Research on the Structure of Valuation Effects: A Comparative Analysis Based on the Developed and Emerging Market Countries

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Abstract

The PVAR model is constructed based on the international panel data of 1991-2014. This paper aims to study the different characteristics of the fluctuation of valuation effects in developed market countries and emerging market countries. The variance decomposition found that the valuation effects fluctuation of emerging market countries was mainly caused by the equity balance index and exchange rate fluctuation, while valuation effects fluctuation of developed market countries was mainly caused by the stock returns and the structure of net foreign assets. Furthermore, the impulse response found that the policy of managing valuation effect by stock return rate of emerging market countries can only be effective in the short term and long-term turned invalid. Policy of improving the equity balance index to manage valuation effects fluctuation is more effective in the emerging market countries than in the developed market countries.

Keywords: valuation effects, panel VAR, equity balance index, stock returns, exchange rates

1. Introduction and Literature Review

The conventional inter temporal model shows that a country's external balance is mainly adjusted by the trade channel and foreign net assets position is equal to the accumulated value of current accounts. With the deepening of international financial openness, the scale of the external stock assets of all countries is expanding. It has been unable for the traditional cross period equilibrium theory to explain the huge gains or losses of the foreign net assets. For example, during 2000-2014 years, the United States current accounts for the proportion of GDP with an average of -4.04%, while net international investment position annual growth of GDP average -2.73%, indicating that the appreciation of the net international investment position value offset part of the trade deficit (Liu, 2016). The changes of the market value of a country's net foreign assets which are caused by the unexpected change of exchange rate and asset prices are defined as valuation effects by Lane & Milesi-Ferretti . (2001). The existence of valuation effects makes a country's net foreign assets expose to unexpected change risk of exchange rate and asset price more. Under this background, studying the effect of valuation scale, structure and dynamic evolution has great significance on clarifying the adjustment mechanism of external balance.

The influence of valuation effects on external equilibrium depends on its size and structure (Liu, 2016). According to Lane & Milesi-Ferretti (2004) and Devereux & Sutherland (2010), the size of valuation effects can be expressed as: $VA_t = NFA_t - NFA_{t-1} - CA_t = \Delta NFA_t - CA_t$. Among them, VA is valuation effect, NFA is the international net asset position and CA is the current account. Both domestic and overseas scholars, consider that the size of the valuation is mainly affected by exchange rate, asset price changes and the structure of the external net assets through the further dismantling and subdivision. Because valuation effects caused by the net foreign assets are difficult to be directly measured, they are usually reflected in changes in exchange rates and asset prices. Therefore, scholars nowadays mainly divided valuation effects internal structure into two parts, namely valuation effects caused by exchange rate volatility and valuation effects caused by asset prices.

Exchange rate fluctuation would influence the wave of valuation effects through the price method of a country's foreign net assets and currency allocation. The impact of valuation effects are not the same for different types of countries. IMF (2005) pointed out that the foreign assets of the developed market countries (such as the United States) mainly expressed in foreign currency and foreign debt in its own currency. Therefore, when the currency of these countries unexpectedly devalues, the value of foreign assets would increase in its own currency, but the value of the external liabilities is unchanged, so as to increase the net foreign assets. Due to the low international

recognition of the currency in emerging market countries, its foreign assets and foreign liabilities are both expressed mainly in foreign currency, so valuation effects produced by the unexpected exchange rate changes may improve the external equilibrium and may also worsen the external equilibrium (Song et al., 2014).

A country's foreign assets are mainly divided into direct investment, securities investment, other investment and reserve assets. The fluctuation of asset prices mainly influences direct investment and securities investment. Previous literature about the measurement of the impact of asset prices on valuation effects mainly included reflecting the fluctuation of asset prices by stock return rate (Cheng, 2014); Liu (2016) measured the volatility in asset prices by total market value of the securities market change rate and Song et al. (2014) measured valuation effects caused by asset prices as the total valuation effect minus valuation effects caused by the exchange rate fluctuations from a quantitative point of view. These measure the impact of asset prices on valuation effects only from the perspective of the yield, but not effectively measure the asset price fluctuations in the role of the asset structure.

In order to explain the importance of asset structure in asset pricing, this paper makes a comparative analysis between the characteristics of external assets and liabilities of emerging market countries and developed markets. According to "the external wealth of nations" database established by Lane & Milesi-Ferretti (2007), emerging market countries' external debt was mainly in the form of bank loans, government debt in the early 1990s, and gradually evolved as mainly external assets in the form of bonds and other fixed income assets, external debt as FDI and equity. On the contrary, the external assets of developed market countries in the past were based on direct lending among countries, but now are dominated by FDI and portfolio investment, and external debt mainly to state bonds, stocks and etc. (Cheng, 2014). The return of investment of emerging market countries' is below its cost of debt, and valuation effects produced negative influence; developed market countries external assets yield is higher than the cost of its external debt, making valuation effects produce positive regulation.

In order to show valuation effects caused by asset prices fluctuation more completely, in this paper, the asset price volatility is further subdivided into the structure factors and the yield factors. The equity structure of assets and liabilities index will be defined, namely the ratio of direct investment and securities investment assets with a country's foreign debt of them to measure the asset prices volatility in assets structure, and still adopt stock return rate as the measure of asset prices volatility in earnings.

Based on the above analysis, this paper uses the comparative analysis method to study the different characteristics of valuation effects of the developed market countries and emerging markets. The contribution of this paper lies in: (1) The innovation of the ownership structure index of assets and liabilities measure valuation effects caused by asset prices from the angle of structure factor, which make up the previous research only from income factors to measure valuation effects caused by asset prices; (2) Add the time series on the existing empirical research on the valuation; in Cheng's (2014) paper, the time series is from 1991 to 2007, but this article will expand it to 2014, so that the empirical results are more realistic and reliable.

2. Model Construction

2.1 Data Sources and Sample Selection

2.1.1 Data Sources

Since the establishment of the stock market in many emerging market countries started in 1990, the time series of 1991-2014 years are studied.

Nominal exchange rate (E): Nominal exchange rate is the bilateral nominal exchange rate between the US dollar and various countries, being expressed that a dollar unit can be exchanged for how many units of the country's currency. E rise indicates a dollar appreciation and the country's currency devaluation. Data source from IFS IMF database.

Stock return rate (R): Calculated by the continuously compounded stock returns, $R_t = \ln(P_t) - \ln(P_{t-1})$. P_t represents the average closing price of the stock in the year of t. Data source from Wind information database.

Equity balance index (AL), AL = (direct investment assets + securities investment assets) / (direct investment liabilities + securities investment liabilities), where the data of 1991-2011 source from the "external wealth of nations" database created by Lane & Milesi-Ferretti (2007). The database revalued the international investment position of 189 countries and regions since 1970 by the market value, and now has been updated to 2011. 2012-2014 data is from the international investment position table (IIP) of IFS database of IMF. And according to Lane & Milesi-Ferretti (2007) statistical methods to adjust the data, investments in securities only include equity securities, debt securities and other investments in other investment categories.

Valuation effects (VA), according to the definition of valuation effects, $\Delta NFA_t = NFA_t - NFA_{t-1} = CA_t + VA_t$, where data before 2011 is from the Lane & Milesi-Ferretti (2007) database, after 2011 is from the IIP database of IMF, and CA data is from the BOP database of IMF.

2.1.2 The Selection of Panel Country

In order to study valuation effects better, this paper constructs two panels of developed market countries and emerging market countries to study comparatively, and each panel has eight countries, including developed countries panel composed by the United States, Britain, France, Germany, Japan, Canada, Sweden, Finland. With the rise of the emerging markets group, emerging markets are becoming more and more influential in the world economy, politics and culture. Asian emerging markets are more prominent, because many economic growth miracle occurred in these countries. Therefore, this paper chooses the Asian emerging market countries as a representative of the emerging market countries, including China, India, Indonesia, Malaysia, the Philippines, Singapore, South Korea, and Thailand.

2.2 Model Specification

In this paper, we use vector auto regressive (VAR) model to measure the linkage between exchange rate, stock returns, equity balance index and valuation effects. But because of the variables in this research involving in the stock return rate and most of the stock market emerging market countries established after 1990, 1991-2014 annual data cannot meet the data length of the VAR model. In order to solve the problem of insufficient data length and variable endogenous, a vector auto regression model based on panel data (PVAR) is established in this paper. The model is set as follows:

$$\begin{pmatrix} E_{it} \\ R_{it} \\ AL_{it} \\ VA_{it} \end{pmatrix} = \alpha_{i0} + p \begin{pmatrix} E_{it-p} \\ R_{it-p} \\ AL_{it-p} \\ VA_{it-p} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \end{pmatrix}$$

Where E_{it} represents the nominal exchange rate of country i in year t. R_{it} represents the average return rate of stock market of country i in year t. AL_{it} represents the equity balance index of country i in year t. VA_{it} represents valuation effects of country i in year t. α_{i0} represents the fixed effect of country i, used to reflect individual heterogeneity among countries. p represents the lag order, ε_{it} represents the residual variables of four equality.

3. Empirical Test and Result Analysis

3.1 Data Stationary Test

The PVAR model requires variables must be stable. Therefore, in this paper, we use panel data unit root test method of LLC test which is for common unit root and IPS test which is for individual unit root to test the stability of the panel data. Panel data from 1991 to 2014 years of the developed market countries and emerging market countries was tested for smooth and steady. The results of the two methods both show that all the variables in the two panels reject the original hypothesis, which indicates that the E, R, AL, VA data of the developed market countries and emerging market countries are all stationary time series.

3.2 Lag Option of Panel VAR

This paper comprehensively uses the AIC, BIC and HQIC guidelines, combines the PVAR2 package of Lian (2009), and uses the STATA software to choose the lag order of the PVAR model. The results of AIC, BIC and HQIC are consistent in the developed market countries, which show that the optimal lag order of the model is 1. The results of the three kinds of standards are inconsistent in emerging market countries panel. But as the BIC/HQIC is tend to choose more streamlined model, AIC is tend to choose more "plump" model, usually, BIC/HQIC outperforms AIC, therefore chooses lag order for 2.

Table 1. Selection criteria of PVAR model lag

Lag	Developed Market Country Panel			Emerging Market Countries Panel		
	AIC	BIC	HQIC	AIC	BIC	HQIC
1	32.7904*	33.6551*	33.1411*	41.0924	41.957	41.4431
2	33.246	34.4361	33.729	40.7593	41.9493*	41.2422*
3	34.0171	35.5547	34.6415	40.7541*	42.2916	41.3784

3.3 Impulse Response

In order to study the dynamic relationship between the exchange rate E, the stock return rate R, the equity index AL and valuation effects VA, this paper respectively arranges these four variables as a unit pulse in the base period, constructs 95% confidence interval, and uses Monte Carlo (Carlo Monte) stochastic simulation method to simulate the dynamic response of AL, R and E on VA in the 500 calculation. Having set the impact of the duration of 6 years, the paper obtained the pulse map reflected by a unit standard deviation of developed market countries and emerging market countries respectively (Figure 1, Figure 2).
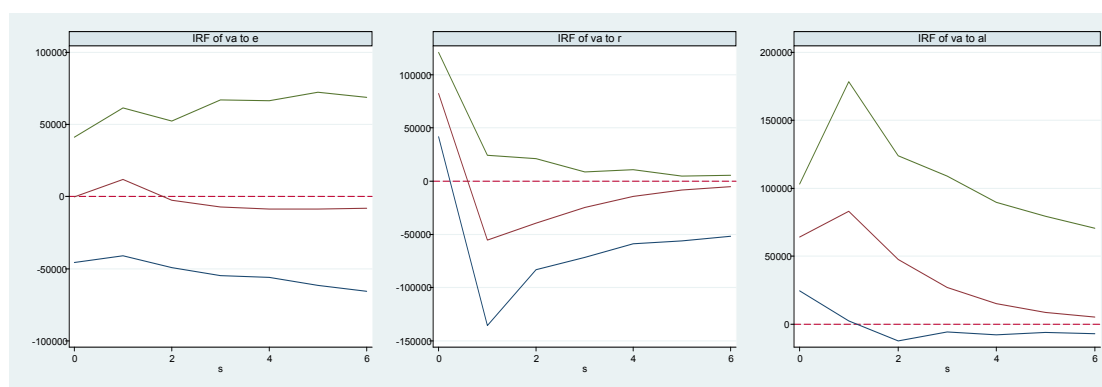

Figure 1. The impulse response of E, R, AL, VA in developed market countries

3.3.1 Impulse Response of Developed Market Countries

Facing a positive impact of E (appreciation of the dollar, devaluation of the national currency), valuation effects began to rise from the same period slowly, and reached the maximum appreciation effectin the first phase, then declined slowly. From the lag phase two to the lag phase six, the effect is negative, which is consistent with the conclusion of Cheng et al. (2014). Developed countries tended to use foreign currency to represent their foreign assets, and before the collapse of the Bretton Woods System, the dollar was the main foreign currency. With the appreciation of the dollar, the value of foreign assets increased which is expressed in domestic currency, resulting in a positive valuation effect. With the establishment of Jamaica system and the deepening trend of global asset allocation diversification, developed countries gradually use other foreign currency to represent their foreign assets. Additionally, the positive valuation effect brought by the the appreciation of dollar is partly offset by the negative effect brought by the devaluation of the other foreign currency, so that valuation effects begin to decline, making the cumulative valuation effect after the second period turns negative.

Facing a positive impact of R, VA first dropped significantly, and in the first phase reached the maximum decline effect, then gradually picked up after the first phase, the cumulative effect of the six phase trended toward zero. This is mainly related to the asset structure of the developed market countries. Developed market countries external debt mainly consists of paying the fixed interest of the State bonds, stocks and etc. Domestic stock returns are equivalent to the cost of foreign debt. With the rise of stock returns, the attraction in foreign capital rising, leading to the flow of funds as the securities market in developed countries has a high degree of opening to the outside world, which causes an increase in the interest rate of foreign liabilities and payments, resulting in a negative valuation effect. With the continuous accumulation of funds, the marginal efficiency of capital decreases, and this effect begins to gradually weaken after the first phase, and eventually tends to zero.

Facing a positive impact of AL (foreign direct investment increased), valuation effects of developed countries rise sharply at first, then decline slowly, but always turn to a positive valuation effect. As the capital return rate

of developed countries is lower than emerging countries, its assets are mainly in the form of the direct investment in emerging market countries which usually own a higher profit. In the early days, the high returns of foreign direct investment made valuation effects increase significantly, and with the continuous accumulation of the investment, due to the diminish of the marginal efficiency of capital, the income rate of foreign direct investment decreased gradually, so the valuation effects decreased.
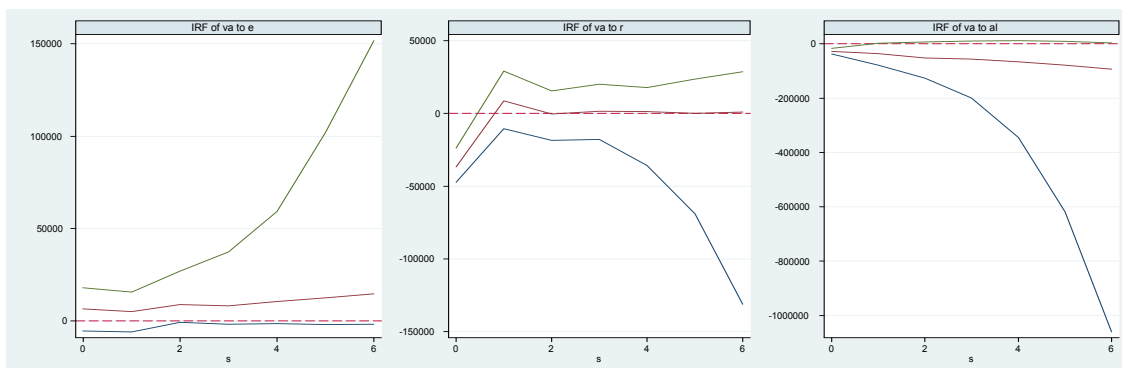

Figure 2. The impulse response of E, R, AL, VA in emerging market countries

3.3.2 The Impulse Response of Emerging Market Countries

Facing a positive impact of E, valuation effects began to rise slowly from the same period, and reached the maximum appreciation effect in the six phases, and always turned to a positive valuation effect. Differing from the developed market countries, before or after the collapse of the Bretton Woods System, foreign assets and liabilities of emerging market countries were both mainly expressed in the dollar, which means the degree of diversification of assets is not high. When the nominal exchange rate under the direct quotation method E rises, the value of foreign assets expressed in the domestic currency will increase while the value of foreign debt expressed in the domestic currency will also increase, so valuation effects emerging market countries caused by non expected exchange rate fluctuation may either improve the external equilibrium or worsen the external equilibrium (Song et al., 2014). And the impulse response result shows that, the devaluation of the current of emerging market countries brings a positive valuation effect, possibly because the emerging market countries' long-term trade surplus has accumulated a large amount of external debt assets, while the foreign net assets position is positive, thus it brings the positive valuation effects.

Facing a positive impact of R, valuation effects began to rise gradually from the same period, and reached the maximum appreciation effect of 10000 in the first phase, then declined gradually after the first phase, the accumulative effects of the six phase trend toward zero. This is mainly related to the asset structure of the emerging market countries. In contrast to developed market countries, emerging market countries' foreign assets mainly consist of the bonds of developed countries and other fixed income assets, debts are mainly FDI, and thus the main source of income comes from the net interest income. The rise of stock returns in developed markets has increased the returns of assets of emerging market countries, resulting in a positive valuation effect. Similarly, the marginal efficiency of capital decreases the effect of R on valuation effects, and eventually tends towards zero.

Facing a positive impact of AL, valuation effects of emerging market countries have maintained a downward trend from the beginning to the six periods, and always presented a negative effect. Because of the low efficiency of financial markets of emerging market countries, financial capital of emerging market countries by passed its own financial markets and invested in the developed market countries, and received the FDI investment from the developed market countries (Ju & Wei, 2006). The developed market countries own adequate capital and complete financial system, so the capital return of developed countries is often lower than the emerging market countries. Therefore, the proportion of foreign direct investment in emerging market countries rises, but due to its external assets income being far lower than the cost of external debt, which still results in a negative impact on valuation effects.

3.4 Variance Decomposition

In order to study the contribution of the exchange rate E, the stock return rate R and the equity index AL on valuation effects VA respectively, the variance decomposition is used to decompose the mean square error of the

four variables in different forecast period. Set the forecast period to 6 years, decomposition results as shown in Table 2.

Table 2. Variance decomposition of forecast error variance

s		Developed Market Country Panel				Emerging Market Countries Panel			
		E	R	AL	VA	E	R	AL	VA
VA	1.000	0.0%	6.6%	4.0%	89.4%	0.5%	15.8%	9.1%	74.6%
VA	2.000	0.1%	8.7%	9.7%	81.5%	0.7%	14.4%	20.6%	64.4%
VA	3.000	0.1%	9.7%	11.3%	78.8%	1.2%	11.3%	36.9%	50.7%
VA	4.000	0.2%	10.1%	11.8%	77.9%	1.3%	8.9%	48.9%	40.9%
VA	5.000	0.2%	10.2%	12.0%	77.6%	1.6%	6.9%	59.0%	32.6%
VA	6.000	0.3%	10.3%	13.0%	76.4%	1.8%	5.2%	67.6%	25.5%

3.4.1 Results of Variance Decomposition in the Developed Market Countries

In the short term, the first phase valuation effects can explain the 89.4% fluctuation of its own, then the stock return rate R and equity balance index AL can respectively explain 6.6% and 4%, but the exchange rate does not explain; In the medium (third phase) and long-term (sixth phase), in addition to valuation effects' own interpretation, the interpretation of the fluctuation of valuation effects of AL is higher than R, respectively, 9.7% to 11.3% and 12% to 10.3%. E's contribution to the exchange rate fluctuations of the developed market countries is very small.

3.4.2 Results of Variance Decomposition in the Emerging Market Countries

In the short term, the first phase valuation effects can explain the 74.6% fluctuation of its own, then the stock return rate R and equity balance index AL can respectively explain 15.8% and 9.1% , but the exchange rate only explains 0.5%; In the medium term, valuation effects can explain the 50.7% fluctuation of its own, which is still the highest proportion, followed by AL and R; In the long term, AL can explain the 67.6% fluctuation of valuation effects, which has exceeded the proportion of VA, VA can only explain the 25.5% fluctuation of its own, R and E can respectively explain 5.2% and 1.8%. E interpretation proportion of valuation effects shows a rising trend from the first phase to the sixth phase, rising from 0.5% to 1.8%.

4. Conclusions

This paper uses the annual data of 1991-2014, constructing PVAR model in two panels of developed market countries and emerging market countries respectively and studying the relationship between exchange rate, stock returns, equity balance index and valuation effects. By means of orthogonal impulse response and variance decomposition, the conclusions are as follows:

Emerging market countries should manage valuation effects through the improvement of equity balance index AL and exchange rate policy. Managing valuation effect through the stock return is effective in the short term, but not long term. The variance decomposition results of the emerging market countries show that, AL's ability to explain the volatility of valuation effects is rapidly increasing, and Al has become the most important factor in the long term; E's explanation for the volatility of valuation effects is also rising. It shows that in the context of the deepening of financial integration, the risk of exchange rate volatility of emerging market countries is further aggravating; impact on valuation effects will also be more and more serious. From the picture of impulse response to VA on the stock return rate R of emerging market countries, valuation effects in the short term appear to rise after the impact of R, but eventually tend to be stable, noting that the positive effect of increasing stock returns on valuation effects is only temporary, and emerging market countries managing valuation effect through the stock return rate can only be effective in the short term, but not long-term.

Developed market countries should focus on the management of valuation effects of stock returns and the structure of the external assets of its own configuration. The variance decomposition results of the developed market countries show that, from short term to long, VA has always been the most important determinant of the volatility of valuation effects, and the six phases of the lag of the interpretation proportion all exceeded 75%. Therefore, the developed market should pay more attention to the structure of the external net assets allocation problems to manage the volatility risk of valuation effects; in addition, R is the third major factors after AL and VA in the variance decomposition results of developed market countries, but the interpretation of the volatility of valuation effects of R shows a rising trend. Therefore, except for continuing to maintain a high proportion of FDI

form of capital output, the developed countries also should increase the management of stock returns, leading it in the direction of improving the external balance of the country.

5. Implications

The empirical results of this paper have a certain guiding significance for China to correctly understand the impact of valuation effects and effective management of China's foreign assets and realize the value added. The revelation is as follows.

First, with the internationalization of the RMB and the gradual progress of the reform of the exchange rate, the impact of exchange rate volatility on China's valuation will be more and more severe. Therefore, China should effectively use the RMB exchange rate tool, so that the RMB exchange rate could generate a normal fluctuation mechanism, leading the external imbalance to the favorable direction of adjustment. At the same time, our country should change the shortcoming of the single currency allocation of external assets, and disperse the exchange rate risk effectively through the diversification of currency allocation.

Secondly, foreign direct investment is often higher than other similar assets because of its return on investment rate, which can pull up overall income rate of foreign assets. Therefore, the policy implications for China are to optimize the structure of the foreign assets, in particular, to increase the size of the direct investment and the degree of income in emerging market countries. Moreover, it continues to strengthen and improve the "the Belt and Road Initiative", "Asian investment bank" and the strategy of Chinese gradually accomplishing foreign capital output, improves the yield of China's foreign assets, and gradually reduces the introduction of foreign capital scale and progress.

Finally, Chinese enterprises should further accelerate the pace of going out. At present, with the implementation of the domestic supply side structural reforms, the domestic industry is facing greater pressure of cutting excessive industrial capacity. Because of the enterprises in needs of transition and development, they can regard overseas investment as a new choice. On the one hand, through overseas mergers and acquisitions, they can directly use foreign advanced technology and industry, being equivalent to stand on the shoulders of giants, which can effectively reduce development cost and time, and assist Chinese enterprises faster better upgrade. On the other hand, the local equity and asset prices are inexpensive in some developed economies and Brazil and other emerging economies, which is a good opportunity for Chinese enterprises to go out and realize the mergers and acquisitions.

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