Global Imbalance Adjustment: Stylized Facts, Driving Factors and China's Prospects

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Abstract

This paper summarizes global imbalance adjustment after the GFC and analyzes the evolution of balance of payments using a four-quadrant diagram. We construct the framework of a stock adjustment mechanism to analyze the main driving factors for the imbalance in surplus/deficit countries and debtors/creditors in an attempt to determine the sustainability of imbalance adjustment. We find that imbalances have been reduced to some extent, but most countries have not achieved rebalance after the global financial crisis. Therefore, we propose an ideal path for global imbalance adjustment and summarize the policy practices of representative countries that have followed this route. Based on our analysis, we suggest that China should learn from the Australian experience and adopt a macro-prudential assessment policy, actively adjust the domestic economic structure and optimize the structure of balance of payments.

Key words: current account, flow adjustment, global imbalance, net foreign assets, stock adjustment

JEL codes: E61, F32, F41, O11

I. Introduction

Since the 2008 global financial crisis (GFC), the global current account imbalance has been significantly alleviated and debate over the external balance has turned from sustainability to rebalance. As it has been over a decade since the GFC, concluding whether global imbalance has been tackled depends on which standard we choose. Theoretically, the change of flow in the balance of payments (BOP) and change of stock in international investment position (IIP) should move in the same direction, although changes of stock are much slower than changes of flow. However, in reality, there is often significant deviation between BOP and IIP adjustment. Moreover, there is notable heterogeneity in countries' imbalance adjustments after the GFC.

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Scholars have attempted to explain this phenomenon from various perspectives. For example, the reconstruction of the post-crisis trading system has seen global import and export mainly driven by trades of intermediate and semi-finished goods rather than finished goods (Kregel, 2019). Another example is that financial globalization has diversified the denominating currencies for foreign assets and liabilities (Caballero et al., 2008). In addition, the increase of both the scale and volatility of cross-border capital flow combined with fluctuations in exchange rates and asset prices make the valuation effect an important channel of stock adjustment (Yang et al., 2019). Finally, although controversy still exists over whether the global imbalance has actually eased since the GFC, the International Monetary Fund (IMF) *2014 Pilot External Balance Report* suggests that close attention should be paid to both net debtors' and net creditors' growing stock imbalances (IMF, 2014).

This paper attempts to summarize the stylized facts of global imbalance adjustments after the GFC from both flow and stock perspectives, and to determine the driving factors behind these adjustments. First, we analyze the global imbalance adjustment from both flow and stock perspectives. Second, we decompose the stock adjustment channels to ascertain the main contributing factors of imbalances before and after the GFC and explore the common rules behind the evolution of the global imbalance. Third, we adopt a quadrant analysis method to depict the path and trends of various kinds of national adjustment and discuss the driving forces behind such adjustment. Fourth, we propose the ideal path for global imbalance adjustment. Finally, we offer suggestions on how to improve China's BOP structure.

The rest of the paper is organized as follows: Section II comments on the related literature. Section III summarizes the stylized facts of global imbalance adjustment. Section IV explores the driving factors for adjustment. Section V proposes the ideal path of global imbalance adjustment and explores the best national practices. Section VI concludes and provides policy suggestions for China.

II. Literature Review

The rapid development of financial globalization and the significant expansion of both intermediate goods and service trade are an important background for global imbalance adjustment after the GFC. Because of the differences in negative effects of the GFC, international capital presents both a regular flow and "reverse flow mystery" (Prasad et al., 2006) between developed and emerging economies, and an "allocation puzzle" (Gourinchas and Jeanne, 2013) between emerging

economies.[1] These have contributed to the divergence of imbalance adjustment between countries and regions.

Since the GFC, the reduction of the current account scale in the major economies has been a significant feature of global imbalance adjustment, especially in China and the US where their current accounts have shrunk continuously since 2008. The concept of "global rebalancing" was first proposed at the 2009 G20 summit. Balancing economic growth, improving external imbalances and adjusting economic structure became the consensus of policymakers of various countries after the GFC. Zhang (2010) proposed that to achieve global rebalancing, China and the US should play important roles. China should facilitate the primary distribution of national income, improve the RMB exchange rate formation mechanism and accelerate market-oriented factor reform. The US should boost the private saving rate, take steps to avoid worsening fiscal deficit, allow a modest depreciation of the dollar and limit trade protectionism. Zhang (2016) adopted four dimensions to assess China's economy rebalancing, with external rebalancing mainly measured by the current account balance. In addition, Liu and Zhang (2018a,b) explored the significant characteristics of rebalancing in major economies and their driving forces and found that significant heterogeneity exists in the process of adjustment among these countries. Structural factors significantly influenced the current accounts of developed countries, exacerbating rather than easing imbalances, although cyclical factors do help to ease current account imbalances in developing countries. This suggests that global current account imbalance adjustment may be unsustainable, and economies need to follow an effective path of rebalancing.

However, contrary to the easing current account imbalance, the stock of global assets and liabilities has significantly expanded. Lane and Milesi-Ferretti (2007, 2018) observed that countries' net foreign assets and the stock size of liabilities under financial integration were inconsistent with statistical calibrations, leading to deviations in stock measurement. They adjusted the data of net foreign assets and liabilities of 145 countries using the market capitalization method, a dataset that is now widely used. Meanwhile, the expansion of stock has significantly increased the external risks of economies. Catão and Milesi-Ferretti (2014) studied the relationship between the stock of external debt and the economic crisis and found that net foreign debt stock and current account deficit as share of GDP are effective crisis-early-warning indices,[2] a net debt rate over 50 percent

[1]The "reverse flow mystery" refers to the abnormal phenomenon of when a large amount of capital flows from developing countries to developed countries with abundant capital in practice. The "capital allocation puzzle" refers to the abnormal flow of capital between emerging markets and other developing countries.

[2]The "crisis-early-warning indices" refer to those indices or variables that are likely to be highly correlated with financial crisis.

may be likely to cause crisis.Therefore, keeping reserves rather than just increasing foreign assets helped to release risk. Bénétrix et al. (2015) analyzed the evolution of international currency risk exposure from 2002 to 2012 and found that the distribution of valuation effects caused by currency mismatch was stabilizing and showed a negative covariant pattern[3] with the net position of foreign assets before the crisis.

After the GFC, some pioneering research on global imbalances focused on the valuation effect caused by financial adjustment channels and stock adjustment behind the current account. According to classic macroeconomics theory, a country's current account should equal the change of net foreign assets for a given period. Thus, Obstfeld and Rogoff (1995) proposed the inter-temporal optimization method of the current account, arguing that the inter-temporal transactions of a country's trade are reflected in the current account. They expressed the current account as $CA_t = NFA_{t+1} - NFA_t = Y_t - C_t - I_t - G_t$,[4] which laid the foundation for new open macroeconomics and became the most important theoretical mechanism to analyze external imbalances. However, Gourinchas and Rey (2007, 2015) pointed out the weakness of this analysis framework: capital gains and losses caused by exchange rate fluctuations and asset price fluctuations were not taken into account. They further divided the current account into trade and income accounts and pointed out that the income account belongs to the financial adjustment channel. Lane and Shambaugh (2010) distinguished asset price fluctuation and exchange rate adjustment effects on the basis of the valuation effect, and calculated the degree of the exchange rate valuation effect of 117 countries, which greatly expanded the research prospects of external imbalance. Mileva (2015) and Ghironi et al. (2015) further measured the valuation effects of some major economies using this method and proposed suggestions to improve BOP.

Scholars have also identified drivers for and effective measures behind global imbalances. For example, research by Chen and Zhou (2011) demonstrated that the essence of rebalancing is to transform the economic growth mode and promote the re-coupling of economic growth forces. Countries with imbalance should focus on the redistribution of economic benefits and reasonable bearing of adjustment costs. Liu (2011) pointed out that it is necessary to encourage technological innovation and cooperation between economies and establish a new pattern of international competition to achieve global rebalancing. Li (2014) proposed that both developed

[3]Covariation comes from the mathematical concept that the form of an equation does not change fundamentally in different coordinates.

[4]In this formula, *CA* stands for current account balance, *NFA* represents net foreign assets balance, *Y* is total GDP of one nation, *C* stands for a nation's total consumption, *I* represents total investment of one nation, *G* denotes government spending and *t* is the given time or period.

and emerging economies should adjust domestic economic structure, deepen economic reform and maximize domestic demand. Meanwhile, several studies have provided new views to analyze global imbalances. From the perspective of international labor division, Zhang and Xue (2013) found that to ease global imbalance it is necessary to facilitate the structure of factors and improve the asymmetric flow of production factors. Habermeier et al. (2009) and Ju et al. (2019) pointed out that macro-prudential coordination and regulations among countries are particularly critical for imbalance adjustment from the perspective of capital flows. Habermeier et al. (2009) also suggested the introduction of a globally unified credit risk analysis framework, the establishment of a sovereign credit rating system and the adoption of a new investment portfolio method.

III. Stylized Facts behind Global Imbalance Adjustment: Asymmetric Adjustment of Stock and Flow

Before and after the GFC, global imbalance adjustment showed significant heterogeneity in both flows and stocks. In this section, we will first summarize the stylized facts of global imbalance from flow and stock adjustments. We select 48 countries around the world as samples, covering all continents and major economies, including developed and developing countries.[5] We analyze the evolution law of global imbalances between debtors and creditors, deficit and surplus and developed and developing countries, separately.

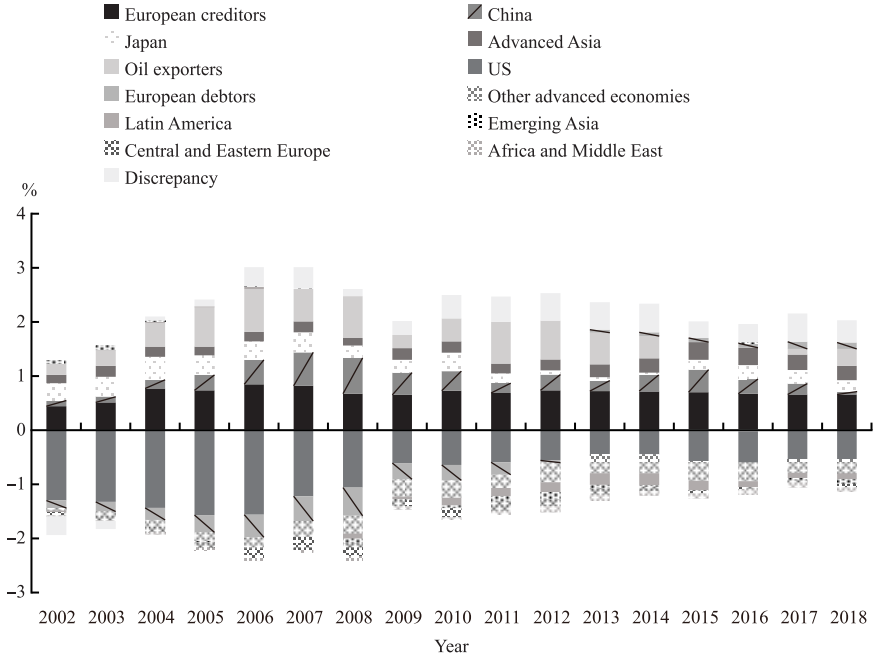
1. Current Account Imbalance Gradually Eased While Stock Imbalance Continued to Increase after the Global Financial Crisis

Figure 1 depicts the trends of current account imbalance before and after the GFC. Overall, global current account imbalance improved significantly after the GFC. For the major countries, China's current account surplus reduced significantly, and US current account deficit only adjusted slightly. Although European creditors did not present a significant reduction in current account surplus, European debtors' deficits reduced

[5]The 48 countries are: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Costa Rica, Czech Republic, Denmark, Egypt, Finland, France, Germany, Greece, Guatemala, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Malaysia, Mexico, Morocco, the Netherlands, New Zealand, Norway, Pakistan, Peru, the Philippines, Poland, Portugal, Russia, South Africa, South Korea, Sweden, Switzerland, Spain, Sri Lanka, Thailand, Tunisia, Turkey, the United Kingdom and the United States. The selection of these countries is basically consistent with the samples analyzed by the IMF method of external balance assessment. These countries are representative economies in the world and extensive data is available.

significantly. Oil exporters'[6] current account surpluses shrank after 2012. Japan's current account surplus had expanded in the past five years.

Figure 1. Global Current Account Imbalance Adjustment, 2002–2018



Source: IMF (2019b).

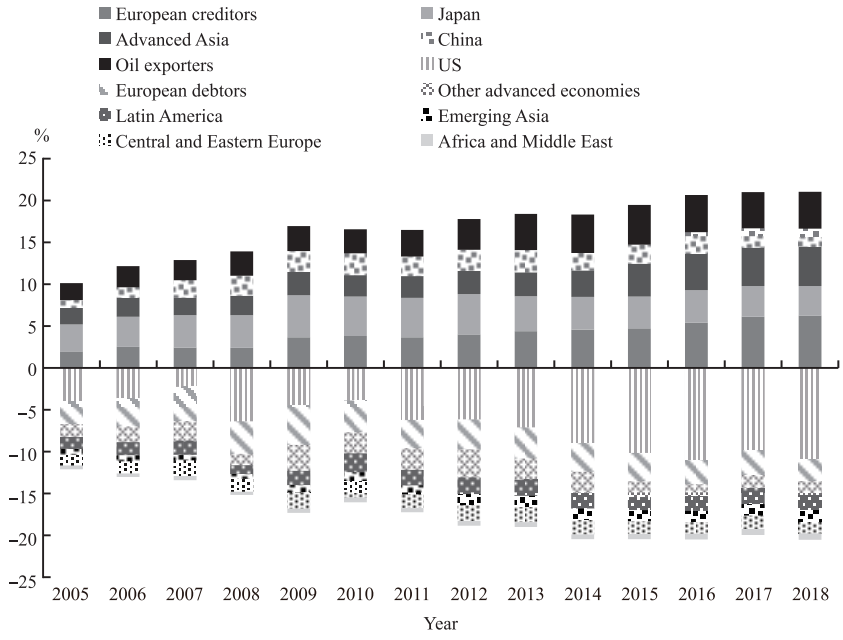
After the GFC, only a few countries' current account has been improved, some saw current account deterioration, while most of the countries' current account imbalance maintained unchanged. Given the heterogeneity in the size of economies, global current account imbalance adjustment is likely to be highly correlated with a reduction in China's current account surplus and a small reduction in the deficit of debtors in Europe so far.

Figure 2 shows the evolution of global stock imbalances before and after the GFC. The stock imbalance did not ease after the crisis but significantly expanded, and there was significant heterogeneity in the stock adjustment of major economies. Among them, US net debt increased significantly after the crisis, leading to the expansion of the global foreign debt stock ratio. The share of net foreign assets in oil exporting countries,

[6]Oil exporters refer to Organization of the Petroleum Exporting Countries (OPEC).

advanced Asian economies and Eurozone creditors grew slowly. However, China's net foreign asset position and the net debt stock of Eurozone debtors both declined by varying degrees.

Figure 2. Change of Stock Imbalance Adjustment before and after the Global Financial Crisis, 2005–2018



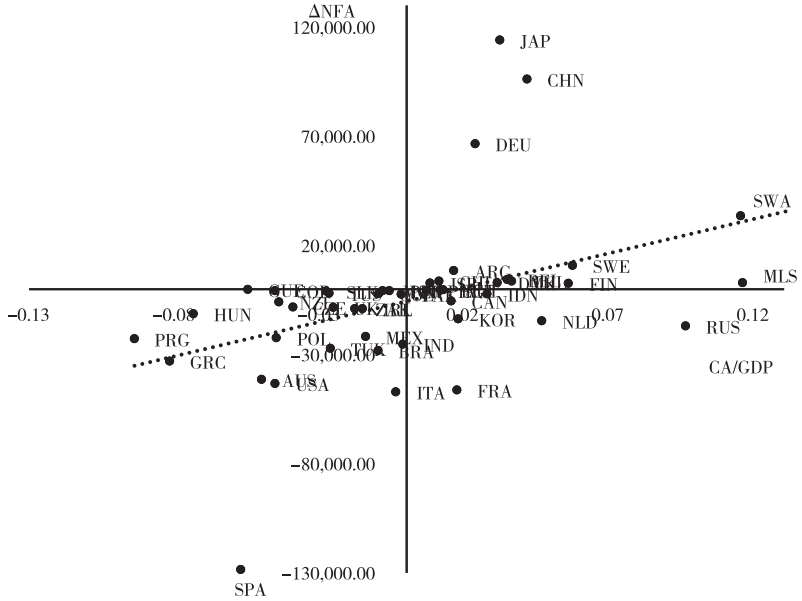
Source: IMF (2019b).

Above all, the global imbalance after the GFC presents asymmetry in flow and stock adjustment (Figures 1 and 2), which means that since the GFC the contribution of the valuation effect caused by exchange rate and asset price fluctuations of BOP adjustment continues to increase.

2. Reduced and Differentiated Imbalances in Major Countries

As shown in Figures 3 and 4, on the whole, the increase of net foreign assets (NFA) is positively correlated with the increase of current account surplus; that is, expansion of the current account surplus is usually accompanied by an increase in NFA. However, the slope of the fitting line obviously decreases after the crisis, indicating that the correlation coefficient between current account adjustment and NFA has decreased significantly after the GFC.

Figure 3. Evolution of Imbalances in Major Economies before the Global Financial Crisis, 1998–2007



Sources: CEIC, World Development Indicators, International Financial Statistics database and Lane and Milesi-Ferretti (2017).

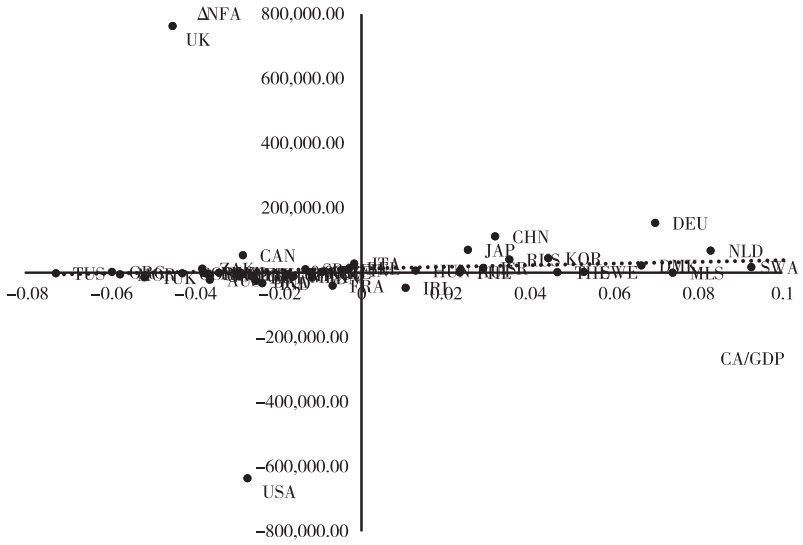
Notes: CA, current account balance; NFA, net foreign assets. See Appendix for country abbreviations.

Before the GFC, the surplus countries had positive NFA positions and deficit countries had negative net foreign debts, but the current account flow adjustment and stock changes in a few countries show significant deviation (Figure 3). For example, despite the prolonged current account surplus, NFA continued to fall in France, the Netherlands, Russia and South Korea. Russia's current account surplus accounted for more than 8 percent (Figure 3), suggesting that decreases in NFA and abnormal changes in BOP clearly do not facilitate external wealth accumulation.

After the GFC, most countries experienced significant adjustments in their current accounts, namely slight surpluses and deficits (Figure 4). The four countries above with abnormal BOP adjustments before the crisis all showed some improvement in their BOP. That is, the expansion of surplus was in line with the change direction of NFA. In some other countries (e.g. Spain), the stock imbalance also eased significantly. It is worth noting that the external imbalance between the US and the UK worsened after the GFC. Although the US current account deficit narrowed slightly, faster accumulation of

net foreign debt is observed. The UK's current account deficits and NFA position have both been accumulating rapidly and continuously, which means that the imbalance has not been alleviated but further aggravated. Meanwhile, current account deficit and NFA expansion oppose the common law of BOP adjustment.

Figure 4. Evolution of Imbalances in Major Economies after the Global Financial Crisis, 2008–2017

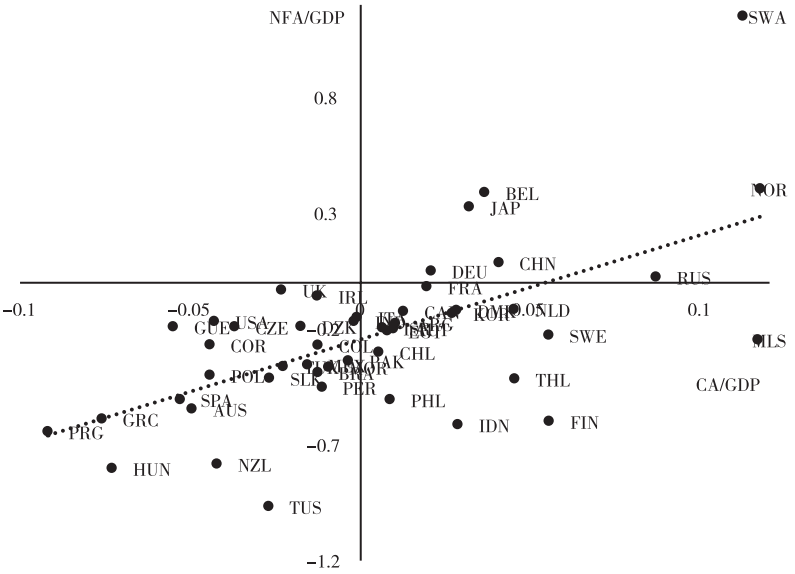


Sources: CEIC, World Development Indicators, International Financial Statistics database and Lane and Milesi-Ferretti (2017).

Notes: CA, current account balance; NFA, net foreign assets. See Appendix for country abbreviations.

We use four-quadrant diagram analysis to further divide the sample countries. As shown in Figure 5, the first to fourth quadrants represent the positions of surplus creditors, deficit creditors, deficit debtors and surplus debtors, respectively. Before the GFC, none of the sample countries were deficit creditors. In terms of sample country distribution, deficit debtors account for the largest portion, followed by surplus debtors, while only seven countries are surplus creditors. The slope of the fitting line in Figure 5 shows that the expansion of current account surplus is positively correlated with the increase in the proportion of NFA. But for four economies – Finland, Indonesia, the Philippines and Thailand – current account surpluses have not been effective in defusing their high external stock of debt.

Figure 5. Flow and Stock Imbalance before the Global Financial Crisis, 1998–2007



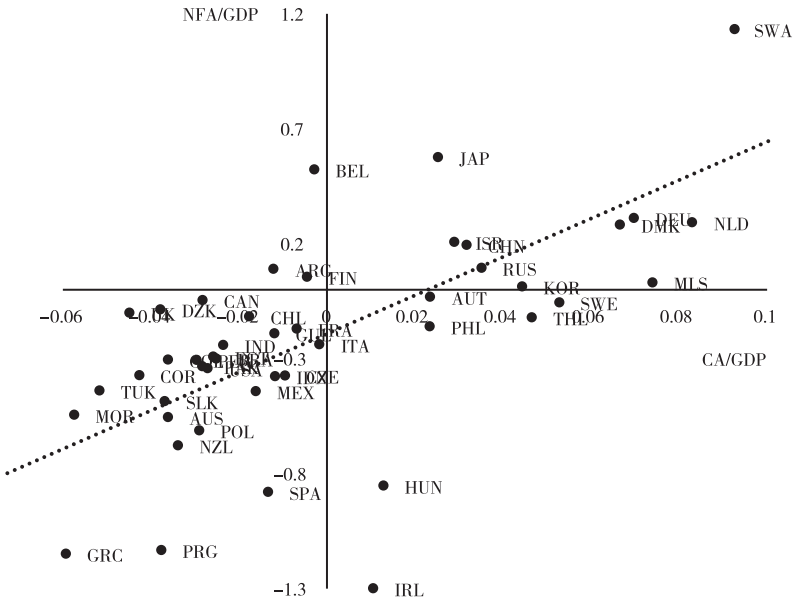
Sources: CEIC, World Development Indicators, International Financial Statistics database and Lane and Milesi-Ferretti (2017).

Notes: CA, current account balance; NFA, net foreign assets. See Appendix for country abbreviations.

We make a comparison between Figures 5 and 6: first, deficit countries' current account imbalance adjustment is more significant and no obvious adjustments are presented in surplus countries in addition to individuals. This may be because deficit countries are developed economies whose external demand declined and import growth slowed down significantly, and surplus countries are often willing to maintain a certain degree of trade surplus. Second, stock imbalance in both debtors and creditors has not improved but rather has significantly worsened. Third, before the crisis, stock imbalances in the four high-debt countries – Finland, Indonesia, the Philippines and Thailand – were significantly alleviated, whereas stock imbalance of economies represented by the five European GIIPS[7] countries intensified, accumulating high net foreign debt. Fourth, Argentina, Belgium and Finland became deficit creditors after the crisis, which is conducive to the accumulation of external wealth. Fifth, some individual countries, such as Hungary and Ireland, turned into highly indebted surplus countries, which meant that their current account surpluses could neither increase external wealth, nor reduce external debt.

[7]GIIPS refers to Greece, Ireland, Italy, Portugal and Spain.

Figure 6. Flow and Stock Imbalance after the Global Financial Crisis, 2008–2017



Sources: CEIC, World Development Indicators, International Financial Statistics database and Lane and Milesi-Ferretti (2017).

Notes: CA, current account balance; NFA, net foreign assets. See Appendix for country abbreviations.

Generally, cross-quadrant adjustments reflect structural changes in BOP. Figures 5 and 6 show that flow and stock imbalances in several countries changed quadratically after the GFC. Interestingly, most of these countries were debtors that suffered from the European debt crisis or developing economies that were deeply affected by the Asian financial and Latin American debt crises. Such countries usually transform from surplus creditors or deficit debtors into surplus debtors, which is not conducive to the accumulation of national wealth. In addition, it is worth noting that Argentina, Belgium and Finland have undergone BOP improvement that is conducive to improving their own welfare, and have transformed into deficit creditors, with the relative size of their current accounts less than 2 percent, achieving current account rebalancing.

IV. Underlying Causes behind Global Imbalance Adjustment

In this section, based on the concise analytical framework of stock adjustment, we reveal

the underlying causes of global imbalance adjustment after the GFC, and determine the common laws of global imbalance evolution.

1. Analytical Framework

According to Gourinchas and Rey (2007) and Alberola et al. (2018), we establish the following framework to analyze stock adjustment.

First, we establish the relationship between the change of NFA from beginning to end and current account adjustment:

$$NFA_t - NFA_{t-1} = FA_t + VAL_t + EO_t, \quad (1)$$

where *FA* stands for capital account, *VAL* denotes the valuation effect and *EO* is errors and omissions.

Divide Equation (1) by the nominal GDP in period *t*, and then we obtain:

$$nfa_t - nfa_{t-1} = -\frac{g_t}{1+g_t} nfa_{t-1} + fa_t + val_t + eo_t. \quad (2)^8$$

According to Equations (1) and (2), a country's NFA adjustment can be decomposed into current account and capital account (represented by *FA*), *VAL* and *EO*. In terms of the relative scale adjustment of NFA, it may continue to be decomposed into the economic growth effect of NFA, CA and FA changes in flow adjustment effect, VAL of disturbance and EO. Among them, the economic growth effect is defined by GDP growth ($\frac{g_t}{1+g_t}$) multiplied by the relative scale of NFA (*nfa*) in the last period; CA and FA adjustment is equal to *FA* divided by the ratio of the current GDP; the VAL is equal to the difference between the stock of foreign assets and financial accounts or the difference between the stock of foreign debt and financial account inflows; and the remainder are EO.[9]

According to the above analytical framework, we analyze stock imbalance adjustments in 48 major economies before and after the GFC, and try to determine the underlying causes behind this round of adjustment.

2. Main Reasons and Sustainability of Stock Adjustment in Economies after the Global Financial Crisis

The channels of stock adjustment are decomposed into four parts: growth effect of NFA,

[8]Variables with lowercase letters represent primitive variables divided by nominal GDP.

[9]Because the items of IIP and the financial account of BOP are the same, the difference between the ending stock of the current period and the ending stock of the previous period is the current change, and the financial account reflects the current change of the external assets and liabilities of the transaction; the difference between the two can be regarded as the VAL.

flow effect of CA and FA changes, VAL caused by exchange rate and foreign asset price fluctuations, and EO. Because of the huge differences in national conditions among the samples, we divide them into four parts: developed debtors, developed creditors, developing debtors and developing creditors.[10]

Comparison of the determinants of stock adjustment before and after the GFC reveals differences between the flow effect and stock adjustment of economies, especially for debtors. Generally speaking, the first two items, the economic growth effect and FA adjustment of stock decomposition, are relatively stable, which can be realized by a country's own structural adjustment. The latter two, VAL and EO, are uncertain factors. If there is a significant increase in these two items, it means that adjustment for the imbalance is uncertain and difficult to sustain. The results in Table 1 suggest: first, for developed creditors, the ratio of growth effect and flow effect after the GFC increased by 13.1 percent[11] compared to that before GFC, indicating that the proportion of uncertain factors in stock adjustment in developed debtors decreased after the crisis, and the adjustment for imbalance was more stable after the crisis. Meanwhile, the post-crisis VAL in developed countries is significantly higher than before, indicating that financial adjustment channels play a more prominent role in these countries.

Table 1. Stock Adjustment Decomposition before and after the Global Financial Crisis

	Before the global financial crisis, 1998–2007				After the global financial crisis, 2008–2017			
Countries	Growth effect (%)	Flow effect (%)	Valuation effect (%)	Errors and omissions (%)	Growth effect (%)	Flow effect (%)	Valuation effect (%)	Errors and omissions (%)
Developed creditors	6.13	58.09	8.70	27.07	10.03	66.99	16.33	6.65
Developed debtors	22.02	20.90	40.20	16.87	22.23	3.27	37.75	36.74
Developing creditors	6.06	53.02	25.86	15.06	17.38	57.74	4.39	20.48
Developing debtors	32.29	7.20	35.85	24.65	36.57	47.33	11.71	4.37

Sources: CEIC database and authors' calculations.

[10]Developed debtors include: Australia, Austria, Canada, Denmark, France, Finland, Greece, Ireland, Italy, the Netherlands, New Zealand, Portugal, Spain, Sweden, the UK and the US; developed creditors include Belgium, Germany, Japan, Israel and Norway; developing debtors include Brazil, Chile, Colombia, Costa Rica, Czech republic, Egypt, Guatemala, Hungary, India, Indonesia, Mexico, Morocco, Pakistan, Peru, the Philippines, Poland, South Africa, South Korea, Sri Lanka, Thailand, Turkey and Tunisia; and developing creditors include Argentina, China and Russia.

[11]These results are derived from Table 1 and the authors' calculations. The remaining data is similarly calculated.

Second, for developed debtors, economic growth and flow effects accounted for only 43 percent of the stock adjustment before the crisis, which may indicate that stock imbalance in these countries was caused by factors other than structural. After the crisis, the VAL and the total proportion of EO increased slightly, and the VAL was the biggest contributor to the stock adjustment. This demonstrates that stock adjustment of developed debtors is unstable and unsustainable.

Third, for developing creditors, the CA and FA-determined flow adjustment ratios remain the largest contributor to stock adjustment. After the crisis, the economic growth effect of NFA significantly improved while the unstable VAL significantly reduced. Meanwhile, the proportion of structural adjustment factors significantly improved compared to that before the crisis. This suggests sustainable adjustment in favor of improving imbalances in developing creditors.

Fourth, for developing debtors, the flow effect adjustment before the crisis only accounted for approximately 7.2 percent of stock adjustment, while flow effects after the crisis increased to 47.33 percent. Meanwhile, the NFA growth effect improved while the VAL significantly reduced. In addition, post-crisis structural factors in the stock adjustment increased significantly. This means that post-crisis adjustment of stock imbalances in developing debtors is more stable and sustainable.

In addition, comparing the VALs in different countries, we find that the VALs of debtors is much larger than that of creditors, which is also related to the fact that most debtors are concentrated in developed economies and financial channel adjustment of the CA is relatively significant. Developed and developing debtors have a positive VAL after the GFC; that is, the VAL is conducive to an increase in NFA and the accumulation of national wealth. For developing creditors, the negative VAL after the crisis is further intensified; that is, the VAL is not conducive to an increase in NFA and the accumulation of national wealth. Therefore, we can conclude that the VALs present significant heterogeneity among countries. For developed and developing debtors, the positive VAL is helpful for the further accumulation of NFA, the reduction of debt and the correction of stock imbalance. For developing creditors, the negative VAL further reduces the increase rate of NFA and helps to reduce the global stock imbalance, but to some extent induces further loss of national wealth. For developed creditors, the positive VAL will further increase their NFA position, which is not helpful for reducing global stock imbalances.

3. Can Changes in Stock Adjustment Explain the Evolution of Imbalances in Typical Countries after the Global Financial Crisis?

Based on the stylized facts of the imbalance adjustment described in Section III, we try to explain changes in a typical country's BOP with changes to stock adjustment.

(1) Both Current Account Surplus and Net Foreign Assets Decline during the Imbalance Period, 1998–2007

According to the stylized facts in Section III, France, the Netherlands, Russia and South Korea have current account surpluses but negative NFA stocks. Comparing the stock adjustment subdivision of the crisis in these four countries (Table 2), we find that a negative VAL of adjustment plays an important role, namely the VAL significantly reduces the net stock of foreign assets of the four countries. For Russia, the VAL contributed to 40 percent of stock adjustment, which caused serious deviation from the traditional international trade flows.

Table 2. Representative Surplus Debtors' Stock Imbalance

Country	*Δnfa_gdp*	Growth effect	Flow effect	Valuation effect	Errors and omissions
France	0.0171	0.0024	0.0217	–0.0100	0.0029
Russia	–0.0155	–0.0014	0.0863	–0.0718	–0.0285
South Korea	–0.0051	0.0063	0.0261	–0.0394	0.0017
The Netherland	–0.0171	0.0018	–0.0003	–0.0135	–0.0050

Sources: CEIC database and authors' calculations.

(2) Did the Valuation Effect Alleviate or Worsen Imbalance after the Global Financial Crisis?

Imbalance between Russia and the Netherlands was significantly reduced after the GFC. The relative size of the negative VAL in Russia decreased from 0.07 before the GFC to 0.01 after the GFC,[12] and the contribution to stock imbalance adjustment decreased from 40 to 20 percent.[13] Similarly, the VAL in the Netherlands changed from negative to positive. After the crisis, the VAL was conducive to the accumulation of NFA, and the scale also declined significantly. These changes in direction, stemming from VALs, explain the easing of imbalances.

Imbalances in the UK and the US have deteriorated significantly since the GFC (see analysis in Figure 4). First, the US shows larger negative VALs after the crisis, which accounted for one-third of the stock adjustment. Because external debt was mostly denominated in US dollars, the reason behind this adjustment is related primarily to asset price volatility, leading to a significant deterioration of NFA stock and high debt. For the UK, the adjustment of CA and FA flows accounted for a large proportion of the

[12]Relative size is measured by the ratio of VAL to GDP. Data calculated by the authors using the results from Table 2.

[13]Data calculated by the authors using the results from Table 2.

stock adjustment, and the deficit ratio increased significantly, aggravating the overall stock imbalance.

(3) Trans-quadrant Transformation of Surplus/Deficit Countries and Creditors/Debtors after the Global Financial Crisis

After the GFC, several countries adjusted their BOP in different quadrants (according to cross-quadrant analysis in Section III). Among them, Argentina, Belgium and Finland transformed from surplus creditors or surplus debtors into deficit creditors after the crisis while some countries, such as Hungary and Ireland, transformed from deficit debtors into surplus and high-debt countries.

Comparing BOP adjustments in Argentina, Belgium and Finland, we find significant positive VALs in all three countries (0.0155, 0.0337 and 0.0708, respectively)[14] after the GFC. The VAL is the biggest contributor to stock adjustment in Finland, leading to its transformation. Argentina and Belgium also have considerably positive VALs, significantly higher than that before the GFC. However, it is worth noting that the NFA growth effects in all three countries are negative, and as VALs are usually caused by exchange rates and asset price fluctuations, their BOP improvements based on the VAL are not sustainable.

For Hungary, CA adjustment played an important role in the process of transition from deficit debtor to surplus debtor after the GFC. In addition to EO, the growth and valuation effects were both positive. Due to Hungary's excessive deficit, the overall deficit is not sufficient to reverse long-term high debt, but Hungary's BOP adjustment is transforming more positively than before the crisis and has good prospects. For Ireland, the negative VAL of soaring debt currency and maturity mismatch caused by the European debt crisis is –0.18,[15] which significantly aggravates external imbalance.

Therefore, although imbalance in a few countries has improved across quadrants, it is attributed to the relatively unstable VAL, and this kind of adjustment is actually unsustainable. Although several countries have experienced deterioration of their cross-quadrant income and expenditure, this adjustment is also a result of the uncertainty of the VAL that they may be relying on to solve the debt mismatch in order to reverse adverse adjustment of BOP in the future.

(4) Common Rules of Global Imbalance Adjustment

Although there has been widespread debate about whether global imbalances have

[14]The results were calculated by the authors according to the analytical framework in Section IV.

[15]Calculated according to the CEIC dataset.

improved since the GFC, there has been little disagreement about defining global imbalance adjustment as the combined improvement of stock and flow imbalances. However, there is no clear criteria about to what extent of adjustment could indicate a successful improvement. According to Cline and Williamson (2008), when the relative size of the CA exceeds 4 percent in a following year, it can be judged as a CA imbalance (flow imbalance). Despite the heterogeneity in the optimal debt ratio of various countries, when the absolute ratio of net foreign debt continues to exceed 60 percent it can be judged as stock imbalance. We define the intersection of flow and stock imbalance boundaries as the broadest criterion for determining global imbalances.[16]

According to these criteria, the major pre-crisis imbalances occurred in Australia, China, Costa Rica, Finland, Greece, Guatemala, Hungary, Indonesia, Malaysia, the Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Spain, Sweden, Switzerland, Thailand and the US.

Since the GFC, some imbalanced countries, such as Australia, China, Finland, Guatemala, Indonesia, Malaysia, New Zealand, Russia, Sweden, Switzerland and Thailand, have undergone dual adjustment in both flows and stocks. Others, such as Hungary, Poland, Portugal, Spain and the US, have only seen flow adjustments and stock deterioration. In addition, several countries that did not previously have imbalances developed imbalances after the crisis, such as Greece, Ireland and Italy.

There are several commonalities between the countries that managed to alleviate imbalances. First, all of the countries that experienced imbalance adjustment were less affected by the GFC and European debt crisis, and have not experienced the large-scale flow of cross-border funds. Second, half of the countries that achieved imbalance adjustment learned from debt crises in their history. Third, most countries that have adjusted their imbalances have established macro-prudential assessment frameworks.

In our samples, since the GFC, 11 countries have improved their stock and flow imbalances, five have only adjusted the CA, and 10 countries that achieved BOP balance continue to have imbalances. Therefore, from the perspectives of both flow and stock, global imbalances were alleviated to a certain extent after the crisis, but most countries did not achieve flow and stock rebalancing.

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[16]This definition was used in the US government declaration at the G20 Seoul Summit on 11–12 November 2010 (http://www.g20.utoronto.ca/summits/2010seoul.html) while the definition of high debt is taken from the Maastricht Treaty.

V. Ideal Path for Global Imbalance Adjustment

1. Definition of the Ideal Path

Our findings suggest that if a country experiences a reduction of both flow and stock, its external imbalance is improved. If a country's stock and flow adjustments move in the same direction, BOP adjustment could follow the common rules. If economic growth and flow adjustment effects are dominant in a country, BOP adjustment is sustainable. However, it should also be pointed out that a country's realization of a better BOP is conducive to the improvement of national welfare and its economic structure. Therefore, any BOP adjustment that damages its own welfare cannot be regarded as an effective imbalance adjustment. Therefore, we propose an ideal path for global imbalance adjustment measured by two aspects: First, there should be effective improvement of imbalances based on flow and stock within a certain period of time, but excluding excessive adjustment across quadrants (e.g. when a deficit country with CA/GDP at –5 percent transformed into a surplus country with CA/GDP at 6 percent, although the deficit disappeared, it accumulated much greater surplus, which led to another kind of imbalance). Second, the reduction of deficit or increase of surplus can effectively translate into accumulated investment income of NFA, or the reduction of surplus or deficit in the surplus countries. But if investment income is not significantly reduced (i.e. the continuous improvement of investment income), the optimization of CA structure and the overall improvement of national welfare are required. These two standards are relatively strict, implying the optimal degree of imbalance adjustment.

For the first measure, we performed detailed analysis in Sections III and IV, and identified that the second measure requires analysis of the relationship between a country's CA balance and its investment returns. In theory, countries with CA surpluses need to maintain positive investment returns on their NFA to achieve stable national welfare. In contrast, countries with CA deficits typically have negative returns on NFA because their interest payments exceed their earnings.

First, we divided the sample countries into four categories: surplus with positive income, surplus with negative income, deficit with positive income and deficit with negative income. An obvious feature is that nearly 20 sample countries[17] demonstrated BOP changes in the whole period or in the period after the GFC, contradicting the theory; that is, long-term surplus was maintained but investment income remained negative or long-term deficit was maintained but investment income was positive.

[17]These countries include Argentina, Austria, China, Egypt, France, Guatemala, Hungary, India, Ireland, Italy, Malaysia, Morocco, Norway, Pakistan, Portugal, Russia, South Korea, Spain, Sri Lanka, Tunisia and the US.

Second, we summarize the characteristics of a few economies according to time and country dimensions: (i) Austria, Malaysia, Russia, and Sri Lanka have been running a surplus with negative income and a deficit with positive income for two decades. Among them, Malaysia and Russia have a perennial CA surplus but negative investment income. During 2013–2014, negative investment income exceeded their CA surplus, which is mainly attributed to the continuous sale of foreign assets and the use of direct investment to repay foreign debts. Sri Lanka has a perennial CA deficit but positive investment income, which may be related to the fact that it has received large-scale foreign aid for many years. (ii) The European debt crisis caused the adverse BOP evolution of other European GIIPS countries except Greece. After the European sovereign crisis, although Ireland, Italy, Portugal and Spain all experienced BOP adjustment, but the adjustments were not conducive to increasing their welfare. (iii) After the GFC, China and Hungary demonstrated BOP improvement that was not conducive to an increase in their welfare. (iv) Before and after the GFC, Egypt, France, India, Morocco, Pakistan, South Korea and the US have better BOP adjustment that facilitated an increase in welfare; among them, Egypt, France, India, Morocco, Pakistan and the US maintain a CA deficit with positive investment income, while South Korea has reversed the condition of surplus with negative income and realized favorable BOP adjustment.

2. Balance of Payment Adjustment Conducive to Welfare Increase

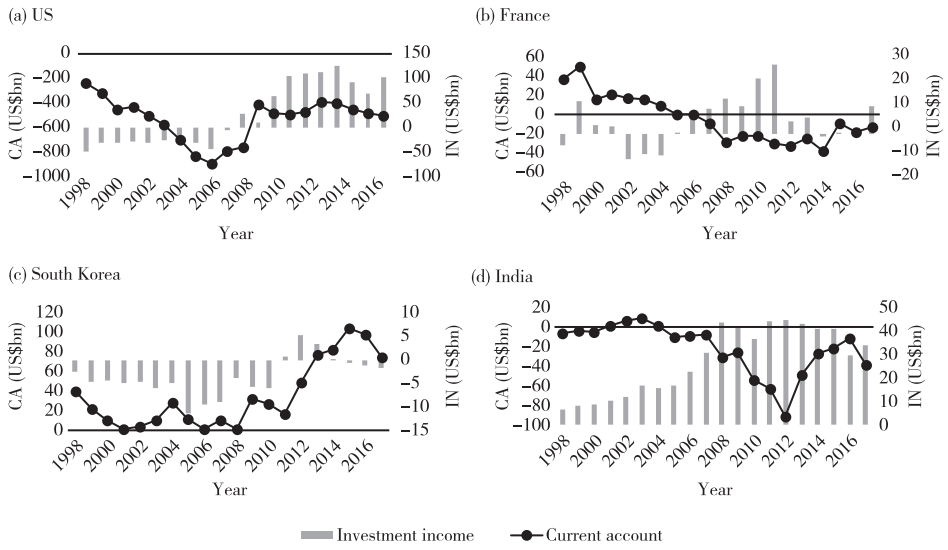
Since the GFC, a few countries have experienced favorable BOP evolution, which has facilitated their welfare. What are the reasons behind this? We selected G20 economies, such as France, India, South Korea and the US for detailed analysis.

As shown in Figure 7, after the GFC, while the absolute size of the US CA was shrinking, the return on NFA turned positive and increased significantly. This helped the US rebalance its CA and accumulate national wealth, in which debtors gain substantial assets from international borrowing without paying interest.

The BOP evolution is highly correlated with variety, maturity structure and the currency composition of US foreign assets and liabilities. First, from the US's IIP (Figure 7a), we can see that the equity proportion of foreign assets after the GFC was significantly greater than the credit proportion (especially in direct investment and portfolio items). Because the yields of equity were significantly higher than the yields of credits the US can gain higher returns from foreign assets. Regarding the foreign liabilities of the US, the same proportion of equity assets is higher, and the ratio of equity is approximately three times that of the debt. This means that the proportion of debt that the US needs to regularly pay principal and interest upon is actually limited, while the foreign liabilities accumulate rapidly. Second, as the world's biggest debtor,

the debt maturity structure of the US also determines foreign asset income. The ratio of long-term to short-term debt is approximately 2:1, with most of the long-term debt being low-yield US treasury bonds. As long-term and short-term interest rates in the US are significantly lower than in other countries due to the quantitative easing policy in place since the GFC, the US is not under pressure to pay the debt. Third, considering the currency structure of US debt, approximately 93 percent of external debt is denominated in local currency, while only 7 percent is denominated in foreign currency, which can avoid losses of treasury yields caused by currency mismatches.[18]

Figure 7. Current Account and Investment Income Adjustment in Four Countries, 1998–2017



Source: CEIC database.

Notes: CA, current account; IN, investment income.

Since the GFC, France's BOP evolution has been conducive to the improvement of its welfare (Figure 7b). During 1999–2001 and 2005–2013, as a deficit country, investment income in France was positive. Similar to the US, the equity asset proportion is nearly 80 percent, with credit asset proportion only 20 percent, and France can gain higher returns from equity assets. In terms of liability, most is still debt rather than equity and debt dividends need to be paid regularly, resulting in lower overall investment yields than in the US and negative investment income in some years. The ratio of short-term to long-term debt in France is approximately 2:3, which reduces the pressure of short-

[18]The data in this subsection were obtained from the CEIC database unless otherwise stated.

term liquidity and decreases the liquidity risk. The proportion of government debt (26 percent) is lower in external debt in France, and most of the debt is local currency debt (in euro). Because the euro is an international reserve currency, the French have relatively low pressure to pay the debt and can avoid term-structure and currency mismatch to the largest degree.

As emerging economies, South Korea and India are also experiencing BOP adjustment, which is helpful for improving national welfare (Figure 7c, d). Comparing the BOP position before (1998–2007) and after (2008–2014) the crisis, the ratio of equity to credit in foreign assets of South Korea is approximately 9:1, demonstrating insignificant change, while the proportion of overseas liabilities rose slightly after the crisis. There is little difference in the ratio of long-term and short-term debt before and after the crisis. The composition of foreign currency shows that after the crisis, the South Korean government significantly increased the proportion of foreign currency debt in local currency debt, nearly double that before the crisis, avoiding the income loss caused by currency mismatch and exchange rate fluctuations.

There are some differences in overseas asset allocation structure between India and South Korea. The adjustment of India's BOP is not significantly related to the GFC. The improvement of BOP started in 2005. The ratio of India's long-term and short-term external debt is approximately 5:2. The relatively high ratio of long-term external debt means that India faces no short-term repayment pressure. The proportion of equity in India's overseas assets and liabilities is significantly higher than that of bonds. In addition, unlike South Korea, most of India's debt is denominated in foreign currency, which is vulnerable to exchange rate impact, leading to some uncertainties for India's BOP in the future.

3. Ideal Path for Representative Countries

Our analysis suggests that the ideal path to tackle global imbalance is to alleviate the imbalance of flow and stock and improve national welfare at the same time, namely, to increase positive returns on investment or reduce negative returns on investment. Strictly speaking, few sample countries have achieved this. However, if this criterion is expanded to include significant adjustments of flow or stock, maintaining BOP within a reasonable range, and decreasing investment losses in deficit countries or increasing investment gains in surplus countries, only Australia and Guatemala follow the ideal path for imbalance adjustment after the GFC.

As Guatemala's economic structure is simple and not typical, we use BOP improvement in Australia after the crisis as an example.

Australia's current account deficits and debt stock have both been significantly

adjusted (narrowed) after the GFC and show a trend of further adjustment in the medium term, mainly because Australia has significant advantages in terms of trade and has achieved a leap in new energy exports, including natural gas. Meanwhile, according to the 2017 IMF *External Balance Assessment Report*, Australia's current account is mainly driven by policy factors. The significant depreciation of the real effective exchange rate of Austraila dollars and the long-term interest rate gap between Australia and the US has accelerated the improvement of Australia's BOP (IMF, 2017).

Australia's external balance improvement is also highly correlated with its positive structural adjustments. These adjustments have effectively optimized the fundamentals of Australia's economy (IMF, 2019a). First, the Australian government has adopted economic policies supporting full employment and maintained the inflation rate within the target range. Second, the Australian government has adopted an active fiscal policy to achieve the target of fiscal surplus in the medium term, and adhered to the independence of monetary policy to mitigate the adverse impact of the financial crisis on the domestic economy through the external sector. Third, the Australian central bank has adopted a series of macro-prudential supervision policies, including controlling the growth rate of banks' housing-related loans, establishing early-warning indicators for high-risk banks and raising the proportion of risk reserves. Finally, Australia has implemented various adjustment measures to improve BOP structure, effectively reducing the risk of increased debt stock caused by currency mismatch, and has actively developed multilateral trade relationships.

VI. Conclusions and Suggestions

Since the outbreak of the GFC, global imbalances have demonstrated asymmetric adjustments in both flow and stock perspectives. Although flow imbalances of major economies have been reduced, stock imbalances have been exacerbated.

After decomposing the channels of stock adjustment, we report the following findings: First, the economic growth and flow effects of developed creditors have increased after the GFC, and the adjustment of external imbalances has become more stable and sustainable. Second, due to the high proportion of the VAL and EO, post-crisis stock adjustment of developed debtors is relatively unstable and unsustainable. Third, post-crisis improvements of BOP of developing creditors are the result of their own structural adjustments. Fourth, the VAL has contributed less to the stock adjustment of developing debtors after the crisis, thus thieir stock adjustments have been more stable. Furthermore, changes in stock adjustment can explain the evolution of imbalances in most typical countries after the GFC.

By expanding the ideal path of global imbalance adjustment, with reduced investment losses in deficit countries or increased investment gains in surplus countries, we find that Australia and Guatemala have followed the ideal path since the crisis. The improvement in Australia's external balance is highly correlated with active and positive structural adjustment.

China plays an important role in global imbalance adjustment. After the crisis, both the CA surplus and debt stock ratio decreased rapidly, and this trend will continue in the future. However, as a surplus country, the continuous negative net foreign investment return reduces national welfare. China should learn from Australia's experience, adopting macro-prudential assessment policies, actively adjusting domestic economic structure and further optimizing the BOP structure.

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Appendix. Abbreviations of Sample Countries

Country	Abbreviation	Country	Abbreviation
Argentina	ART	Italy	ITA
Australia	AUS	Japan	JAP
Austria	AUT	Korea	KOR
Belgium	BEL	Mexico	MEX
Brazil	BRA	Malaysia	MLS
Canada	CAN	Morocco	MOR
Chile	CHL	Netherlands	NLD
China	CHN	Norway	NOR
Colombia	COL	New Zealand	NZL
Costa Rica	COR	Pakistan	PAK
Czechia	CZE	Peru	PER
Germany	DEU	Philippines	PHL
Denmark	DMK	Poland	POL
South Africa	DZK	Portugal	PRG
Egypt	EGT	Russia	RUS
Finland	FIN	Sri Lanka	SLK
France	FRA	Spain	SPA
Greece	GRC	Switzerland	SWA
Guatemala	GUE	Sweden	SWE
Hungary	HUN	Thailand	THL
Indonesia	IDN	Turkey	TUK
India	IND	Tunisia	TUS
Ireland	IRL	United Kingdom	UK
Israel	ISR	United States	USA

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