The Impacts of Financial Crises on the Trilemma Configurations

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Abstract

Over the years, policymakers have explored various combinations of varying degrees of monetary policy independence, exchange rate stability, and financial openness while recognizing that not all three policies can be achieved to the fullest extent – the "monetary trilemma" hypothesis. In recent years, holding international reserves (IR) has become an important policy instrument as a buffer or insurance against liquidity shortages. Significant and fundamental economic events such as currency crises have often changed the policy mix. In this paper, we find that countries' policy mixes have been diverse and varied over time from the perspective of the trilemma and also IR holding. We then illustrate how the combination of the three trilemma policies and IR holding drastically changed before and after the Asian Financial Crisis (AFC). However, the Global Financial Crisis did not lead to a drastic change in the policy arrangements. We find that countries that faced large terms of trade shocks or negative economic growth during the crisis increase IR holding in the post-AFC. Countries that had negative growth during the crisis also tend to pursue more exchange rate flexibility and more open financial markets. This characteristic is true for commodity exporters, but not for manufacturing exporters. Countries with large current account deficit (i.e., "large capital borrowers") tend to be more sensitive to economic growth at the time of the AFC. Countries that are under IMF stabilization programs or those with sovereign wealth funds tend to hold more IR. These characteristics were not found in the aftermath of the GFC. In general, countries increased their IR holdings after the GFC, but did not respond to the during-crisis economic and institutional conditions.

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1 Introduction

Achieving stable and sustainable economic growth is a long-standing goal of economic policymakers. With respect to open macro policy, policymakers have coordinated a combination of different degrees of monetary policy independence (MI), exchange rate stability (ERS), and financial openness (FO), but not all three policies can be achieved to the fullest extent – i.e., the "monetary trilemma hypothesis" (Fig. 1).

Sudden and fundamental changes in the economic environment due to major economic events, such as currency crises or changes in the international monetary system, have caused policymakers to change the mix of the three trilemma policies. After the European powers, the United States, and Japan left the gold standard in the 1930s, the international monetary system after World War II shifted to the Bretton Woods system. That means in the context of the trilemma, economic major powers replaced a system with full FO and ERS and zero MI with another system with full ERS and MI and zero FO as a response to the economic turmoil in the 1930s.

As financial globalization progressed in the 1980s first in the advanced economies (AE) and in the 1990s in less developed countries (LDC), the influence of financial markets has become significant in the global economy. After emerging market economies (EMEs) experienced financial crises in the late 1990s and the early 2000s, how to maintain financial stability has become an important policy
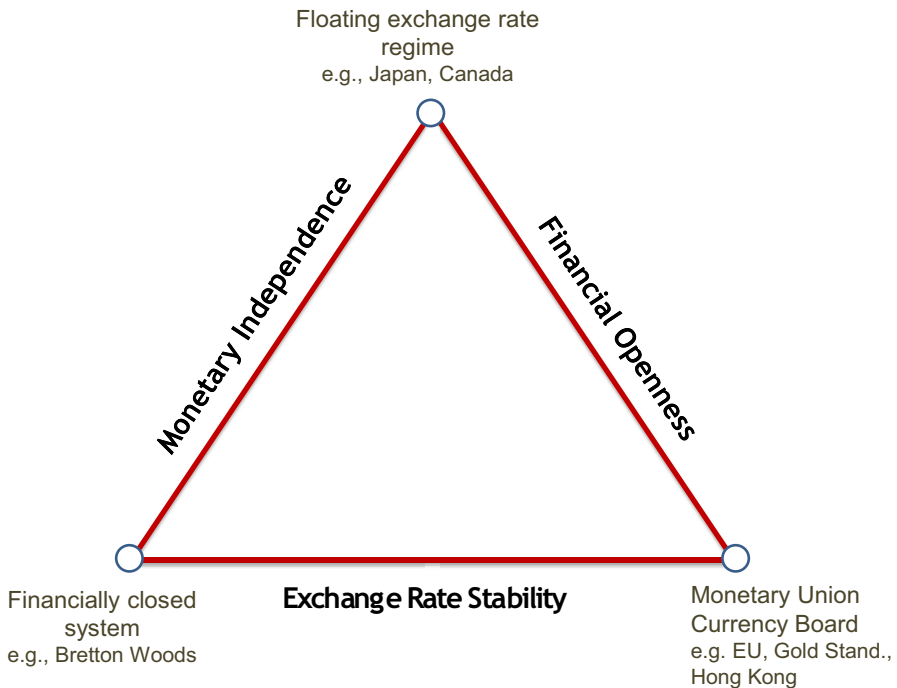

Fig. 1 The "Monetary Trilemma"

objective. It has been argued that financial liberalization is a double-edged sword. While financial opening would alleviate financial repression, promote more efficient allocation of financial resources, and thereby enable higher economic development, opening financial markets for cross-border capital can also exacerbate boom-bust cycles. Financial volatility has become a key barometer in open macro management. How to ensure that financial volatility does not affect the real economy and how to maintain smooth consumption against potentially volatile income flows have become important policy concerns.

In addition, financial globalization has also made EMEs sensitive and vulnerable to changes in financial conditions in the center-economies, most namely the United States. Thus, countries' macroeconomic conditions have become more sensitive to the "global financial cycles" in capital flows, asset prices, and credit growth.

In the late 1990s and early 2000s, after witnessing crisis-ridden EMEs experience severe hard currency shortages, many developing countries, especially emerging economies, began to hoard international reserves (IR) as a line of defense against financial instability. In addition, the fact that the International Monetary Fund (IMF) imposed stringent conditionalities on crisis-ridden economies seeking for bailouts has led EMEs to avoid viewing the IMF as a potential source of emergency funds and regard IR holding as self-insurance against potential financial instability. China is undoubtedly a prime example of a country that is hoarding large amounts of IR for insurance against financial instability.

Thus, after the EME crises, IR have become an important policy in addition to the trilemma-based three open macro policies.

There do not seem to be many developing countries where the configuration of the trilemma policy variables has drastically changed in the aftermath of the Global Financial Crisis (GFC) of 2008–09. That might be partly because the epicenter of the crisis was the U.S. and several other European countries, and because the impact of the crisis on developing economies was rather uniform, not regionally concentrated like the case of the AFC. That raises a natural question of how the post-crisis response to the GFC of countries' trilemma policy arrangements and IR holding differ from those to the AFC.

In this paper, we first illustrate the development of the international monetary system in the last five decades from the perspective of the trilemma and also IR holding. We then investigate how the combination of the three trilemma policies and IR holding changed before and after the major crises, namely, the AFC and the GFC. Lastly, we examine what kind of economic and institutional factors lead to changes in the policy configurations.

We start with Sect. 2 where we review the theory of the monetary trilemma and the development of the international monetary system in the post-Bretton Woods era from the theory's perspective. We also discuss the role of IR holding as a fourth variable of the open macro policy configurations. Using the "diamond charts," We examine how the configuration of the four variables changed over the AFC of 1997–98 and the GFC of 2008–09. In Sect. 3, we conduct a formal empirical analysis of the development of the four policy variables at the time of financial crises.

Lastly, we examine what kind of economic and institutional factors lead to changes in the policy configurations. In Sect. 4, we make concluding remarks.

2 The Trilemma Theory and Evidence

2.1 The Trilemma Hypothesis

The trilemma is illustrated in Fig. 1. Each of the three sides of the triangle—representing monetary independence, exchange rate stability, and financial integration—depicts a potentially desirable goal, yet it is not possible to be simultaneously on all three sides of the triangle. For example, the top vertex, labeled "floating exchange rate," is associated with the full extent of monetary policy autonomy and financial openness, but not exchange rate stability.

History has shown that different international financial systems have attempted to achieve combinations of two out of the three policy goals, such as the Gold Standard – guaranteeing capital mobility and exchange rate stability – and the Bretton Woods system – providing monetary autonomy and exchange rate stability. The fact that economies have altered the combinations as a reaction to crises or major economic events may be taken to imply that each of the three policy options is a mixed bag of both merits and demerits for managing macroeconomic conditions.

Greater monetary independence could allow policy makers to stabilize the economy through monetary policy without being subject to other economies' macroeconomic management, thus potentially leading to stable and sustainable economic growth. However, in a world with price and wage rigidities, policy makers could also manipulate output movement (at least in the short-run), thus leading to increasing output and inflation volatility. Furthermore, monetary authorities could also abuse their autonomy to monetize fiscal debt, and therefore end up destabilizing the economy through high and volatile inflation.

Exchange rate stability could bring out price stability by providing an anchor, and lower risk premium by mitigating uncertainty, thereby fostering investment and international trade. Also, at the time of an economic crisis, maintaining a pegged exchange rate could increase the credibility of policy makers and thereby contribute to stabilizing output movement (Aizenman et al. 2012). However, greater levels of exchange rate stability could also rid policy makers of a policy choice of using exchange rate as a tool to absorb external shocks.[1] Hence, the rigidity caused by exchange rate stability could not only enhance output volatility, but also cause misallocation of resources and unbalanced, unsustainable growth.

Financial liberalization is perhaps the most contentious and hotly debated policy among the three policy choices of the trilemma. On the one hand, more open financial markets could lead to economic growth by paving the way for more efficient resource

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[1] Prasad (2008) argues that exchange rate rigidities would prevent policy makers from implementing appropriate policies consistent with macroeconomic reality, implying that they would be prone to cause asset boom and bust by overheating the economy.

allocation, mitigating information asymmetry, enhancing and/or supplementing domestic savings, and helping transfer of technological or managerial know-how (i.e., growth in total factor productivity). Also, economies with greater access to international capital markets should be better able to stabilize themselves through risk sharing and portfolio diversification. On the other hand, it is also true that financial liberalization has often been blamed for economic instability over the last three decades. Based on this view, financial openness could expose economies to volatile cross-border capital flows resulting in sudden stops or reversal of capital flows, thereby making economies vulnerable to boom-bust cycles (Kaminsky and Schmukler 2003).

Thus, theory tells us that each one of the three trilemma policy choices can be a double-edged sword, which should explain the wide and mixed variety of empirical findings on each of the three policy choices. Furthermore, to make the matter more complicated, while there are three ways of pairing two out of the three policies (i.e., three vertices in the triangle in Fig. 1), the effect of each policy choice can differ depending on what the other policy choice it is paired with. For example, exchange rate stability can be more destabilizing when it is paired with financial openness while it can be stabilizing if paired with greater monetary autonomy. Hence, it may be worthwhile to empirically analyze the three types of policy combinations in a comprehensive and systematic manner.[2]

2.2 Development of Policy Combinations in the Trilemma Context

Now, let us take a look at the development of trilemma policy combinations. Aizenman et al. (2013) introduced a set of metrics that measure the extent of achievement in the three policy goals.

Aizenman et al.'s "trilemma indexes" measure the degree to which each of the three policy choices is implemented by economies. The indexes are updated occasionally and cover more than 180 economies for 1970 through 2020.[3] The monetary independence index (MI) is based on the correlation of a country's interest rates with the base country's interest rate. The index for exchange rate stability (ERS) is an invert of exchange rate volatility, i.e., standard deviations of the monthly rate of depreciation, using the exchange rate between the home and base economies. The degree of financial integration is measured with the Chinn and Ito (2006, 2008) capital controls index (KAOPEN).[4]

Figure 2 illustrates the trajectories of the trilemma indexes for different income-country groups. For the advanced economies (AE),[5] financial openness accelerated

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[2] For a comprehensive analysis of all of the three policy aspects of the trilemma, refer to Obstfeld et al. (2005, 2009, 2010) and Shambaugh (2004).

[3] The data are available at http://web.pdx.edu/~ito/trilemma_indexes.htm. The measure of financial openness (KAOPEN) is updated only to 2019.

[4] More details on the construction of the indexes can be found in Aizenman et al. (2013) as well as in http://web.pdx.edu/~ito/trilemma_indexes.htm.

[5] The advanced economies (AEs) refer to traditional Organization of Economic Cooperation and Development (OECD) member countries whose IMF numerical codes are below 186 plus Australia and New Zealand.
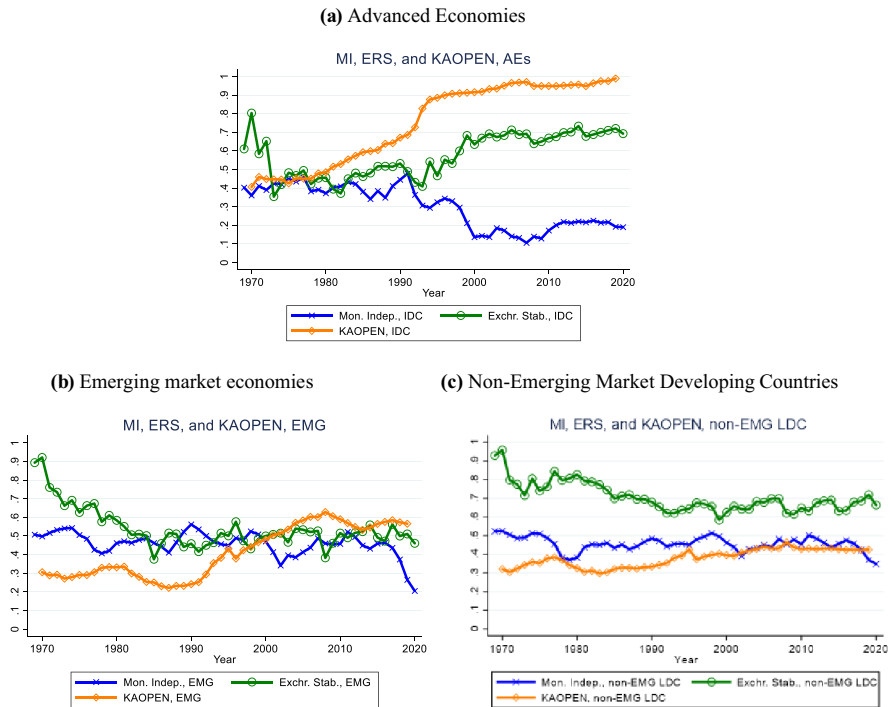
(a) Advanced Economies

(b) Emerging market economies   **(c)** Non-Emerging Market Developing Countries

Fig. 2 Development of the trilemma configurations over time, (**a**) Advanced Economies, (**b**) Emerging market economies, (**c**) Non-Emerging Market Developing Countries

after the beginning of the 1990s while the extent of monetary independence started a declining trend. After the end of the 1990s, exchange rate stability rose significantly. All these trends seem to reflect the introduction of the euro in 1999.

Developing economies on the other hand do not present such a distinct divergence of the indexes, and their experiences differ depending on whether they are emerging or non-emerging market economies.[6] For EMEs, exchange rate stability declined rapidly from the 1970s through the mid-1980s. After some retrenchment around early 1980s (in the wake of the debt crisis), financial openness started rising from 1990 onwards. For the other developing economies (non-EME LDC), exchange rate stability declined less rapidly, and financial openness trended upward more slowly. In both cases though, monetary independence remained more or less trendless.

Interestingly, EMEs tend to choose a policy combination composed of intermediate levels of all three policies as the indexes suggest, which we call the "middle-ground convergence." This pattern of results suggests that EMEs may have been

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[6] EMEs are those classified as either emerging or frontier in 1980–1997 by the International Financial Corporation, plus Hong Kong and Singapore. This group of economies is a subset of the group of less developed, or developing, countries (LDC). These groupings are not time variant.

trying to cling to moderate levels of both monetary independence and financial openness while maintaining higher levels of exchange rate stability. In other words, they have been leaning somewhat against the trilemma over a period that interestingly coincides with the time when some of these economies began accumulating sizable IR, potentially to buffer the trade-off arising from the trilemma.

None of these observations is applicable to non-emerging developing market economies (Fig. 2). For this group of economies, exchange rate stability has been the most aggressively pursued policy throughout the period. In contrast to the experience of the EMEs, financial liberalization has not been proceeding rapidly for the non-emerging market developing economies.

Comparing these indexes provides some interesting insights into how the international financial architecture has evolved over time. However, just looking at the evolution of open macro policies through the lens of the three trilemma policies may not be sufficient; it is increasingly important to shed light on the role of IR holding.

Over the last two decades, while a growing number of developing countries have opted for greater flexibility in exchange rate, IR/GDP ratios increased dramatically, especially in the wake of the East Asian crises, and most evidently among EMEs. Between 1990 and 2011, global reserves increased from about USD 1 trillion to more than USD 10 trillion, and to USD 15 by 2020 (Fig. 3). Today, about three quarters of the global IR are held by developing countries, geographically concentrating in Asia (Fig. 3). The most dramatic changes occurred in China; As of 1990, China held mere 2.8% of global reserves, increasing its ratio to about 23.6% in 2020.

Many researchers have pointed out the increasing importance of financial integration as a determinant for IR hoarding (Aizenman and Lee 2007; Cheung and Ito 2009; Delatte and Fouquau 2012; and Obstfeld et al. 2009), suggesting a link between the changing configurations of the trilemma and the level of IR.

In fact, holding an adequate amount of IR may indeed allow an economy to achieve a certain target combination of the three trilemma policies. For example, a country pursuing a stable exchange rate and monetary autonomy may try to liberalize cross-border financial transactions while determined not to give up the current levels of exchange rate stability and monetary autonomy. In such a case, the monetary authorities may try to hold a sizeable amount of IR so that they can stabilize the exchange rate movement while retaining monetary autonomy. Or, an economy with open financial markets and fixed exchange rate could independently relax monetary policy, though temporarily, as long as it holds a massive amount of IR.

The "diamond charts" suffice this purpose and intuitively summarize the development of trilemma policy combinations while incorporating IR holding. Figure 4 illustrates the trends for different income-based or geographical groups of countries. Each country's configuration at a given instant is summarized by a "generalized diamond," whose four vertices measure monetary independence, exchange rate stability, IR/GDP ratio, and financial integration. The origin has been normalized so as to represent zero monetary independence, pure float, zero international reserves, and financial autarky.

Based on the figures, AEs and EMEs have moved towards deeper financial integration while non-emerging market developing countries have barely inched toward financial integration. While pursuing greater financial openness, AEs have lost

(a): IR Holding by AEs and Non-AEs (in US Billions)

(b): IR Holding by Country Groups (% of World Total)
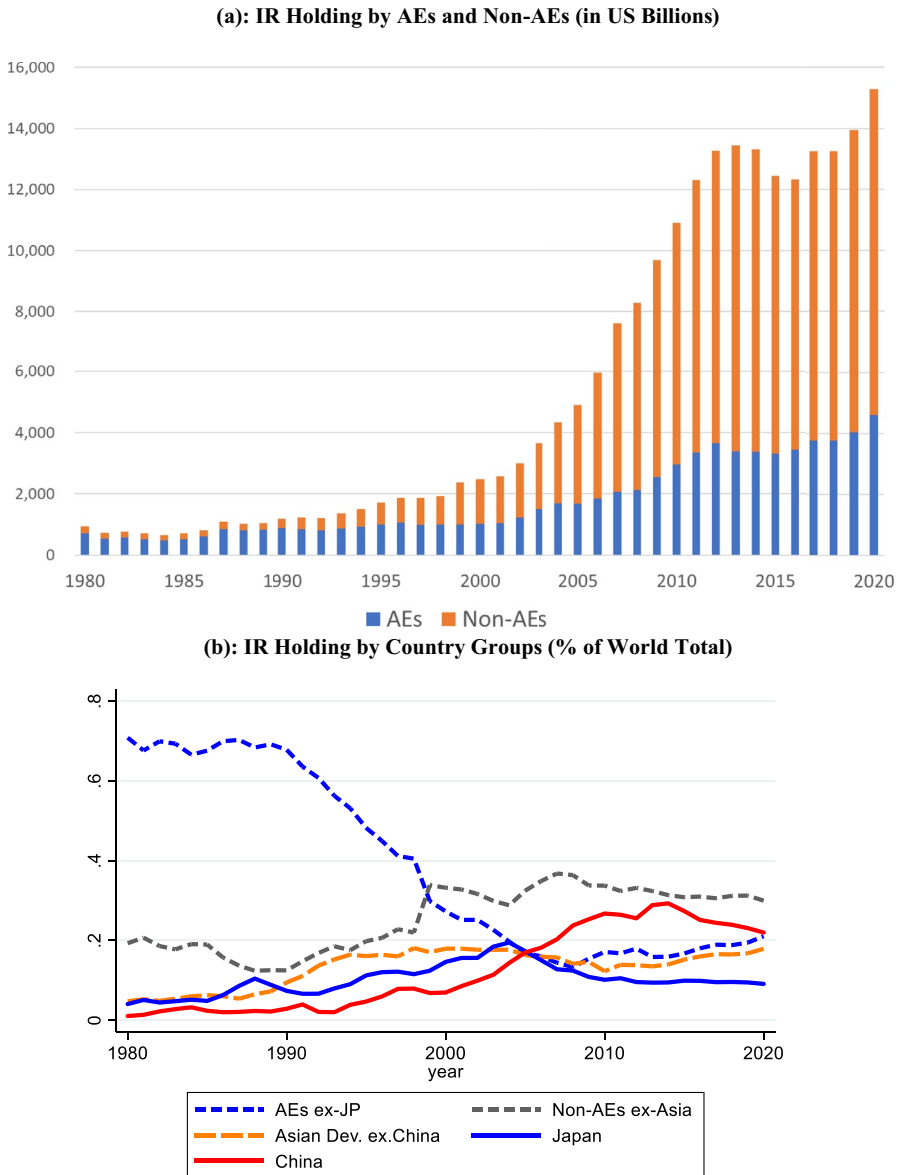
Fig. 3 (**a**): IR Holding by AEs and Non-AEs (in US Billions), (**b**): IR Holding by Country Groups (% of World Total)

monetary independence. EMEs, after giving up some exchange rate stability during the 1970s, have not changed their stance on the exchange rate stability at an intermediate level whereas non-emerging market developing countries seem to be remaining at, or slightly oscillating around, a relatively high level of exchange rate stability.
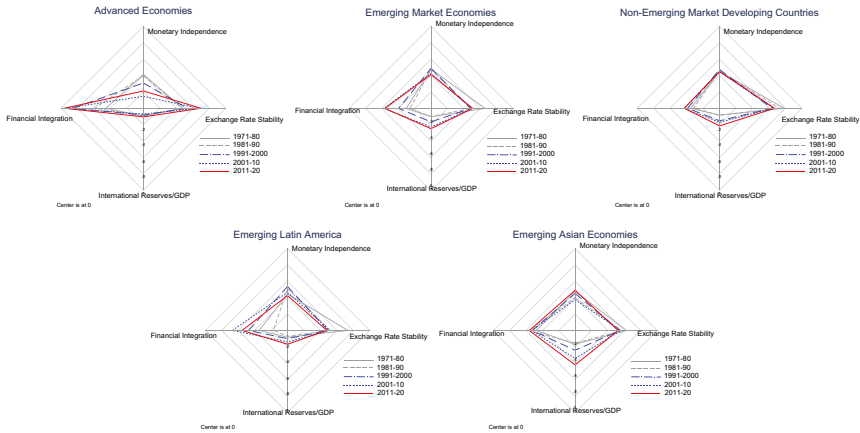
NOTES: "Emerging Asian Economies" include Brunei, Cambodia, China, Hong Kong, Indonesia, Korean Rep., Malaysia, Philippines, Singapore, Taiwan, Thailand, and Vietnam. "Emerging Latin America" includes Argentina, Brazil, Chile, Colombia, Ecuador, Jamaica, Mexico, Peru, Trinidad and Tobago, and Venezuela. "Eastern & Central Europe" includes Albania, Belarus, Bulgaria, Croatia, Czech Rep., Estonia, Hungary, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovak Rep., Slovenia, and Ukraine.

Fig. 4 The trilemma and international reserves configurations over time

Interestingly, EMEs stand out from other groups by achieving a relatively balanced, mid-level combination of the three macroeconomic goals along with a substantially increased amount of IR holding by the 2000s.

EMEs in Latin America (LATAM) and Asia have moved somewhat toward exchange rate flexibility in the 1970s, a contrast from the group of non-EME developing countries.[7] LATAM countries have rapidly increased financial openness although they retrenched financial openness in the 2010s. Asian EMEs have retained a stable level of financial openness through the sample period. One distinctive characteristic of the group of Asian EMEs is that it holds much more IR than any other group while having achieved a balanced combination of the three policy goals.

2.3 Impacts of the Crises on the Four Policy Combinations – Graphical Presentation

These changes in the policy configurations can be abrupt and radical, caused by major economic events such as currency crisis and changes in the international monetary system.

The diamond chars of Fig. 5 illustrate the impacts of financial crises on the four policy combinations. In Fig. 5, the diamonds with the orange solid lines depict the

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[7] "Emerging Asian Economies" include Brunei, Cambodia, China, Hong Kong, Indonesia, Korean Rep., Malaysia, Philippines, Singapore, Taiwan, Thailand, and Vietnam. "Emerging Latin America" includes Argentina, Brazil, Chile, Colombia, Ecuador, Jamaica, Mexico, Peru, Trinidad and Tobago, and Venezuela.

(a): Impacts of the Asian Financial Crisis on the Trilemma and IR Configurations
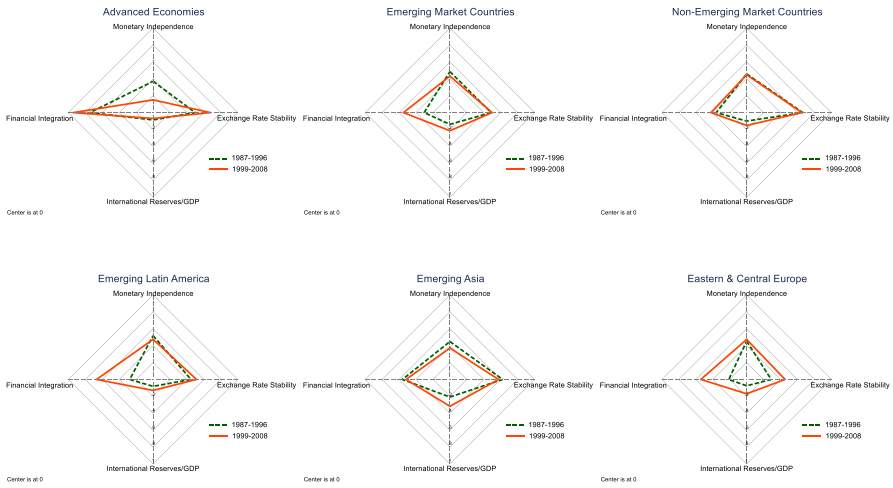
(b): Impacts of the Global Financial Crisis on the Trilemma and IR Configurations
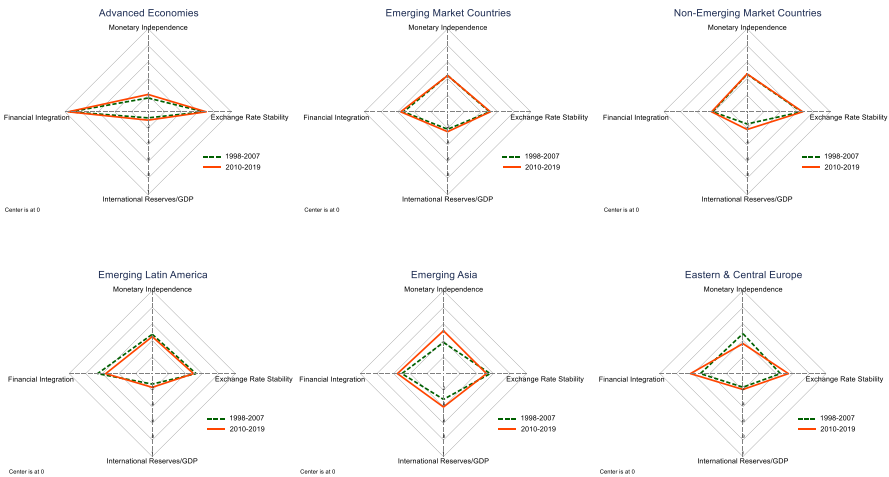
Fig. 5 (**a**): Impacts of the Asian financial crisis on the trilemma and IR configurations, (**b**): impacts of the global financial crisis on the trilemma and IR configurations

three trilemma policy configurations and IR (as a share of GDP) shown as the ten-year averages between 1999 and 2008, i.e., post-Asian Financial Crisis (AFC) decade.[8] The diamonds with the green dotted lines illustrate the four policy configurations as the ten-year averages in the pre-Asian Financial Crisis (i.e., 1987 – 1996).

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[8] We assume that the years of 1997–98 are the crisis period.

In the aftermath of the AFC, EMEs have increased the level of financial openness significantly and these economies hold more IR compared to the pre-AFC period. In contrast, non-EME developing economies do not show much change between the pre- and the post-AFC periods. Among EMEs, Latin American economies increased financial openness considerably whereas Asian EMEs did not change the level of financial openness between the pre- and the post-crisis period. However, these economies significantly increased the level of IR holding in the post-AFC period as many studies show. They also reduced the level of monetary independence to some extent in the post-crisis period. EMEs in Eastern and Central Europe increased the levels of both financial openness and IR holding.[9]

Did the GFC leave any impacts on the trilemma configurations and IR holding?

Figure 5 illustrates the diamond charts for the four policy variables in the decades before and after the GFC. The diamond charts for AEs, EMEs, and non-EMEs show that the trilemma configurations and IR holding have not changed in the aftermath of the GFC. However, there appear to be some geographical differences across EMEs. Asian EMEs have increased the level of monetary independence and also retained more IR whereas LATAM EMEs have reduced the level of financial openness to a small extent. Eastern and Central European EMEs have become less independent in their monetary policy making and more financially openness. Their exchange rate stability has also inched up as well. All these reflect policy changes by some Eastern and Central European EMEs to link their currencies to the euro.

3 Analysis on the Change in the Trilemma and IR Configurations

3.1 Systematic Tests on the Change in the Trilemma and IR Configurations between the Pre- and Post-crisis

While the above analysis with the diamond charts helps to provide pictures on long-term changes in the configurations of the trilemma and IR policies over crises, aggregations of policy variables across the sample groups may mask the nuances of the development of policy configurations in individual economies.

Given that, we test the following regression analysis:

$$\Delta y_{i,k,t}^{C} = \overline{y_{i,k,t+5|t+1}^{C}} - \overline{y_{i,k,t-1|t-5}^{C}} = \alpha_{k}^{C} + \varepsilon_{i,k,t}^{C}. \tag{1}$$

$\overline{y_{i,k,t+5|t+1}^{C}}$ represents the post-crisis 5-year average of one of the trilemma variables or IR holding ($k \in K$) of country i in the aftermath of either the AFC or GFC

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[9] For AEs, the diamond chart illustrates that these economies have lost monetary independence while further raising the level of financial openness. However, these developments rather reflect the efforts made by the euro member countries than showing the impacts of the AFC on AEs.

(i.e., $C = $ AFC or GFC) whereas $\overline{y^C_{i,k,t-1|t-5}}$ represents the pre-crisis 5-year average of the variable of concern prior to the AFC or GFC.[10] Hence, $\Delta y^C_{i,k,t}$ refers to the change over the AFC or GFC period in one of the variables of our concern: MI, ERS, FO, and IR.

The above specification is essentially the t-test on the level of variable y between the pre- and the post-crisis 5-year periods. Hence, a significantly positive $\hat{\alpha}$ indicates the level of variable y is significantly higher in the 5-year period after crisis C *on average* for a sample group.

Columns 1 through 4 of Tables 1 and 2 report the results of the estimation based on Eq. (1) for the case of the AFC and the GFC, respectively.

In the case of the AFC, the sample countries on average increased the extent of ERS and FO, whereas they reduced the extent of MI. The average amount of IR also went up for these countries as well. In contrast, the GFC does not involve any significant changes in the ERS or FO policies, but the sample economies increased the levels of MI and IR in the post-GFC period. Whether the AFC or the GFC, in its aftermath, economies of our concern increased the holding of IR, which is consistent with the argument that countries hold IR for the sake of self-insurance (Aizenman and Lee 2007).

In the previous section, we have also seen that the combinations of the three trilemma policies and IR holding differ across income and regional groups of economies. We have seen that the trilemma configurations between AEs and developing economies differ. Although we are interested in the *change* in the trilemma and IR configurations, we still examine the differences among AEs, euro member countries, and non-AEs by including the dummies for non-AEs (LDC) and the euro member countries (EURO). In columns 5 through 8 of Table 1, we see that compared to the pre-AFC period, the euro member countries pursued greater ERS but gave up MI, which reflects the efforts made for the inauguration of euro that almost coincides with the AFC period. Compared to non-euro AEs, LDC's average increase in the amount of IR holding is positive in the post-AFC period, but it is not statistically significant.

To examine if there is any heterogeneity on the four policy variables based on the regions, we include regional dummies in the estimation, namely, Asia, Eastern and Central Europe (ECE), Middle East and North Africa (MENA), Latin America, and Sub-Saharan Africa (SSA).[11] However, we do not observe any region-specific characteristics in the average changes in the four policy variables.

What about the case of the GFC (Table 2)? On average, the sample economies increased the volume of IR holding and the level of MI in the aftermath of the GFC

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[10] We regard the years 1997–1998 as crisis year (t) for AFC, and 2008–2009 for GFC. The pre-crisis period is the five-year period leading up to crisis period, i.e., 1992–1996 for the AFC and 2003–2007 for the GFC. The post-crisis period is 1999–2003 for the AFC and 2010–2014 for the GFC. Hence, neither $\overline{y^C_{i,k,t+5|t+1}}$ nor $\overline{y^C_{i,k,t-1|t-5}}$ includes the crisis periods (t) in its calculation.

[11] The dummies for Western Europe and North America are not included, which means that the estimated coefficient of the constant term represents the average change in a policy variable of concern before and after a crisis among the Western European and North American countries.

Table 1 Changes in the four policy configurations over the Asian Financial Crisis (AFC)

	d_IR (1)	d_ERS (2)	d_KA (3)	d_MI (4)	d_IR (5)	d_ERS (6)	d_KA (7)	d_MI (8)	d_IR (9)	d_ERS (10)	d_KA (11)	d_MI (12)
Constant	0.024	0.038	0.071	-0.049	0.002	0.013	0.057	-0.067	-0.005	0.025	0.087	-0.077
	(0.006)***	(0.023)*	(0.020)***	(0.014)***	(0.020)	(0.071)	(0.069)	(0.042)	(0.021)	(0.077)	(0.075)	(0.045)*
LDC					0.030	-0.006	0.013	0.044	0.044	-0.009	-0.020	-0.024
					(0.021)	(0.075)	(0.072)	(0.044)	(0.035)	(0.129)	(0.126)	(0.075)
Euro					-0.034	0.371	0.036	-0.203	-0.027	0.359	0.007	-0.193
					(0.029)	(0.103)***	(0.102)	(0.061)***	(0.029)	(0.106)***	(0.106)	(0.062)***
Asia									0.029	-0.047	-0.119	0.041
									(0.036)	(0.135)	(0.132)	(0.078)
ECE									0.024	0.112	0.026	0.134
									(0.040)	(0.148)	(0.145)	(0.087)
MENA									-0.047	-0.001	-0.025	-0.028
									(0.041)	(0.151)	(0.148)	(0.092)
LATAM									-0.019	0.014	0.067	0.060
									(0.039)	(0.146)	(0.143)	(0.085)
SSA									-0.024	-0.109	0.016	0.128
									(0.040)	(0.147)	(0.143)	(0.086)
N	127	135	134	124	127	135	134	124	127	135	134	124
Adj. R2	0.00	0.00	0.00	0.00	0.06	0.14	-0.01	0.18	0.15	0.18	0.01	0.24

Table 2 Changes in the four policy configurations over the Global Financial Crisis (GFC)

	d_IR (1)	d_ERS (2)	d_KA (3)	d_MI (4)	d_IR (5)	d_ERS (6)	d_KA (7)	d_MI (8)	d_IR (9)	d_ERS (10)	d_KA (11)	d_MI (12)
Constant	0.032	-0.003	-0.012	0.037	0.106	-0.070	-0.032	0.161	0.126	-0.050	-0.044	0.156
	(0.010)***	(0.014)	(0.013)	(0.018)**	(0.032)***	(0.047)	(0.044)	(0.057)***	(0.039)***	(0.056)	(0.054)	(0.068)**
LDC					-0.069	0.063	0.019	-0.125	-0.027	0.029	-0.018	-0.073
					(0.033)**	(0.048)	(0.046)	(0.059)**	(0.059)	(0.084)	(0.080)	(0.102)
Euro					-0.136	0.134	0.049	-0.183	-0.157	0.115	0.060	-0.178
					(0.040)***	(0.058)**	(0.055)	(0.070)**	(0.047)***	(0.067)*	(0.064)	(0.081)**
Asia									-0.068	-0.068	0.042	0.018
									(0.068)	(0.097)	(0.093)	(0.118)
ECE									-0.087	0.061	0.086	-0.104
									(0.073)	(0.105)	(0.099)	(0.127)
MENA									-0.014	-0.009	0.035	0.051
									(0.076)	(0.109)	(0.104)	(0.133)
LATAM									-0.063	0.036	0.002	-0.054
									(0.073)	(0.105)	(0.100)	(0.127)
SSA									-0.063	0.021	0.076	-0.095
									(0.074)	(0.105)	(0.100)	(0.128)
N	132	133	136	126	130	133	136	126	130	133	136	126
Adj. R2	0.00	0.00	0.00	0.00	0.07	0.03	-0.01	0.04	0.07	0.05	-0.00	0.07

The dependent variable is the change in the -year average of a trilemma configuration of concern between the pre- and the post-GFC. "LDC" refers to "less developed economies," "ECE," "MENA," "LATAM," and "SSA" refer to "Eastern & Central Europe," "Middle East and North Africa," "Latin America," and Sub-Saharan Africa," respectively. * $p<0.1$; ** $p<0.05$; *** $p<0.01$

(columns 1 and 4). Developing economies in general increased the amount of IR by 3.7% (= 0.106 – 0.069) and the level of MI by 3.6% in the post-crisis period when we do not control for regional heterogeneity. As was the case with the AFC, we do not find any region-specific behavior in the policy configurations, and when we include the regional dummies, we lose statistical significance for the non-AE dummy.

3.2 In-depth Analysis of the Change in the Trilemma and IR Configurations – SURE Approach

The previous analysis reported in Tables 1 and 2 is essentially comparison of the averages of policy variables for different country groups. As can be seen in the low adjusted R^2, there can be missing variables that may affect the change in the trilemma and IR configurations.

We now identify econometrically the determinants of the changes in the three trilemma policy combination and IR holding. Instead of assuming that the trilemma-related policy combinations can be only attributed to geographical characteristics or income levels, we examine whether and how economic and institutional factors affect the open macro policy configurations. For the estimation, we can simply use the following estimation model for policy variable k:

$$\Delta y_{i,k,t}^{C} = \alpha_k^C + X_{i.k.t}^{C*} B_k + \varepsilon_{i,k,t}^C. \tag{2}$$

Here, we assume that a policymaker determines the combinations of the three trilemma policies and IR holding jointly, which we believe is a reasonable assumption. Aizenman et al. (2013) and Ito and Kawai (2014) empirically show that the three policy variables based on the trilemma: *MI*, *ERS*, and *FO* are linearly related. Furthermore, as Aizenman (2017) and Aizenman et al. (2020) argue, we may now live in a world of "quadrilemma," where financial stability has been added to the trilemma's original policy goals.

The above arguments lead us to incorporate additional two considerations to Eq. (2).

First, if we assume Eq. (2) as a set of four equations and that *IR*, *MI*, *ERS*, and *FO* are jointly determined, the error terms: $\varepsilon_{i,IR,t}^C$, $\varepsilon_{i,MI,t}^C \varepsilon_{i,ERS,t}^C$, and $\varepsilon_{i,FO,t}^C$ will be correlated.

Second, the extent to which a policy variable (k) changes its value over a crisis episode can be affected by changes in the other policy variables. That is especially the case for the three trilemma policy variables because they are linearly related. Hence, in the estimation model for the change in policy variable k over crisis C, the changes in the other three variables should also be included in the estimation.[12] Therefore, the set of estimation equations will be:

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[12] For example, the estimation model for the change in the IR level controls for the changes in MI, ERS, and FO over a crisis of concern, and the estimation for the change in the MI level controls for IR, ERS, and FO, etc.

$$
\begin{cases}
\Delta y^C_{i,IR,t} = \alpha^C_{IR} + \gamma^C_{IR,MI}\Delta y^C_{i,MI,t} + \gamma^C_{IR,ERS}\Delta y^C_{i,ERS,t} + \gamma^C_{IR,FO}\Delta y^C_{i,FO,t} + X^C_{i,t}B^C_{IR} + \varepsilon^C_{i,IR,t} \\
\Delta y^C_{i,MI,t} = \alpha^C_{MI} + \gamma^C_{MI,IR}\Delta y^C_{i,IR,t} + \gamma^C_{MI,ERS}\Delta y^C_{i,ERS,t} + \gamma^C_{MI,FO}\Delta y^C_{i,FO,t} + X^C_{i,t}B^C_{MI} + \varepsilon^C_{i,MI,t} \\
\Delta y^C_{i,ERS,t} = \alpha^C_{ERS} + \gamma^C_{ERS,IR}\Delta y^C_{i,IR,t} + \gamma^C_{ERS,MI}\Delta y^C_{i,MI,t} + \gamma^C_{ERS,FO}\Delta y^C_{i,FO,t} + X^C_{i,t}B^C_{ERS} + \varepsilon^C_{i,ERS,t} \\
\Delta y^C_{i,FO,t} = \alpha^C_{FO} + \gamma^C_{FO,IR}\Delta y^C_{i,IR,t} + \gamma^C_{FO,MI}\Delta y^C_{i,MI,t} + \gamma^C_{FO,ERS}\Delta y^C_{i,ERS,t} + X^C_{i,t}B^C_{FO} + \varepsilon^C_{i,FO,t}
\end{cases}
$$

$$(3)$$

To account for the joint determination of the policy variables and the correlated error terms across the four equations, we apply the seemingly unrelated regression (SUR) estimation method to a cross-sectional data for each of AFC and GFC.

X is a vector of the common explanatory variables; B is a vector of corresponding coefficients; and $cov(\varepsilon^j, \varepsilon^k) \neq 0$ for j or $k = \{IR, ES, FO, MI\}$. The theoretical rationale for this estimation is that the exogenous variables in $X_{i,t}$ jointly determine the change in the combinations of the four policy choices.

The vector of explanatory variables $X_{i,t}$ includes the following variables: terms of trade (TOT) shocks; relative per-capita income (per capita GDP in PPP as a percentage of the US level); the growth rate of GDP during the crisis of concern; the dummies for the existence of the sovereign wealth fund (SWF), IMF stabilization programs, and swap agreements.

We suppose that TOT shocks would capture the extent of external shocks to which the sample countries are exposed prior to and during the crisis of concern. We measure the shocks using the standard deviations of the growth rate of TOT over five years including the crisis years. Because the level of exposure could also be affected by the level of openness of the country, we include the product between the five-year standard deviations of the growth rate of TOT and the level of trade openness (i.e., (EX + IM)/GDP) as of the crisis years.

We include relative income in the estimation (as of one year prior to the crisis period) because we have seen that countries may behave differently depending on their income levels. The growth rate of real GDP is measured for the crisis years, so that it supposed to examine whether the "depth" of the crisis impacts the changes in the policy combinations.

We include a dummy for swap agreements, that takes the value of one if a country has a bilateral currency swap agreement with a major central bank of either the Federal Reserve Board, the European Central Bank, and the Bank of Japan, or the People's Bank of China (regardless of the currency of the agreement) (Aizenman et al. 2015). We stipulate that a swap agreement can relax liquidity constraint and ensure accessibility to a hard currency when there is liquidity shortage. The access to hard currencies is especially helpful when the global economic conditions are still fragile in the immediate aftermath of a financial crisis. Hence, a swap agreement provision may allow countries to hold less of IR than they would otherwise. Removing or alleviating liquidity shortage may make it easier for policymakers to implement financial liberalization, which suggests the existence of a swap agreement may lead to an increase in the extent of financial openness.

The greater reliance on sovereign wealth funds (SWF) as a means to manage the public sector's saving is another example of a possible supplement to IR hoarding.

The impetus of instituting an SWF has been based on the recognition that the primary mandate of the central bank is to conduct monetary policy and ensure financial stability, not managing IR. Hence, the opportunity cost of reserves in practice may be of limited relevance for the central bank's operations. Therefore, once the level of IR (as a share of GDP) reaches a level high enough to cover self-insurance needs, countries, usually those with high saving rates, may opt to manage their public saving in their own SWFs. That can especially be true for commodity-rich countries. Unlike the central bank authorities, the mandate of SWFs is to secure stable income for future generations; therefore, an SWF generally has a higher risk tolerance than the central bank and aims for higher-than-expected income and longer-term investments. Given these considerations, the presence of SWFs may lower IR/GDP for a given savings rate. We include a dummy variable for the existence of SWFs in the estimation.[13]

IMF's stabilization programs may affect the change in the IR holding. Funds available through stabilization programs may provide an additional funding source for a crisis afflicted economy. Or, an expectation that IMF's stabilization programs would be available to mitigate liquidity shortage may make policymakers less incentivized to hold IR. Furthermore, the IMF may require a potential fund recipient country to implement financial opening as one of the conditionalities. Also, the IMF may encourage a potential recipient to adopt flexible exchange rate. We assign a value of one for the dummy for a country under an IMF stabilization program during the crisis period.[14]

We continue to include the regional dummies. In addition, because the euro member countries have had a unique history of the trilemma configuration, we control for the euro membership with a dummy.

Table 3 presents the results from the SUR estimations on the determinants of the changes in the four policy variables over the AFC.

Let us first focus on the three trilemma variables.[15] If a country increases the extent of ERS in the aftermath of AFC, it would tend to lower MI (i.e., corr(dERS, dMI) < 0). Conversely, a greater pursuit of exchange rate *flexibility* would yield greater MI. A country that opens up its financial markets more in the post-AFC period would lose its MI for a given change in ERS (i.e., corr (dFO, dMI) < 0). For a given change in MI, the changes in FO and ERS are in a positive relationship (i.e., corr (dFO, dERS) > 0). The combination of the three correlations as we found is consistent with the theoretical premise that the weighted average of the three variables is a constant (Mundell 1963).[16]

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[13] The data is extracted from Aizenman et al. (2015).

[14] The data is extracted from Aizenman and Ito (2014).

[15] From the way the estimation model is specified, we should think that the dependent variables and the independent variables of the trilemma and IR variables are not strictly in a causal relationship.

[16] That is, if achievement in the three policy goals can be measured by some normalized indexes, the sum of the three indexes must be a constant. More specifically, if each of the indexes is assumed to range from 0 to 1, the sum of the three indexes must be 2 (Ito and Kawai 2014).

Table 3 SUR estimations on the determinants of the changes in the open macro policy variables over the AFC

	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)
Change in ERS over AFC	0.087		0.194	-0.119
	(0.025)***		(0.105)*	(0.065)*
Change in FO over AFC	-0.094	0.213		-0.394
	(0.027)***	(0.115)*		(0.060)***
Change in MI over AFC	-0.068	-0.340	-1.023	
	(0.044)	(0.185)*	(0.156)***	
Change in IR over AFC		1.565	-1.526	-0.427
		(0.457)***	(0.436)***	(0.278)
EURO	-0.068	0.344	-0.309	-0.160
	(0.025)***	(0.101)***	(0.101)***	(0.061)***
Asia	0.077	-0.217	-0.055	-0.032
	(0.025)***	(0.112)*	(0.107)	(0.067)
Eastern & Central Europe	0.098	-0.248	0.232	0.096
	(0.035)***	(0.151)	(0.145)	(0.090)
MENA	0.126	-0.304	0.293	0.083
	(0.030)***	(0.134)**	(0.128)**	(0.080)
Latin America	0.075	-0.159	0.316	0.177
	(0.027)***	(0.117)	(0.110)***	(0.067)***
Sub-Saharan Africa	0.079	-0.195	0.305	0.203
	(0.029)***	(0.126)	(0.120)**	(0.072)***
TOT shocks x trade openness	0.293	-0.932	0.615	0.324
	(0.139)**	(0.595)	(0.573)	(0.354)
Relative income	0.104	-0.352	0.220	0.094
	(0.034)***	(0.145)**	(0.141)	(0.087)
Real GDP growth during crisis	-0.549	2.084	-2.632	-0.937
	(0.226)**	(0.956)**	(0.899)***	(0.571)
IMF	0.013	-0.057	-0.005	-0.042
	(0.014)	(0.059)	(0.056)	(0.034)
SWF	0.010	0.074	0.059	0.016
	(0.020)	(0.085)	(0.081)	(0.050)
Constant	-0.063	0.164	-0.058	-0.073
	(0.031)**	(0.135)	(0.129)	(0.080)
N	80			

The movement of IR holding is also related to the trilemma configurations. An increase in the extent of ERS and that in IR are positively correlated (columns 1 and 2) while changes in FO are negatively correlated with IR. These findings suggest that if a central bank with an undervalued currency pursued greater ERS, it would

hold more IR through active foreign exchange interventions (i.e., by buying hard currency and selling off its domestic currency. Or, a country that aborted high level of ERS would lose its reserves due to speculative attacks. A country with more open financial markets may lose its IR holding ceteris paribus, suggesting that increasing the level of financial openness might lead to a leak of IR holding.

A country that experienced greater TOT shocks during and prior to the AFC or *negative* GDP growth during the crisis tends to hold more IR in the post-AFC period, providing evidence for self-insurance motives of IR holding. A country with negative per capita growth also tends to pursue greater exchange rate *flexibility* apparently with the hope of retaining greater MI. We do not find any significant impacts of IMF stabilization programs or the possession of SWF.

Appendix Table 8 in Appendix 2 reports the SUR estimation results for the subsamples of AEs and non-AE countries. Overall, we can see that the results in Table 3 are consistent with the results of the non-AE subsample than with those of the AE subsample.

For the subsample of non-AE countries, the estimate on the TOT shocks is now significantly negative for the ERS estimation, indicating that when it is exposed to TOT shocks, an economy of concern would respond by pursuing greater exchange rate *flexibility* so that exchange rate movements could bugger the shocks. If a developing country experiences negative growth during the AFC, in its aftermath, it would tend to pursue less ERS and greater FO and MI while holding more IR. Higher MI may be for the country of concern to retain more control over monetary policy while greater financial openness for the country to benefit more from international risk sharing. To insure itself against the risk from potentially great financial instability, the country would accumulate more IR.

Table 4 presents the SUR estimation results for the case of the GFC.

Overall, the results of the SUR estimation do not appear robust, indicating that countries did not respond to the GFC by altering the mix of open macro policies. While the estimate of the TOT shock is now significantly positive, its impact on IR is no longer significant. The mixture of the four policy variables is not affected by economic growth. A country under the IMF's stabilization program would decrease the extent of ERS and MI.

We see the same correlation patterns of corr(dERS, dMI) < 0 and corr(dFO, dMI) < 0, but we do not see statistically significant correlation between the post-crisis change in ERS and that in FO (corr(dERS, dFO) = 0) unlike in the case of the AFC.

However, a change in ERS and that in IR are negatively correlated in the post-GFC period, a contrast to the case of the post-AFC period. In the aftermath of the GFC, those economies that pursued more exchange rate flexibility tended to hold more IR, possibly because those economies wanted to buffer themselves by ensuring more access to hard currency. Furthermore, a rise in the level of MI, possibly by reducing the level of ERS, would lead to a rise in IR holding.

In general, the trilemma and IR arrangements did not change much in the post-GFC period. In the post-AFC period, many developing countries responded to the

Table 4 SUR estimations on the determinants of the changes in the open macro policy variables over the GFC

	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)
Change in ERS over GFC	-0.122		-0.033	-0.368
	(0.071)*		(0.100)	(0.106)***
Change in FO over GFC	0.022	-0.029		-0.278
	(0.068)	(0.089)		(0.102)***
Change in MI over GFC	0.275	-0.274	-0.231	
	(0.058)***	(0.079)***	(0.085)***	
Change in IR over GFC		-0.212	0.043	0.640
		(0.123)*	(0.132)	(0.136)***
EURO	-0.079	0.021	0.036	-0.042
	(0.047)*	(0.063)	(0.067)	(0.073)
Asia	-0.047	-0.048	0.001	-0.022
	(0.052)	(0.068)	(0.072)	(0.079)
Eastern & Central Europe	-0.059	0.075	0.056	-0.008
	(0.051)	(0.067)	(0.071)	(0.078)
MENA	-0.032	-0.031	-0.043	-0.017
	(0.060)	(0.079)	(0.084)	(0.092)
Latin America	-0.041	0.064	-0.073	-0.035
	(0.055)	(0.073)	(0.077)	(0.084)
Sub-Saharan Africa	-0.053	0.035	0.019	-0.022
	(0.060)	(0.080)	(0.084)	(0.092)
TOT shocks x trade openness	0.262	0.449	-0.113	-0.057
	(0.184)	(0.240)*	(0.257)	(0.282)
Relative income	0.043	0.017	0.055	0.000
	(0.040)	(0.053)	(0.056)	(0.062)
Real GDP growth during crisis	-0.240	0.164	0.468	0.548
	(0.320)	(0.422)	(0.444)	(0.487)
IMF	0.041	-0.108	0.020	-0.093
	(0.027)	(0.035)***	(0.038)	(0.041)**
SWF	-0.040	-0.039	0.055	0.075
	(0.029)	(0.038)	(0.041)	(0.044)*
Swap	-0.016	0.026	-0.045	0.010
	(0.033)	(0.043)	(0.046)	(0.050)
Constant	0.039	-0.012	-0.017	0.053
	(0.056)	(0.074)	(0.078)	(0.085)
N	112			

crisis by altering the trilemma and IR configuration. Their response was heterogenous. In the case of GFC, the impact was greater AEs, where the epicenter was, but it was rather weaker and homogenous in the developing economies. We do not observe much significant alteration of the policy arrangements in the aftermath of

the GFC. In sum, the AFC was more impactful than the GFC in terms of how countries changed their policy configuration in the aftermath of the crisis.

We conducted the OLS estimations that correspond to the SUR estimations reported in Tables 3 and 4. The results are reported in Online Appendix. Overall, the results from the OLS estimations are less robust than those from the SUR estimations. However, the signs of the estimates are mostly consistent with those in the SUR estimations. Considering that the SUR estimation improves the level of efficiency, the results are not unexpected.

3.3 Further Analysis of the Heterogeneity in Crisis Response

Countries with certain economic characteristics may respond to crises differently than countries without them. Here, we investigate whether and how commodity exporters, manufacturing exporters, and large capital borrowers behave differently in terms of how they respond to the AFC and the GFC.

Let us first compare commodity exporters with non-commodity exporters. At the top panel of Table 5, we divide the full sample into the subsamples of commodity exporters and non-commodity exporters and report the results from the estimation for the change in policy configurations over the post-AFC period.[17] The bottom panel reports the comparative results from the estimations for policy changes in the post-GFC period.[18]

In the post-AFC case, the statistical significance of the estimates from the estimation of commodity exporters and their signs are more consistent with those in Table 3 and more robust than the results from the estimation for the non-commodity exporters. For commodity exporters, the estimates of TOT shocks are now significant for all four policy variables. Commodity exporters exposed to TOT shocks during the AFC tend to increase the holding of IR in the post-crisis period so as to insure themselves against the TOT shocks. These exporters tend to increase the levels of FO and MI while pursuing lower levels of ERS, all of which is consistent with a mix of more flexible exchange rate policy and greater monetary autonomy. Clearly, this policy mix is intended to stabilize the crisis conditions.

Commodity exporters are also sensitive to the output growth during the crisis than non-commodity exporters. If commodity exporters experienced negative growth during the AFC, in its aftermath, they tend to hold more IR and pursue more exchange rate flexibility and more FO. Commodity exporters with SWFs tend to reduce foreign exchange reserves and the extent of FO whereas they tend to increase ERS in the post-AFC period. They also tend to hold more IR in the post-crisis period when they are under IMF's stabilization programs.

In the case of the post-GFC period (the bottom of Table 5), the trilemma and IR arrangements are not so responsive to economic and structural variables. While TOT

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[17] We regard countries whose commodity exports account for more than 40% of total exports as commodity exporters.

[18] The OLS estimation results are reported in Tables 2(a) through (c) in Online Appendix.

Table 5 SUR estimation with disaggregated samples, commodity exporters vs. non-commodity exporters

Over the AFC	Commodity Exporters				Non-Commodity Exporters			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over AFC	0.117		0.460	0.025	-0.106		-0.032	-0.292
	(0.025)***		(0.119)***	(0.091)	(0.036)***		(0.149)	(0.088)***
Change in FO over AFC	-0.182	0.693		-0.471	-0.048	-0.034		-0.391
	(0.026)***	(0.179)***		(0.093)***	(0.038)	(0.157)		(0.084)***
Change in MI over AFC	-0.116	0.078	-0.961		-0.185	-0.780	-0.991	
	(0.048)**	(0.280)	(0.190)***		(0.058)***	(0.235)***	(0.214)***	
Change in IR over AFC		3.746	-3.887	-1.213		-1.812	-0.780	-1.183
		(0.799)***	(0.547)***	(0.501)**		(0.609)***	(0.616)	(0.369)***
TOT shocks x trade openness	0.955	-3.712	4.134	1.654	0.007	0.103	-0.812	0.008
	(0.182)***	(1.220)***	(0.923)***	(0.712)**	(0.165)	(0.681)	(0.641)	(0.412)
Relative income	0.071	-0.556	0.251	0.005	0.124	0.052	0.354	0.255
	(0.066)	(0.367)	(0.306)	(0.215)	(0.036)***	(0.164)	(0.157)**	(0.096)***
Real GDP growth during crisis	-0.831	4.603	-4.171	-1.637	-0.364	-0.683	-0.243	-0.337
	(0.315)***	(1.753)***	(1.408)***	(1.039)	(0.255)	(1.079)	(1.053)	(0.661)
IMF	0.028	-0.111	0.091	-0.005	0.003	-0.117	0.139	0.024
	(0.017)*	(0.100)	(0.081)	(0.057)	(0.021)	(0.083)	(0.081)*	(0.052)
SWF	-0.097	0.343	-0.425	-0.182	0.076	0.300	0.146	0.157
	(0.029)***	(0.181)*	(0.141)***	(0.103)*	(0.023)***	(0.097)***	(0.100)	(0.062)**
N	38				42			

Table 5 (continued)

Over the GFC	Commodity Exporters				Non-Commodity Exporters			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over GFC	-0.222		-0.523	0.388	0.044		0.467	-0.158
	(0.104)**		(0.170)***	(0.177)**	(0.107)		(0.098)***	(0.146)
Change in FO over GFC	0.082	-0.299		0.041	-0.360	0.680		-0.230
	(0.080)	(0.097)***		(0.136)	(0.123)***	(0.143)***		(0.174)
Change in MI over GFC	0.294	0.217	0.040		0.276	-0.126	-0.127	
	(0.074)***	(0.099)**	(0.133)		(0.091)***	(0.117)	(0.096)	
Change in IR over GFC		-0.359	0.232	0.846		0.067	-0.375	0.523
		(0.167)**	(0.224)	(0.213)***		(0.163)	(0.128)***	(0.173)***
TOT shocks x trade openness	0.599	0.416	0.046	-0.377	-0.135	0.660	-0.568	-0.449
	(0.223)***	(0.299)	(0.399)	(0.402)	(0.332)	(0.401)*	(0.335)*	(0.452)
Relative income	-0.064	-0.052	0.082	0.068	0.269	0.055	0.101	-0.122
	(0.044)	(0.056)	(0.073)	(0.075)	(0.080)***	(0.106)	(0.088)	(0.119)
Real GDP growth during crisis	-0.614	0.096	0.551	0.659	1.451	-0.170	0.962	-1.033
	(0.352)*	(0.457)	(0.602)	(0.607)	(0.563)**	(0.719)	(0.582)*	(0.796)
IMF	0.027	-0.084	-0.065	-0.010	0.094	-0.191	0.153	-0.025
	(0.032)	(0.039)**	(0.054)	(0.055)	(0.046)**	(0.053)***	(0.045)***	(0.065)
SWF	-0.048	0.016	0.080	0.055	-0.028	-0.125	0.089	0.055
	(0.038)	(0.048)	(0.063)	(0.064)	(0.048)	(0.057)**	(0.048)*	(0.065)
Swap	-0.004	-0.082	-0.174	0.090	0.007	-0.033	0.033	-0.020
	(0.047)	(0.059)	(0.075)**	(0.078)	(0.048)	(0.059)	(0.049)	(0.066)
N	55				57			

shocks and real GDP growth during the crisis continue to be significantly positive and negative factors for IR holding, respectively, as was the case with the post-AFC period, being a recipient country of IMF's stabilization programs leads a country of concern to reduce the extent of ERS. The impact of IMF's stabilization programs on IR holding, ERS, and FO is statistically significant and greater in magnitude for non-commodity exporters, possibly indicating that commodity exporters have easier assess to hard currency liquidity and therefore that the impact of stabilization programs is weaker for commodity exporters.

In general, commodity exporters policy mitigates the volatility of the real exchange rate by increasing IR and/or through SWF in good times. In bad times, it would also provide the treasury with more resources, as has been the policy of Norway, Chile, and the like.

Manufacturing exporters may have some common ground in responding to the crisis by changing their open macro policy arrangements. We regard those countries whose share of manufacturing exporters in total exports is greater than 45% as manufacturing exporters and divide the full sample into the subsamples of manufacturing exporters and non-manufacturing exporters. Table 6 reports the results from the SUR estimations for the cases of the AFC and the GFC.

We can see that manufacturing exporters are not responsive to TOT shocks in the post-AFC period unlike commodity exporters. Non-manufacturing exporters are more responsive to TOT shocks. While real GDP growth during the crisis is negatively correlated with IR holding for both commodity and manufacturing exporters, the correlation between real GDP growth and ERS is negative for manufacturing exporters unlike commodity exporters. If a commodity exporter experienced negative GDP growth during the AFC crisis, it would pursue greater ERS, but that would involve a reduction in IR holding (through foreign exchange interventions).

A manufacturing exporter under an IMF stabilization program tends to open its financial markets in the post-AFC period, but if it were not a manufacturing exporter though it is an IMF fund recipient, it would tend to reduce the extent of FO and MI. Previously, we found a commodity exporter that possesses SWFs tends to reduce the amount of IR holding in the post-AFC period. For a manufacturing exporter, the impact of possessing an SWF on IR holding, ERS, and MI is positive.

In the case of the GFC, the estimations for both manufacturing and non-manufacturing exporters continue to be weak. The impact of IMF stabilization programs on ERS continues to be negative. A manufacturing exporter that experienced a deep decline in real GDP growth tends to hold lower levels of IR and FO, but to entail a higher level of ERS, which is opposite to the case of the AFC.

Overall, because the volatility of the TOT of manufacturing exporters is much smaller compared to commodity exporters, counter-cyclical policies may be of lesser importance.

Lastly, we divide the full sample into the subsamples of "large capital borrowers" and "non-large capital borrowers" (Table 7). The former group includes the countries whose average current balances (as a share of GDP) is below -2% as the average over five years leading up to the crisis year. We consider such economies as those running

Table 6 SUR estimation with disaggregated samples, manufacturing exporters vs. non-manufacturing exporters

Over the AFC	Manufacturing Exporters				Non-Manufacturing Exporters			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over AFC	-0.188		0.365	-0.467	0.134		0.417	-0.002
	(0.032)***		(0.181)**	(0.071)***	(0.030)***		(0.124)***	(0.085)
Change in FO over AFC	0.013	0.272		0.038	-0.151	0.558		-0.429
	(0.034)	(0.135)**		(0.079)	(0.034)***	(0.166)***		(0.083)***
Change in MI over AFC	-0.359	-1.440	0.157		-0.062	-0.005	-1.030	
	(0.052)***	(0.220)***	(0.328)		(0.059)	(0.274)	(0.199)***	
Change in IR over AFC		-3.209	0.306	-1.989		2.866	-2.409	-0.412
		(0.546)***	(0.774)	(0.289)***		(0.637)***	(0.549)***	(0.393)
TOT shocks x trade openness	-0.431	-0.228	-2.873	-0.620	0.336	-1.398	1.234	0.631
	(0.539)	(2.257)	(2.582)	(1.285)	(0.149)**	(0.693)**	(0.610)**	(0.389)
Relative income	0.065	0.053	0.311	0.115	0.031	-0.257	-0.004	-0.043
	(0.031)**	(0.135)	(0.154)**	(0.076)	(0.063)	(0.289)	(0.251)	(0.163)
Real GDP growth during crisis	-0.565	-2.200	1.987	-1.323	-0.779	3.471	-3.705	-1.181
	(0.269)**	(1.138)*	(1.308)	(0.633)**	(0.305)**	(1.403)**	(1.157)***	(0.801)
IMF	-0.013	-0.137	0.270	-0.047	-0.005	0.042	-0.116	-0.087
	(0.024)	(0.096)	(0.105)***	(0.055)	(0.018)	(0.083)	(0.070)*	(0.045)*
SWF	0.157	0.636	-0.107	0.359	-0.018	-0.000	-0.041	-0.058
	(0.028)***	(0.115)***	(0.164)	(0.068)***	(0.027)	(0.128)	(0.110)	(0.070)
N	38				42			

Table 6 (continued)

Over the GFC	Manufacturing Exporters				Non-Manufacturing Exporters			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over GFC	0.057		0.276	-0.599	-0.053		-0.457	0.477
	(0.091)		(0.106)***	(0.105)***	(0.114)		(0.169)***	(0.198)**
Change in FO over GFC	-0.190	0.365		-0.121	0.288	-0.289		-0.079
	(0.104)*	(0.141)***		(0.139)	(0.085)***	(0.107)***		(0.162)
Change in MI over GFC	0.323	-0.645	-0.099		0.304	0.224	-0.059	
	(0.089)***	(0.113)***	(0.113)		(0.071)***	(0.093)**	(0.120)	
Change in IR over GFC		0.111	-0.278	0.583		-0.079	0.682	0.972
		(0.177)	(0.152)*	(0.160)***		(0.171)	(0.202)***	(0.228)***
TOT shocks x trade openness	-1.691	1.229	0.161	2.050	0.560	0.402	-0.172	-0.871
	(0.544)***	(0.800)	(0.703)	(0.762)***	(0.192)***	(0.247)	(0.315)	(0.356)**
Relative income	0.210	0.039	0.064	-0.077	-0.093	-0.078	0.114	0.144
	(0.071)***	(0.105)	(0.091)	(0.101)	(0.049)*	(0.060)	(0.075)	(0.088)
Real GDP growth during crisis	0.842	-1.231	1.304	-0.965	-0.409	0.899	0.589	0.211
	(0.484)*	(0.675)*	(0.574)**	(0.650)	(0.405)	(0.482)*	(0.628)	(0.729)
IMF	0.060	-0.131	0.061	-0.087	0.046	-0.032	-0.021	-0.066
	(0.044)	(0.060)**	(0.053)	(0.059)	(0.032)	(0.040)	(0.050)	(0.058)
SWF	0.008	-0.130	0.097	-0.057	-0.062	-0.016	0.067	0.131
	(0.041)	(0.056)**	(0.049)**	(0.055)	(0.039)	(0.048)	(0.060)	(0.068)*
Swap	-0.030	-0.004	-0.021	-0.003	0.006	-0.001	-0.067	0.030
	(0.039)	(0.055)	(0.048)	(0.053)	(0.050)	(0.061)	(0.076)	(0.089)
N	61				51			

Table 7 SUR estimation with disaggregated samples, large capital borrowers vs. non- large capital borrowers

Over the AFC	Large Capital Borrowers				Non-Large Capital Borrowers			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over AFC	-0.028		0.440	0.017	0.072		0.040	-0.213
	(0.038)		(0.149)***	(0.097)	(0.034)**		(0.140)	(0.100)**
Change in FO over AFC	-0.058	0.401		-0.446	-0.121	0.054		-0.517
	(0.036)	(0.136)***		(0.075)***	(0.038)***	(0.190)		(0.098)***
Change in MI over AFC	-0.139	0.041	-1.195		-0.013	-0.534	-0.950	
	(0.058)**	(0.236)	(0.201)***		(0.055)	(0.249)**	(0.180)***	
Change in IR over AFC		-0.437	-0.996	-0.893		1.565	-1.937	-0.114
		(0.602)	(0.624)	(0.375)**		(0.744)**	(0.602)***	(0.479)
TOT shocks x trade openness	0.223	-0.870	1.062	0.558	0.156	-0.785	0.290	0.165
	(0.164)	(0.648)	(0.685)	(0.418)	(0.177)	(0.823)	(0.713)	(0.524)
Relative income	0.112	-0.324	0.541	0.299	0.066	-0.403	-0.049	-0.142
	(0.046)**	(0.186)*	(0.192)***	(0.117)**	(0.042)	(0.193)**	(0.171)	(0.127)
Real GDP growth during crisis	-0.171	3.505	-3.767	-1.401	-0.616	1.590	-1.575	-0.345
	(0.311)	(1.135)***	(1.200)***	(0.770)*	(0.303)**	(1.461)	(1.252)	(0.931)
IMF	0.050	0.022	0.004	-0.009	-0.013	-0.128	-0.053	-0.039
	(0.020)**	(0.085)	(0.089)	(0.054)	(0.018)	(0.082)	(0.073)	(0.054)
SWF	0.124	0.629	-0.271	0.005	-0.002	0.077	0.034	0.005
	(0.043)***	(0.164)***	(0.191)	(0.119)	(0.019)	(0.088)	(0.075)	(0.056)
N	43				37			

Table 7 (continued)

Over the GFC	Large Capital Borrowers				Non-Large Capital Borrowers			
	dIR	dERS	dFO	dMI	dIR	dERS	dFO	dMI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over GFC	0.096		0.181	-0.238	-0.388		-0.367	-0.264
	(0.129)		(0.139)	(0.157)	(0.069)***		(0.153)**	(0.162)
Change in FO over GFC	0.204	0.170		-0.252	-0.139	-0.259		-0.303
	(0.124)	(0.131)		(0.152)*	(0.066)**	(0.108)**		(0.135)**
Change in MI over GFC	0.565	-0.175	-0.197		0.074	-0.167	-0.272	
	(0.095)***	(0.115)	(0.119)*		(0.062)	(0.103)	(0.122)**	
Change in IR over GFC		0.106	0.239	0.844		-1.050	-0.535	0.315
		(0.142)	(0.146)	(0.142)***		(0.188)***	(0.252)**	(0.267)
TOT shocks x trade openness	0.355	0.064	-0.496	-0.289	0.046	0.555	0.200	0.628
	(0.277)	(0.294)	(0.296)*	(0.342)	(0.251)	(0.406)	(0.493)	(0.516)
Relative income	0.060	0.001	0.163	-0.012	-0.002	-0.017	-0.052	-0.047
	(0.086)	(0.091)	(0.091)*	(0.106)	(0.039)	(0.064)	(0.076)	(0.081)
Real GDP growth during crisis	0.737	-0.260	0.504	-1.050	-0.598	-0.470	0.558	1.183
	(0.835)	(0.881)	(0.903)	(1.016)	(0.303)**	(0.511)	(0.607)	(0.631)*
IMF	0.107	-0.041	0.090	-0.162	-0.019	-0.112	-0.060	-0.049
	(0.051)**	(0.055)	(0.055)	(0.061)***	(0.028)	(0.044)**	(0.056)	(0.059)
SWF	-0.074	-0.042	0.061	0.082	0.032	0.016	0.073	0.049
	(0.040)*	(0.043)	(0.044)	(0.049)*	(0.041)	(0.068)	(0.081)	(0.085)
Swap	-0.004	-0.040	-0.043	0.004	-0.027	0.002	-0.024	0.016
	(0.054)	(0.057)	(0.059)	(0.067)	(0.034)	(0.057)	(0.068)	(0.072)
N	58				54			

current account deficit persistently, meaning they borrow constantly from international financial markets. These economies can be more vulnerable to shocks from the crisis. The subsample of "non-large capital borrowers" includes the remainder countries.

In the case of the AFC, large capital borrowers which experienced negative GDP growth during the crisis tend to change their policy arrangements toward lower ERS, and higher FO and MI, though the growth rate does not affect the volume of IR holding. That may mean that while trying to benefit from more international risk diversification, large capital borrowers also try to retain monetary autonomy. Those large capital borrowers under IMF stabilization programs tend to hold more IR in the post-AFC period, which is also the case if they have SWFs. Economic and structural variables do not appear to impact the policy configurations for non-large capital borrowers.

4 Concluding Remarks

To deal with economic and financial turmoil, whether internally generated or externally imported, economic policymakers change their policy goals and configurations to stabilize economic and financial conditions or minimize vulnerability. In an open macro setting, policymakers face the constraint of choosing two out of three policy goals: monetary independence, exchange rate stability, and financial openness.[19] In a financially globalized world that emerged three decades ago, in addition to the three policy goals, how to achieve financial stability has been also an important policy goal. In response, holding international reserves (IR) has become an important policy instrument as a buffer or insurance against liquidity shortages. Significant and fundamental economic events such as currency crises have often changed the policy mix.

In this paper, using the trilemma index and the data on IR as a share of GDP, we find that countries' policy mixes have been diverse and varied over time. In particular, among EMEs, we observe that the three dimensions of the trilemma configurations are converging towards a "middle ground" among emerging market economies with managed exchange rate flexibility, underpinned by sizable holdings of international reserves, and intermediate levels of monetary independence and financial integration.

We are interested in whether and to what extent the most recent major financial crises (before the COVID-19 crisis in March 2020) have led to changes in policy mix in the aftermath of the crisis.

We illustrate how the combination of the three trilemma policies and IR holding drastically changed before and after the AFC, but the GFC did not lead to a drastic change in the policy arrangements.

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[19] Or, a country can choose a policy mix of intermediate levels of all three policy goals.

In general, developing countries increased the holding of IR in the aftermath of the AFC. Those countries that were exposed to greater TOT shocks or that experienced negative economic growth during the crisis tended to hold more IR and pursue lower ERS in the post-crisis period. These findings represent the insurance motives of holding IR against future financial instability.

The results from the SUR estimation of policy responses are much less robust in the case of the post-GFC period compared to the post-AFC period. That suggests that policymakers did not respond to the GFC by altering the policy mix of the open macro variables. Hence, in terms of whether a major economic event leads to a drastic change in the open macro policy arrangement, the AFC was more impactful than the GFC.

We also compare how the post-crisis response differs among different types of economies.

Our SUR estimation results show that commodity exporters exposed to TOT shocks during the AFC tend to increase the holding of IR in the post-crisis period. They tend to increase the levels of FO and MI while pursuing lower levels of ERS. This policy mix can be interpreted as an attempt to retain more exchange rate flexibility and greater monetary autonomy.

Commodity exporters are also sensitive to the output growth during the crisis than non-commodity exporters. If they experienced negative economic growth during the AFC, they would hold more IR and pursue less ERS and more FO. In sum, the findings on the impacts of TOT shocks and economic growth indicate that commodity exporters would opt for a policy mix that would allow them to ensure more monetary autonomy.

The regression analysis of manufacturing exporters does not show the same kind of results as that of commodity exporters. A manufacturing exporter that experienced a deep decline in real GDP growth tends to hold lower levels of IR and FO, but to entail a higher level of ERS, the latter of which is opposite to what we find with commodity exporters.

Lastly, we focus on the behavior of "large capital borrowers." In the case of the AFC, large capital borrowers which experienced negative GDP growth during the crisis tend to change their policy arrangements toward lower ERS, and higher FO and MI, though the growth rate does not affect the volume of IR holding. That may mean that while trying to benefit from more international risk diversification, large capital borrowers also try to retain monetary autonomy. Our regression results indicate that economic and structural variables matter more for policy reconfigurations of large capital borrowers than those of non-large capital borrowers.

Appendix 1: Country List for the Regression Analysis (120 economies)

Albania

Algeria

Angola

Argentina		EME
Armenia		
Australia	AE	
Austria	AE	
Azerbaijan		
Bahamas, The		
Bahrain		
Bangladesh		
Barbados		
Belarus		
Belgium	AE	
Belize		
Bolivia		
Botswana		EME
Brazil		EME
Bulgaria		EME
Cameroon		
Canada	AE	
Chile		EME
China		EME
Colombia		EME
Congo, Rep		
Costa Rica		
Croatia		
Cyprus		
Czech Republic		EME
Denmark	AE	
Dominican Republic		
Ecuador		EME
Egypt, Arab Rep		EME
El Salvador		
Estonia		
Fiji		
Finland	AE	
France	AE	
Gabon		
Germany	AE	
Ghana		EME
Greece	AE	
Grenada		
Guatemala		
Haiti		

Honduras		
Hong Kong, China		EME
Hungary		EME
Iceland	AE	
India		EME
Indonesia		EME
Ireland	AE	
Israel		EME
Italy	AE	
Jamaica		EME
Japan	AE	
Jordan		EME
Kazakhstan		
Kenya		EME
Korea, Rep		EME
Kuwait		
Lao PDR		
Latvia		
Lebanon		
Lithuania		EME
Malaysia		EME
Malta	AE	
Mauritius		EME
Mexico		EME
Moldova		
Mongolia		
Morocco		EME
Mozambique		
Namibia		
Netherlands	AE	
New Zealand	AE	
Nicaragua		
Nigeria		EME
Norway	AE	
Oman		
Pakistan		
Panama		
Paraguay		

Peru		EME
Philippines		EME
Poland		EME
Portugal	AE	
Qatar		
Romania		
Russian Federation		EME
Rwanda		
Saudi Arabia		
Seychelles		
Singapore		EME
Slovak Republic		EME
Slovenia		EME
South Africa		EME
Spain	AE	
Sri Lanka		
Suriname		
Sweden	AE	
Switzerland	AE	
Tajikistan		
Tanzania		
Thailand		EME
Tunisia		EME
Turkey		EME
Ukraine		
United Kingdom	AE	
Uruguay		
Venezuela, RB		EME
Vietnam		EME
Zambia		

AE refers to "advanced economies" whereas EME stands for "emerging market economies"

Appendix 2: SUR Estimation with Disaggregated Samples

Tables 8 and 9.

Table 8 SUR estimation with disaggregated samples over the AFC

	Advanced Economies				Developing Economies			
	IR	ERS	FO	MI	IR	ERS	FO	MI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over AFC	-0.033		0.575	-0.453	0.127		0.194	-0.079
	(0.040)		(0.138)***	(0.108)***	(0.029)***		(0.133)	(0.079)
Change in FO over AFC	-0.010	0.895		0.209	-0.079	0.185		-0.407
	(0.050)	(0.215)***		(0.167)	(0.030)***	(0.127)		(0.066)***
Change in MI over AFC	-0.188	-1.084	0.321		-0.039	-0.213	-1.150	
	(0.053)***	(0.259)***	(0.257)		(0.052)	(0.213)	(0.186)***	
Change in IR over AFC		-0.930	-0.174	-2.194		2.181	-1.423	-0.246
		(1.104)	(0.899)	(0.617)***		(0.501)***	(0.540)***	(0.330)
EURO	-0.049	0.103	-0.138	-0.095				
	(0.016)***	(0.088)	(0.076)*	(0.056)*				
Asia	0.023	0.176	-0.147	0.101	0.023	-0.103	-0.382	-0.257
	(0.018)	(0.096)*	(0.074)**	(0.062)	(0.027)	(0.112)	(0.105)***	(0.062)***
Eastern & Central Europe					0.003	0.013	-0.127	-0.118
					(0.034)	(0.142)	(0.145)	(0.085)
MENA					0.036	-0.069	-0.069	-0.135
					(0.027)	(0.114)	(0.116)	(0.066)*
Latin America					-0.010	0.066	-0.010	-0.030
					(0.018)	(0.073)	(0.075)	(0.045)
TOT shocks	-0.033	-0.561	1.856	0.497	0.354	-1.243	0.617	0.259
	(0.728)	(3.838)	(3.047)	(2.474)	(0.149)**	(0.623)**	(0.653)	(0.387)
Relative income	0.113	0.190	-0.197	0.291	0.195	-0.691	0.364	0.100
	(0.051)**	(0.285)	(0.227)	(0.179)	(0.047)***	(0.200)***	(0.218)*	(0.130)

Table 8 (continued)

	Advanced Economies				Developing Economies			
	IR	ERS	FO	MI	IR	ERS	FO	MI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real GDP growth during crisis	-0.399	2.102	-1.939	0.064	-0.489	1.896	-2.941	-1.213
	(0.360)	(1.921)	(1.540)	(1.260)	(0.258)*	(1.061)*	(1.060)***	(0.646)*
IMF					0.011	-0.038	-0.018	-0.044
					(0.015)	(0.061)	(0.062)	(0.037)
SWF	-0.020	-0.487	0.324	-0.256	-0.032	0.230	-0.000	0.019
	(0.040)	(0.196)**	(0.160)**	(0.127)**	(0.025)	(0.100)**	(0.107)	(0.064)
Constant	-0.080	-0.313	0.259	-0.294	0.001	0.000	0.264	0.148
	(0.043)*	(0.232)	(0.181)	(0.143)**	(0.026)	(0.109)	(0.107)**	(0.065)**
N	22				58			

Table 9 SUR Estimation with Disaggregated Samples over the GFC

	Advanced Economies				Developing Economies			
	IR	ERS	FO	MI	IR	ERS	FO	MI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in ERS over GFC	-0.971		0.876	0.217	-0.027		0.061	-0.304
	(0.603)		(0.108)***	(0.942)	(0.073)		(0.105)	(0.114)***
Change in FO over GFC	0.110	0.931		-0.909	0.166	0.061		-0.220
	(0.648)	(0.115)***		(0.959)	(0.072)**	(0.105)		(0.116)*
Change in MI over GFC	0.277	0.011	-0.042		0.203	-0.247	-0.179	
	(0.138)**	(0.047)	(0.045)		(0.064)***	(0.093)***	(0.094)*	
Change in IR over GFC		-0.103	0.011	0.594		-0.057	0.350	0.524
		(0.064)	(0.065)	(0.297)**		(0.153)	(0.151)**	(0.165)***
EURO	-0.013	0.010	-0.011	-0.004	-0.038	0.193	-0.198	-0.314
	(0.046)	(0.015)	(0.014)	(0.068)	(0.113)	(0.162)	(0.163)	(0.178)*
Asia	-0.054	-0.039	0.037	0.087	0.134	-0.107	-0.302	-0.175
	(0.073)	(0.022)*	(0.022)*	(0.106)	(0.149)	(0.216)	(0.215)	(0.240)
Eastern & Central Europe					0.086	0.025	-0.230	-0.156
					(0.144)	(0.209)	(0.208)	(0.232)
MENA					0.151	-0.081	-0.346	-0.165
					(0.152)	(0.221)	(0.218)	(0.245)
Latin America					0.130	0.023	-0.376	-0.182
					(0.149)	(0.216)	(0.213)*	(0.240)
Sub-Saharan Africa					0.100	-0.008	-0.273	-0.167
					(0.149)	(0.217)	(0.215)	(0.240)
TOT shocks	-0.181	0.268	-0.176	0.956	0.347	0.368	-0.304	-0.134
	(0.857)	(0.244)	(0.252)	(1.255)	(0.182)*	(0.265)	(0.267)	(0.297)

Table 9 (continued)

	Advanced Economies				Developing Economies			
	IR	ERS	FO	MI	IR	ERS	FO	MI
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Relative income	0.216	-0.060	0.066	-0.224	0.012	-0.005	0.073	0.016
	(0.179)	(0.056)	(0.057)	(0.273)	(0.041)	(0.059)	(0.058)	(0.065)
Real GDP growth during crisis	1.487	-0.413	0.615	-0.527	-0.278	0.115	0.431	0.641
	(1.280)	(0.410)	(0.377)	(1.930)	(0.316)	(0.459)	(0.458)	(0.505)
IMF	0.234	0.608	-0.610	-0.331	0.035	-0.128	0.046	-0.094
	(0.399)	(0.063)***	(0.033)***	(0.597)	(0.028)	(0.038)***	(0.040)	(0.044)**
SWF	-0.062	0.006	-0.018	-0.039	-0.034	-0.033	0.067	0.096
	(0.051)	(0.017)	(0.016)	(0.078)	(0.032)	(0.046)	(0.046)	(0.050)*
Swap					-0.005	0.022	-0.046	0.016
					(0.032)	(0.047)	(0.047)	(0.052)
Constant	-0.102	0.015	-0.011	0.182	-0.120	0.049	0.267	0.201
	(0.143)	(0.046)	(0.045)	(0.210)	(0.148)	(0.215)	(0.214)	(0.238)
N	22				90			

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