an insight.

CONCLUDING REMARKS

This study assesses the global imbalances across three regions (Chapter I), from Korean economy context (Chapter II), and from the perspective of history of economic thought (Chapter III). Chapter I demonstrates the asymmetry of the international financial arrangement (IFA) by examining contrast adjustments in the triangular pattern of international private capital flows among the center, creditor, and debtor periphery. Based on the asymmetry it concludes that decentralized efforts by individual country have limitations and international coordination is inevitable to minimize the negative externalities of the capital flows in the world economy. Chapter II investigates the implications of global imbalances on the Korean economy by assessing the impact of Korea's foreign reserve accumulation on the macro economy and analyzing the distributional impacts of an exchange rate. Chapter III studies the global imbalances and international capital flows in a broader political-economy context from the history of economic thought. It observes that from the historical perspective challenges for policy makers and economist' philosophical foundation on global imbalances and international capital flows could be a parallel from the past to the present, if not an exact repetition.

The study may provide an example of new-comparative economic history approach, which suggests that economic processes can be best be understood by systematically comparing experiences across time, regions, and, above all, countries (Hatton, O'Rourke and Taylor 2007). The findings of the three Chapters suggest that current questions such as the sources of financial and economic stability, the importance of the functioning of IFA, the nature of asymmetry of the IFA, and the impact of financial globalization are not space-time specific. For example, from a historical perspective current phases of international financial markets is similar to the late period of the first era of financial globalization. In addition, Korea's foreign reserve and

exchange rate policies can be understood as one of the peculiar features of the global financial markets after 1997 Asian crisis.

In this context the three Chapters may provide coadjutant logical basis for each other. The analysis of triangular patterns of capital flows in Chapter I have concreteness with the observation of Korea's experience in Chapter II. Conversely, the conclusion of the Chapter I may provide a broader point of view of the Korea's foreign reserve and exchange rate policies emphasizing their limitations from the global context. Moreover, since any IFA is a social-historical product the analysis of Chapter III may accord complementary ground. In addition, a major advantage in taking an intellectual history approach is that it allows us to focus on long-run trends rather than short-run ups and downs and seek an alternative paradigm to the mainstream economic thought.

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APPENDIX 1. A SUMMARY OF THE STATISTICS IN CHAPTER I

1. USA

Variable	Obs	Mean	Std. Dev.	Min	Max
netflow	132	0.0064	0.0055	-0.0051	0.0223
% change	131	2.2984	26.9714	-54.2721	302.5243
1st difference	131	0.0001	0.0048	-0.0141	0.0104
ca	132	-0.0065	0.0042	-0.0165	0.0030
% change	131	-0.4418	5.4141	-56.2791	21.6908
1st difference	131	0.0000	0.0015	-0.0031	0.0056
usprate	132	5.2658	3.5186	0.1250	14.0000
% change	131	-0.0179	0.1529	-0.7698	0.5703
1st difference	131	-0.0983	0.6762	-2.8700	2.7000
prate	132	5.2658	3.5186	0.1250	14.0000
% change	131	-0.0179	0.1529	-0.7698	0.5703
1st difference	131	-0.0983	0.6762	-2.8700	2.7000
intl	132	8.1158	3.6162	3.2500	20.3230
% change	131	-0.0088	0.0833	-0.2887	0.4413
1st difference	131	-0.1004	0.9122	-4.7130	5.1230
intd	132	0.0000	0.0000	0.0000	0.0000
% change	0				
1st difference	131	0.0000	0.0000	0.0000	0.0000
neer	132	81.8569	23.1630	31.2930	117.9530
% change	131	0.0084	0.0308	-0.0460	0.1101
1st difference	131	0.4398	2.2863	-4.0900	9.6930
reserve	132	0.0070	0.0020	0.0036	0.0120
% change	131	0.0104	0.0959	-0.1370	0.7445
1st difference	131	0.0000	0.0006	-0.0012	0.0037
usfs	76	0.0253	0.9956	-1.2180	5.3360
% change	75	-0.4006	1.8995	-10.0833	2.7500
1st difference	75	-0.0039	0.6042	-1.4610	3.8640

2. East Asian Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
netflow	1174	0.1054	0.4867	-1.9738	5.3487
% change	1153	-1.3305	16.8369	-380.3262	86.9500
1st difference	1163	0.0000	0.1930	-2.0448	2.5529
ca	1098	0.0312	0.0759	-0.1405	0.3181
% change	1088	-0.0413	10.7353	-227.0519	179.4966
1st difference	1088	0.0007	0.0311	-0.1291	0.1991
usprate	1188	5.2658	3.5067	0.1250	14.0000
% change	1179	-0.0179	0.1524	-0.7698	0.5703
1st difference	1179	-0.0983	0.6739	-2.8700	2.7000
prate	1097	7.0816	5.8540	0.3333	74.1800
% change	1087	-0.0007	0.1572	-0.8571	2.2769
1st difference	1087	-0.0701	1.9606	-21.4200	30.9200
intl	1080	10.0919	6.9260	2.5640	47.7770
% change	1071	-0.0041	0.1006	-0.6975	1.9884
1st difference	1071	-0.0919	1.2354	-25.3230	10.6180
intd	1080	2.3715	6.7790	-15.2830	40.1800
% change	1007	-0.0376	2.8891	-40.9996	47.1431
1st difference	1071	-0.0105	1.3420	-25.3430	10.5980
neer	1140	160.4341	158.4942	69.6130	1209.5100
% change	1131	-0.0044	0.0420	-0.6823	0.2474
1st difference	1131	-1.6482	15.1140	-278.0490	78.8101
reserve	1186	1.1731	1.0301	0.0313	4.8380
% change	1176	0.0259	0.1660	-0.5057	1.7987
1st difference	1176	0.0123	0.1148	-0.4866	1.2455
usfs	684	0.0253	0.9898	-1.2180	5.3360
% change	675	-0.4006	1.8882	-10.0833	2.7500
1st difference	675	-0.0039	0.6006	-1.4610	3.8640

3. Latin American Countries

Variable	Obs	Mean	Std. Dev.	Min	Max
netflow	1151	0.0094	0.0631	-1.1345	0.2865
% change	1132	-0.4091	16.6331	-373.2666	155.8000
1st difference	1142	-0.0002	0.0674	-1.0291	1.1593
ca	1141	-0.0083	0.0457	-0.1560	0.2317
% change	1132	0.2520	11.9247	-103.7023	307.7580
1st difference	1132	0.0000	0.0266	-0.2463	0.1603
usprate	1188	5.2658	3.5067	0.1250	14.0000
% change	1179	-0.0179	0.1524	-0.7698	0.5703
1st difference	1179	-0.0983	0.6739	-2.8700	2.7000
prate	1117	39873.8800	1171907.0000	0.5000	38800000.0000
% change	1108	7.1349	191.7815	-1.0000	6166.2970
1st difference	1108	-0.1988	1664508.0000	-38800000.0000	38800000.0000
intl	1018	144.6366	1351.8210	3.7010	35894.8000
% change	1005	0.0433	0.3788	-0.9938	3.8907
1st difference	1005	4.5873	1402.8090	-35670.7000	17710.7000
intd	1018	137.1149	1351.6550	-12.3230	35884.7700
% change	1005	-0.5681	18.8773	-590.7866	29.5760
1st difference	1005	4.6700	1402.8170	-35670.6600	17711.1700
neer	1140	39600000000	372000000000	37.4330	5700000000000
% change	1131	-0.0437	0.1387	-0.9850	0.2647
1st difference	1131	-5050000000	43400000000	-600000000000	1844.8000
reserve	1154	0.3160	0.2568	0.0000	1.1883
% change	1145	0.0616	0.6556	-0.9864	18.2038
1st difference	1145	0.0009	0.0697	-0.8540	0.6129
usfs	684	0.0253	0.9898	-1.2180	5.3360
% change	675	-0.4006	1.8882	-10.0833	2.7500
1st difference	675	-0.0039	0.6006	-1.4610	3.8640

APPENDIX 2. THE RESULTS OF UNIT ROOT TEST BY DICKEY-FULLER METHOD IN CHAPTER I

1. Original Data

	CA	NETFLOW	RESERVE	USPRATE	PRATE
USA	-2.331	-5.686***	-0.945	-1.737	-1.737
HK	-4.422***	-2.577	-0.370	-1.737	-0.473
CHN	-2.230	-1.723	-0.477	-1.737	-1.204
IDN	-3.430***	-5.694***	-1.983	-1.737	-2.574
KOR	-4.080***	-7.059***	-0.758	-1.737	-2.502
MYS	-1.906	-6.547***	-0.977	-1.737	-2.229
PHI	-4.225***	-8.971***	-2.004	-1.737	-2.140
SIG	-2.785*	-3.612***	-1.997	-1.737	-2.376
THA	-3.775***	-4.897***	0.404	-1.737	-1.386
TPI	-3.956***	-7.201***	-0.404	-1.737	-1.968
ARG	-3.839***	-4.646***	-32.736***	-1.737	-11.464***
BRA	-3.334**	-7.443***	-24.069***	-1.737	-8.219***
CHI	-4.257***	-5.688***	-2.061	-1.737	-2.172
COL	-2.931**	-5.389***	-1.638	-1.737	-0.707
EQU	-3.857***	-9.022***	-3.936***	-1.737	-2.030
MEX	-3.869***	-5.920***	-1.985	-1.737	-2.329
PER	-2.726*	-5.839***	-9.726***	-1.737	-7.208***
UR	-6.172***	-7.316***	-1.034	-1.737	-1.440
VEZ	-4.208***	-7.647***	-1.796	-1.737	-2.350
	INTL	INTD	NEER	REER	USFS
USA	-2.072	.	-2.653*	-1.814	-2.676*
HK	-1.933	-2.941**	-2.493	-1.206	-2.676*
CHN	-1.350	-1.392	-2.289	-3.722***	-2.676*
IDN	-1.490	-1.418	-1.591	-2.224	-2.676*
KOR	-1.631	-2.260	-1.563	-1.292	-2.676*
MYS	-4.891***	-6.984***	-1.171	-1.432	-2.676*
PHI	-2.157	-2.410	-4.319***	-1.267	-2.676*
SIG	-1.254	-1.862	-0.216	0.173	-2.676*
THA	-2.249	-1.443	-0.926	-1.472	-2.676*
TPI	-1.884	-2.952**	-2.422	-0.834	-2.676*
ARG	-10.359***	-9.553***	-5.753***	-2.270	-2.676*
BRA	-6.353***	-6.354***	-28.446***	-2.071	-2.676*
CHI	-4.679***	-5.751***	-0.963	-1.345	-2.676*
COL	-1.240	-1.653	-4.916***	-1.918	-2.676*
EQU	-2.030	-2.246	-2.092	-1.338	-2.676*
MEX	-5.894***	-5.899***	-6.015***	-2.626*	-2.676*
PER	-3.851***	-3.690***	-5.154***	-1.501	-2.676*
UR	-1.622	-1.688	-2.028	-0.279	-2.676*
VEZ	-3.328**	-3.629***	-1.699	-1.377	-2.676*

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

2. First Difference Data

	ddCA	ddNETFLOW	ddRESERVE	ddUSPRATE	ddPRATE
USA	-11.397***	-19.354***	-10.417***	-9.079***	-9.079***
HK	-10.885***	-12.411***	-7.488***	-9.079***	-6.256***
CHN	-12.254***	-10.896***	-10.185***	-9.079***	-7.873***
IDN	-15.663***	-14.914***	-12.090***	-9.079***	-10.204***
KOR	-12.656***	-16.698***	-13.197***	-9.079***	-8.988***
MYS	-12.369***	-14.483***	-11.297***	-9.079***	-8.586***
PHI	-14.141***	-17.238***	-11.546***	-9.079***	-13.396***
SIG	-14.805***	-16.334***	-11.672***	-9.079***	-11.445***
THA	-14.494***	-18.391***	-10.996***	-9.079***	-9.090***
TPI	-13.247***	-15.658***	-11.019***	-9.079***	-5.977***
ARG	-13.181***	-17.331***	-8.936***	-9.079***	-19.590***
BRA	-17.735***	-15.623***	-17.024***	-9.079***	-15.687***
CHI	-12.562***	-17.901***	-11.953***	-9.079***	-6.756***
COL	-12.061***	-16.833***	-11.015***	-9.079***	-8.785***
EQU	-11.110***	-19.712***	-10.335***	-9.079***	-13.323***
MEX	-11.798***	-16.354***	-9.468***	-9.079***	-12.853***
PER	-11.659***	-14.998***	-4.319***	-9.079***	-16.427***
UR	-16.123***	-18.611***	-10.541***	-9.079***	-7.260***
VEZ	-11.402***	-16.969***	-11.132***	-9.079***	-11.776***

	ddINTL	ddINTD	ddNEER	ddREER	ddUSFS
USA	-10.363***		-8.077***	-8.353***	-7.627***
HK	-9.733***	-10.724***	-8.372***	-6.576***	-7.627***
CHN	-10.068***	-9.651***	-8.596***	-11.553***	-7.627***
IDN	-7.647***	-8.340***	-11.015***	-10.785***	-7.627***
KOR	-6.640***	-5.869***	-7.442***	-6.854***	-7.627***
MYS	-19.117***	-14.078***	-7.405***	-11.411***	-7.627***
PHI	-10.230***	-10.337***	-7.671***	-11.267***	-7.627***
SIG	-9.884***	-9.677***	-8.237***	-6.814***	-7.627***
THA	-10.007***	-7.475***	-10.656***	-10.765***	-7.627***
TPI	-7.604***	-11.546***	-11.478***	-11.382***	-7.627***
ARG	-10.776***	-10.581***	-10.806***	-10.645***	-7.627***
BRA	-12.252***	-12.252***	-4.175***	-9.506***	-7.627***
CHI	-17.185***	-17.430***	-8.218***	-10.536***	-7.627***
COL	-8.835***	-8.917***	-6.020***	-11.632***	-7.627***
EQU	-13.323***	-13.117***	-10.990***	-11.268***	-7.627***
MEX	-13.434***	-13.435***	-4.207***	-11.610***	-7.627***
PER	-11.322***	-11.385***	-11.069***	-10.734***	-7.627***
UR	-6.784***	-6.764***	-8.307***	-7.822***	-7.627***
VEZ	-7.718***	-7.430 ***	-7.609***	-7.742***	-7.627***

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

3. Percent Change Data

	dCA	dNETFLOW	dRESERVE	dUSPRATE	dPRATE
USA	-10.405***	-11.426***	-10.227***	-6.640***	-6.640***
HK	-7.560***	-11.652***	-8.440***	-6.640***	-7.003***
CHN	-11.313***	-12.253***	-10.391***	-6.640***	-8.414***
IDN	-11.077***	-10.894***	-11.860***	-6.640***	-11.043***
KOR	-11.558***	-11.193***	-12.054***	-6.640***	-8.156***
MYS	-11.361***	-10.614***	-10.996***	-6.640***	-8.472***
PHI	-11.131***	-11.366***	-12.314***	-6.640***	-12.164***
SIG	-11.425***	-11.272***	-11.712***	-6.640***	-10.377***
THA	-10.998***	-11.401***	-13.162***	-6.640***	-7.680***
TPI	-11.405***	-11.476***	-10.388***	-6.640***	-5.642***
ARG	-10.590***	-10.814***	-9.232***	-6.640***	-11.435***
BRA	-11.102***	-11.337***	-9.448***	-6.640***	-8.850***
CHI	-11.317***	-11.661***	-11.248***	-6.640***	-4.721***
COL	-11.879***	-11.425***	-10.835***	-6.640***	-8.574***
EQU	-11.379***	-10.821***	-11.622***	-6.640***	-14.004***
MEX	-11.490***	-11.370***	-9.309***	-6.640***	-11.262***
PER	-9.113***	-8.789***	-9.365***	-6.640***	-9.705***
UR	-10.504***	-11.175***	-11.514***	-6.640***	-8.482***
VEZ	-11.281***	-11.691***	-12.556***	-6.640***	-10.967***

	dINTL	dINTD	dNEER	dREER	dUSFS
USA	-8.118***		-7.573***	-8.836***	-7.789***
HK	-9.301***	-11.197***	-8.570***	-7.488***	-7.789***
CHN	-9.572***	-10.263***	-9.498***	-11.406***	-7.789***
IDN	-10.103***	-11.139***	-10.980***	-10.646***	-7.789***
KOR	-7.113***	-10.059***	-8.217***	-7.377***	-7.789***
MYS	-11.565***	-8.679***	-7.807***	-11.368***	-7.789***
PHI	-11.019***	-11.467***	-8.033***	-11.305***	-7.789***
SIG	-9.775***	-15.292***	-7.791***	-6.509***	-7.789***
THA	-9.481***	-8.901***	-10.638***	-10.716***	-7.789***
TPI	-7.742***	-10.979***	-11.546***	-11.403***	-7.789***
ARG	-7.423***	-8.306***	-11.755***	-10.583***	-7.789***
BRA	-6.793***	-6.654***	-3.592***	-9.551***	-7.789***
CHI	-15.301***	-11.382***	-7.476***	-20.523***	-7.789***
COL	-8.045***	-10.061***	-7.784***	-10.183***	-7.789***
EQU	-14.004***	-12.689***	-11.950***	-10.494***	-7.789***
MEX	-7.989***	-9.782***	-5.771***	-11.664***	-7.789***
PER	-11.037***	-10.661***	-11.711***	-10.759***	-7.789***
UR	-7.041***	-10.213***	-8.050***	-7.841***	-7.789***
VEZ	-7.408***	-6.807***	-8.565***	-7.104***	-7.789***

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

APPENDIX 3. OPTIMAL LAG SELECTION IN CHAPTER I

	Model (1)	Model (2)-1	Model (2)-2	Model (3)
US	1			
HK		1	1	4
CHN		0	1	1
IDN		0	1	2
KOR		1	2	1
MYS		1	1	1
PHI		1	1	1
SIG		1	1	1
THA		1	1	1
TPI		1	1	1
ARG		0	4	2
BRA		3	1	1
CHI		1	1	2
COL		1	2	1
EQU		1	1	1
MEX		1	2	1
PER		0	4	1
UR		1	1	1
VEZ		1	1	1

Optimal lag selection is based on the Hannan and Quinn information criterion (HQIC).

Model (1): [USFS, USPRATE, INTL], Model (2)-1: [USPRATE, PRATE, INTL, INTD], Model (2)-2: [USPRATE, NETFLOW, NEER], and Model (3): [RESERVE, NETFLOW, CA]

APPENDIX 4. A SUMMARY OF DATA AND THE RESULT OF UNIT ROOT TEST IN

CHAPTER II-SECTION III

1. The Summary Statistics

variable	obs	mean	Std. dev.	min	max
reserve	132	9.15E+10	1.05E+11	1.90E+09	3.23E+11
netflow	132	1.29E+09	5.16E+09	-3.28E+10	1.42E+10
ca	132	2.30E+09	4.39E+09	-7.40E+09	1.48E+10
gdp	132	1.20E+11	8.40E+10	1.26E+10	3.05E+11
reserve1	132	0.517885	0.398403	0.081494	1.223984
netflow1	132	0.012512	0.044447	-0.24311	0.14393
ca1	132	0.011681	0.042288	-0.1188	0.1383
dreserve1	131	0.027781	0.192402	-0.3469	1.210198

Foreign reserve holding('reserve1') is defined by the ratio of the Korea's stock of foreign reserve holding('reserve') to the Korea's GDP. 'dreserve1' is first difference value of the 'reserve1'. Net capital flow('netflow1') is the ratio of the sum of Korea's gross capital inflow and outflow which covers foreign direct investment, portfolio investment, and other private capital investment('netflow') to the Korea's GDP. Current account('ca1') is also defined by the ratio of the Korea's current account('ca') to the Korea's GDP.

2. The Result of Stationarity Test(Dickey-Fuller Test)

reserve1		netflow1	ca1
level	1st difference	level	level
-0.611	-16.775***	-7.059***	-4.080***

***p<0.001

APPENDIX 5. A SUMMARY OF DATA IN CHAPTER II-SECTION IV

Variable	Obs	Mean	Std.dev	Min	Max
Micro data					
exp(=export/sale)	16018	0.468357	7.321908	-0.01804	733.3333
pro(=profit/sale)	24142	0.06268	0.117232	-1	0.909091
w(=labor cost/employee)	23525	1.28E+07	1.35E+07	2154.399	3.44E+08
a(=employee/sale)	23584	1.15E-08	1.69E-07	4.71E-11	1.97E-05
a1(=1/a)	23584	3.46E+08	5.12E+08	50772.63	2.13E+10
ulc(=labor cost/sale)	24023	-0.03217	0.0079	-0.06287	0.00336
em	23665	848.41	3415.53	1	111400
Macro data					
reer	35878	-0.00425	0.089365	-0.25521	0.147882
neer	35878	-0.02496	0.092623	-0.29971	0.133088
wd	35878	0.02552	0.116888	-0.14969	0.470787
ip	35878	0.109231	0.142452	-0.37426	0.88
gdp	37005	0.063578	0.040178	-0.057	0.123
wgdp	37005	0.028235	0.013662	-0.02245	0.04822

'exp' refers to export ratio defined by the ratio of export sales to the sum of export and domestic sales, 'pro' refers profit rate defined by to the ratio of profit to sales, 'w' refers to wage rate defined by the ratio of labor cost to the number of employees of a firm, 'a' refers to labor coefficient defined by the ratio of employee to sale), 'a1' refers to labor productivity which is reciprocal to the 'a', 'ulc' refers to the log value of unit labor cost which is defined by the ratio of labor cost to sale, 'reer' refers to annual growth rate of real effective exchange rate, 'neer' refers to annual growth rate of nominal effective exchange rate, 'wd' refers to annual growth rate of Korean won to U.S. dollar exchange rate, 'ip' refers to annual growth rate of manufacturing industry production growth, and 'wdp' refers to annual growth rate of Korea's GDP growth 'wgdp' refers to annual growth rate of world GDP growth.