A New Measure of the Stability of Exchange Rate Arrangements in the Context of the Trilemma*

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Abstract

Using the simple geometry of the classic, open-economy trilemma, this paper introduces a new measure of the stability of exchange rate arrangements. Applying the new measure to post-Bretton Woods data, we find that the combination of flexible exchange rates and financial market openness is the most unstable arrangement within the trilemma. We also find that middle-income countries have more unstable arrangements that do either poor or rich countries. In addition, we examine whether official foreign reserve holdings are linked to the stability of exchange rate arrangements within the trilemma. We find that high foreign exchange reserves correspond to modestly more stable arrangements in low-income countries, but no such correspondence appears in middle-income countries or in rich countries.

The paper also characterizes exchange rate arrangements in terms of their semblance to definitive policy archetypes; and, it uses the trilemma constraint to provide a new gauge of monetary sovereignty. Using the new monetary sovereignty gauge, we find that countries typically blend a substantial degree of monetary sovereignty with both exchange rate stability and financial openness. That is, most countries occupy the "middle" of the trilemma policy space. In this broad sense, the middle remains "filled out" rather than "hollowed out."

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1 Introduction

The classic, open-economy trilemma teaches us that a country cannot simultaneously achieve exchange rate stability, capital market openness, and monetary sovereignty. Choosing, say, to peg an exchange rate means choosing to give up some degree of monetary sovereignty, capital market openness, or both. While the trilemma tells us that such choices must be made, recent history – notably in Europe – reminds us that the choices are never final. Even a monetary union can be dismantled.

That exchange rate arrangements are not permanent has been emphasized by Obstfeld and Rogoff (1995) among others, and further explored by researchers such as Calvo and Reinhart (2002), Reinhart and Rogoff (2004), Levy-Yeyati and Sturzenegger (2005), and Ilzetzki, Reinhart, and Rogoff (2008), who document the sometimes dramatic changes in the observed behavior of exchange rates. In this paper, we build on such studies by characterizing the exchange rate arrangements in terms of all three legs of the trilemma, and we introduce a new, formal measure of the stability of the arrangements over time.

Our new measure of stability starts with the simple geometry of the trilemma. We can think of a country's exchange rate arrangement in terms of locations in a constrained three-dimensional policy space, one that is defined by exchange rate stability, financial openness, and monetary policy sovereignty. In this framework, the *change* in a country's arrangement is naturally measured as a movement from one point to another in the three-dimensional policy space. So, gauge the *stability* of a country's arrangements is reflected in the extent of the changes over time. Specifically, overall stability or instability is measured by the distances between the sequential locations in the policy space. A stable arrangement is defined as one with relatively small movements within the policy space, while large movements within the policy space represent unstable arrangements.

We also provide a new measure of monetary sovereignty. The new measure is an implicit one that is derived from the trilemma's constraint: the trilemma constrains monetary sovereignty at the expense of exchange rate stability and financial openness. So, given measures of exchange rate stability and financial openness, the trilemma's constraint yields a measure of monetary sovereignty. This new measure complements the now-standard measures that rely on the correlation between a country's interest rate and the interest rate of a base country.

In the next section of this paper, we introduce our new measure of stability. We then use the measure to assess the stability of the trilemma policies of 177 economies in the modern era (post-Bretton Woods). Then, we sort countries into policy archetypes in each year. We then explore which arrangements are most stable. Finally, we examine the links between stability, archetype, and official holdings of foreign reserves.

2 A Stability Measure

To gauge stability, we begin with the international trilemma's standard triad of policies. We denote the i^{th} country's extant regime in period t as $R_{i,t}$, where:

$$R_{i,t} = (S_{i,t}, F_{i,t}, M_{i,t}),$$

and $S_{i,t}$ represents exchange rate stability, $F_{i,t}$ represents financial openness, and $M_{i,t}$ represents monetary sovereignty. The measures of $S_{i,t}$, $F_{i,t}$, and $M_{i,t}$, are normalized so that each falls between zero and one (inclusive); and values of one represent perfectly fixed exchange rates, perfectly open financial markets, and perfectly sovereign monetary policy. So, a pure fix with open financial markets is: $R_{i,t} = (1, 1, 0)$; a pure fix with monetary sovereignty is $R_{i,t} = (1, 0, 1)$, and a pure float with open capital markets and monetary sovereignty is $R_{i,t} = (0, 1, 1)$.

In this framework, a *change* in a country's regime from one period to the next is simply the vector connecting the two consecutive points in the policy space:

$$r_{i,t} = R_{i,t} - R_{i,t-1}$$

$$= (s_{i,t}, f_{i,t}, m_{i,t}) = (S_{i,t} - S_{i,t-1}, F_{i,t} - F_{i,t-1}, M_{i,t} - M_{i,t-1}).$$

Using this vector of policy changes, $r_{i,t}$, we can definitively measure the overall change in policy using the vector's norm, $||r_{i,t}||$.[1] Using the norm, we define a single, univariate measure adjusted to fall between zero and one:

[1] We use the Euclidean norm (henceforth, in this paper, the norm).

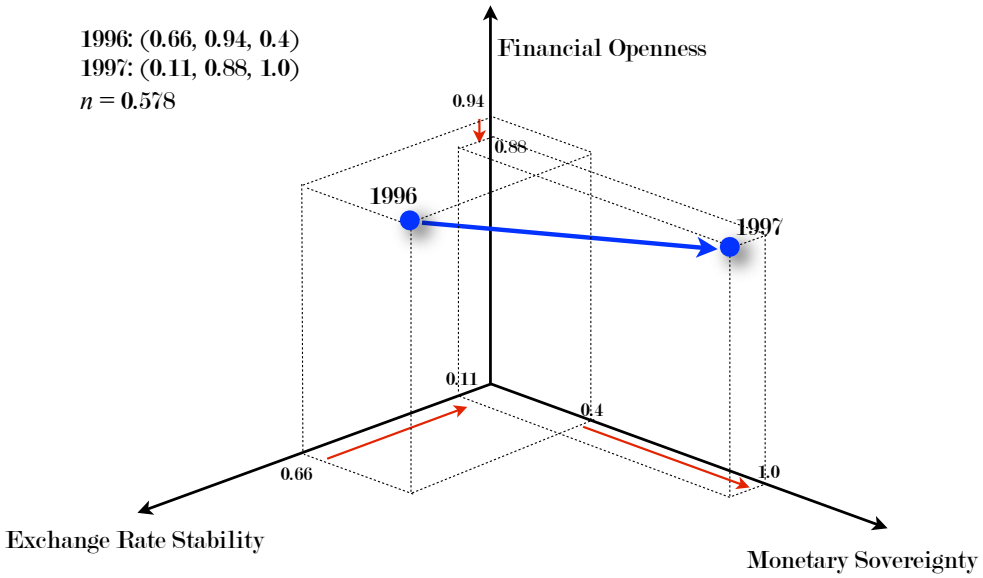

Figure 1: Indonesia 1996–97

$$n_{i,t} = \frac{||r_{i,t}||}{\sqrt{2}}.$$

This adjusted norm, $n_{i,t}$, captures in a simple scalar the full extent of the change in a country's triad of policies. By providing a univariate gauge of multivariate changes in policies, our new measure follows Girton and Roper's (1977) 'exchange market pressure' measure. While their classic measure lacks our norm's geometric interpretation, it provides an early, univariate amalgam of foreign exchange policies.

Figure 1 illustrates this approach to measuring policy stability. The figure displays the two data points underlying a single observation of the adjusted norm, $n_{i,t}$. The observation is for Indonesia at the time of the Asian Crisis (i = Indonesia, and t = 1997), and the underlying data are from Aizenman, Chinn, and Ito (2010), which we discuss in more detail in the next section.[2] As is well-known, Indonesia experienced a substantial increase in its exchange rate variability and a small reduction in its financial openness during the crisis, while it increased its monetary sovereignty considerably. These changes are indicated by the vector shown between the observations for 1996 and for 1997.[3] The normalized length of the vector measures the overall change in the policy triad. The norm in 1997 is about five times the values typical of Indonesia earlier in the decade, and it exceeds (by a

[2]This figure uses our new, implicit measure of monetary sovereignty, also described below.

[3]The cartesian coordinates $(S_{i,t}, F_{i,t}, M_{i,t})$ are (0.66, 0.94, 0.4) for 1996 and (0.11, 0.88, 1.0) for 1997. So, $n_{i,t} = 0.578$.

substantial margin) 95 percent of the values in the sample.

In general, the norm of the vector summarizes the overall changes in the policies of the trilemma. Below, we use the norm (adjusted to fall between zero and one) to examine the stability of various policies and to assess the extent to which stability may be linked to official holdings of foreign exchange reserves.

3 Data and Overall Stability

In this section, we calculate the new stability measure each year using a sample of 177 countries with annual data from 1970 through 2008. We begin with the *de facto* exchange rate stability and monetary sovereignty measures provided by Aizenman, Chinn, and Ito (2010), updated with the latest version of the *de jure* financial account openness measure of Chinn and Ito (2008). Then, we recalculate our measure of stability using an alternative gauge of monetary sovereignty.

Aizenman *et. al.* construct the annual measure of $S_{i,t}$, using the exchange rate's monthly standard deviation against a base country.[4] Like many other researchers, they follow Shambaugh (2004) in constructing monetary sovereignty measures, $M_{i,t}$, using the correlation between each country's money market interest rate and that of its base country. Finally, Chinn and Ito's *de jure* measure of financial market openness, $F_{i,t}$, is essentially a weighted average of the International Monetary Fund's indicators of exchange restrictions.[5]

Table 1 provides a summary of the adjusted norms, $n_{i,t}$, calculated using these data. The table provides the summary statistics by income categories, which are taken from the World Bank's January 2011 list of economies; and it also provides the statistics for an overlapping emerging market category, which is taken from the Morgan Stanley Capital International's Emerging Market Index. The first column reports the mean for each cate-

[4]Like others, Aizenman, Chinn, and Ito apply a threshold to the standard deviation method in order to allow for currencies that remain in narrow bands; and, they also allow for individual devaluations or revaluations. The base countries include Australia, Belgium, France, Germany, India, Malaysia, South Africa, the United Kingdom, and the United States.

[5]Specifically, Chinn and Ito measure financial openness with the first principal component of the IMF's binary indicators of restrictions on current and capital account transactions, of multiple exchange rates, and of the required surrender of export proceeds. This is also the measure subsequently used by Aizenman *et. al.*. Miniane (2004) provides a *de jure* index that uses finer IMF data on capital account restrictions, but Miniane's data are available for only thirty countries. Many other, related, *de jure* indices have been developed, but few blend the easy interpretation and the wide coverage that Chinn and Ito provide. The natural alternative is to use actual capital flows as *de facto* measures of financial openness. However, actual flows are quite volatile from period to period, arguably too volatile to be accurately representing the generally slower moving changes in the underlying policies that are of interest to us here.

Table 1: Trilemma Stability: Initial Adjusted Norm

	Mean	Max.	Min.	St. Dev.	Obs.	H_0
Low Income Economies	0.12	0.72	0.00	0.12	1018	0.59
Middle Income Economies	0.14	0.76	0.00	0.13	2254	−5.58(***)
High Income Economies	0.11	0.67	0.00	0.09	1372	5.58(***)
All (Low, Middle and High)	0.13	0.76	0.00	0.12	4644	–
Emerging Economies	0.16	0.76	0.00	0.13	620	−8.11(***)

Notes: Here, trilemma stability is calculated for 177 countries from 1971-2008 using data from Aizenman, Chinn, and Ito (2010), who in turn use Shambaugh's (2004) monetary measure. The income group classifications are from the World Bank (January 2011), available at www.worldbank.org, and the emerging group is that of the Morgan Stanley Capital International Emerging Market Index (excluding Taiwan due to data unavailability). The last column reports the value of the t-statistic for the hypothesis that the relevant income group's mean norm equals that of the rest of the world. Triple asterisks indicate that the test statistic is significant at the one percent level.

gory. As a group, the richest countries have the most stable exchange rate policies. Their mean, shown in the third row, is 0.11. (Keep in mind that a sustained float can be part of a "stable" policy, despite the fact that the exchange rate itself fluctuates.) The last row gives the statistics for the emerging economies. With a mean adjusted norm of 0.16, they have the largest norms. That is, while the rich have the most stable policies, it is the emerging economies – not the poor ones – that have the greatest policy instability.

Figure 2 graphs the adjusted norms over time. The dashed lines in the graphs correspond to the measures computed so far, which were summarized in Table 1. The graphs' solid lines correspond to a second, closely related measure of stability – one that substitutes an implicit measure of monetary sovereignty (described below) for the Shambaugh measure used by Aizenman, Chinn, and Ito.

4 Related Measures and Tests

4.1 An Implicit Measure of Monetary Sovereignty

As discussed above, Shambaugh's (2004) approach to gauging monetary sovereignty uses the correlation between a country's domestic, short-term interest rate and that of a putative base country, often the United States. High correlations are taken as indicative of monetary dependence: they are taken as a lack of monetary sovereignty. The drawback of this otherwise valuable approach is that, in addition to reflecting monetary dependence,

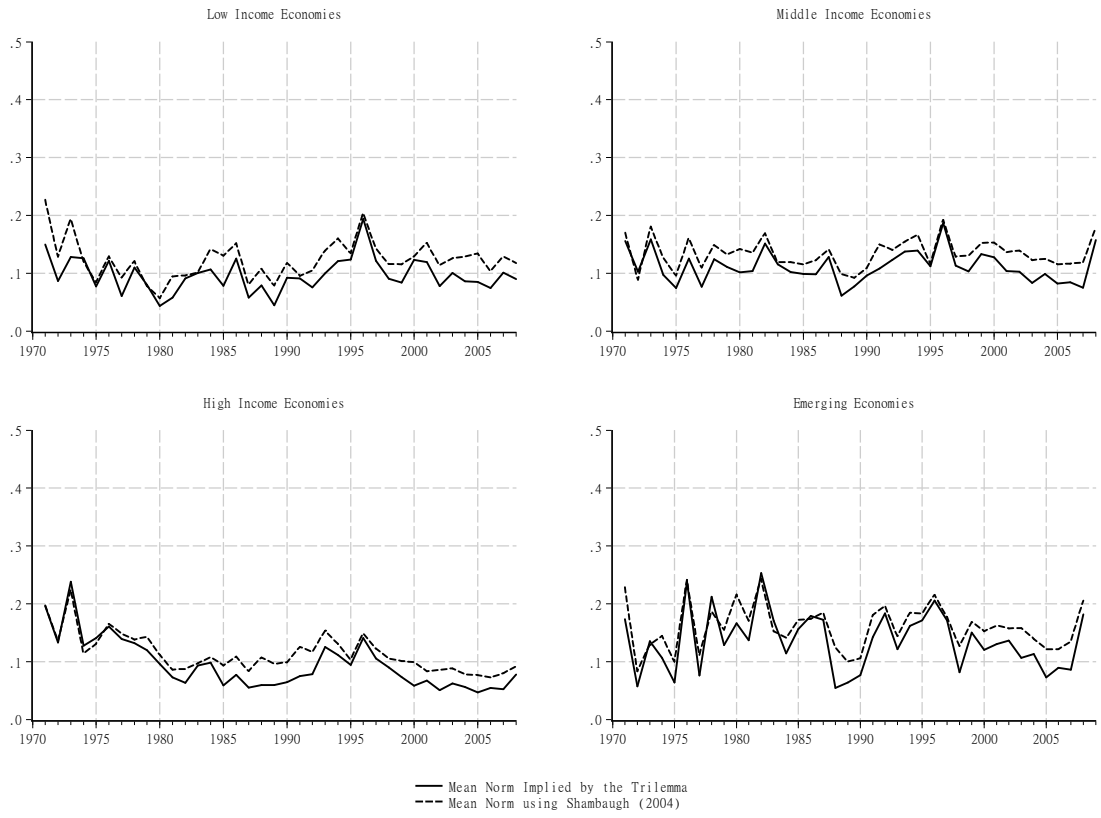

Figure 2: Norms by Income Group

the measure also reflects the correlations between the underlying circumstances to which independent monetary policies may respond. That is, even a country with complete monetary sovereignty would appear otherwise if it were subject to some of the same shocks or influences as its "base" country. Canada provides a telling example of the measure's problem. Whether or not the Bank of Canada is influenced by the policies of the Federal Reserve, it is not constrained by them. Yet, despite Canada's own monetary sovereignty, its interest rates are highly correlated with those of the United States. Taken at face value, this approach would misleadingly say that the Bank of Canada is constrained by the policies of the Federal Reserve Board.

Other researchers, such as Frankel, Schmukler, and Serven (2004, in work contemporaneous with Shambaugh's), and Reade and Volz (2008), allow for more general dynamic links between the interest rates of the countries. However, even these more general measures ultimately rely on interest rate comovements, so they are subject to the same drawback.[6]

[6]Three other, more recent studies take important steps toward mitigating the problem. Duburcq and

Here, we introduce an alternative measure of monetary sovereignty that does not suffer from this drawback, and we use the new measure of sovereignty to refine our gauge of stability, $n_{i,t}$. Our new measure of sovereignty starts by taking the trilemma seriously: we assume that the trilemma holds. With that assumption, the existing measures of exchange rate stability, $S_{i,t}$, and of financial openness, $F_{i,t}$, provide us with an implicit measure of monetary sovereignty, $M_{i,t}$. Specifically, the implicit measure of monetary sovereignty is:

$$M_{i,t} = 2 - S_{i,t} - F_{i,t}.$$

Figure 3 provides graphs that depict both this implicit measure of monetary sovereignty (the solid lines), along with the Shambaugh measure (the dashed lines).[7] Overall, the new, implicit measure suggests a substantially greater degree of monetary sovereignty than does the Shambaugh measure. For example, using our new measure of monetary sovereignty, Canada's latest observations (for 2007 and 2008) are 0.75 and 0.81, while Shambaugh's measures for the same recent years are much smaller: 0.25 and 0.31.[8] Since our new measure of monetary sovereignty takes the trilemma as given, we cannot use it to test the trilemma's validity, which is what Aizenman, Chinn, and Ito (2010) test.[9] However, we can use the implicit measure to explore what is of interest to us here: trilemma policy stability.

Table 2 provides a summary of policy stability using the adjusted norms calculated with the new, implied measure of monetary policy. As was shown in the figure, the overall mean norms are now lower. However, the relative stability of the income groups remains unchanged, and the major differences remain statistically significant: the high-income countries again exhibit the most stable exchange rate policies, while the emerging

Girardin (2010) allow domestic monetary conditions to matter in a study of eight Latin American countries over eleven years. Bluedorn and Bowdler (2010) separate the anticipated and unanticipated components of the base country's interest rate changes using the U.S. as the base country. Herwartz and Roestel (2010) examine long-run interest rate dependence and condition on domestic variables for a panel of 20 small, high income countries.

[7] In cases wherex the implicit measure would yield a value in excess of one, we have equated the measure with one. The imposition of this limit reflects the fact that countries not pursuing exchange rate stability and financial openness to the fullest extent nevertheless cannot acquire more than complete ($M_{i,t} = 1$) monetary sovereignty.

[8] Equally telling are the values for New Zealand, which – as the poster-country for inflation targeting – has targeted its inflation rate for even longer than Canada. Our new, implicit measure gives values of 0.71 and 0.76 in the last two years – values that are indicative of a monetary policy that is relatively unconstrained by the exchange rate. In contrast, the much lower values of Shambaugh's measure, 0.11 and 0.10, would suggest otherwise.

[9] As do Obstfeld, Shambaugh, and Taylor (2005), among others.

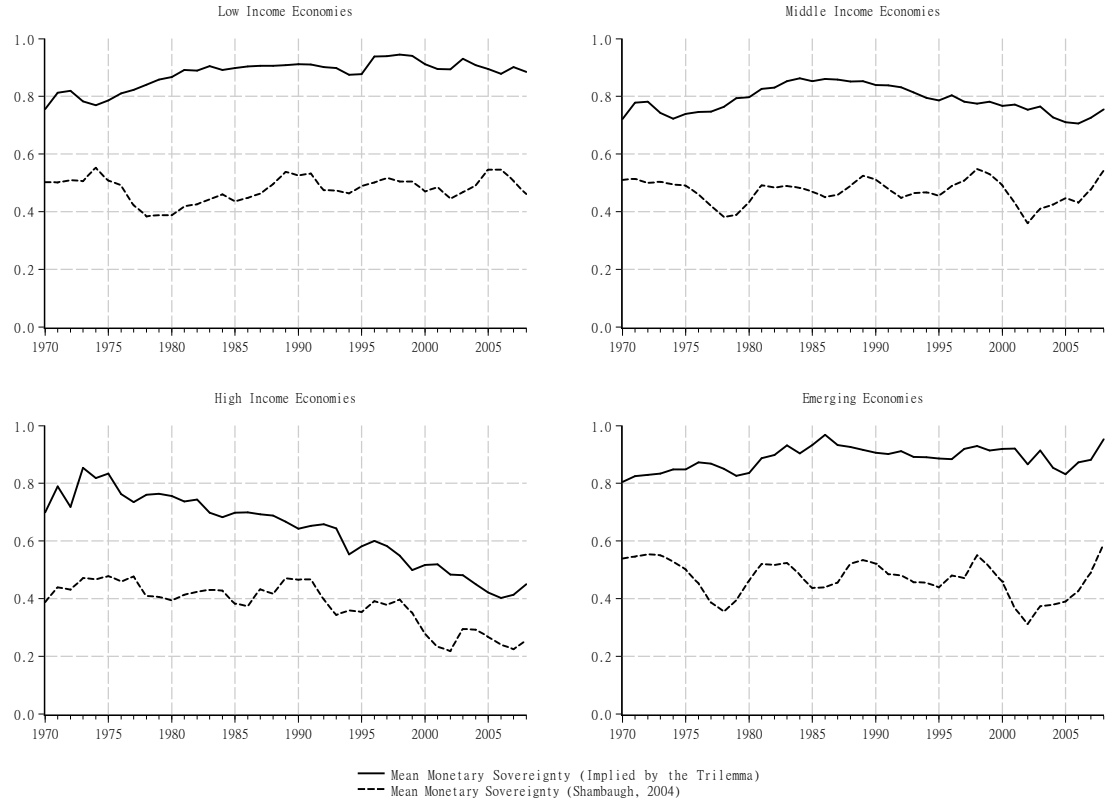

Figure 3: Measures of Monetary Sovereignty

economies exhibit the least stable policy outcomes. Throughout the remainder of the paper, unless otherwise indicated, we calculate the norms using the new, trilemma-implied measure of monetary stability.

4.2 Stability over Time

Using the implicit norm, Table 3 examines whether some of the dynamic changes in stability suggested in Figure 2 are statistically significant. Specifically, the table provides tests of whether the mean adjusted norm remains unchanged after some of the key crises that occur in the sample: the Mexican Crisis (1994), the Southeast Asian Crisis (1997), and the Argentine Crisis (2002).

The table indicates that the different income groups have had very different experiences in this regard. For the low-income countries, shown in the first panel, there is only some slight evidence of a minor increase in instability after the Mexican crisis. For the remaining groupings, all notable changes go in the opposite direction: toward greater

Table 2: Norm using the Trilemma-Implied Monetary Sovereignty Measure

	Mean	Max.	Min.	St. Dev.	Obs.	H_0
Low Income Economies	0.10	0.76	0.00	0.14	1218	1.53
Middle Income Economies	0.11	0.94	0.00	0.15	2664	−4.90(***)
High Income Economies	0.09	0.77	0.00	0.12	1500	3.57(***)
All (Low, Middle and High)	0.10	0.94	0.00	0.14	5382	–
Emerging Economies	0.13	0.94	0.00	0.16	662	−6.32(***)

Notes: Here, the adjusted norm is calculated using the new, implicit measure of monetary sovereignty for each of 177 countries from 1971-2008. The income group classifications are from the World Bank (January 2011), available at www.worldbank.org, and the emerging group is that of the Morgan Stanley Capital International Emerging Market Index (excluding Taiwan due to data unavailability). The last column reports the value of the t-statistic for the hypothesis that the relevant income group's mean norm equals that of the rest of the world. Triple asterisks indicate that the test statistic is significant at the one percent level.

stability (decrease in the norm). For the middle-income countries as a whole, shown in the second panel, there is some evidence of a minor increase in stability since the Argentine crisis. For the high-income countries, shown in the third panel, change is more readily apparent. For those countries, the most recent period displays substantially greater stability, regardless of which crisis is used to split the sample. For the full group of countries, shown in the fourth panel, we can with some confidence reject the idea that the means are the same now as they were before either of the two most recent crises. The emerging countries, shown in the last panel, echo the rising stability of the world as a whole, but the evidence is somewhat weaker.

4.3 Policy Outliers

When it comes to policy stability, sometimes it is the very large changes in policy that are of most interest. So, we separately examine the incidence of large observations. Table 4 provides data on the largest decile of adjusted norms. The table lists the number of these large observations in each year, by income group and for the full sample. In each cell within the table, the numerator gives the number of the large observations, while the denominator gives the total number of observations. Overall, the pattern of large policy changes follows the pattern of the means. The richest economies have the fewest large changes in their trilemma policies, while the emerging economies have the most large changes. In the panel regressions later, we first examine all the policy changes – large

Table 3: Implicit Norm Means Before and After Recent Crises, 1994 (Mexico), 1997 (Southeast Asia), 2002 (Argentina)

	1970–1994	1995–2008	1970–1997	1998–2008	1970–2002	2003–2008	H_0
	0.09	0.10					−1.66(*)
Low Income Econ.			0.10	0.09			0.52
					0.10	0.09	0.86
	0.11	0.11					−0.05
Middle Income Econ.			0.14	0.11			1.57
					0.11	0.10	2.38(**)
	0.10	0.07					4.87(***)
High Income Econ.			0.11	0.06			6.44(***)
					0.10	0.06	4.77(***)
	0.10	0.10					1.20
All (Lo, Mid. and Hi)			0.11	0.09			4.15(***)
					0.11	0.09	4.27(***)
	0.14	0.13					0.75
Emerging Econ.			0.14	0.12			2.16(**)
					0.14	0.11	1.96(**)

Notes: The last column reports the value of the t-statistic for a test of the hypothesis that the two means (before and after the relevant breakpoint) are equal. Single, double, and triple asterisks denote statistical significance at the ten percent, five percent, and one percent level respectively.

and small; then, we turn our attention to the probabilities of the large changes in policies identified here.

4.4 Archetypes

Next, we explore how the norms differ across the types of exchange rate arrangements. We assign observations to four different types of arrangements based on their semblance to one of four "archetypes:" a '*Hong-Kong*' type, with exchange rate stability and open capital markets; a '*China*' type, with exchange rate stability and monetary sovereignty; a '*U.S.*' type with open financial markets and monetary sovereignty; and a '*Middle*' type, with a modest degree of all three characteristics.

We use the simple geometry of the trilemma to describe the types of arrangements more precisely. Letting j= '*Hong Kong*', '*China*', '*U.S.*', '*Middle*', we define $type_j$ such that R_j takes on the values: $(1, 1, 0)$, $(1, 0, 1)$, $(0, 1, 1)$, and $(\frac{2}{3}, \frac{2}{3}, \frac{2}{3})$. Each of these four values of R_j represents a point on the frontier of the feasible set defined by the trilemma. The first three points represent the three corners corresponding to the '*Hong Kong*,' '*China*,' and '*U.S.*' archetypes described above, and the last point represents the '*Middle*' of the

Table 4: Number of Implicit Norm Values in the Last Decile by Income Group

Year	Low Income	Middle Income	High Income	All	Emerging
1971	9/26	12/48	9/29	30/103	4/15
1972	3/27	7/48	3/29	13/104	0/15
1973	8/27	12/50	13/30	33/107	2/15
1974	5/28	4/51	3/31	12/110	2/15
1975	2/27	4/49	5/31	11/107	0/15
1976	3/26	7/51	4/31	14/108	4/15
1977	1/26	2/52	6/34	9/112	0/15
1978	4/26	7/53	4/36	15/115	3/15
1979	1/26	8/53	4/36	13/115	3/15
1980	1/27	7/55	2/36	10/118	4/15
1981	1/27	7/56	1/36	9/119	3/15
1982	3/30	8/58	1/37	12/125	5/15
1983	3/31	10/63	3/37	16/131	5/15
1984	3/31	5/65	2/37	10/133	1/15
1985	1/33	7/66	1/37	9/136	3/16
1986	4/33	6/70	2/37	12/140	3/16
1987	1/33	7/70	0/39	8/142	4/18
1988	1/33	1/70	2/39	4/142	0/18
1989	0/35	6/71	1/39	7/145	1/18
1990	3/35	5/72	1/39	9/146	1/18
1991	2/34	5/73	2/39	9/146	1/18
1992	2/34	10/73	1/39	13/146	4/18
1993	1/34	12/73	5/40	18/147	2/18
1994	4/34	13/74	3/40	20/148	4/18
1995	7/33	10/75	0/40	17/148	3/18
1996	6/34	14/78	2/40	22/152	5/18
1997	3/34	14/89	4/47	21/170	6/20
1998	2/36	11/89	4/47	17/172	1/20
1999	3/37	13/89	4/47	20/173	2/20
2000	6/37	15/90	0/47	21/174	2/20
2001	4/36	9/88	5/47	18/171	4/20
2002	4/36	6/87	1/47	11/170	2/20
2003	4/37	8/88	2/47	14/172	1/20
2004	2/37	10/88	2/47	14/172	1/20
2005	2/36	6/88	1/47	9/171	1/20
2006	1/36	5/86	2/46	8/168	1/20
2007	3/33	4/83	2/46	9/162	1/20
2008	0/33	18/82	3/47	21/162	1/20
Total	113/1218	315/2664	110/1500	538/5382	90/662
(%)	9.3%	11.8%	7.3%	10.0%	13.6%

Notes: A 'large' norm value is a value in the last decile in the sample –over 0.2789. Each numerator gives the number of extraordinary norms in the relevant portion of the sample, while the denominators gives the corresponding number of countries.

feasible frontier. Then, we define country i's type in period t by its proximity to one of the four points. Specifically, we let:

$$j = \underset{j}{argmin} ||(R_{i,t} - R_j)||$$

$$type_{i,t} \overset{def}{=} type_j.$$

That is, the observation's type is defined by the one that minimizes the distance between the observation and the archetype.

Using this definition of assigned types, Figure 4 shows the number of economies in each year of each type. Throughout most of the modern period, the most common arrangement is the '*China*' type. In nearly every year, more than forty economies have had relatively stable exchange rates and a relatively high degree of monetary sovereignty. The second most common arrangement type is the '*Middle.*' The number of '*Middle*' observations rose through the mid-nineties as many '*China*' type economies began to relax some of their capital controls. The number of economies of the '*Hong Kong*' type has been rising fairly steadily since the nineties. The number of economies of the '*U.S.*' type has risen throughout the period, though less steadily.

The figure also shows that there has been no sustained 'hollowing out of the middle', defined as it is here in terms of the full triad of trilemma policies. Early work on the 'hollowing out of the middle' argued that increasing capital mobility was making intermediate exchange rate regimes unsustainable, forcing governments to choose between zero and full exchange rate stability. While financial market openness is central to that 'hollowing' or 'bipolar' view, much of the extant work defines those phrases exclusively in terms of exchange rate stability. Here, defining the 'middle' and the 'poles' in terms of all three of the trilemma's dimensions, we find that there has been no obvious migration to any of the trilemma corners. Hence, the 'hollowing out' or 'polar' (previously bipolar) view does not hold in this broader context.

Table 5 summarizes how our measure of policy stability, the adjusted norm, differs across the four types of arrangements. As shown in Table 5, policy stability differs markedly by type. For every type, one can strongly reject the hypothesis that the norm is the same as for the remaining economies as a whole. Notably, the least stable arrange-

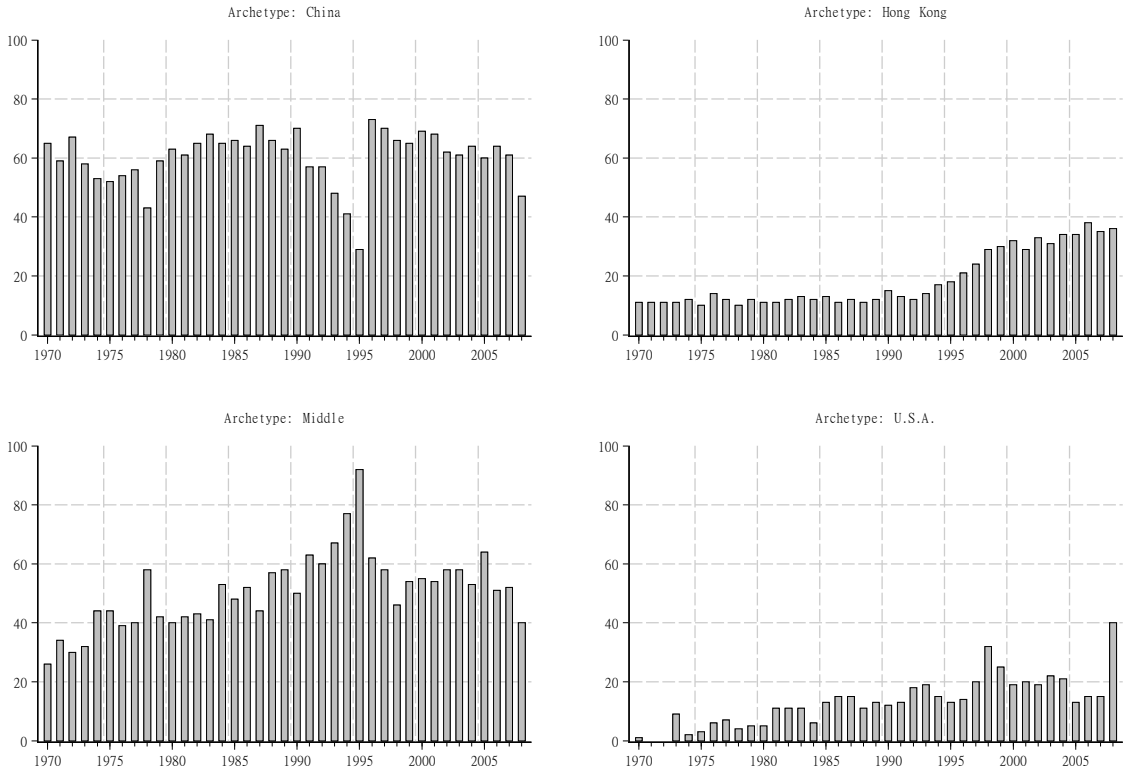

Figure 4: Archetypes: Number of Countries

ments are most like the '*U.S.*' archetype: when exchange rates are flexible and financial markets are open. The mean of the adjusted norm for this category, 0.17, is nearly twice the mean for the '*China*' category, 0.09, and nearly triple the mean for the '*Hong Kong*' category, 0.06, which exhibits the most stability. The mean norm of the '*Middle*' archetype economies, 0.12, lies close to the middle of the range of norms. While it is not the most stable among the policies, there is again little to suggest that '*Middle*'type policies cannot persist.

Table 5: Norm using the Trilemma-Implied Monetary Sovereignty Measure

	Mean	Max.	Min.	St. Dev.	Obs.	H_0
China Archetype	0.09	0.75	0.00	0.14	2251	5.43(***)
Hong Kong Archetype	0.06	0.94	0.00	0.13	706	8.43(***)
U.S. Archetype	0.17	0.94	0.00	0.18	508	−10.68(***)
Mid Archetype	0.12	0.74	0.00	0.13	1917	−5.04(***)

Notes: The last column reports the value of the t-statistic for a test of the hypothesis that the mean norm of the archetype equals the mean norm of the remaining sample. Single, double, and triple asterisks denote statistical significance at the ten percent level, five percent level, and one percent level respectively.

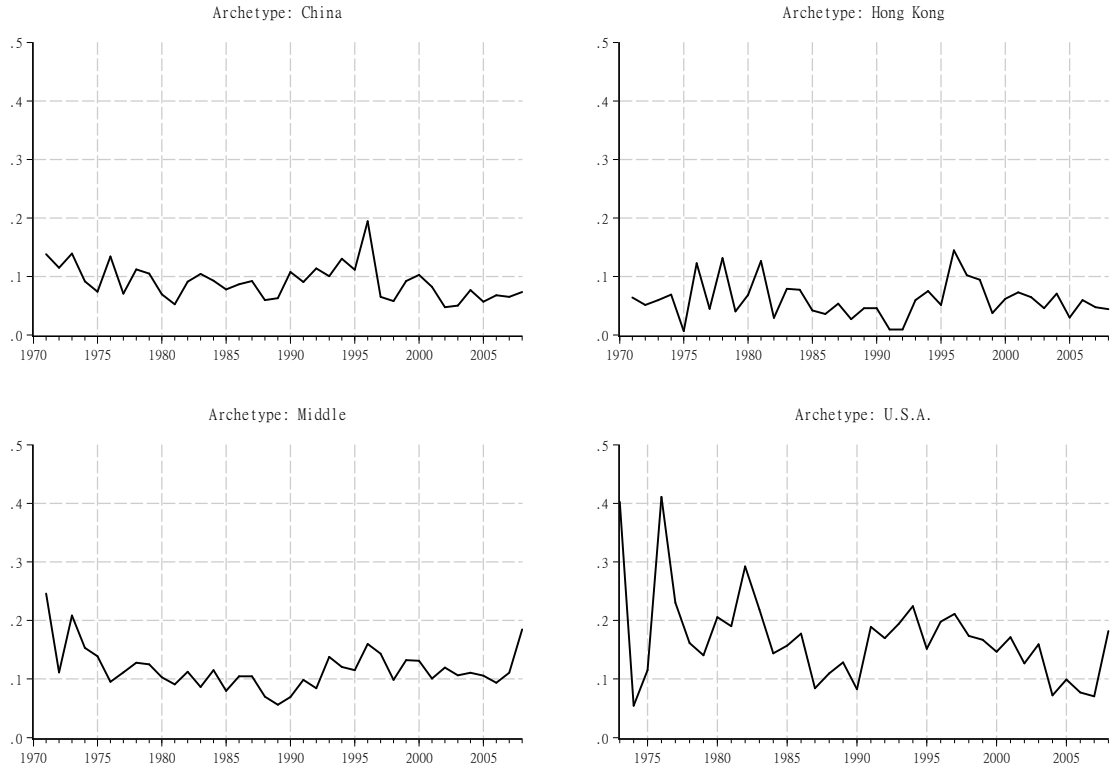

Figure 5: Archetypes: Norm

Figure 5 gives a richer picture of how stability changes over time for each of the types. The four graphs display the mean adjusted norm for the four types over the sample. Despite the obvious spikes in the norms of the '*China*' type and '*Hong Kong*' archetypes at the time of the Asian crisis, these archetypes, which have exchange rate stability in common, exhibit the smallest overall policy changes; and, their relative stability has been sustained in the recent 2007-2008 crisis period. While the norms of the '*U.S.*' archetype countries have fallen over the modern era as a whole, they remain relatively high; and, the norms of both the 'middle' and '*U.S.*' archetypes have risen in the most recent, turbulent period.

5 Panel Regressions

This section uses regressions to flesh out the links between stability and the underlying trilemma policies. We begin with linear regressions that examine the full range, from small to large, of policy changes. Then we use probit estimation to focus on the probability of observing policy changes that are large. We treat income groups separately in both the

linear and the probit regressions; and, we include two specifications that relate our gauge of stability to the underlying trilemma policies and to official holdings of foreign exchange reserves.

Our inclusion of reserves reflects a long tradition of studying their links to trilemma policies. Beginning with the early work on optimal reserves in a stochastic setting, economists have modeled reserves as potentially reducing the probability or cost of devaluations, of speculative attacks, and of sudden stops.[10] To the extent that reserves act as a buffer against such events, one might expect reserves to be positively linked to policy stability. Alternatively, one might expect a negative link between reserves and stability if reserves were accumulated in advance of policy *in*stability for the purpose of insulating the economy from the effects of that instability. In either case, reserves may interact empirically with the underlying trilemma policies.

Our first specification regresses the adjusted norm on past reserves, on past measures of exchange rate stability and of financial openness, and on the interactions between reserves and the two measures.[11] The second specification also regresses the adjusted norm on reserves, but instead of including the measures of exchange rate stability and openness, it includes dummies for the economy's *archetype*.

Specifically, the two linear panel specifications are:

$$n_{i,t} = \beta_0+\beta_1\rho_{i,t-1}+\beta_2 S_{i,t-1}+\beta_3 F_{i,t-1}+\beta_4(S_{i,t-1}-\overline{S})(\rho_{i,t-1}-\overline{\rho})+\beta_5(F_{i,t-1}-\overline{F})(\rho_{i,t-1}-\overline{\rho})+\epsilon_{i,t} \quad \text{(I)}$$

$$n_{i,t} = \gamma_0 + \gamma_1\rho_{i,t-1} + \gamma_2 D_{\text{“}China\text{”},i,t-1} + \gamma_3 D_{\text{“}HongKong\text{”},i,t-1} + \gamma_4 D_{\text{“}U.S.\text{”},i,t-1} + \varepsilon_{i,t} \quad \text{(II)}$$

where: $\rho_{i,t}$ is the ratio of official reserves to GDP, overbars indicate sample means, and

[10] For early work on optimal reserves in a stochastic setting, see Kenen and Yudin (1965) and Heller (1966). Others who have built on this work include Hamada (1977), who extends Heller's work; Frenkel and Jovanovic (1981), who emphasize inventory management; Sachs, Tornell and Velasco (1996), who focus on speculative attacks; Garcia and Soto (2004); Jeanne and Ranciere (2011), who examine sudden stops; Aizenman and Marion (2004), who model the role of domestic politics; Dominguez, Hashimoto, and Ito (2011), who examine reserves and stabilization in the recent crises; and, notably, Aizenman, Chinn, and Ito (2010), who document the how reserves have changed with trilemma policies.

[11] Reserves data are taken from the World Bank's World Development Indicators.

D_j indicates a dummy variable for $type_{i,t} = R_j$.[12] Each of the two linear specifications is estimated with no fixed effects, with country fixed effects, with time effects, and with both country and time effects; and, for all of regressions, both simple OLS and cluster-robust standard errors are reported.

For the probit estimates, we define a large policy change as one that falls within the top decile of each income group. The decile cut-offs range from $n = 0.24$ for high-income countries to $n = 0.30$ for middle income countries. The dependent variable then takes on a value of one when the norm exceeds the cut off value, and it takes on a value of zero otherwise. Using these values, we estimate the probit model using the same explanatory variables as in the two linear panel specifications above. For the probit, each of the two specifications is estimated with conventional standard errors, then with clustered errors, then with random effects.

5.1 Low-Income Economies

Tables 6 and 7 provide the estimation results for the low-income economies. The linear estimates are given in Table 6. As shown in the first column of the table, the coefficients on lagged exchange rate stability and its interaction with reserves are both negative and mildly statistically significant. The coefficient on lagged financial openness is also negative and significant, but the coefficient on its interaction with reserves is positive. Taken together, these initial results would suggest that, for low-income economies, official reserves are indicative of greater stability when exchange rates are relatively fixed and capital markets are relatively closed. As shown in the table, these results are replicated when time effects are included, although the statistical significance disappears when country effects are included.

The second column of table 6 gives the initial estimates from the second specification, which uses the lagged archetypes. In this case, the coefficient on reserves is sizable, negative, and significant. This finding is robust in terms of both size and significance across all of the estimates. For low-income countries, conditional on the previous period's archetypes, large holdings of official reserves are indicative of substantial policy stability.

Table 7 gives the probit results. The first specification yields the same signs as

[12] Note that $R_{\text{“}Middle\text{”}}$ is subsumed by the constant in the second specification.

the linear estimates, but they provide little that is robustly significant. However, the archetype specification, like its linear counterpart in Table 6, again shows that in low-income economies, conditional on the archetype, greater reserves are strongly indicative of greater trilemma policy stability.

5.2 Middle-Income and High-Income Economies

Tables 8 and 9 provide the results for the middle-income economies, and tables 10 and 11 give the results for the high-income economies. In table 8, we see in the first specification that the coefficients on lagged exchange rate stability are negative and statistically significant for all the middle-income cases. In the second specification, the coefficients on all of the lagged archetypes are robustly significant. That is, the greatest macroeconomic policy stability in the middle-income economies is found among the '*Hong Kong*' archetypes, and to a lesser extent, among the '*China*' archetypes. Correspondingly, the greatest *in*stabilty is found among the '*U.S.*' archetypes.

Table 9 gives the probit estimates for the middle-income economies. There we find little that is significant in the first specification, but the second specification confirms the finding that '*U.S.*' archetype – the only archetype with floating exchange rates – is the least stable policy configuration. Together, these two tables tell us that for middle-income countries, the greatest trilemma stability exists in those countries with fixed exchange rate arrangements.

The high income results, given in the next two tables, are broadly similar to those of the middle-income countries. As shown in the linear estimates of table 10, the coefficients on lagged exchange rate stability are again all negative and, in most cases, significant at standard confidence levels. That is, exchange rate stability is again indicative of greater subsequent overall trilemma stability. In the second specification, the coefficients on the '*Hong Kong*' and '*China*' archetypes are again negative and significant. (While the coefficients on the '*U.S.*' archetype were statistically significant for the middle-income countries, they are not significant here.) In the high-income probit estimates, shown in table 11, the coefficients on the the '*Hong Kong*' and '*China*' archetypes are also robustly negative and significant. For these rich economies, the policy triad is most stable (as it is for middle income economies) when exchange rates are relatively fixed.

5.3 Emerging Economies

The estimation results for the emerging economies are shown in tables 12 and 13. Focusing on these economies, we find that financial openness becomes more important than exchange rates. As shown in table 12, the first of the linear specifications yields coefficients on lagged financial openness that are uniformly positive and largely statistically significant. That is, greater financial openness in the emerging economies is indicative of greater trilemma *in*stability. At the same time, the coefficients on lagged exchange rate stability are largely insignificant. That is, exchange rate stability seems to say little about the stability in exchange rate arrangements overall in emerging economies. In the second set of the linear specifications, it is the '*U.S.*' archetype that is most often significant, and its coefficients are also uniformly positive. For estimates using large policy changes, shown in table 13, the most important among the archetypes is the '*Hong Kong*' archetype, and, like the '*U.S.*' archetype, its coefficients are positive. What these two archetypes share is a high degree of financial market openness. As in table 12, the coefficients on financial openness in table 13 are again positive. Although they are less strikingly significant than the linear financial openness coefficients, they nonetheless indicate that large changes in trilemma policies are found more often in economies that are relatively open financially. It is only here among the emerging economies that we find financial openness to be associated with trilemma instability.

6 Conclusions

Underlying this paper is a willingness to take the constraint of the classic, open-economy trilemma seriously and to draw out some of its implications for empirical work on exchange rate arrangements. It is the simple geometry of the trilemma that provides us with a univariate gauge of the stability of a country's multidimensional exchange rate policies. Given existing measures of exchange rate stability and international financial openness, it is the trilemma's constraint that provides us with an implicit gauge of monetary sovereignty. It is the trilemma's policy space that allows us to characterize exchange rate arrangements in terms of their semblance to definitive policy archetypes.

Using the trilemma, we assess the stability of exchange rate arrangements in the mod-

ern era. We find that the policy combinations embracing exchange rate flexibility are the least stable overall. However, the exchange rate by itself matters less in emerging economies, where financial openness is more tightly linked with instability. Looking at foreign exchange reserves, we find that they come with greater policy stability only in poor countries.

Throughout the world, most countries now blend the trilemma's three objectives. That is, countries are typically located roughly in the middle, rather than at the poles, of the trilemma policy space. There, they display a substantial, but incomplete degree of monetary sovereignty. In the modern era, a floating exchange rate, with its correspondingly high monetary sovereignty and high financial openness, remains both relatively unstable and relatively uncommon.

Table 6: OLS Estimates – Low Income Economies

	No Effects		**Country Effects**		**Time Effects**		**Country & Time Effects**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−0.077	−0.273	−0.078	−0.234	−0.149	−0.343	−0.089	−0.303
	(0.165)	(0.060)***	(0.197)	(0.073)***	(0.166)	(0.065)***	(0.199)	(0.081)***
	(0.181)	*(0.062)****	*(0.208)*	*(0.070)****	*(0.191)*	*(0.075)****	*(0.208)*	*(0.094)****
Exchange Rate Stability	−0.035		0.000		−0.040		−0.001	
	(0.017)**		(0.020)		(0.018)**		(0.021)	
	(0.231)		*(0.022)*		*(0.025)*		*(0.027)*	
Financial Openness	−0.082		−0.055		−0.090		−0.057	
	(0.027)***		(0.038)		(0.027)***		(0.038)	
	*(0.021)****		*(0.034)*		*(0.023)****		*(0.039)*	
Res. (%GDP) × E. R. S.	−0.432		−0.297		−0.424		−0.345	
	(0.181)**		(0.208)		(0.179)**		(0.207)*	
	*(0.182)***		*(0.203)*		*(0.184)***		*(0.196)**	
Res. (%GDP) × Fin. Op.	0.445		0.249		0.435		0.129	
	(0.225)**		(0.293)		(0.222)**		(0.292)	
	*(0.258)**		*(0.263)*		*(0.267)*		*(0.293)*	
China Archetype		0.000		−0.000		0.003		0.003
		(0.009)		(0.010)		(0.009)		(0.010)
		(0.011)		*(0.010)*		*(0.011)*		*(0.010)*
Hong Kong Archetype		−0.057		−0.029		−0.045		−0.016
		(0.037)		(0.044)		(0.037)		(0.044)
		*(0.027)***		*(0.030)*		*(0.025)**		*(0.029)*
U.S. Archetype		0.029		0.020		0.024		0.017
		(0.015)*		(0.017)		(0.015)		(0.017)
		(0.018)		*(0.017)*		*(0.020)*		*(0.017)*
Constant	0.158	0.117	0.127	0.114	0.249	0.181	0.176	0.149
	(0.014)***	(0.009)***	(0.017)***	(0.009)***	(0.033)***	(0.031)***	(0.034)***	(0.030)***
	*(0.016)****	*(0.013)****	*(0.018)****	*(0.008)****	*(0.057)****	*(0.047)****	*(0.056)****	*(0.043)****
F (OLS)	15.27***	6.82***	3.19***	3.15**	3.92***	2.55***	2.33***	2.24***
F (Clustered)	25.38***	7.21***	3.35**	4.23***				

Notes: The dependent variable is the norm implied by the trilemma. The regressors are lagged one period, and "E.R.S." refers to exchange rate stability. OLS standard errors are in parentheses, and cluster-robust errors are reported in italics underneath.

Table 7: Probit Estimates – Low Income Economies

	Panel A		**Panel B**		**Panel C**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−2.939	−3.438	−2.939	−3.438	−2.976	−3.489
	(2.659)	(0.929)***	(2.557)	(0.881)***	(2.804)	(0.989)***
Exchange Rate Stability	0.283		0.283		0.358	
	(0.226)		(0.208)		(0.247)	
Financial Openness	−0.709		−0.709		−0.666	
	(0.380)*		(0.323)**		(0.412)	
Res. (%GDP) × E. R. S.	−3.120		−3.120		−3.239	
	(2.946)		(2.723)		(3.084)	
Res. (%GDP) × Fin. Op.	5.137		5.137		5.261	
	(3.369)		(2.961)*		(3.615)	
China Archetype		0.325		0.325		0.334
		(0.129)**		(0.151)**		(0.134)**
Hong Kong Archetype		−0.081		−0.081		−0.041
		(0.532)		(0.139)		(0.560)
U.S. Archetype		0.374		0.374		0.396
		(0.195)*		(0.193)**		(0.204)**
Constant	−1.018	−1.259	−1.018	−1.259	−1.081	−1.275
	(0.188)***	(0.128)***	(0.164)***	(0.135)***	(0.211)***	(0.139)***
LR	20.99***	22.96***	20.02***	38.14***	19.00***	21.10***

Notes: The dependent variable is a discrete variable taking the value 1 if the norm is in the last decile (value greater than 0.2721) and 0 otherwise. The regressors are lagged one period. Standard errors are in parentheses. Panel A reports simple probit estimates; Panel B reports estimates with cluster-robust errors; and Panel C reports estimates from a probit with random effects.

Table 8: OLS Estimates – Middle Income Economies

	No Effects		**Country Effects**		**Time Effects**		**Country & Time Effects**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	0.005	−0.024	0.138	0.019	−0.005	−0.014	0.134	0.038
	(0.056)	(0.022)	(0.072)*	(0.035)	(0.056)	(0.023)	(0.073)*	(0.040)
	(0.059)	*(0.039)*	*(0.078)**	*(0.038)*	*(0.057)*	*(0.040)*	*(0.074)**	*(0.035)*
Exchange Rate Stability	−0.094		−0.060		−0.100		−0.059	
	(0.124)***		(0.015)***		(0.013)***		(0.016)***	
	*(0.018)****		*(0.028)***		*(0.018)****		*(0.025)***	
Financial Openness	−0.005		−0.015		−0.007		−0.022	
	(0.014)		(0.019)		(0.014)		(0.019)	
	(0.024)		*(0.034)*		*(0.025)*		*(0.036)*	
Res. (%GDP) × E. R. S.	−0.116		−0.167		−0.090		−0.153	
	(0.071)		(0.091)*		(0.071)		(0.092)*	
	(0.077)		*(0.120)*		*(0.078)*		*(0.117)*	
Res. (%GDP) × Fin. Op.	0.099		−0.029		0.118		0.009	
	(0.073)		(0.090)		(0.072)		(0.090)	
	(0.100)		*(0.101)*		*(0.101)*		*(0.106)*	
China Archetype		−0.021		−0.010		−0.018		−0.003
		(0.007)***		(0.008)		(0.007)**		(0.008)
		*(0.008)***		*(0.010)*		*(0.009)***		*(0.009)*
Hong Kong Archetype		−0.052		−0.054		−0.049		−0.043
		(0.011)***		(0.014)***		(0.011)***		(0.014)***
		*(0.017)****		*(0.019)****		*(0.017)****		*(0.020)***
U.S. Archetype		0.056		0.027		0.060		0.031
		(0.012)***		(0.013)**		(0.012)***		(0.013)**
		*(0.017)****		*(0.018)*		*(0.167)****		*(0.017)**
Constant	0.181	0.126	0.156	0.118	0.259	0.174	0.121	0.074
	(0.010)***	(0.006)***	(0.012)***	(0.007)***	(0.025)***	(0.023)***	(0.026)***	(0.023)***
	*(0.014)****	*(0.010)****	*(0.017)****	*(0.007)****	*(0.035)****	*(0.029)****	*(0.022)****	*(0.020)****
F (OLS)	28.59***	16.44***	9.14***	6.37**	5.66***	3.66***	3.34***	2.92***
F (Clustered)	16.28***	9.02***	5.06**	3.30**	12.22***	14.22***	11.07***	12.90***

Notes:

Notes: The dependent variable is the norm implied by the trilemma. The regressors are lagged one period, and "E.R.S." refers to exchange rate stability. OLS standard errors are in parentheses, and cluster-robust errors are reported in italics underneath.

Table 9: Probit Estimates – Middle Income Economies

	Panel A		**Panel B**		**Panel C**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−0.688	−0.317	−0.688	−0.317	0.076	−0.233
	(0.680)	(0.264)	(0.753)	(0.328)	(0.813)	(0.359)
Exchange Rate Stability	−0.221		−0.221		−0.159	
	(0.139)		(0.169)		(0.159)	
Financial Openness	−0.259		−0.259		−0.340	
	(0.158)		(0.213)		(0.196)*	
Res. (%GDP) × E. R. S.	−0.657		−0.657		−1.131	
	(0.855)		(1.011)		(0.998)	
Res. (%GDP) × Fin. Op.	1.849		1.849		1.103	
	(0.855)**		(1.202)		(1.016)	
China Archetype		0.026		0.026		0.070
		(0.078)		(0.078)		(0.091)
Hong Kong Archetype		−0.122		−0.122		−0.197
		(0.126)		(0.180)		(0.149)
U.S. Archetype		0.337		0.337		0.236
		(0.126)***		(0.142)**		(0.135)*
Constant	−1.005	−1.274	−1.005	−1.274	−1.148	−1.405
	(0.111)***	(0.069)***	(0.137)***	(0.079)***	(0.145)***	(0.102)***
LR	15.31***	11.18**	8.69	8.65*	10.77*	7.57

Notes: The dependent variable is a discrete variable taking the value 1 if the norm is in the last decile (value greater than 0.304) and 0 otherwise. The regressors are lagged one period. Standard errors are in parentheses. Panel A reports simple probit estimates; Panel B reports estimates with cluster-robust errors; and Panel C reports estimates from a probit with random effects.

Table 10: OLS Estimates – High Income Economies

	No Effects		**Country Effects**		**Time Effects**		**Country & Time Effects**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−0.011	0.016	−0.150	−0.027	0.005	0.027	−0.016	−0.004
	(0.044)	(0.017)	(0.072)**	(0.039)	(0.042)	(0.016)*	(0.068)**	(0.038)
	(0.052)	*(0.019)*	*(0.072)***	*(0.072)*	*(0.057)*	*(0.019)*	*(0.095)**	*(0.084)*
Exchange Rate Stability	−0.084		−0.098		−0.083		−0.122	
	(0.014)***		(0.020)***		(0.013)***		(0.020)***	
	*(0.023)****		*(0.042)***		*(0.018)****		*(0.030)****	
Financial Openness	−0.022		−0.041		−0.003		0.024	
	(0.011)**		(0.016)**		(0.011)		(0.018)	
	(0.017)		*(0.028)*		*(0.015)*		*(0.024)*	
Res. (%GDP) × E. R. S.	−0.050		0.086		−0.075		0.087	
	(0.076)		(0.097)		(0.073)		(0.093)	
	(0.116)		*(0.138)*		*(0.103)*		*(0.111)*	
Res. (%GDP) × Fin. Op.	0.086		0.183		0.099		0.216	
	(0.046)*		(0.070)***		(0.044)**		(0.067)***	
	(0.064)		*(0.151)*		*(0.061)*		*(0.121)**	
China Archetype		−0.053		−0.043		−0.054		−0.055
		(0.008)***		(0.011)***		(0.008)***		(0.011)***
		*(0.014)****		*(0.017)***		*(0.011)****		*(0.014)****
Hong Kong Archetype		−0.081		−0.106		−0.065		−0.081
		(0.007)***		(0.011)***		(0.007)***		(0.012)***
		*(0.010)****		*(0.016)****		*(0.011)****		*(0.016)****
U.S. Archetype		−0.014		−0.002		−0.004		0.013
		(0.010)		(0.011)		(0.010)		(0.011)
		(0.015)		*(0.018)*		*(0.014)*		*(0.016)*
Constant	0.158	0.122	0.178	0.131	0.166	0.128	0.181	0.131
	(0.011)***	(0.005)***	(0.014)***	(0.007)***	(0.023)***	(0.021)***	(0.024)***	(0.022)***
	*(0.014)****	*(0.006)****	*(0.017)****	*(0.010)****	*(0.022)****	*(0.021)****	*(0.033)****	*(0.026)****
F (OLS)	16.96***	33.33***	9.95***	27.26***	6.89***	7.48***	6.03***	6.45***
F (Clustered)	8.52***	20.50***	6.32***	15.03***	90.05***	54.54***	152.76***	147.61***

Notes:

Notes: The dependent variable is the norm implied by the trilemma. The regressors are lagged one period, and "E.R.S." refers to exchange rate stability. OLS standard errors are in parentheses, and cluster-robust errors are reported in italics underneath.

Table 11: Probit Estimates – High Income Economies

	Panel A		**Panel B**		**Panel C**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−0.331	0.041	−0.331	0.041	−0.475	−0.010
	(0.736)	(0.261)	(0.734)	(0.235)	(0.796)	(0.312)
Exchange Rate Stability	−0.114		−0.114		−0.145	
	(0.209)		(0.260)		(0.223)	
Financial Openness	−0.258		−0.258		−0.277	
	(0.166)		(0.215)		(0.179)	
Res. (%GDP) × E. R. S.	−0.782		−0.782		−0.675	
	(1.162)		(1.341)		(1.215)	
Res. (%GDP) × Fin. Op.	1.217		1.217		1.327	
	(0.731)*		(0.723)*		(0.799)*	
China Archetype		−0.419		−0.419		−0.424
		(0.135)***		(0.172)**		(0.142)***
Hong Kong Archetype		−0.487		−0.487		−0.546
		(0.125)***		(0.153)***		(0.140)***
U.S. Archetype		−0.200		−0.200		−0.172
		(0.149)		(0.215)		(0.157)
Constant	−1.042	−1.096	−1.042	−1.096	−1.032	−1.108
	(0.162)***	(0.072)***	(0.153)***	(0.072)***	(0.173)***	(0.083)***
LR	5.23	21.35***	5.50	14.69***	5.29	22.24***

Notes: The dependent variable is a discrete variable taking the value 1 if the norm is in the last decile (value greater than 0.242) and 0 otherwise. The regressors are lagged one period. Standard errors are in parentheses. Panel A reports simple probit estimates; Panel B reports estimates with cluster-robust errors; and Panel C reports estimates from a probit with random effects.

Table 12: OLS Estimates – Emerging Economies

	No Effects		**Country Effects**		**Time Effects**		**Country & Time Effects**	
	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II	Spec. I	Spec. II
Reserves (%GDP)	−0.080	−0.118	−0.025	−0.135	−0.045	−0.017	0.060	0.036
	(0.193)	(0.734)	(0.214)	(0.091)	(0.206)	(0.088)	(0.243)	(0.137)
	(0.221)	*(0.096)*	*(0.211)*	*(0.125)*	*(0.234)*	*(0.073)*	*(0.220)*	*(0.150)*
Exchange Rate Stability	−0.028		−0.039		−0.048		−0.060	
	(0.030)		(0.033)		(0.032)		(0.036)*	
	(0.046)		*(0.058)*		*(0.042)*		*(0.059)*	
Financial Openness	0.117		0.120		0.115		0.115	
	(0.035)***		(0.047)**		(0.035)***		(0.048)**	
	*(0.037)****		*(0.093)*		*(0.035)****		*(0.101)*	
Res. (%GDP) × E. R. S.	0.086		0.036		0.151		0.105	
	(0.237)		(0.252)		(0.239)		(0.256)	
	(0.316)		*(0.308)*		*(0.288)*		*(0.246)*	
Res. (%GDP) × Fin. Op.	−0.330		−0.486		−0.248		−0.259	
	(0.262)		(0.330)		(0.261)		(0.329)	
	*(0.162)**		*(0.362)*		*(0.159)*		*(0.372)*	
China Archetype		−0.029		−0.026		−0.027		−0.029
		(0.014)**		(0.017)		(0.014)*		(0.019)
		*(0.012)***		*(0.018)*		*(0.012)***		*(0.017)*
Hong Kong Archetype		0.045		0.039		0.051		0.047
		(0.029)		(0.034)		(0.029)*		(0.034)
		(0.049)		*(0.058)*		*(0.056)*		*(0.070)*
U.S. Archetype		0.063		0.054		0.076		0.069
		(0.023)***		(0.024)**		(0.023)***		(0.025)***
		*(0.033)**		*(0.040)*		*(0.032)***		*(0.041)*
Constant	0.128	0.152	0.137	0.154	0.186	0.241	0.114	0.264
	(0.021)***	(0.014)***	(0.025)***	(0.016)***	(0.048)***	(0.042)***	(0.046)**	(0.042)***
	*(0.024)****	*(0.017)****	*(0.026)****	*(0.018)****	*(0.071)***	*(0.082)****	*(0.033)****	*(0.071)****
F (OLS)	3.71***	5.38***	2.09*	2.90**	2.02***	2.19***	1.82***	1.93***
F (Clustered)	6.60***	5.01***	1.13	2.14				

Notes:

Notes: The dependent variable is the norm implied by the trilemma. The regressors are lagged one period, and "E.R.S." refers to exchange rate stability. OLS standard errors are in parentheses, and cluster-robust errors are reported in italics underneath.

Table 13: Probit Estimates – Emerging Economies

	Panel A		**Panel B**		**Panel C**	
	Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Reserves (%GDP)	−1.667	−1.013	−1.667	−1.013	−1.654	−1.189
	(2.186)	(0.833)	(2.670)	(1.154)	(2.254)	(0.907)
Exchange Rate Stability	0.264		0.264		0.232	
	(0.306)		(0.406)		(0.312)	
Financial Openness	0.664		0.664		0.689	
	(0.338)*		(0.211)***		(0.372)*	
Res. (%GDP) × E. R. S.	1.671		1.671		1.701	
	(2.490)		(2.576)		(2.525)	
Res. (%GDP) × Fin. Op.	−1.561		−1.561		−1.923	
	(2.782)		(3.019)		(2.975)	
China Archetype		−0.158		−0.158		−0.166
		(0.160)		(0.145)		(0.168)
Hong Kong Archetype		0.508		0.508		0.485
		(0.259)**		(0.386)		(0.280)*
U.S. Archetype		0.353		0.353		0.344
		(0.223)		(0.226)		(0.229)
Constant	−1.522	−1.191	−1.522	−1.191	−1.527	−1.198
	(0.230)***	(0.153)***	(0.288)***	(0.192)***	(0.244)***	(0.166)***
LR	11.07**	10.76**	16.96***	9.43**	8.90	8.96*

Notes: The dependent variable is a discrete variable taking the value 1 if the norm is in the last decile (value greater than 0.2721) and 0 otherwise. Regressors are lagged one period. Standard errors are in parentheses. Panel A reports simple probit estimates; Panel B reports estimates with cluster-robust errors; and Panel C reports estimates from a probit with random effects.

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