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Is the valuation effect always beneficial for adjusting external imbalances? *

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Abstract This paper investigates implications of the valuation effect on a number of international macroeconomic issues. Emphasizing that the valuation effect is a wealth transfer among countries through capital gains or losses, it mainly concentrates on studying implications of the valuation effect on international risk sharings and external imbalances. For these purposes, a standard two-country monetary macroeconomic model is considered and the financial integration is embedded through cross-border asset holdings. Main findings of this paper can be summarized as follows: First, the valuation effect works mainly as an impact effect and it depends crucially on initial movements of nominal exchange rates and asset prices. Second, the valuation effect can matter quantitatively depending on the composition of external asset position and types of shocks. Especially, when bonds are main components in external asset position and a monetary shock hits the economy, the valuation effect is conspicuous. Finally, the valuation effect can exert considerable influences on the economy. Specifically, under certain circumstances, it can work against international risk sharings and magnify external imbalances by amplifying the effects of a shock.

Keywords Valuation Effect, External Imbalance, International Risk Sharing

JEL Classification F41, F32, F44

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1. INTRODUCTION

Recently, the international macroeconomic environment has changed significantly in various aspects. Of these changes, financial integration is particularly noteworthy. Over the past three decades, international financial markets have integrated so rapidly that their landscape has undergone enormous changes. First, the size of cross-border asset holdings has increased drastically over the period. A significant fraction of domestic financial assets are held by foreign investors and at the same time, domestic investors hold a large amount of foreign assets. Second, since various types of assets from different countries can now be traded with less barriers in the integrated markets, the composition of each country's external asset position has become more complicated in terms of currencies and types of assets.[1]

One of the most interesting consequences of these changes is that due to its complex compositions, a considerable amount of capital gains or losses can happen from external asset positions when exchange rates and asset prices fluctuate. These capital gains or losses are so called the *valuation effect,* which has drawn much attention among economists.[2]

Confronting this new phenomenon, recently, many studies have tried to evaluate the quantitative importance of the valuation effect empirically. [3] For instance, according to estimates of BEA, the valuation effect in the U.S. economy in absolute term amounts to 2.5% of GDP as average between 1989 and 2004 and it is quantitatively as large as the trade balance which amounts to 2.2% of GDP in absolute term in the same period. In addition, Lane and Milesi-Ferretti (2007) report quantitatively similar results for other advanced economies. Those results indicate that the valuation effect cannot be ignored anymore at least for advanced economies and it becomes an important component in understanding the dynamics of the current account and external asset position.

However, so far, the valuation effect has not been a main subject in main-

[1] According to Lane and Milesi-Ferretti (2007), in industrial countries, the aggregate assets and liabilities tripled as a ratio to GDP during the period. And, the phenomena have concentrated on FDI and portfolio equity. They increased four times and six times respectively. For details, see Lane and Milesi-Ferretti (2003a) and Lane and Milesi-Ferretti (2007).

[2] Note that capital gains or losses can be realized from domestic asset positions as well. In that sense, the *external* valuation effect seems to be a more correct terminology rather than the valuation effect. However, to avoid an unnecessary confusion and be compatible with existing literature, I will just use the valuation effect in below.

[3] See Lane and Milesi-Ferretti (2001), Lane and Milesi-Ferretti (2005), Lane and Milesi-Ferretti (2007), Gourinchas and Rey (2007), Tille (2003), Kollman (2006), Kim *et al*. (2017) and among others.

stream international macroeconomic analyses despite its increasing quantitative importance. Only recently, some studies consider implications of the valuation effect explicitly in analyzing some international macroeconomic issues. But, even their consideration of the valuation effect is limited in that most of the studies concentrate on investigating the roles of valuation effect in a very specific situation, especially the current external imbalances of the United States.[4] They commonly discuss the possibility that the valuation effect can reduce the magnitude of nominal depreciation of the U.S. dollar needed to restore the external balance of the United States.

In this regard, the valuation effect needs to be examined in a more general environment for a better understanding of its implications. So, this paper attempts to consider the valuation effect in a more general framework and examine its implications in broader aspects of the economy. Especially, the following issues will be highlighted.

First, it is notable that the valuation effect is basically a wealth transfer among countries through capital gains or losses from each country's existing external asset position and the wealth transfer inevitably accompanies different welfare implications among countries. Therefore, it is natural to examine welfare implications of the wealth transfer due to the valuation effect. Some existing literature follow this direction of research. For example, Tille (2008) studies implications of the valuation effect on international transmissions of monetary shocks, especially with regard to its welfare effects and show that the valuation effect can magnify the welfare gains from monetary expansions. Benigno (2009b) also pursue the similar avenue but in a somewhat different perspective. He focuses mainly on examining what a role the valuation effect can play to achieve the efficient allocation when the economy has multiple distortions such as monopolistic competition and nominal rigidity. In a similar vein, this paper attempt to study implications of the valuation effect on international risk sharings but in a more systematic way compared with existing studies.[5] More specifically, this paper attempt to examine the valuation effect quantitatively based on a fully-fledged two-country sticky price model with a more realistic production side and investigate more specific questions with regard to the valuation effect such as how it works in the general equilibrium framework and whether it works *for* or *against* international risk sharing.

[4]Obstfeld (2004), Obstfeld and Rogoff (2005) and Cavallo and Tille (2006) are exemplary.

[5]In this perspective, Heathcote and Perri (2013) and Benigno and Kucuk (2012) are also mentionable. Both studies attempt to explore the implications of international risk sharing using international business cycle models in which the valuation effect is embedded. But they differs from this paper in the sense that the valuation effect is not a main subject of investigation.

Second, another interesting feature of the valuation effect is associated with external imbalance. In recent literature, the main focus is on the role of the valuation effect in adjusting external imbalances. As well known, in traditional international macroeconomics, it is believed that the adjustments of external imbalances can be achieved only through cumulative changes in trade balances. However, as recent studies emphasize, after the financial integration, there can exist an additional adjusting mechanism through the valuation effect. The valuation effect can generate a wealth transfer and this wealth transfer can contribute to clearing external imbalances. This possibility of the valuation effect as an adjusting mechanism of external imbalances is explored in many studies. For example, Gourinchas and Rey (2007) try to decompose empirically the external adjustments of the U.S. economy into different components. According to their estimates, about one third of total external adjustment of the U.S. economy can be attributed to changes in returns on given external asset position. Also, Obstfeld and Rogoff (2005) consider the role of the valuation effect when they analyze the current external imbalance of the U.S. economy. Especially, they examine whether the valuation effect can reduce the magnitude of nominal depreciation of the U.S. dollar needed to restore the external balance, but their simulation shows that it has only a small effect. However, arguably, most of previous studies seem to emphasize only the positive aspects of the valuation effect with regard to external imbalances. In other words, they fail to consider the case in which the valuation effect can also be a contributor to external imbalances. For example, when an exogenous shock hits the economy, it is possible that the valuation effect can even magnify external imbalances by amplifying effects of the shock. So, this paper attempts to examine how the valuation effect is related to external imbalances in a more general framework and ask whether it is really beneficial in terms of mitigating external imbalances.

To address these issues, a standard two-country monetary business cycle model is considered in this paper. The main difference from standard models is that financial integration is embedded into the model through a considerable amount of cross-border asset holdings. But, to study implications of the valuation effect on the issues above, two extensions with different financial market environments are also considered. One is an economy in which contingent bonds are allowed to trade and can be counted to represent a perfect risk sharing world. The other one is an economy in which only uncontingent bonds are allowed but zero cross-border holdings at the steady states and can be considered as an economy before the financial integration.

Main findings of this paper can be summarized as follows: First, the valua-

tion effect works mainly as an impact effect and it depends crucially on initial movements of nominal exchange rates and asset prices. Second, the valuation effect can matter quantitatively depending on the composition of the external asset position and types of shocks. Especially, when bonds are main components in the external asset position and a monetary shock hits the economy, the valuation effect is conspicuous. Finally, in a certain circumstance, the valuation effect turns out to exert considerable influences on international risk sharing by affecting the equilibrium allocation. More specifically, in the case that bonds are main components in external asset position and a monetary shock hits an economy, the valuation effect can hurt international risk sharing and magnify external imbalance by amplifying a shock.

The remainder of the paper is organized as follows: In section 2, the theoretical models are described in detail. The parameterization and the solution method are discussed in section 3. Simulation are presented and discussed in section 4. The final section concludes with a brief summary of major findings and discusses implications in conclusion.

2. MODEL

To investigate implications of the valuation effect on international business cycles, a standard two-country monetary international business cycle model is developed. It shares major features with standard ones as described below.[6]

The world consist of two countries, *Home* and *Foreign*. In each country, there are intermediate goods producing firms and final goods producing firms. Each intermediate goods producing firm is a monopolistic competitor and indexed by its product which is in a continuum of varieties. Meanwhile, each final goods producing firm combines home and foreign intermediate goods into final goods using a simple CES technology. Both countries share the same preference and technology and only intermediate goods are allowed to trade internationally. Finally, the home and foreign markets are segmented and price differences cannot be arbitraged away. As a result, each intermediate good producing firm can charge different prices in different markets.[7]

[6]The main features of theoretical model are borrowed from various previous studies. Its overall stucture and nominal rigidity is modelled following Chari *et al*. (2002) while the structure of cross-border asset holding is following Tille (2008). Finally the degree of exchange rate pass-through is assumed to have a parameterized functional form following Corsetti and Pesenti (2005).

[7]As a result, the main source of real exchange rate fluctuation is the deviation of the law of one price. Another source is, as widely known, the existence of nontradable goods, which is ignored in this paper.

However, the model differs from standard ones in the following ways: First, not only bonds but also equities are allowed to trade internationally to incorporate the financial integration into the model. In addition, to study implications of the valuation effect, two extensions with different financial market environments are also considered. Second, it is notable that no specific position regarding exchange rate pass-through is taken in this paper. As is well known among international macroeconomist, the assumption of exchange rate pass-through is critical for the overall performances of models.[8] In this regard, following Corsetti and Pesenti (2005) and Tille (2008), the model assumes a functional form of pass-through which can nest perfect pass-through (or PCP , producer currency pricing) and no pass-through (or LCP, local currency pricing). In the calibration, an eclectic view will be taken as the benchmark case and extreme cases (perfect pass-through and no pass-through) are considered as sensitivity analysis.

For notations, all foreign variables have an asterisk (*) to be distinguished from their home equivalent. H or F in the subscript of variables, which are associated with the quantities and prices of intermediate goods or financial assets, represents their nationality. In addition, s_t denotes a particular state of the world at time t and the history of events up to period t is represented by $s^t = (s_o, \cdots, s_t)$. The probability of any particular history of s^t is $\pi(s^t)$.

Each agent's optimization problem will be discussed respectively in below.

2.1. FIRMS

2.1.1 Final good producing firms

The final good producing sector is a perfectly competitive market. A final good producing firm combines home and foreign intermediate goods into final goods. Thus, a representative final good producing firm in the home country solves

$$\max_{Y_H, Y_F} P(s^t)Y(s^t) - \int_0^1 P_H(i,s^t)Y_H(i,s^t)di - \int_0^1 P_F(i^*,s^t)Y_F(i^*,s^t)di^* \qquad (1)$$

subject to

$$Y(s^t) = \left[\omega\left(\int_0^1 Y_H(i,s^t)^\theta di\right)^{\frac{\rho}{\theta}} + (1-\omega)\left(\int_0^1 Y_F\left(i^*,s^t\right)^\theta di^*\right)^{\frac{\rho}{\theta}}\right]^{\frac{1}{\rho}} \qquad (2)$$

where $i \in [0,1]$ and $i^* \in [0,1]$ are indices for home and foreign intermediate goods respectively and $Y(s^t)$, $Y_H(i,s^t)$, and $Y_F(i,s^t)$ are respectively quantities of

[8] For details, see Obstfeld and Rogoff (2000) and Betts and Devereux (2000).

final goods, home and foreign intermediate goods. Similarly, $P(s^t)$, $P_H(i,s^t)$, and $P_F(i,s^t)$ are corresponding prices. Also, note that θ and ρ measure respectively the elasticity of substitution across intermediate goods of the same country and different countries.

From the profit maximization problem above, the demand for each differentiated intermediate good and the final good price can be obtained as follows.

$$Y_H(i,s^t) = P_H(i,s^t)^{\frac{1}{\theta-1}} \left(P(s^t)\omega\right)^{\frac{1}{\rho-1}} P_H(s^t)^{\frac{\rho-\theta}{(1-\rho)(1-\theta)}} \quad for\ \ i \in [0,1] \tag{3}$$

$$Y_F(i^*,s^t) = P_F(i^*,s^t)^{\frac{1}{\theta-1}} \left(P(s^t)(1-\omega)\right)^{\frac{1}{\rho-1}} P_F(s^t)^{\frac{\rho-\theta}{(1-\rho)(1-\theta)}} \quad for\ i^* \in [0,1] \tag{4}$$

$$P(s^t) = \left[\omega^{\frac{1}{1-\rho}} P_H(s^t)^{\frac{\rho}{\rho-1}} + (1-\omega)^{\frac{1}{1-\rho}} P_F(s^t)^{\frac{\rho}{\rho-1}}\right]^{\frac{\rho-1}{\rho}} \tag{5}$$

where

$$P_H(s^t) \equiv \left(\int_0^1 P_H(i,s^t)^{\frac{\theta}{\theta-1}} di\right)^{\frac{\theta-1}{\theta}} \tag{6}$$

$$P_F(s^t) \equiv \left(\int_0^1 P_F(i^*,s^t)^{\frac{\theta}{\theta-1}} di^*\right)^{\frac{\theta-1}{\theta}} \tag{7}$$

and $P_H(s^t)$ and $P_F(s^t)$ are the price indices for home and foreign intermediate goods in the home country respectively.

Similar equations for the foreign country can be obtained from an analogous maximization problem.

2.1.2 Intermediate good producing firms

Intermediate good producing firms face a nominal rigidity and the rigidity is introduced following Calvo (1983). Thus, for each intermediate good producing firm, an opportunity of reoptimizing its price is drawn from the Poisson distribution. The parameter φ represent the probability that the firm cannot reoptimize its price.

Also, as discussed above, there is no consensus about the degree of exchange rate pass-through among international macroeconomists.[9] So, this paper assumes a functional form of exchange rate pass-through, following Corsetti and Pesenti (2005) and Tille (2008). By doing so, the degree of pass-through can be parameterized in the theoretical economies. More specifically, the exchange

[9] See Obstfeld and Rogoff (2000) and Betts and Devereux (2000).

rate pass-through on the foreign price of each intermediate good is assumed to follow the functional relations below

$$P_H^*(i,s^t) = \bar{P}_H^*(i)S(s^t)^{-\mu} \tag{8}$$

$$P_F(i,s^t) = \bar{P}_F(i)S(s^t)^{\mu} \tag{9}$$

where $S(\cdot)$ is the nominal exchange rate. Note that $\bar{P}_H^*$ and $\bar{P}_F$ are prices determined by producers and P_H^* and P_F are actual prices in the foreign markets. Hence, if $\mu = 1$, the relationship implies the perfect pass-through and producer currency pricing behavior. However, if $\mu = 0$, then it implies no pass-through and local currency pricing behavior.[10]

When an opportunity of reoptimizing its price arrives, a representative intermediate good producing firm in the home country consider the following profit maximization problem

$$\begin{aligned}\max_{P_H(i,s^t),\,\bar{P}_H^*(i,s^t)} \sum_{\tau=0}^{\infty}\sum_{s^{t+\tau}} \Gamma(s^t,s^{t+\tau})\varphi^{\tau}\times \\ \Big[P_H\left(i,s^t\right)Y_H(i,s^{t+\tau}) + S(s^{t+\tau})^{1-\mu}\bar{P}_H^*(i,s^t)Y_H^*(i,s^{t+\tau}) \\ - P(s^{t+\tau})W(s^{t+\tau})N(i,s^{t+\tau}) - P(s^{t+\tau})Z(s^{t+\tau})K\left(i,s^{t+\tau}\right)\Big]\end{aligned}$$

subject to the demand functions for the home and foreign markets and the following constraint

$$Y_H(i,s^{t+\tau}) + Y_H^*(i,s^{t+\tau}) = F\left(A(s^{t+\tau}),N(i,s^{t+\tau}),K\left(i,s^{t+\tau}\right)\right) \tag{10}$$

where $\Gamma(s^t,s^{t+\tau})$ are proper stochastic discounting factors and $F(\cdot)$ is a production function. [11] Also, note that $N(\cdot)$ and $K(\cdot)$denote labors and capitals which are hired from competitive factor markets and $W(\cdot)$ and $Z(\cdot)$ are associated real wages and real rental fees.

An analogous problem will be solved by foreign intermediate goods producing firms.

[10]Note that since the opportunity of reoptimizinag price followsa random process, the lags between the producer price and the actual market price can vary across firms.

[11]The stochastic discounting factors for intermediate good producing firms are the same with those of the mutual fund which will be discussed below. More detailed discussion will be in the next subsection.

2.2. MUTUAL FUNDS

To make equity portfolio choice problem simpler in the model, I assume that there is a big mutual fund in each country, which has the whole ownership of all the firms in the country and owns all the capitals. So, it can be taken as the whole stock market in the country. The revenue of the mutual fund consists of two components. One is the aggregate rental fees which are generated by renting the capitals to intermediate goods producing firms and the other is the aggregate profits from all the owned firms. Dividends are defined simply as the sum of the aggregate rental fees and the aggregate profits net investment costs.

So, the optimization problem which the manager of the mutual fund in the home country considers is

$$\max_{K,I} \sum_{\tau=0}^{\infty} \sum_{s^{t+\tau}} \Gamma(s^t, s^{t+\tau}) \times \Big[P(s^{t+\tau}) Z(s^{t+\tau}) K(s^{t-1+\tau}) + DV(s^{t+\tau}) - P(s^{t+\tau}) I(s^{t+\tau}) - P(s^{t+\tau}) \frac{\eta}{2} \left(\frac{I(s^{t+\tau})}{K(s^{t-1+\tau})} - \delta \right)^2 K(s^{t-1+\tau}) \Big]$$

subject to

$$K(s^{t+\tau}) = (1-\delta) K(s^{t-1+\tau}) + I(s^{t+\tau}) \tag{11}$$

where $I(\cdot)$ and $DV(\cdot)$ are investments and dividends repectively. Also, δ and η are the depreciation rate of capital and the parameter for capital adjustment costs.[12]

2.3. HOUSEHOLDS

To incorporate the financial integration and external asset position into the model, each household is assumed to be able to access to both domestic and foreign financial market. In each financial market, only one-period bonds and

[12] As Heathcote and Perri (2013) discuss, if the home and foreign investors are unable to perfectly insure against country-specific shocks, they will use different shadow prices to discount dividends in any particular state. As a result, there can be a conflict of interests among investor with regard to the fund's reinvestment and dividend decisions. However, in this paper, it is assumed that the fund reflect only domestic investors' interests and maximize the value of the fund for them. Hence, the proper discounting factors are defined as $\Gamma(s^t, s^{t+\tau}) \equiv \beta^\tau \pi(s^{t+\tau}) \frac{U_C(s^{t+\tau})}{U_C(s^t)} \frac{P(s^t)}{P(s^{t+\tau})}$ where $U_c(\cdot)$ is the derivative of utility function with respect to consumption.

equities are traded and both are denominated in local currency. Under the financial environment, A representative household in the home country considers the following utility maximization problem

$$\max_{C,M,N,\kappa_H,\kappa_F,B_H,B_F} \sum_{t=0}^{\infty} \sum_{s^t} \beta^t \pi(s^t) U\left(C(s^t), \frac{M(s^t)}{P(s^t)}, N(s^t)\right)$$

subject to its budget constraint

$$\begin{aligned} P(s^t)C(s^t) + M(s^t) + Q\left(s^t\right) B_H(s^t) + S(s^t)Q^*(s^t)B_F(s^t) \\ + VM(s^t)\left(\kappa_H(s^t) - \kappa_H(s^{t-1})\right) + S(s^t)VM^*(s^t)\left(\kappa_F(s^t) - \kappa_F(s^{t-1})\right) \\ \leq P(s^t)W(s^t)N(s^t) + B_H(s^{t-1}) + S(s^t)B_F(s^{t-1}) \\ + DV(s^t)\kappa_H(s^{t-1}) + S(s^t)DV^*(s^t)\kappa_F(s^{t-1}) + M(s^{t-1}) + T(s^t) \end{aligned} \quad (12)$$

where $\kappa_H(\cdot)$ and $\kappa_F(\cdot)$ are fractions of the ownership on the home and the foreign stock market by the home consumers and $B_H(\cdot)$, $B_F(\cdot)$, $Q(\cdot)$, and $Q^*(\cdot)$ denote holdings of home and foreign currency denominated bonds and their prices respectively. In addition, $VM(\cdot)$ and $VM^*(\cdot)$ denote the total nominal market value of stock market in each country and $DV(\cdot)$ and $DV^*(\cdot)$ are total nominal dividends from the equities. And $M(\cdot)$ and $T(\cdot)$ are nominal money balance and transfers of home currency.

When an economy with contingent bonds is considered, the bonds are assumed to be denominated in the home currency and a representative consumer in the home country will face as a budget constraint

$$\begin{aligned} P(s^t)C(s^t) + M(s^t) + \sum_{s^{t+1}} Q\left(s^{t+1}|s^t\right) B(s^{t+1}) \\ \leq P(s^t)W(s^t)N(s^t) + B(s^t) + DV(s^t) + M(s^{t-1}) + T(s^t) \end{aligned} \quad (13)$$

where $B(s^{t+1})$ and $Q(s^{t+1}|s^t)$ represent the quantity and price of contingent bonds each of which gives one unit of the home currency in the realization of state s^{t+1} at time $t+1$.

An analogous optimization problem will be considered by foreign consumers.

2.4. THE GOVERNMENT

The government in each country is assumed to play a simple role in the economoy. It is responsible only for the country's monetary policy. Following

Chari *et al*. (2002), the policy is assumed as an exogenous process for monetary growth rates, which is given by

$$M(s^t) = \mu(s^t)M(s^{t-1}) \tag{14}$$

where μ follows a stochastic process and it will be discussed in detail below.

Then, the government budget constraint is simply given by

$$T(s^t) = M(s^t) - M(s^{t-1}) \tag{15}$$

where T are transfers to consumers.

The foreign government follow analogous processes either.

2.5. ASSET MARKET CLEARING

Each asset market clears when its world demand equate with its world supply. Hence, in each bond market, at the equilibrium, the condition of zero net supply should be satisfied at each state s^t as follow:

$$B_H(s^t) + B_H^*(s^t) = 0 \tag{16}$$

$$B_F(s^t) + B_F^*(s^t) = 0 \tag{17}$$

where $B_H(\cdot)$ and $B_F(\cdot)$ denote holdings of home and foreign currency denominated bonds by the home agent respectively while $B_H^*(\cdot)$ and $B_F^*(\cdot)$ denote foreign counterparts.

Since fractions of the ownership on the home and foreign stock markets are assumed to be traded, the sum of shares should be equal to one at the equilibrium. Hence, the clearing of equity markets requires following equilibrium conditions at each state s^t.

$$\kappa_H(s^t) + \kappa_H^*(s^t) = 1 \tag{18}$$

$$\kappa_F(s^t) + \kappa_F^*(s^t) = 1 \tag{19}$$

where $\kappa_H(\cdot)$ and $\kappa_F(\cdot)$ denote fractions of the ownership on the home and the foreign stock market by the home consumers while $\kappa_H^*(\cdot)$ and $\kappa_F^*(\cdot)$ denote foreign counterparts.

2.6. CURRENT ACCOUNTS, NET EXTERNAL ASSETS, AND VALUATION EFFECT

By accounting identity, the changes in nominal net external asset position can be written as:

$$NEA(s^{t+1}) - NEA(s^t) = NX(s^t) + NFI(s^t) + VA(s^t) \tag{20}$$

where $NEA(\cdot)$ is the net external asset position, $NX(\cdot)$ the net exports, $NFI(\cdot)$ the net factor income from asset holdings such as dividends and interests, $VA(\cdot)$ the net capital gains from the external asset position. The interpretation of the identity is straightforward. The accretion of net external asset is financed by surplus in the net exports, the net factor income, and the capital gain. The sum of first two terms in right hand side is the traditional current account measure and obviously there exists a discrepancy between the changes in net external asset position and the old measure. In that perspective, many international macroeconomists point out the defectiveness of official current account measure and argue that the correct measure for current account should consider the valuation effect as well.[13] Hence, the current account measure in this paper consists of net exports, net factor incomes and net capital gains from external asset position as follows:

$$CA(s^t) = NX(s^t) + NFI(s^t) + VA(s^t) \tag{21}$$

Nominal net exports, net factor incomes and net capital gains from the valuation effect in terms of home country are defined respectively as follow:

$$NX(s^t) \equiv S(s^t) \int_0^1 P_H^*(i,s^t) Y_H(i,s^t) di - \int_0^1 P_F(i^*,s^t) Y_F(i^*,s^t) di^* \tag{22}$$

$$\begin{aligned} NFI(s^t) \equiv & -DV(s^t) \kappa_H^* \left(s^{t-1}\right) + S\left(s^t\right) DV^*(s^t) \kappa_F \left(s^{t-1}\right) \\ & + \left(1 - Q\left(s^{t-1}\right)\right) B_H\left(s^{t-1}\right) + S\left(s^t\right) \left(1 - Q^*\left(s^{t-1}\right)\right) B_F(s^{t-1}) \end{aligned} \tag{23}$$

$$\begin{aligned} VA(s^t) \equiv & -\left(VM(s^t) - VM(s^{t-1})\right) \kappa_H^*\left(s^{t-1}\right) \\ & + \left(S(s^t) VM^*(s^t) - S(s^{t-1}) VM^*(s^{t-1})\right) \kappa_F\left(s^{t-1}\right) \\ & + \left(S(s^t) - S(s^{t-1})\right) Q^*(s^{t-1}) B_F(s^{t-1}). \end{aligned} \tag{24}$$

[13] For details of the discrepancy between theoretical and traditional empirical measures of current account, see Kollman (2006).

One interesting observation from the expression for net capital gains is that there is no term related to bonds denominated in the home currency. The reason is that all bonds are assumed one-period bonds which give one unit of local currency in the next period and consequently their prices do not change between the purchase time and their maturity. As a result, the valuation effect happens for bonds only through exchange rate movements, but exchange rate fluctuations do not affect the value of bonds denominated in the home currency for the home investors.

Also, note that the expressions for net factor income and valuation effect can vary with the assumption of financial markets. For example, if an economy only with bond portfolio is considered, all terms associated with equity portfolio will be removed from the expressions.

3. PARAMETERIZATION

3.1. PREFERENCE AND TECHNOLOGY

This section discusses how the preference and the technology are specified and parameter values are set. As discussed above, the same preference and technology are shared in both countries.

The preferences of consumers for each country are given by an instantaneous utility function

$$U\left(C,\frac{M}{P},N\right)=\frac{1}{1-\gamma}C^{1-\gamma}+a_m\frac{1}{1-\gamma_m}\left(\frac{M}{P}\right)^{1-\gamma_m}-a_n\frac{1}{1+\gamma_n}N^{1+\gamma_n} \tag{25}$$

where C, M/P, and N represent consumption, real balance and labor supply in each period.

Turning to the production side, the technology of intermediate goods producing firms is given by a standard Cobb-Douglas production function

$$F\left((A,N(i),K(i)\right)=AN\left(i\right)^{\alpha}K\left(i\right)^{1-\alpha} \tag{26}$$

where A, N and K represent productivity level, labor and capital respectively and i and i^* are indices for differentiated intermediate goods. The production function for final goods producing firms is given by a CES aggregator which is frequently used in trade literature

$$Y=\left[\omega\left(\int_0^1 Y_H(i)^{\theta}di\right)^{\frac{\rho}{\theta}}+(1-\omega)\left(\int_0^1 Y_F\left(i^*\right)^{\theta}di^*\right)^{\frac{\rho}{\theta}}\right]^{\frac{1}{\rho}} \tag{27}$$

where $Y_H(\cdot)$ and $Y_F(\cdot)$ are quantities of home and foreign intermediate goods respectively. ω is the degree of home biased demand of intermediate goods in producing final goods and $1/(1-\rho)$ and $1/(1-\theta)$ are respectively elasticities of substitution between domestic and imported intermediate goods and among intermediate goods of the same origin.

3.2. EXTERNAL ASSET POSITION OF THE U.S.

The most important parameterization is the financial integration. Recall that in the model, the financial integration is captured by the external asset position which consists of home and foreign equities and bonds. To parameterize the model, the empirical counterpart of the external asset position is needed.

Table 1 shows some details of the external asset position of the U.S. economy at the end of 2014.[14] Note that only equity and debt positions are considered in the table but foreign reserves and other asset positions such as claims held by banks are ignored.[15] Although the table ignores the external position of some types of assets, it still captures well the main features of the U.S. external asset position. First, the U.S. is a net debtor not only with major countries but with all countries. The net liabilities amount to 11 % and 25 % of GDP in 2014 respectively with respect to major countries and all countries. Second, the position differs starkly across categories of assets. Overall, the U.S. is a net creditor in terms of equity type assets (FDI and equity) while a net debtor in terms of debt type securities. This feature is described as the 'world venture capitalist' by Gourinchas and Rey (2007). It means that the U.S. economy borrows mainly in the form of debt-type assets with low returns and invest in the form of equity-type asset with high returns. Finally, some of the U.S. foreign assets are denominated in U.S. dollar although they are issued in foreign countries. This unique feature of the U.S. external asset position is the so-called 'exorbitant privilege' of the U.S.

The calibration of the external asset position in the model is mainly based on Table 1. Since the U.S. is identified as the *Home* country and the aggregate of 15 major European countries, Canada and Japan as the *Foreign* country in the parameterization, the model is calibrated based on the external asset position only with the major countries. Also, for simplicity, it is assumed that all external assets are denominated in the foreign currency and all liabilities are denominated

[14] Data sources and methodology are quite similar with those in Tille (2005).

[15] There are two reasons for it. First, data indicate that the valuation effects on foreign reserves and other asset positions are relatively small. For details, see Survey of Current Business (various issues). Second, the model does not take foreign reserves and other asset into account.

Table 1: International Investment Position of U.S. in 2014

Billion of Dollars

	Asset			Liability			Net		
FDI									
Major Countries	1989			2171			-181		
All Countries	3287			2687			600		
Equity									
Major Countries	1678			1214			464		
All Countries	2560			1904			656		
Debt Security									
	total	USD	Others	Total	USD	Others	Total	USD	Others
Long Term Debt									
Major Countries	627	383	244	1909	1909	0	-1282	-1526	244
All Countries	993	711	282	3515	3515	0	-2522	-2804	282
Short Term Debt									
Major Countries	201	167	33	273	273	0	-72	-105	33
All Countries	233	196	38	588	588	0	-355	-393	38
Total Asset and Liability									
Major Countries	4495			5566			-1071		
All Countries	7074			8694			-1620		

Note: 1) Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Japan, Canada are classified as a major country. 2) Foreign reserves and other securities such as bank loans are ignored.

Table 2: Cross Holdings of Foreign Asset at the Steady State

Total External Assets	0.43
Equities	0.30
Bonds	0.13

in the home currency. And then, to impose a symmetric steady state for the countries, average values are taken for both assets and liabilities sides. As a result, Table 2 is obtained after scaling with GDP in 2014. It means that the gross holdings of total foreign assets is calibrated as 43 % of GDP at the steady state and the gross holdings of equities and bonds amount as 30% and 13% respectively.[16] This composition of external asset position serves as a benchmark case and the case is denoted as 'Equity and Bond'.

In addition to the benchmark case, taking similar approach in Tille (2005), two extreme cases with respect to the composition of external asset position are also considered to study whether the valuation effect depends on the composition of external asset positions. They are 'Bond only' and 'Equity only' and the whole gross external asset consists of bonds or equities respectively in each case.

3.3. PARAMETER VALUES

Most of the parameters in the model are calibrated as standard in the literature and summarized in table 3. Some parameters are worth of discussing. Following Backus *et al.* (1994), the parameter ρ is set as 1/3 such that the elasticity of substitution between home and foreign intermediate goods is 1.5. Also, ω is set to imply that the ratio of imports to GDP is 15%. Following Basu (1996), I choose $\theta = 0.9$, which implies a markup of 11% and an elasticity of demand of 10. The parameter φ, which represents the degree of the nominal rigidity, is set to 2/3 such that all firms re-optimize their price every three quarters on average. For the exchange rate pass-through, considering that there still exists the debate on the degree of exchange rate pass-through and expenditure switching effect, I will take an eclectic view about it and set μ as $\frac{1}{2}$ as the benchmark case, which implies partial pass-through.

In this model, the economy is assumed to be hit only by two stochastic shocks, productivity shocks and monetary shocks. The productivity process is

[16] Since only a symmetric steady state is considered, the net holdings of foreign asset should be zero for both countries.

Table 3: Benchmark Parameters

Preference	Risk aversion = 2	γ=2
	Elasticity of labor supply = 1	γ_n=1
	Elasticity of money demand = 1	γ_m=1
	Time discount factor = 0.99	β=0.99
Technology I	Labor share = 2/3	α=2/3
	Depreciation rate = 0.021	δ=0.021
Technology II	Elasticity of substitution between intermediate goods from different countries = 1.5	ρ=0.33
	Elasticity of substitution between intermediate goods from the same country = 6	θ=0.83
Others	Degree of nominal rigidity (average period of fixed price = 3 quarters)	φ=0.66
	degree of exchange rate pass-through (partial pass-through)	μ=0.5

Note: ω is calibrated such that the ratio of exports(or imports) to GDP is 40% at the steady state. η is calibrated such that the ratio of the standard deviation of investment to that of GDP is around 3.

assumed to follow

$$\begin{bmatrix} \log A_t \\ \log A_t^* \end{bmatrix} = \begin{bmatrix} 0.91 & 0.00 \\ 0.00 & 0.91 \end{bmatrix} \begin{bmatrix} \log A_{t-1} \\ \log A_{t-1}^* \end{bmatrix} + \begin{bmatrix} \varepsilon_A \\ \varepsilon_{A^*} \end{bmatrix} \tag{28}$$

$$var(\varepsilon_A) = var(\varepsilon_{A^*}) = 0.0060^2 \tag{29}$$

$$corr(\varepsilon_A, \varepsilon_{A^*}) = 0.250 \tag{30}$$

where ε_A and ε_{A^*} are normally distributed disturbances with mean zero.

Monetary shocks are incorporated in the growth rate of money supplies following Chari *et al*. (2002). The growth rates of the money stock for both countries follow a process of form

$$\begin{bmatrix} \log \mu_t \\ \log \mu_t^* \end{bmatrix} = \begin{bmatrix} 0.680 & 0 \\ 0 & 0.680 \end{bmatrix} \begin{bmatrix} \log \mu_{t-1} \\ \log \mu_{t-1}^* \end{bmatrix} + \begin{bmatrix} \varepsilon_{mu} \\ \varepsilon_{mu^*} \end{bmatrix} \tag{31}$$

$$corr(\varepsilon_\mu, \varepsilon_{\mu^*}) = 0.5 \tag{32}$$

where the standard deviation of ε_μ and ε_{μ^*} are parameterized such that the simulated volatility of output is matched with the data.[17]

Given those parameters, the model is solved numerically with a standard first order approximation method.

[17]The productivity process and the money growth rate process are the same respectively used in Heathcote and Perri (2004) and Chari *et al*. (2002).

4. FINDINGS

Figure 1 and Figure 2 show the impulse response functions of the benchmark theoretical economy ('Equity and Bond') after a productivity and a monetary shock of one standard deviation respectively. In those figures, 'Complete' and 'Bond-no VE' represent respectively an economy in which contingent bonds are allowed to trade and an economy in which only uncontingent bonds are allowed to trade but with zero cross-border holdings of bonds at the steady state. While the former represents a perfect risk sharing economy through complete financial markets, the latter can be regarded as an economy before the financial integration. In below, they are called respectively as 'complete market' and 'no financial integration' for simplicity. Also note that Valuation II are basically the same with Valuation I except that the impact is omitted in it. In below, I findings about the valuation effect are examined first and then implications of the effect on the economy are discussed next.

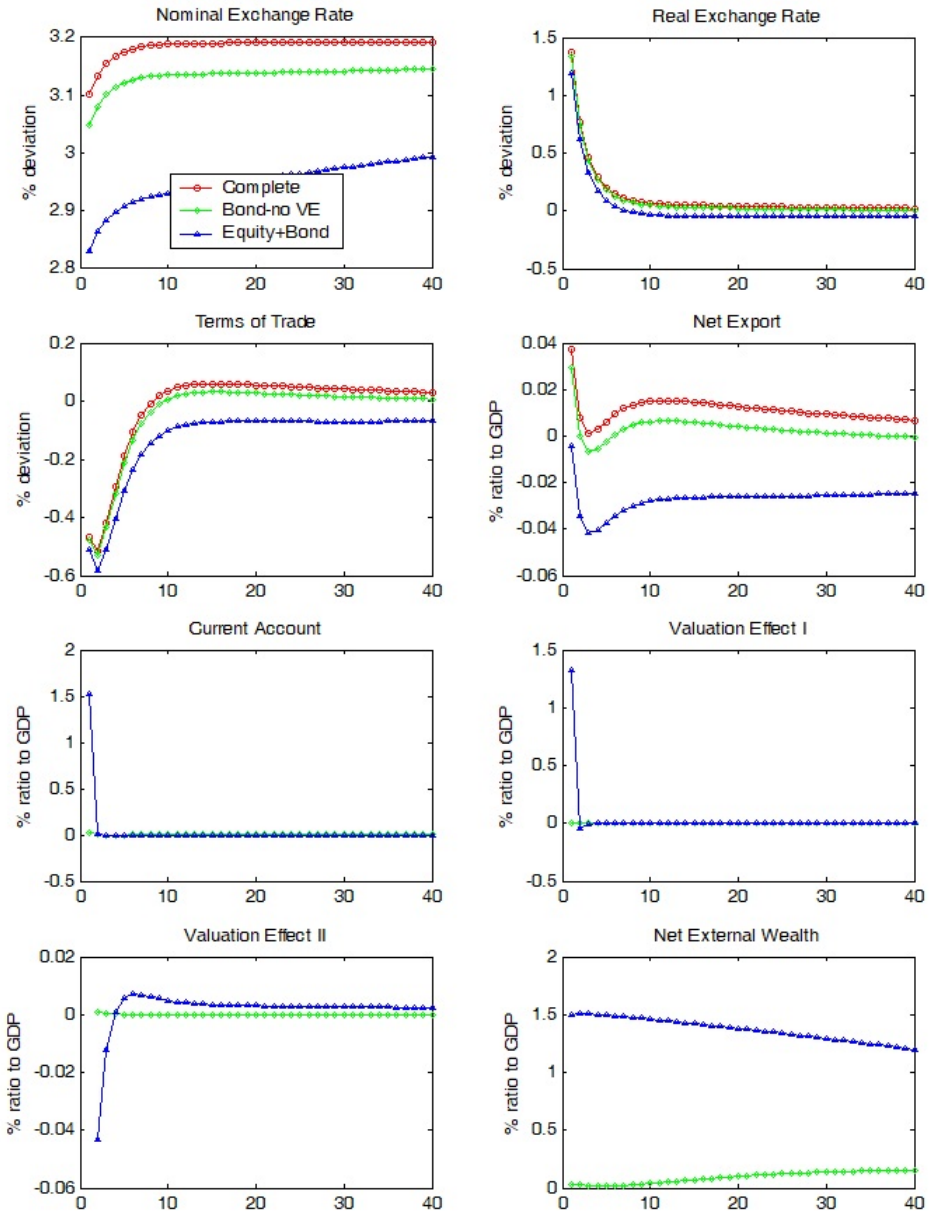
As existing literature points out, the valuation effect becomes meaningful only after the financial integration. In this sense, it is one of interesting issue how the financial integration affects the valuation effect. Comparisons of the benchmark and the no financial integration economy in both figures clearly visualize the effect of the financial integration on the valuation effect. In both figures, the valuation effect is almost negligible in the no financial integration economy compared with in the benchmark economy.[18] Especially, as Figure 1 shows, the valuation effect amounts to about 1.5% of GDP at its peak with a monetary expansion in the benchmark economy. However, the valuation effect is relatively modest with a productivity shock and it is only 0.1% of GDP in absolute value.

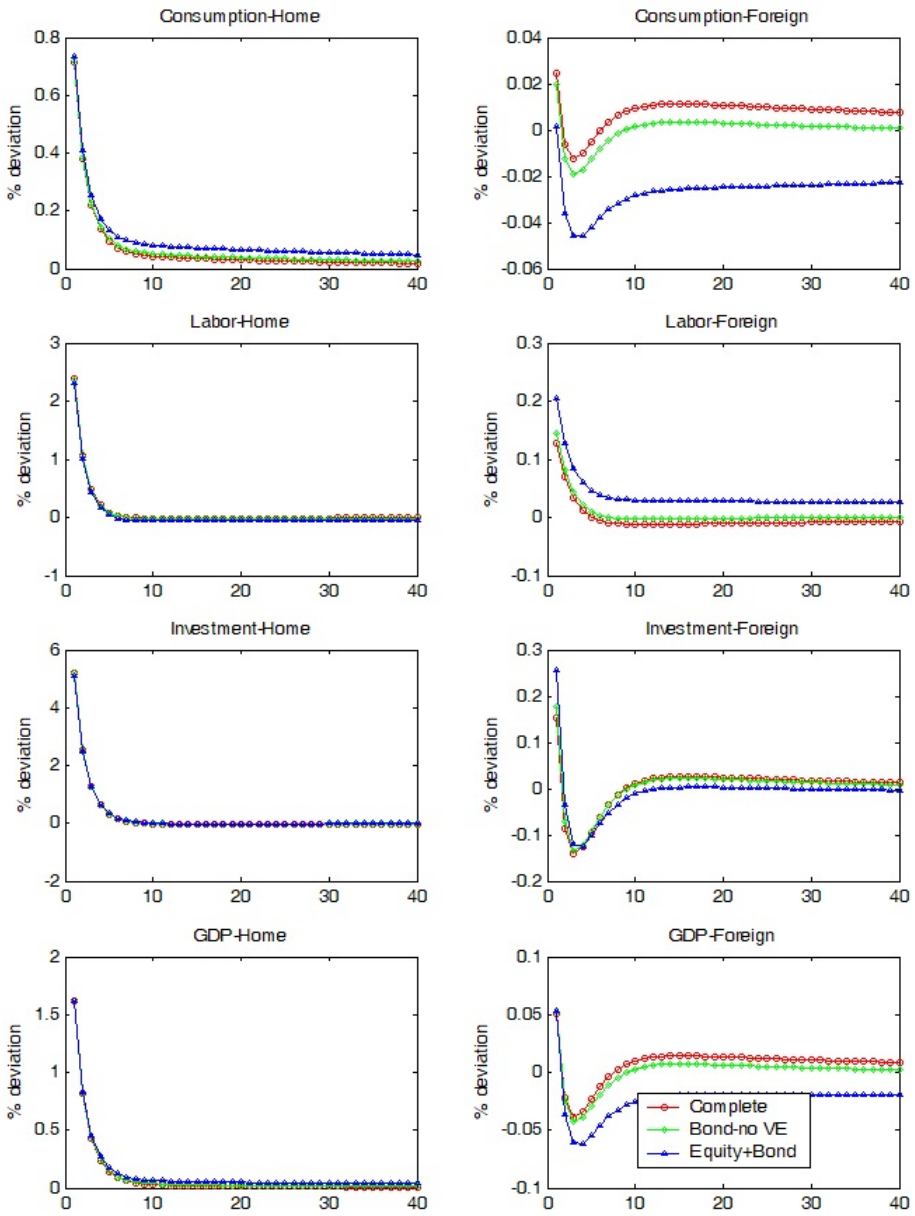
Another important observation from Figure 1 and Figure 2 is that the dynamics of current account and net external wealth are crucially affected by the valuation effect in the benchmark economy. The current account and net external wealth increase or decrease by almost the same amount as the valuation effect on impact in each case.[19] This implies that the valuation effect is a key factor in determining the dynamics of current account and net external asset position at

[18]Note that the valuation effect for the complete market case is omitted in the figure. Becasue there is no proper way to define the valuation effect with infinitely many of contingent bonds. By the same reason, the current account and net external wealth for the complete markets are also omitted.

[19]Note that the traditional current account measure have not taken the valuation effect into account so far. After the financial integration, a lot of international macroeconomist point out the defectiveness of the measure. See Kollman (2006), Lane and Milesi-Ferretti (2001), and among others. However, the current account measure in this paper reflect the valuation effect either.

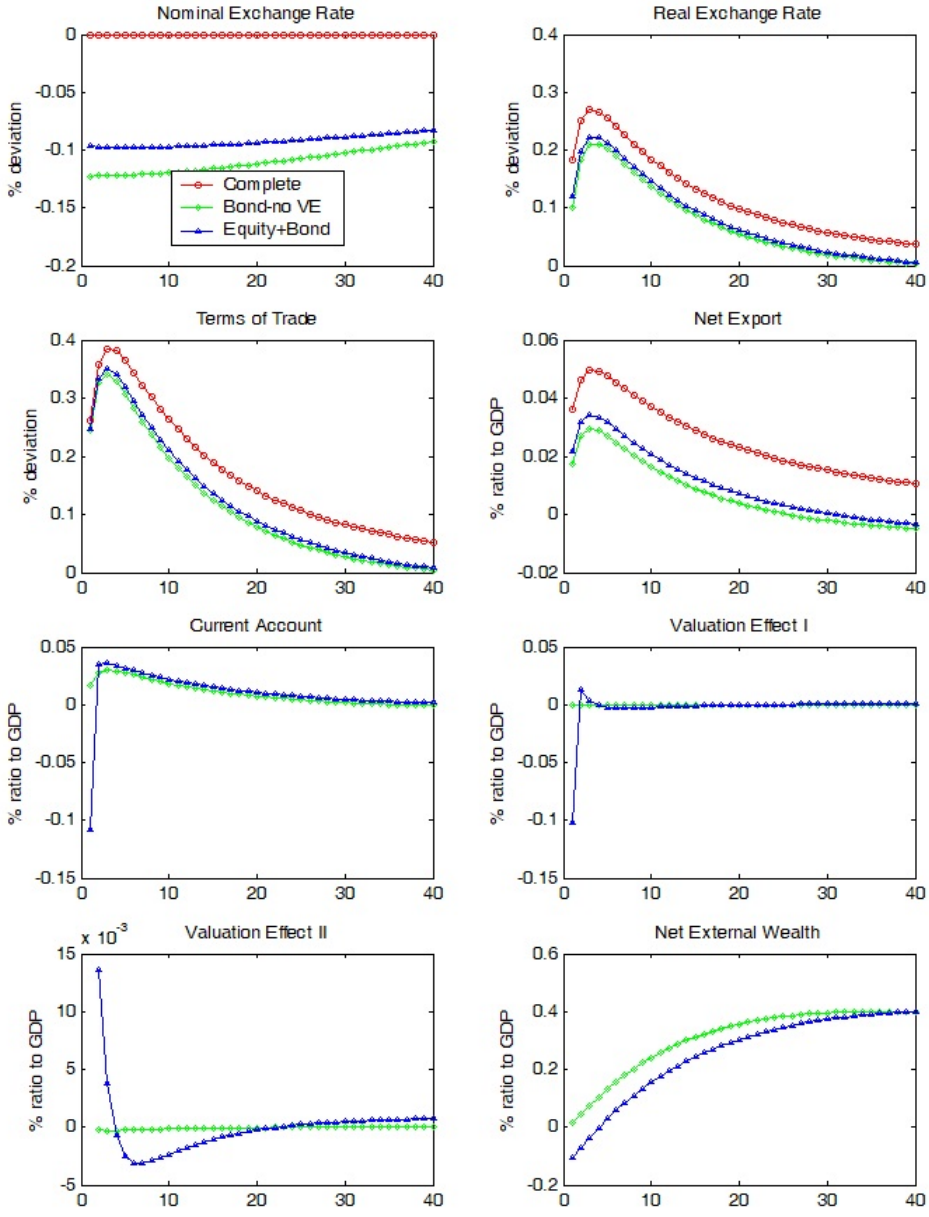
Figure 1: Impulse Response Function of Benchmark Case to a Monetary Shock

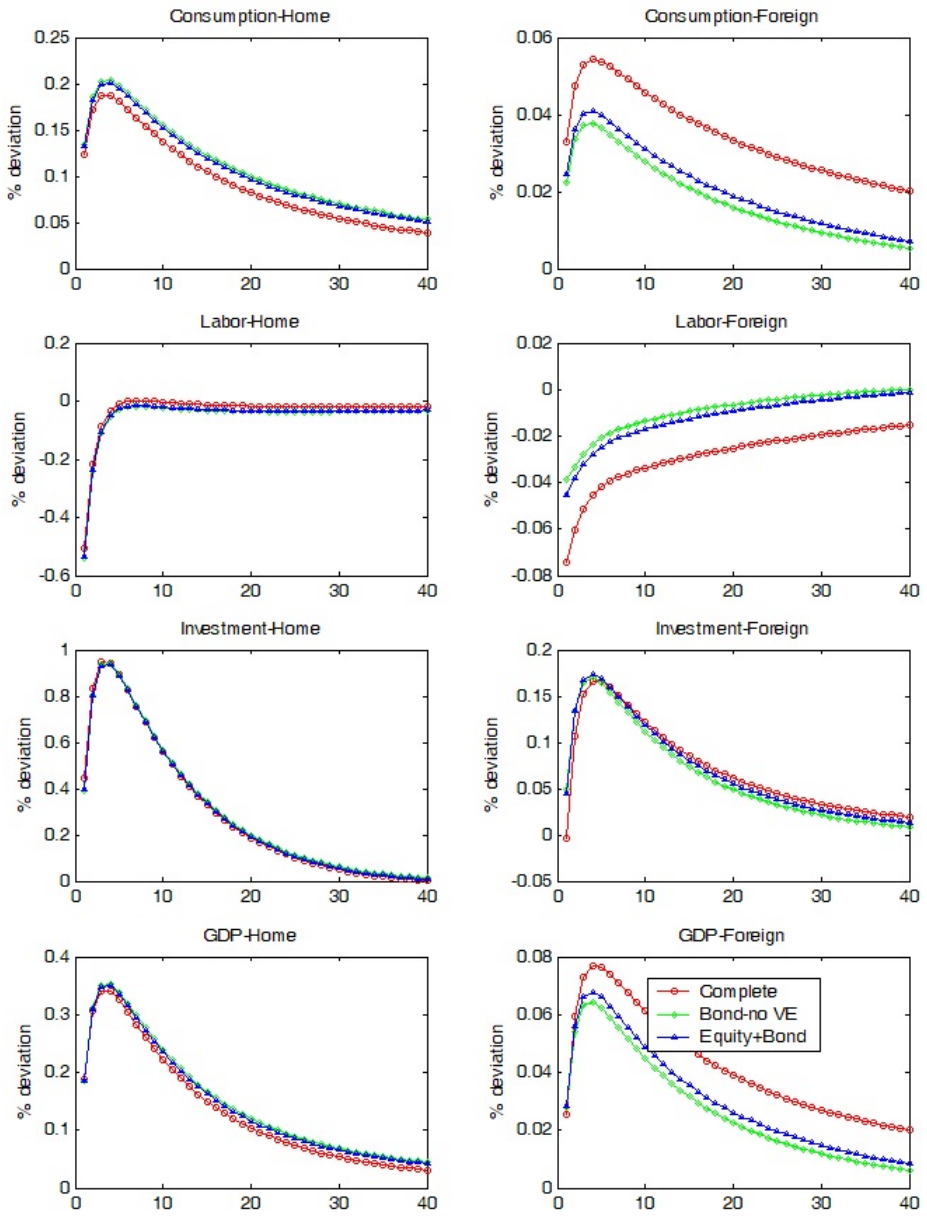




Note: While the impulse response functions of GDP and consumption denote % deviations from their steady state, those of other variables denote levels. The nominal exchange rate is normalized as 1 at the steady state.

Figure 2: Impulse Response Function of Benchmark Case to a Productivity Shock





Note: While the impulse response functions of GDP and consumption denote % deviations from their steady state, those of other variables denote levels. The nominal exchange rate is normalized as 1 at the steady state.

least in a short horizon.[20]

Finally, it is also interesting to note that the valuation effect works mainly as an impact effect and it diminishes very quickly after the shock in both cases although their signs and sizes vary with the types of shocks. The pattern confirms that the valuation effect is basically an asset pricing phenomenon. In other words, since exchange rates and asset prices are both forward-looking variables, they reflect most of the effect of a shock at the impact moment. As a consequence, the valuation effect is heightened at the initial period.

After finding the quantitative relevance of valuation effect, it is natural to ask how an economy is affected by the valuation effect. Before discussing the details, recall that the valuation effect is basically a wealth transfer among countries through capital gains or losses. Obviously, the wealth transfers can influence the economy in various ways.[21] However, this paper concentrates especially on two aspects of the effects. First, taking into account that all wealth transfers inevitably have welfare implications, it is natural to expect that the valuation effect will accompany some welfare implications. Considering that the international risk sharing is a main issue in the international welfare analysis, the implication of valuation effect on international risk sharings is worth careful investigation. Second, wealth transfers through the valuation effect can have direct implications on external imbalances. In this perspective, recent literature pays attention to the possibility of valuation effect as an adjusting mechanism of external imbalances. For instance, Obstfeld and Rogoff (2005) consider the role of valuation effect when they analyze the current external imbalance of the U.S. economy. However, as discussed above, most of such studies limit their interests in analyzing the current U.S. external imbalance. Hence, the following extends the consideration into more general framework and ask whether or not the valuation effect is really beneficial in terms of external imbalances.

Figure 1 and Figure 2 also collect impulse response functions of major macroeconomic variables of three different theoretical economies after each shock. As shown in Figure 1, the complete market and the no financial integration case are quite close to each other but only the benchmark case is rather distinguished from other cases. In terms of risk sharings, the responses of consumptions and

[20] One of direct implications of the pattern is that current account is highly volatile and its persistence is very low reflecting the similar features of valuation effect. This result is consistent with findings in Kollman (2006). According to his findings, if the valuation effect is correctly considered, current account is highly volatile and its autocorrelation is close to zero.

[21] One of classical example is the famous *transfer problem*, the debate between Keynes and Ohlin in 1930s. The debate is about the effects of a wealth transfer on terms of trade. For details, see Obstfeld and Rogoff (1996) and Lane and Milesi-Ferretti (2003b).

labors are particularly interesting. It is notable that although the differences are not so impressive, while the home consumption path is higher in the benchmark economy than in the other economies, the opposite happens to the foreign country. Meanwhile, the foreign labor path is higher when the valuation effect matters.[22] More importantly, the consumption and labor paths in the benchmark case are more deviated from the perfect risk sharing path than in the no financial integration case. These observations combining with the observation of Figure 1 clearly indicate that the wealth effect from the valuation effect is a main reason for this deviation. And, it obviously suggests that the valuation effect can work against the international risk sharing mainly due to a sizable wealth transfers at the impact moment when a monetary shock hits the economy.

The economic intuition behind these results is quite straightforward. As well known, an expansionary monetary shock in a sticky price model can have a positive wealth effect through a real balance effect. Hence, the valuation effect can help the international risk sharing only when it is realized as negative. However, the exchange rate depreciation after a expansionary monetary shock provide the home country a capital gain, which reinforces the existing wealth effect. This apparently work against international risk sharings.

Now, let's turn to the results of a favorable productivity shock. Recall that the valuation effect has a negative sign and is insignificant compared to the case with a monetary shock. As a result, the valuation effect doesn't play any significant role in the economy. As shown in Figure 1, the benchmark economy is barely distinguished from the economy without a valuation effect. However, its qualitative features are starkly contrasted with those in Figure 1. The home country experiences a negative wealth effect from the valuation effect. The effect is reflected in the responses of the economy as shown in Figure 2. Compared with the no financial integration case, the responses of consumptions and labors in the benchmark economy are closer to those of the complete market case. It implies that with a favorable productivity shock, the valuation effect works in the exactly opposite way as with a monetary shock. It can contribute to international risk sharings by transferring some of the initial positive wealth effect from the shock to the foreign country, although it is quantitatively unimportant.

Another interesting observation which can be made from those figures is

[22]Under the benchmark parameterization, an ecceletic view about the pass-through is taken. However, as widely known, the effect of a monetary shock on foreign consumption and labor in this class of model depends heavily on the parameter of exchange rate pass-through. For example, when no pass-through is assumed, foreign consumption falls but foreign labor increases after a home monetary shock. This phenomenon is widely known as 'beggar-thy-neighbor' of a monetary shock. For details, see Betts and Devereux (2000)

related to external imbalances. To discuss this issue, a definition of an external imbalance seems to be needed. In this paper, an external imbalance is defined as a deviation from the stationary ratio of net external wealth to GDP. Note that the symmetric structure of the economy assumed in this paper implies a symmetric external asset position and thus a zero net external wealth at the steady state.

Again, the results hinge on the types of shocks and they are more distinctive with a monetary shock. The bottom-right panel of Figure 1 draws the dynamics of net external wealth of two theoretical economies after a monetary shock and clearly shows that given a monetary shock of the same size, the benchmark economy generates the bigger external imbalance than the no financial integration economy. In addition, the bottom-left panel shows that even during the adjusting period, the valuation effect is not so helpful for clearing the imbalance. Those results suggest that the valuation effect is not always helpful for adjusting external imbalances and it can even be a main contributor to external imbalances by magnifying the effect of economic shocks. Meanwhile, the effect of the financial integration on external imbalances with a productivity shock is not significant and mixed. In sum, the valuation effect is not always helpful in terms of external imbalances and the results are again dependent on types of economic shocks.

It may seem to be contrasted with some recent literature which emphasize a potential role of the valuation effect in adjusting the U.S. external imbalance. Because they commonly argue that due to the financial integration, the valuation effect can contribute to adjusting the current external imbalance to a certain extent. For example, Obstfeld and Rogoff (2005) consider the role of the valuation effect when they analyze the current external imbalance of the U.S. economy. Based on their simulation, they argue that the valuation effect can help reducing the depreciation rate of U.S. dollar needed to restore the external balance, but the quantitative importance is insignificant. A similar approach is also taken in Cavallo and Tille (2006) either, but their calculation based on slightly different assumptions shows that the valuation effect can reduce the depreciation rate of U.S. dollar significantly. In addition, Gourinchas and Rey (2007) extend the idea to a more general framework. They try to decompose the external adjustments of the U.S. economy between 1952 and 2004 into trade balance component and valuation component. According to their estimates, about one third of total external adjustment of the U.S. economy can be attributed to changes in returns on the given external asset position.

However, the validity of their arguments is quite limited in the sense that their analyses are devoted only to the situation in which an external imbalance

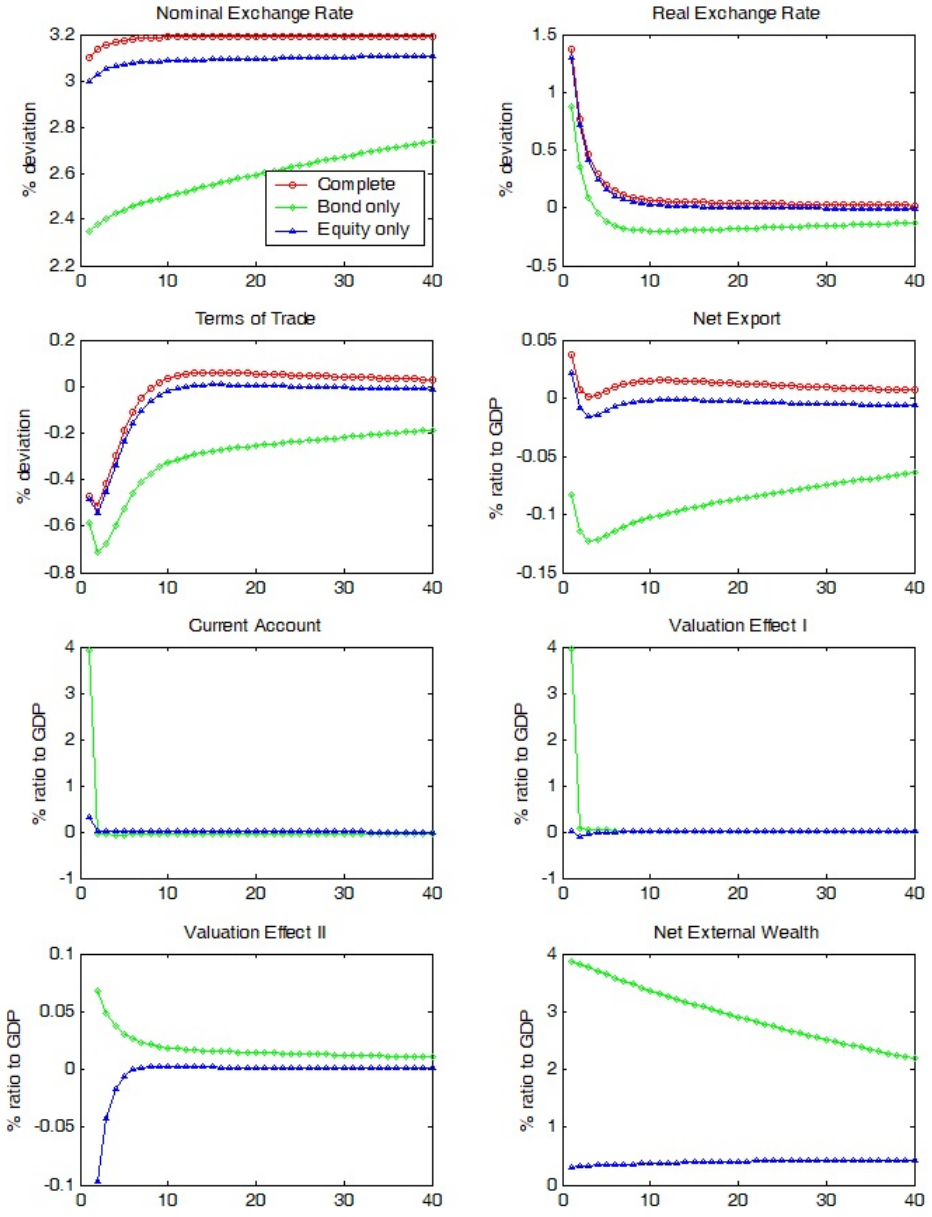
is already given as in the current U.S. economy. For instance, let's suppose one country faces a negative external imbalance as in the U.S. Given such a case, a depreciation of the nominal exchange rate can contribute to clearing the external imbalance in two ways. First of all, a depreciation lowers relative prices of the country's export goods and improves the trade balance. In addition, a nominal exchange rate depreciation can generate a positive valuation effect depending on the currency composition of external asset position. However, as the analyses above shows, in more general situation, the valuation effect may magnify a external imbalance by amplifying the effect of a shock or delay adjusting them. In this regard, the valuation effect is not *always* beneficial in terms of external imbalance.

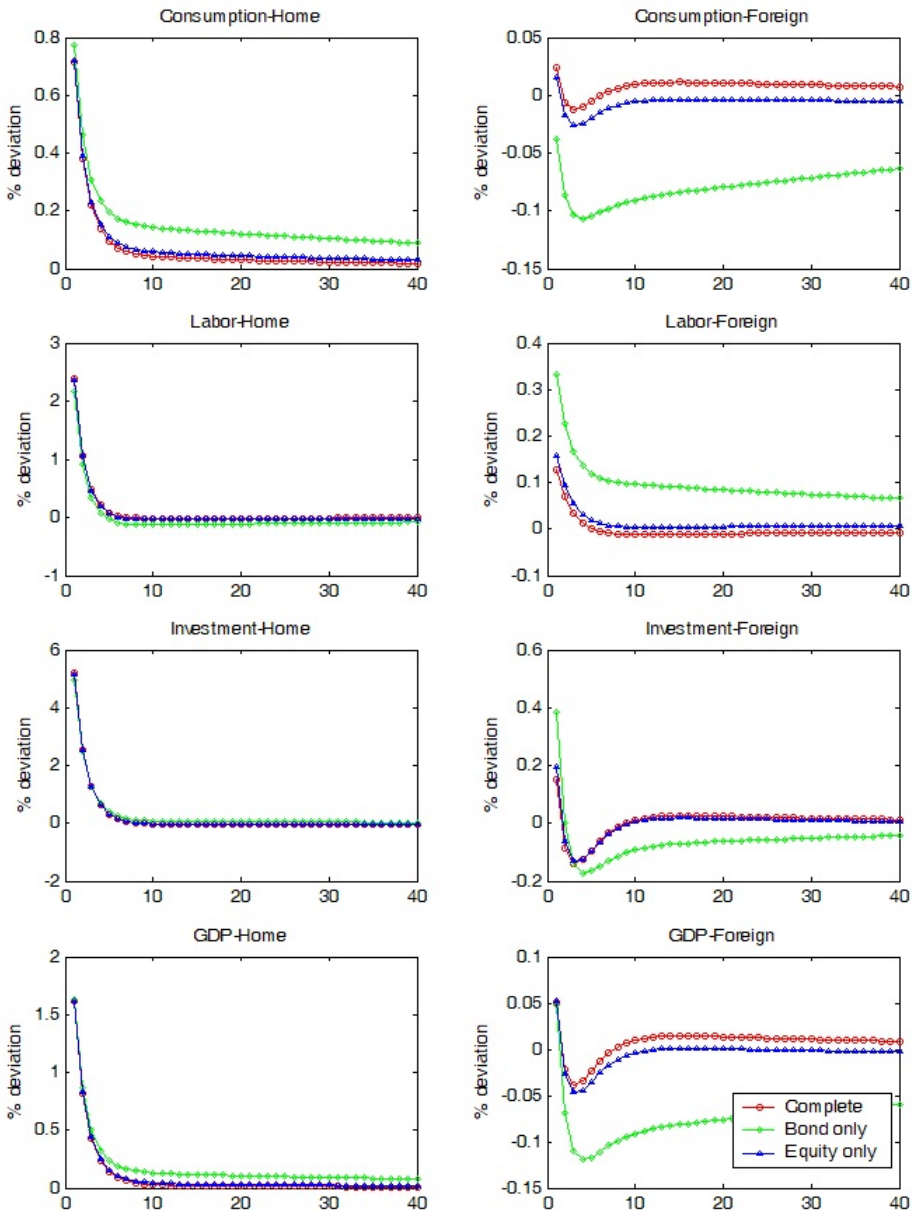
So far, I have investigated implications of the valuation effect in the benchmark economy, which can be considered as a close approximation to the current U.S. and European economies. The analyses above show that the valuation effect exerts some important effects on the economy. Particularly, when a monetary shock matters, the valuation effect can amplify the effect of the shock and, as a result, it may work against international risk sharings and magnifying external imbalance.

However, many studies regarding the valuation effect argue that the effect can critically depend on the composition of asset types in external asset positions. To address this concern, two extreme assumptions about the composition of the external asset position are taken. They are the bond-only economy and the equity-only economy in which the external portfolio consists purely of bonds or of equities respectively. However, for consistency with the benchmark case, the sizes of net and gross external asset position are kept the same.[23] Figure 3 shows impulse response functions of two extreme portfolios with a monetary shock. Impulse response functions of the valuation effect in each economy show clearly that it depends crucially on the composition of external asset position. The valuation effect in the bond-only case amounts up to 4% of GDP in the impact moment, which is approximately 2.5 times greater than in the benchmark case while it is almost negligible in the equity-only case. These differences affect the dynamics of other variables significantly. In the bond-only economy, reflecting the big wealth transfers from the foreign to the home country through valuation effect, current account and net external asset position of the home country improves even more than the benchmark case, in which current account and net ex-

[23]To be more specific, the gross holdings of total foreign bonds or equities is calibrated as 43 % of GDP at the steady state, but the net holdings of foreign bonds or equities is set as zero for both countries because a symmetric steady state is assumed.

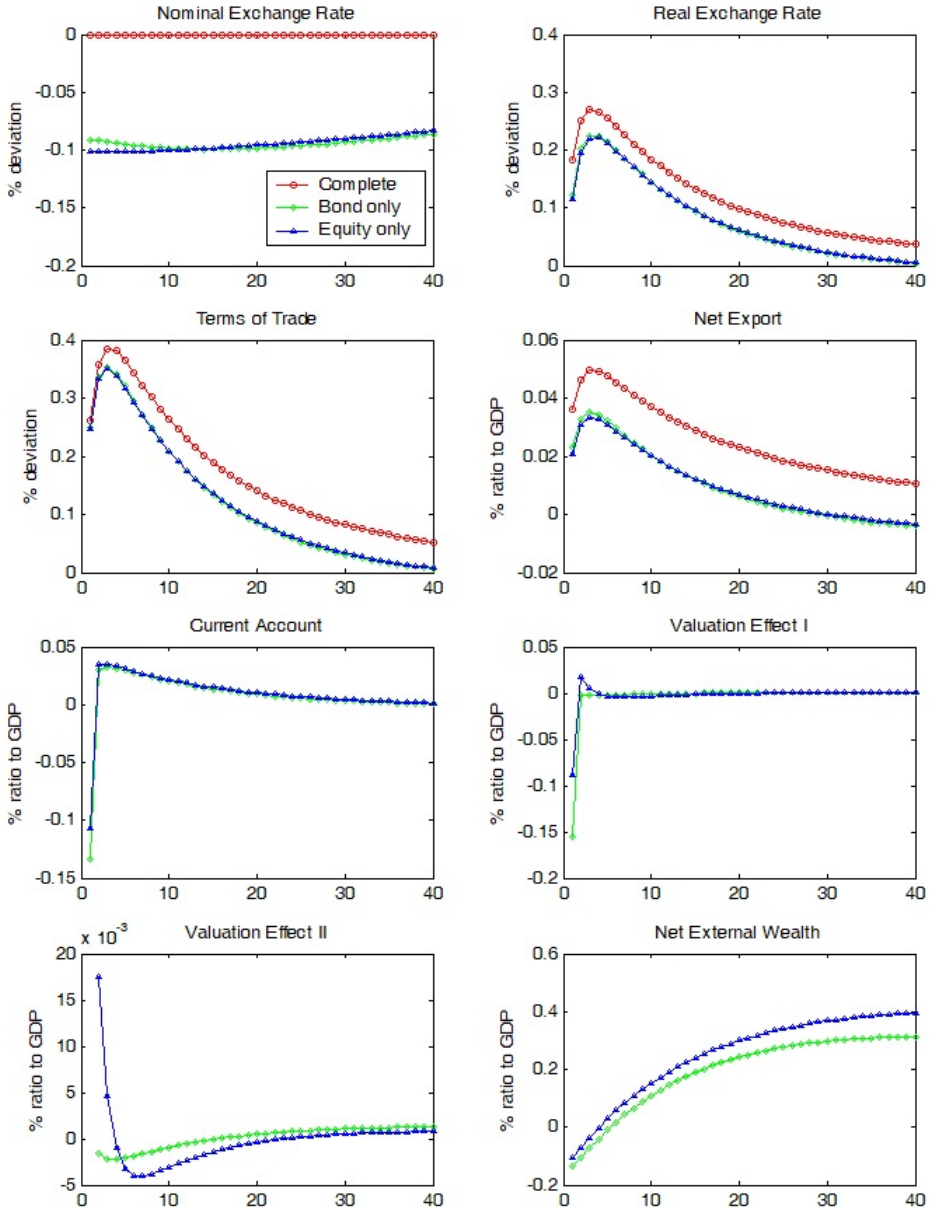
Figure 3: Impulse Response Function of Benchmark Case to a Monetary Shock

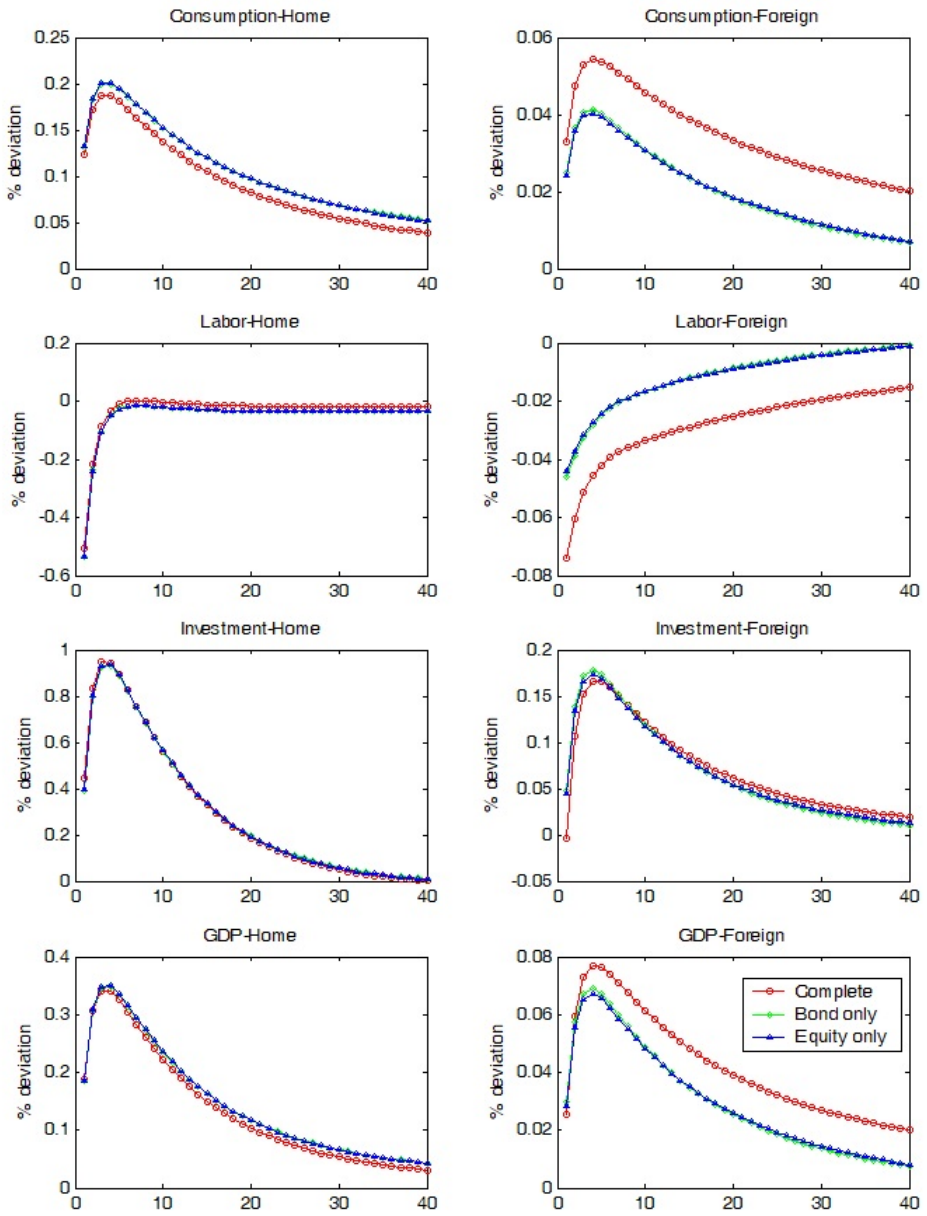




Note: While the impulse response functions of GDP and consumption denote % deviations from their steady state, those of other variables denote levels. The nominal exchange rate is normalized as 1 at the steady state.

Figure 4: Impulse Response Function of Benchmark Case to a Productivity Shock





Note: While the impulse response functions of GDP and consumption denote % deviations from their steady state, those of other variables denote levels. The nominal exchange rate is normalized as 1 at the steady state.

ternal asset position both jump up to around 1.5% of GDP at their peak. Turning to Figure 3 and comparing it with Figure 1, it is easy to see that the benchmark economy lies somewhere between two extreme economies. Without doubt, it reflect different magnitudes of the valuation effect generated in each portfolio. As a result, in terms of responses of consumption and labor, the bond-only economy differs by more from the complete market economy than the benchmark economy. But, the equity-only economy deviates less.

However, starkly contrasted to the case with a monetary shock, Figure 4 shows that the different composition of external asset position doesn't play any meaningful role with a productivity shock. Those two extreme scenarios produce virtually identical responses.

In sum, overall results suggest that the valuation effect matter quantitatively especially when bonds are main components in external asset position and a monetary shock hits an economy. In such a case, as discussed above, the valuation effect can hurt international risk sharings and magnify external imbalance by amplifying a shock.[24]

5. CONCLUSION

As the financial integration has advanced, cross-border asset holdings have increased drastically. One of the most interesting consequences of the development is that the valuation effect can matter quantitatively. Given external asset positions, exchange rate and asset price movements can generate a significant amount of capital gains and losses. Considering that the capital gains or losses are basically wealth transfers among countries, it is natural to expect that the wealth transfers can have considerable influences on the economy.

In this perspective, this paper investigates implications of the valuation effect on a number of international macroeconomic issues. Emphasizing wealth transferring property of the valuation effect, it mainly concentrates on studying implications of the valuation effect on international risk sharings and external imbalances.

Main findings of this paper can be summarized as follows: First, the valuation effect works mainly as an impact effect and it depends crucially on initial movements of nominal exchange rates and asset prices. Second, the valuation effect can matter quantitatively depending on the composition of external asset position and types of shocks. Especially, when bonds are main components in

[24]Note that overall results are robust to different values of parameters of nominal rigidity and exchange rate pass-through. They change dynamics of some variables minorly.

external asset position and a monetary shock hit the economy, the valuation effect is conspicuous. Finally, the valuation effect can exert considerable influences on the economy. Specifically, under certain circumstances, it can work against international risk sharings and magnify external imbalance by amplifying effects of a shock.

There are two promising extensions of this paper. The first one is involved with a technical issue. The main limitation of this paper is that the external asset position is given exogenously rather than derived from an optimal portfolio choice problem. Also, as a related issue, the first order approximation method is known to be insufficient for addressing portfolio choice problem properly. Hence, it will be a fruitful attempt to incorporate an optimal portfolio choice problem into the model more correctly and compare results.

The other extension is related with main findings of this paper. This paper clearly shows that the response of the economy to a shock varies with the composition of external asset position and the valuation effect play an important role in it. Based on the result, it will be interesting to investigate whether policy rules such as monetary policy and exchange rate policy should consider the external asset position or how they reflect such international dimension in them.

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