

To Have or to Hoard? The Political Economy of International Reserves*

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Abstract:

We study the political economy of international reserve holdings in the developing world. We argue that political institutions channel two types of domestic pressures for reserve accumulation—precautionary and mercantilist—but in distinctly different ways. Democratic institutions heighten the impact of mercantilist pressures, while authoritarian institutions heighten the impact of precautionary pressures. We provide evidence consistent with these hypotheses using data from eighty-two developing countries. Confronting the view that China’s reserve holdings are “excessive” or “worrisome,” we also show that given its political institutions and economic policies, China’s reserve holdings are not aberrant when compared to other developing countries.

I. Introduction

China’s holding of US currency has caught the attention of both academic and policymaking communities. And with good reason: estimates place the size of Chinese dollar reserves in 2007 at over a trillion dollars, representing nearly a ten-fold increase from 1997. While size of US dollar holdings by the Chinese monetary authority is staggering, this behavior is not. All countries engaged in international trade and investment hold some quantity of foreign currency in order to pay for imports and to service debt. The necessity to hold foreign currency reserves increases, moreover, when a country pegs their exchange rate to that of another country.

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As an emerging market economy embracing international trade, China is far from alone in amassing foreign exchange reserves. What has caught the attention of observers is not the day-to-day behavior of central bankers, but rather the magnitude of reserve holdings among and across emerging economies. A number of analysts worry about what the consequences of this “hoarding” of international reserves may be. While some have expressed concerns that countries with large reserves may dump currency, potentially destabilizing global currency markets, others recognize that reserves can serve to insulate the domestic economy from exogenous shocks to its financial system. Still others argue that stockpiled reserves give some policymakers an unfair competitive advantage in foreign trade by allowing them to undervalue their countries’ exchange rates.

All politicians—whether popularly elected or ruling by decree—wish to protect their economies from exogenous shocks and to support exports. Holding foreign exchange reserves can help to accomplish both goals, yet we know little about the political factors that motivate policymakers to accumulate foreign exchange. Existing scholarship points to economic characteristics of a country—whether it has a fixed or floating exchange rate regime, the extent to which its capital markets are open to foreign investment, its level of financial development, its exposure to trade, etc. What is missing is an understanding of the political environment surrounding these choices. We argue that the accumulation of foreign exchange reserves—the decision to hold or to hoard—is a function of the incentives of policymakers, incentives that vary depending on how political institutions aggregate societal preferences in their countries.

More precisely, we argue that policymakers in democracies and in autocracies face different incentives when it comes to international economic policies, and that these

differences that result in observable variation in the accumulation of reserves. Democratic institutions compel policymakers to take into consideration the interests of diffuse interest groups to a greater extent than do authoritarian institutions, while the opposite is true regarding the interests of concentrated interest groups. We do not, however, believe that political institutions alone tell the whole—or even most of the—story. Rather, we argue that the effect of political institutions is conditioned by domestic and international economic conditions. Policymakers in democracies, for example, act differently depending on whether the exchange rate regime is fixed or floating, whether the capital market is opened or closed, and whether the exchange rate is undervalued or overvalued.

Specifically, we show that when facing economic conditions that have the potential to harm concentrated interest groups, leading them to demand the policy goals that reserve accumulation can provide, authoritarian regimes will accumulate more foreign reserves than democratic regimes. When facing economic conditions that may benefit diffuse interest groups, leading them to demand the policy goals that reserve accumulation can provide, democratic regimes will accumulate more foreign reserves than authoritarian regimes. Financial openness, financial development, and pegged and/or undervalued exchange rates—which put a relatively small group of financial sector actors at the highest risk for externally-induced economic crises—incentivize authoritarian regimes to accumulate foreign reserves at a higher rate than democratic regimes. By contrast, export exposure—which expose a relatively large group of actors in the tradeable sector (both firm owners and their employees) to the global economy—incentivize democratic leaders to accumulate foreign reserves at a higher rate than autocratic regimes.

Beyond opening the topic of international reserve holdings to systematic study by political scientists, our findings demonstrate that domestic political institutions have predictable effects on the propensity of developing country governments to hoard international reserves. Yet these effects are not simple or direct: they are more subtle, and conditional on the economic conditions that the country faces. More broadly, our argument yields new insights into the strategies that governments use to accommodate their constituents when engaging with the international economy. Analysts have long understood how opening to the international economy produces accommodationist welfare and industrial policies to compensate those constituents who are most vulnerable to the vagaries of international markets (Katzenstein 1985; Rodrik 1998; Rudra and Haggard 2005). We show that political institutions shape *how* regimes globalize, influencing a key method that regimes employ to ensure that globalization “works” in their interests. In the next section we develop our argument and hypotheses through a critical review of the literature. Section three describes the data and methods used to test our hypotheses and section four presents our empirical result. In section five we discuss the implications of our findings—especially as they pertain to China—and show through counterfactual simulations how different hypothetical changes to China’s economy and polity would affect its level of reserve holdings. Section six concludes.

II. The Argument

International reserves constitute a key component of international trade and investment. Exporters prefer to be paid in their own currency, and international investors require the currency of the country where the investment is located. Central bankers that are managing a pegged exchange rate must hold the currency of the country to which they

are pegged. The opening of capital markets coupled with the move to floating exchange rate regimes led a number of scholars to ask why reserves are held, given the social costs associated with the holding of foreign exchange reserves (e.g., Rodrik 2006). The question is not about the quantity of reserves, per se, but when and why do countries hold reserves in excess of what is “optimal.”

Why, then, do we observe larger than optimal levels of reserves? Two interrelated sets of answers appear in the literature.¹ The first suggests that countries hoard reserves for mercantilist reasons—larger stocks of reserves allow for an artificially undervalued exchange rate providing a competitive advantage vis-a-vis a target currency. The second reasons that the rise of international capital market integration makes countries especially vulnerable to exogenous shocks; from this point of view, holding international reserves is a precautionary decision, as reserves provide a measure of insulation from random and capricious international capital flows.²

States have long used mercantilist policies to gain a competitive advantage against their trading partners, and exchange rate undervaluation or competitive devaluation has been key part of that strategy (Eichengreen 1996). In the short run, an undervalued or depreciated exchange rate can bring about a boom in exports and a surge in economic growth and employment. Undervaluation, or any exchange rate policy, has significant distributional consequences as policymakers under- or over-value their exchange rate to serve the interest of a diverse set of constituents.

¹ Aizenman and Lee (2007) provide a review of the economics literature and present a set of empirical tests.

² A third set of arguments suggests that countries hoard reserves in order to gain geopolitical advantage over a (potential) adversary by threatening to dump reserves. In other results (not reported) we find no evidence that strategic considerations explain reserve accumulation when controlling for economic fundamentals.

While an overvalued exchange rate benefits anyone seeking to increase their purchasing power, an undervalued one has a different set of benefits. By decreasing the relative value of domestic currency, undervaluation privileges those involved in the export sector by making exported goods increasingly competitive. Exporters in agricultural or manufacturing sectors, for example, favor exchange rate undervaluation as it makes their products more competitive on global markets (Frieden 1991; 1994).³ Likewise, groups that produce goods that compete with imports also benefit from exchange rate undervaluation as it makes their products relatively less expensive for domestic consumers.

How do policymakers undervalue their exchange rate? In equilibrium, the value of a currency will reflect supply and demand. A government that wants to undervalue their exchange rate relative to another target currency must sell its own currency and buy up the target country's currency, a market strategy that requires holding that target country's currency. States engaged in mercantilist behavior, then, will hold large stores of reserves in order to keep the value of their exchange rate undervalued. While all governments seeking to promote exports and undervalue their currency will accumulate reserves, we expect that democratic institutions will strengthen this effect, for the range of constituents that benefit from an undervalued exchange rate is quite broad, and represents a cross-class alliance between labor and capital in both the export and import-competing sectors.

Mercantilist explanations, however, are alone insufficient when trying to explain the accumulation of reserves in emerging market economies. A number of scholars have argued that central banks hoard reserves for precautionary reasons (e.g., Aizenman and

³ Steinberg (2008) stresses that the preference for undervaluation amongst manufactures is not unambiguous, for oftentimes the manufacturing sector relies on imported inputs.

Lee 2007, Aizenman and Marion 2003, and Cheung and Qian 2007). Countries that are vulnerable to financial crises, so the argument goes, accumulate reserves to signal their commitment to their exchange rate target and to forestall capital account reversals. Such policies, in fact, may be motivated as much by politics as by economics: some systematic evidence finds that financial crises have led to the removal of finance ministers and heads of state (Frankel 2005, Blimes and Leblang 2005).

How does the accumulation of reserves help shield an economy from financial crises? Consider a financially open economy: opening to international financial flows allows an emerging market economy to borrow at relatively low cost on the international market. But opening also means that capital can flee that country rapidly, increasing the likelihood of volatile boom-bust cycles (Tornell et al. 2003) and financial crises (Edwards 2007; Stiglitz 2002). Observing the costs associated with these crises, policymakers that have consciously opened their markets to capital flows also stockpile foreign reserves to serve as a “war chest” that can be used in times of crises.

Ultimately, then, the stockpiling of reserves is a political decision. We argue that political institutions condition the link between capital market openness and the accumulation of foreign exchange reserves. And they do so in two ways. First, because political regimes vary in their responsiveness to constituent demands, some regimes will be more responsive to the concentrated interests that are negatively affected by financial crises. Second, policymakers differ in the extent to which they are held accountable for financial crises, something that also conditions their incentives to accumulate reserves.

Consider first constituent demands. Groups that suffer during financial crises—domestic financial institutions or highly leveraged corporate borrowers—may agitate for

political reform or even for political change. These groups, while favoring open capital markets because they provide access to international capital, dislike volatile capital flows, the extremes of which are sudden stops and capital account reversals (Pepinsky 2008). Because corporate borrowers and domestic financiers prefer a stable open capital account to either closure or openness with volatility, they will advocate for the accumulation of international reserves in order to shield their economies from exogenous economic shocks.

Financial sector interests are not the only ones who are affected by financial crises. Certainly producer and consumer groups are harmed as well, but the benefits associated with reserve accumulation are overwhelmingly concentrated, targeting the financial sector in particular. By contrast, the costs of precautionary reserve accumulation are general and diffuse. This means that political institutions should play a central role in affecting how capital account openness and financial development influence the accumulation of international reserves. Authoritarian regimes are more susceptible to capture by organized business interests than democratic regimes, and for this reason stand to suffer more from the discontent of these organized interests than politicians in democracies, for whom the primary method of sanction is at the ballot box. And, it is precisely those autocracies that have opened their economies to international capital that are supported by business and financial interests.⁴

Financial vulnerability also influences the link between political institutions and reserve accumulation. Here, the causal link runs not through constituent interests, but rather through the office-maximizing incentives of policymakers. While the evidence is mixed, empirical studies find that democratic countries are less likely to experience

⁴ Southeast Asian economies such as Indonesia, Malaysia and Singapore prior to the Asian financial crisis are examples as are Singapore and the United Arab Emirates today.

currency and banking crises (Block 2003; Jo 2003; Francis 2003). If autocracies are more vulnerable to crises than are democracies, then they should have a greater incentive, all else equal, to accumulate foreign exchange reserves. But authoritarian regimes should especially be motivated to do so when other economic policies increase the risk of externally-generated crises: when financial sectors are large or open, and when exchange rates are pegged or misaligned. Indeed, strategic reserving hoarding by authoritarian regimes may explain the findings of Leblang and Satyanath (2006, 2008) that regime type has no effect on the probability that a country will experience a currency crisis.

To be clear: we anticipate that all countries hold reserves, and that those with open capital markets, pegged and/or misaligned exchange rates, and more developed financial sectors will be likely to hold increasingly large amounts as self-protection against international financial crises. But since autocracies provide more political access to organized business groups who favor stable financial flows, and because autocrats may be more vulnerable to externally-generated economic crises, they have a greater incentive to hoard reserves than democracies when facing similar financial conditions.

From this review, we provide five pairs of hypotheses about the relationships between political institutions and economic conditions, on one hand, and reserve holdings, on the other.

Hypothesis 1A (Capital Openness): Countries with more open capital accounts should accumulate more international reserves than countries with closed capital accounts.

Hypothesis 1B (Capital Openness Conditional on Regime Type): Countries with more open capital accounts should accumulate more international reserves than countries with closed capital accounts, and this association should be stronger in authoritarian regimes than in democratic regimes.

Hypothesis 2A (Exchange Rate Regime): Countries with pegged exchange rates should accumulate more international reserves than countries with floating exchange rates.

Hypothesis 2B (Exchange Rate Regime Conditional on Regime Type): Countries with pegged exchange rates should accumulate more international reserves than countries with floating exchange rates, and this association should be stronger in authoritarian regimes than in democratic regimes.

Hypothesis 3A (Financial Development): Countries with large domestic financial sectors should accumulate more international reserves than countries with less developed domestic financial sectors.

Hypothesis 3B (Financial Development Conditional on Regime Type): Countries with large domestic financial sectors should accumulate more international reserves than countries with less developed domestic financial sectors, and this association should be stronger in authoritarian regimes than in democratic regimes.

Hypothesis 4A (Currency Misalignment): The degree to which a country's currency is undervalued relative to an anchor currency should be positively associated with its holdings of international reserves.

Hypothesis 4B (Currency Misalignment Conditional on Regime Type): The degree to which a country's currency is undervalued relative to an anchor currency should be positively associated with its holdings of international reserves, and this association should be stronger in authoritarian regimes than in democratic regimes.⁵

Hypothesis 5A (Export Orientation): The size of a country's export sectors should be positively associated with its holdings of international reserves.

Hypothesis 5B (Export Orientation Conditional on Regime Type): The size of a country's export sectors should be positively associated with its holdings of international reserves, and this association should be stronger in democratic regimes than in authoritarian regimes.

III. Sample, Methods, and Data

⁵ Note that this hypothesis presumes that once we take into account export orientation (see hypotheses 5A and 5B), currency misalignment is more a threat to narrow financial interests than it is a sop to broad export sectors.

We test our hypotheses on a set of emerging and developing countries over the period 1970-2004.⁶ We exclude dollarized economies and countries in monetary unions, as these countries have statutory rules mandating the quantity of reserves that need to be held. This leaves us with an unbalanced sample of 82 developing countries.

Theoretically, we are interested in the extent to which political institutions modify the effect of economic conditions in influencing a policymaker's decision to accumulate reserves. And we are aware that day-to-day operations in global markets require at least a nominal level of reserves. Accordingly, we use three different dependent variables that capture different dimensions of that choice. Our preferred operationalization of our dependent variable measures the quantity of reserves in terms of the number of months of import coverage. Green and Torgerson (2007) note that most countries use a baseline of three or four months of import coverage; to measure the accumulation of reserves beyond the "optimal" amount, we use the number of months of import coverage minus three. We supplement this baseline dependent variable with two additional ones. The first, reserves as a percentage of gross domestic product, captures the size of a country's foreign exchange reserves adjusted for the size of the economy. Second, countries facing capital flight may attempt to buy up money in circulation with reserves. We therefore construct a measure of reserves to M2 to capture reserve adequacy.

Our baseline model of reserve accumulation includes controls for the size of the economy (log of total gdp using PPP measures), a measure of capital account openness, an indicator coded one for countries with *de facto* fixed exchange rate regimes, a variable for exchange rate misalignment (over or undervaluation) and ratios of M2, exports, and

⁶ Our criterion for selecting "developing" countries was to select all countries whose numeric codes in the IFS database are greater than 199. To this we added Turkey (IFS code 186).

imports to GDP. We use M2/GDP as a measure of financial development; this is consistent with current practice. The ratio of exports to GDP captures export orientation, and we include the ratio of imports to GDP to control for competing import-side pressures on reserve holdings. Our variable of interest is a country's political institutions, which we capture using the combined authoritarianism-democracy index (POLITY2) in the POLITY project. More precise definitions of the variables as well as data sources are contained in the data appendix.

In estimating our models, we take into consideration two features of our data. First, given the time-series cross-sectional nature of our data, we estimate fixed effects regressions to mitigate concerns about unobserved country-specific influences on reserve holdings.⁷ Second, we have good reason to suspect that reserve holdings are highly serially-correlated over time. To account for this, we estimate all models with an AR(1) correction.

IV. Results

In Table 1 we present our primary results. In columns 1 and 2 the dependent variable is reserves in months of imports (less 3) so that positive values indicate excess reserve holding. The results from our baseline model in column 1 are primarily in line with expectations and with the results of prior research. Countries that are larger and have larger export sectors are likely to accumulate larger stores of reserves as are countries with open capital markets and fixed exchange rates, though the effect of capital market policies is weak at best. Countries with undervalued exchange rates also accumulate larger

⁷ A series of likelihood ratio tests finds that fixed effects specifications are superior to both random effects and pooled specifications.

quantities of reserves. We find no statistically significant effect of the ratio of broad money to GDP or of political institutions. Altogether, these results provide strong support for hypotheses 2A, 4A, and 5A above, weak support for hypothesis 1A, and no support for hypothesis 3A.

The fact that political institutions have no statistically significant independent effect on reserve holding is not surprising, as we believe that the effect of institutions is conditional on existing economic conditions. In column 2 of Table 1 we estimate a fully interactive model, and see that political institutions do play an important role in conditioning the relationships between economic fundamentals and international reserve holdings. A joint F-test of the five interaction terms rejects the null that the coefficients are each zero at the 99.9% confidence level ($F(5,1636) = 7.21$). To interpret the substantive effects of each interaction term along with the uncertainty associated with them, we examine to a series of graphs that plot the marginal effect of each economic variable across the possible values of POLITY2. Our methods are based on Brambor et al (2006).

Figure 1 shows the marginal effect of capital account openness on reserve holdings across different values of POLITY2. It shows that the relatively weak unconditional association between capital account openness and reserve accumulation found in column 1 is a consequence of the fact that this relationship is absent in the most democratic regimes, and present in the most authoritarian regimes—as the level of democracy increases, the effect of capital account openness on reserve accumulation disappears. This is loosely consistent with Hypothesis 1B, which holds that the effect of capital account openness on reserve accumulation should be positive in all regimes, but larger in more authoritarian regimes.

In Figure 2, we turn to the marginal effect of a pegged exchange rate on reserve holdings across different values of POLITY2. We find again that democratic institutions have a conditioning effect on the relationship between exchange rate pegs and international reserve holdings. Countries with pegged exchange rates accumulate more foreign reserves than countries without them, but this relationship weakens as regimes become more democratic, so much so that it disappears in the most democratic regimes (while the point estimate of the marginal effect is always positive, its 95% confidence interval includes zero). As above, this is loosely consistent with Hypothesis 2B.

Figure 3 displays the marginal effect of financial development (proxied by the log of broad money as a percentage of GDP) on international reserve holdings across the range of values of POLITY2. We find no support this relationship: across all levels of democracy, there is no significant relationship between financial development and international reserve holdings. These results confirm that the results from column 1, where we found no direct relationship between financial development, remain consistent when we allow financial development's affect to vary across political institutions. We accordingly find no support for Hypothesis 3A or 3B in our models.

Figure 4 shows the marginal effect of currency misalignment on international reserve holdings across the range of values of POLITY2. Our results again demonstrate that political institutions have a conditioning effect on the relationship between currency misalignment and international reserve accumulation. To read this graph, recall that according to our measure of misalignment, negative numbers correspond to currency undervaluation. The results demonstrate that as currencies become more overvalued, countries accumulate lower levels of international reserves, but this effect diminishes at

higher levels of democracy, disappearing altogether at the highest values of POLITY2. This is strong evidence to support Hypothesis 4B.

Finally, we examine the relationship between export orientation and reserve accumulation in Figure 5, which shows the marginal effect of exports on international reserve holdings across the range of values of POLITY2. We find that regardless of a country's political institutions, higher levels of export orientation are associated with higher international reserve holdings. But the magnitude of this relationship increases in more democratic regimes which broadly supports Hypothesis 5B.

Table 2 shows the results of our robustness tests. To ensure comparability across specifications, we estimate these models using the same sample of countries used in Table 1. Columns 1-3 employ our first alternative measure of reserve accumulation, international reserves as a fraction of broad money. These results are largely consistent with those in Table 1—nearly every estimate has the same sign, and while the coefficients on most of the interaction terms are no longer significant, they remain jointly significant at beyond the 99.5% confidence level in two models ($F(5,2008) = 3.78$ for column 2, $F(4,2013) = 4.27$ for column 3) at the 90% confidence level in the remainder ($F(5, 1633) = 2.01$). There are two main exceptions to the pattern of similarity. In columns 1 and 2 of *Table 2*, the relationship between financial development and reserve holdings is negative and significant: the larger the ratio of the log of M2/GDP, the lower the ratio of reserves to M2. This result contradicts nearly every established theory of the relationship between financial sector depth and reserve accumulation, but it is likely an artifact of M2 appearing in the numerator of our independent variable and the denominator of our dependent variable. For this reason, we show results from an additional model that omits financial

development and its interaction with political institutions from the right hand side (column 3).

The second difference in the results using reserves as a fraction of GDP as the dependent variable is the sign of the interaction between currency misalignment and political institutions, which is negative in Table 1 but positive in columns 2, 3, and 5 of *Table 2*. But this interactive effect is quite weak. Graph similar those above (not shown) reveal that all countries with undervalued currencies accumulate higher levels of international reserves, and although the marginal effect of currency misalignment increases slightly in more democratic regimes, its point estimate at the highest value for POLITY2 (10) is well within the 90% confidence interval of the point estimate at the lowest value of POLITY2 (-1). By contrast, graphs of the marginal effects of capital account openness, pegged exchange rates, and exports on reserve holdings as a fraction of M2 across all values of POLITY2 are consistent with those obtained Table 1.

V. Simulations

In this section we focus on the case of China. Our logic for doing so is our desire to place China's reserve holdings in the comparative perspective, as commentators have alleged that China's accumulation of international reserves is particularly troubling. We first provide simple visual diagnostics that examine whether China's reserve holdings are consistent with the theory that we have outlined here. We then turn to counterfactual simulations to explore our estimates of how China's reserve holdings would be affected by simple changes in its economic conditions and political institutions.

In Figure 6 we present three scatterplots, one for each of the main interactive models found in Column 2 of Table 1, Column 2 of Table 2, and Column 5 of Table 2. Each

plots the actual values of our dependent variables ($RESERVES/IMPORTS - 3$, $RESERVES/M2$, and $LN(RESERVES/GDP)$) against the predicted values (\hat{Y}) in the interactive models for the corresponding model with that variable as its dependent variable.

--Figure 6 Here--

In red, we have labelled the years for the observations corresponding to China for all years for which China is available in our sample, up to 2004. So for example, when we see “2004” appear on a graph in red, this corresponds to the observation for China in 2004.

The plots are revealing. When we use our preferred measure of reserves holdings as our dependent variable ($RESERVES/IMPORTS - 3$), we underpredict Chinese reserve holdings in some recent years, but for most years the Chinese observations are predicted about as well as most other countries’ observations. When we use reserves as a fraction of broad money or of GDP as our dependent variable, we find that Chinese reserve holdings are remarkably well-predicted by our model, falling right in the middle of the cloud of observations. To what extent, then, is China’s reserve accumulation unusual, given its political institutions and economic conditions? Our answer is: not very!

Our next task is to ask, given these results, how much China’s reserve holdings would be affected given simple changes in the country’s political and economic conditions. To do this, we show the predicted values of our dependent variables given the values of all independent variables for China in 2004, and from there, change the values of key independent variables to see how they would impact China’s reserve holdings. We focus on several possibilities.

1. An increase in capital account openness to the sample average (in 2000),
2. A floating exchange rate regime,

3. The combination of an increase in capital account openness and a floating exchange rate regime,
4. A decrease in export-orientation to the sample average (in 2000)
5. A currency that is neither under- nor over-valued,
6. The combination of a decrease in export-orientation to the sample average and a currency that is neither under- nor over-valued, and
7. Full democratization, so that in *Polity2* score is 10 (rather than -7).

All results are based on the fully interactive model with *RESERVES/IMPORTS* – 3 as the dependent variable.

Our counterfactuals appear Table 3. The estimated standard errors of the predicted values are rather large, so comparisons of the values should be only tentative, but some interesting patterns emerge regarding the *directions* in which economic and political changes would take China's reserve holdings. Were China to liberalize its capital account, our model predicts that it would hold even more reserves than it currently does. But by combining this with a floating exchange rate (which alone we expect to decrease reserve holdings), we estimate that policymakers would decrease their reserve holdings. By contrast, all else equal, both decreasing exports to our sample mean in 2000 and pegging the exchange rate at full alignment would decrease reserve holdings, either separately or together. The most interesting result, however, is that for full democratization: we predict that net of all interactive effects with economic conditions, full democratization would actually *increase* China's reserve holdings.

VI. Conclusion

The recent accumulation of foreign exchange reserves among developing countries has attracted considerable interest, but scholarly analyses have focused on solely on the economic conditions that these countries face. We argue that politics plays a complex role in this process. The recently observed trend in the accumulation of foreign exchange reserves can be better understood by focusing on how political institutions channel the demands for reserve accumulation that are generated by economic conditions. Combining institutional and interest group level explanations, we find that autocracies exhibit more of a tenancy towards precautionary reserve accumulation, while democracies are more inclined to hoard reserves to support the export sector. While these are differences in degree, we also find that precautionary incentives are absent (statistically speaking) in the most democratic countries. This, we believe, is likely due to the propensity of democracies to adopt fixed exchange rate regimes only when they have the capacity to defend them (Leblang 2003); hence rendering them more credible than pegs adopted by autocracies. We also believe that our finding that the links between capital account openness and currency undervaluation on the one hand, and reserve accumulation on the other, disappear in the most democratic regimes reflects an analogous logic.

That said, our results point in the direction of an increased need for integration and synthesis of scholarship on international economic policies. Our results identify an empirical relationship between reserves, exchange rate policy, trade policy, capital market policy and political institutions, but we have studiously avoided attributing a causal interpretation to these results. Rather, we have shown conditional correlations that are consistent with a number of hypotheses drawn from interest group and institutional theories of policymaking. There are a wide array of findings that link political institutions

to exchange rate misalignment, exchange rate regime choice, capital controls and trade policy. And some of these studies use foreign exchange reserves as an independent variable. Our results suggest that what is needed is a theoretical framework and empirical strategy that treats the exchange rate regime, capital market openness, exchange rate misalignment, trade policy and reserve accumulation as a package of policies that are chosen simultaneously.

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VIII. APPENDIX: DATA SOURCES AND DEFINITIONS

The summary statistics for the data employed in our analysis are found in *Table 4*.

-- *Table 4* here --

Our data are compiled from the following sources. *RESERVES/IMPORTS - 3*, *RESERVES/M2*, $LN(RESERVES/GDP)$, $LN(M2/GDP)$, $LN(EXPORTS/GDP)$, $LN(IMPORTS/GDP)$, and *ECONOMIC SIZE* are all taken from the World Development Indicators online database.

- *RESERVES/IMPORTS - 3* is the sum of international reserves as a fraction of imports, from which we subtracted three to reflect the benchmark rule that countries should hold reserves valued at three months of exports.
- *RESERVES/M2* is the sum of international reserves as a ratio of broad money (M2). $LN(RESERVES/GDP)$ is the natural logarithm of the total reserves as a fraction of gross domestic product (GDP).
- $LN(M2/GDP)$ is the natural logarithm of M2 as a fraction of GDP.
- $LN(EXPORTS/GDP)$ is the natural logarithm of exports of goods and services as a fraction of GDP.
- $LN(IMPORTS/GDP)$ is the natural logarithm of imports of goods and services as a fraction of GDP.
- *ECONOMIC SIZE* is the total size of the country's economy as measured by its GDP in PPP terms.

KAOPEN is Chinn and Ito's (2007) index of capital account openness. *PEG* is a binary variable coded as 1 if a country has a *de facto* exchange rate, from Klein and Shambaugh (2006). *POLITY2* is the Polity2 score from the PolityIV project (2006).

We follow Dollar (1992) and calculate exchange rate misalignment as log difference between the real exchange rate (the nominal exchange rate weighted by that country's consumer price index) and its predicted value (based on a regression of the real exchange rate on per capita GDP). We obtained the nominal exchange rate data from the International Monetary Fund's International Financial Statistics and GDP and price indices from the Penn World Tables, Mark 6.1. Because misalignment is a relative concept (misaligned compared to what?) we evaluate countries' misalignment relative to the target currency as coded by Klein and Shambaugh (2006).

Table 1: Baseline Results

<i>Dependent Variable</i>	(1)	(2)
	<i>Reserves / Imports - 3</i>	
<i>KAOPEN</i>	0.128+ (0.065)	0.157* (0.069)
<i>PEG</i>	0.447**** (0.110)	0.508**** (0.110)
<i>LN(M2/GDP)</i>	0.086 (0.163)	0.096 (0.163)
<i>LN(EXPORTS/GDP)</i>	1.629**** (0.210)	1.738**** (0.210)
<i>MISALIGNMENT</i>	-1.103**** (0.197)	-0.978**** (0.197)
<i>POLITY2</i>	0.022 (0.015)	-0.238** (0.086)
<i>KAOPEN</i> × <i>POLITY2</i>		-0.019* (0.008)
<i>PEG</i> × <i>POLITY2</i>		-0.047** (0.014)
<i>LN(M2/GDP)</i> × <i>POLITY2</i>		0.008 (0.021)
<i>MISALIGNMENT</i> × <i>POLITY2</i>		0.054** (0.020)
<i>LN(EXPORTS/GDP)</i> × <i>POLITY2</i>		0.085**** (0.019)
<i>LN(IMPORTS/GDP)</i>	-2.916**** (0.221)	-2.996**** (0.220)
<i>GDP</i>	0.159* (0.071)	0.120+ (0.071)
<i>CONSTANT</i>	1.396**** (0.293)	2.115**** (0.289)
N	1731	1731
Countries	82	82
Adjusted R ²	0.074	0.092

Standard errors in parentheses.

+ = $p < .1$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$, two tailed tests.

Table 2: Robustness Tests

<i>Dependent Variable</i>	(1)	(2)	(3)	(4)	(5)
	<i>Reserves / M2</i>		<i>Ln (Reserves / GDP)</i>		
<i>KAOPEN</i>	0.758 (0.902)	1.653+ (0.960)	1.205 (0.985)	0.072*** (0.019)	0.087**** (0.020)
<i>PEG</i>	4.728** (1.522)	5.167*** (1.533)	5.190*** (1.567)	0.090** (0.033)	0.097** (0.033)
<i>LN(M2/GDP)</i>	-21.119**** (2.264)	-21.039**** (2.269)		0.061 (0.049)	0.07 (0.049)
<i>LN(EXPORTS/GDP)</i>	17.153**** (2.910)	17.597**** (2.931)	18.891**** (2.996)	0.523**** (0.062)	0.537**** (0.063)
<i>MISALIGNMENT</i>	-12.338**** (2.722)	-11.975**** (2.740)	-12.584**** (2.810)	-0.288**** (0.058)	-0.282**** (0.058)
<i>POLITY2</i>	0.08 (0.203)	-2.409* (1.191)	-1.466+ (0.816)	0.002 (0.004)	-2.47E-04 (0.025)
<i>KAOPEN ×</i> <i>POLITY2</i>		-0.381** (0.117)	-0.385** (0.119)		-0.005* (0.002)
<i>PEG ×</i> <i>POLITY2</i>		-0.373+ (0.198)	-0.459* (0.202)		-0.002 (0.004)
<i>LN(M2/GDP) ×</i> <i>POLITY2</i>		0.282 (0.295)			-0.009 (0.006)
<i>MISALIGNMENT ×</i> <i>POLITY2</i>		-0.109 (0.273)	-0.118 (0.279)		-0.004 (0.006)
<i>LN(EXPORTS/GDP) ×</i> <i>POLITY2</i>		0.509+ (0.267)	0.494+ (0.273)		0.009+ (0.006)
<i>LN(IMPORTS/GDP)</i>	-11.866*** (3.067)	-12.195**** (3.072)	-15.532**** (3.121)	-0.118+ (0.065)	-0.133* (0.066)
<i>GDP</i>	3.335*** (0.973)	3.065** (0.981)	0.729 (0.995)	0.02 (0.019)	0.018 (0.019)
<i>CONSTANT</i>	11.893** (4.067)	17.138**** (4.053)	7.870+ (4.099)	0.190* (0.092)	0.225* (0.092)
N	1731	1731	1731	1728	1728
Countries	82	82	82	82	82
Adjusted R ²	0.050	0.057	0.009	0.054	0.056

Standard errors in parentheses.

+ = $p < .1$, * = $p < .05$, ** = $p < .01$, *** = $p < .001$, two tailed tests.

Table 3: Counterfactual Experiments

	Mean	Standard Error
Actual Values (China in 2004)	2.548	(1.582)
If...		
Capital account liberalization to developing country sample average	2.934	(1.585)
Floating Exchange Rate	1.713	(1.585)
Both capital account liberalization and exchange rate float	2.099	(1.582)
Exports decrease to developing country sample average	2.470	(1.584)
No currency misalignment	1.762	(1.578)
Both exports decrease and no misalignment	1.684	(1.578)
Full democratization	3.274	(1.559)

Table 4: Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
<i>RESERVES/IMPORTS - 3</i>	1813	0.960	3.152	-2.957	24.084
<i>RESERVES/M2</i>	1813	37.797	48.833	0.121	534.821
<i>LN(RESERVES/GDP)</i>	1813	2.180	0.930	-2.869	4.740
<i>KAOPEN</i>	1813	-0.263	1.376	-1.725	2.656
<i>PEG</i>	1813	0.327	0.469	0	1
<i>LN(M2/GDP)</i>	1813	3.437	0.633	1.372	9.117
<i>LN(EXPORTS/GDP)</i>	1813	3.233	0.660	1.144	5.368
<i>MISALIGNMENT</i>	1813	-0.156	0.465	-1.913	2.432
<i>POLITY2</i>	1813	1.003	7.288	-10	10
<i>LN (IMPORTS/GDP)</i>	1813	3.423	0.568	1.093	5.226
<i>LN (GDP)</i>	1813	24.451	1.663	20.082	29.564

Figure 1: *The Marginal Effect of Capital Openness on Reserve Holdings, by Political Institutions*

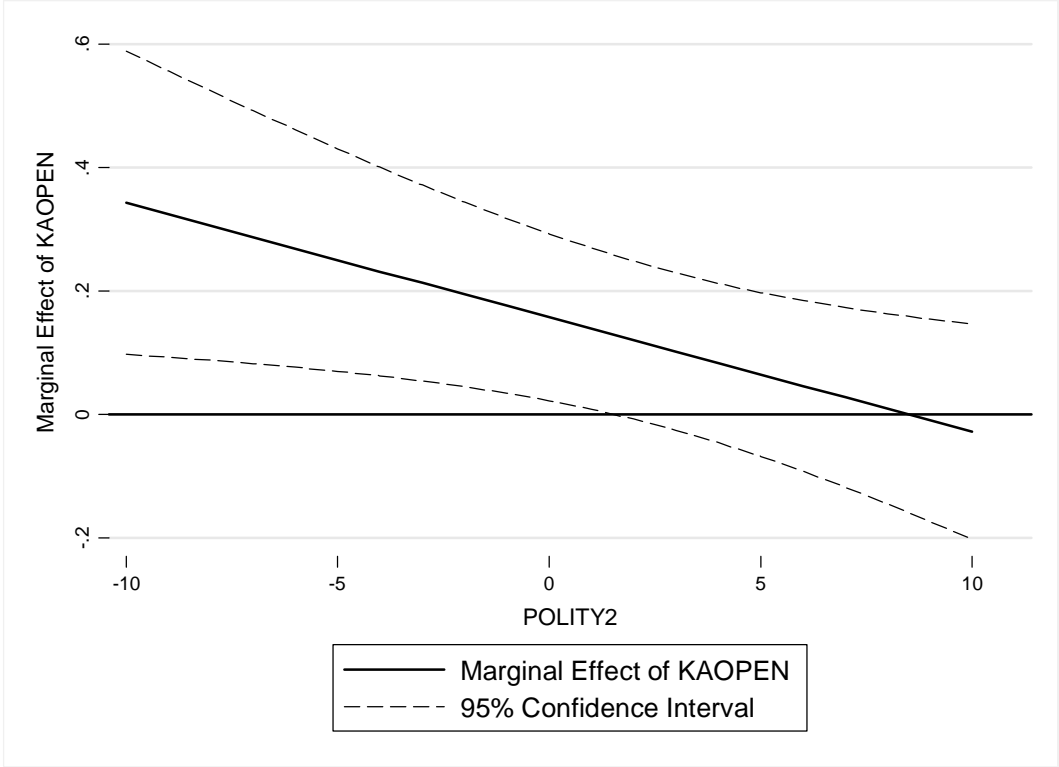


Figure 2: *The Marginal Effect of Pegged Exchange Rates on Reserve Holdings, by Political Institutions*

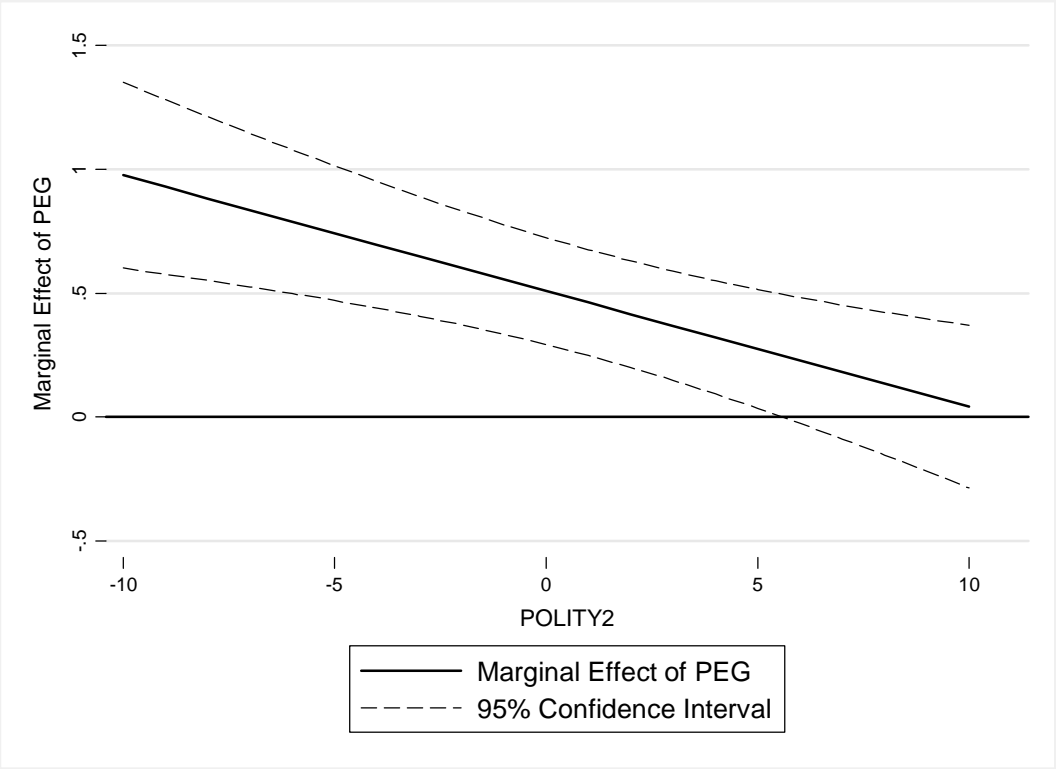


Figure 3: *The Marginal Effect of Financial Development on Reserve Holdings, by Political Institutions*

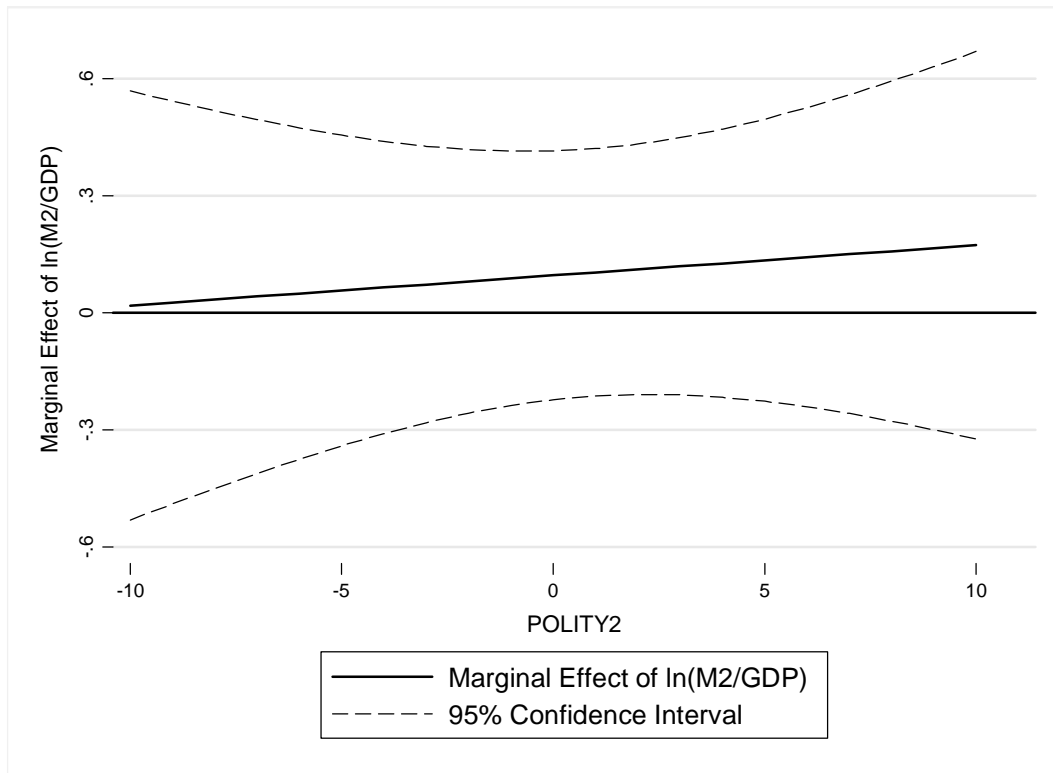


Figure 4: *The Marginal Effect of Currency Misalignment on Reserve Holdings, by Political Institutions*

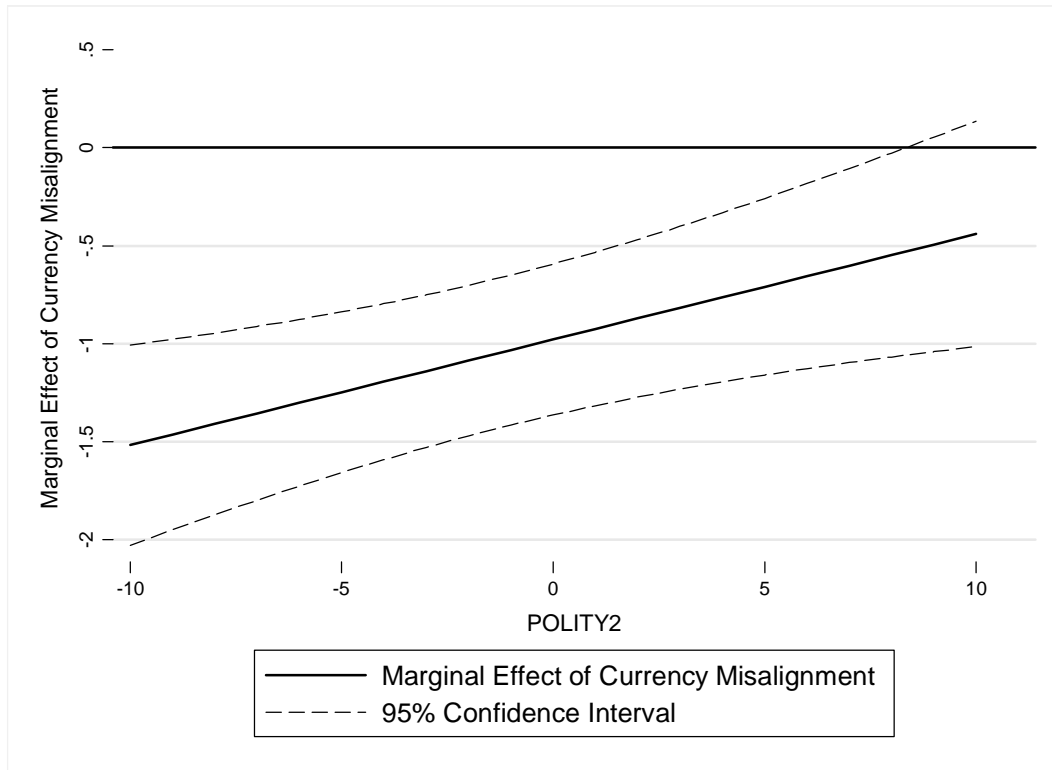


Figure 5: *The Marginal Effect of Exports on Reserve Holdings, by Political Institutions*

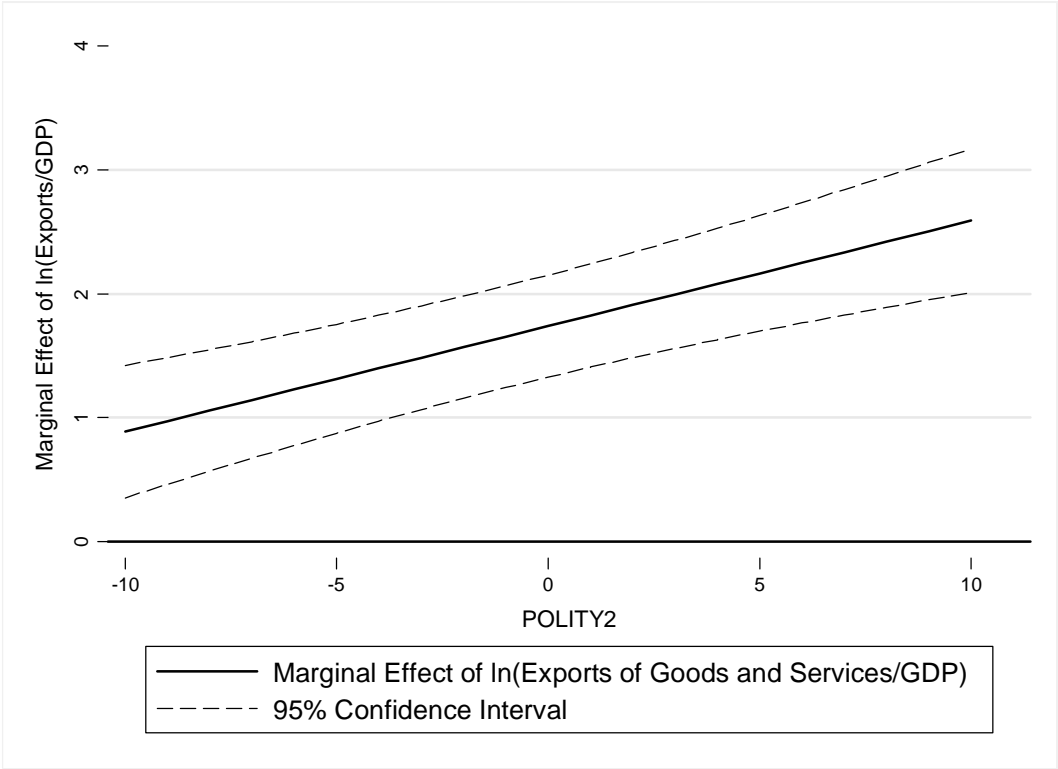


Figure 6: China's Reserve Holdings

