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Working Paper

International reserves and fiscal policy in developing countries

Working Paper, No. 06-18

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Suggested Citation: Zhou, Yan (2007) : International reserves and fiscal policy in developing countries, Working Paper, No. 06-18, University of California, Santa Cruz Institute for International Economics (SCIIE), Santa Cruz, CA

This Version is available at:
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SCCIE WORKING PAPER #06-18
Santa Cruz Center for International Economics
http://sccie.ucsc.edu/

International Reserves and Fiscal Policy in Developing Countries

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Revised in September, 2007

Abstract

This paper investigates empirically the relationship between the pattern of fiscal policy and the demand for international reserves in developing countries, and how this relationship is associated with political risk and conditional access to global capital markets. It finds evidence that for developing countries with low political risk, countercyclical (procyclical) fiscal policies are associated with higher (lower) international reserve holdings in economic downturns. The relationship is stronger when the countries with low political risk rely heavily on external financing. For developing countries with high political risk, the link between reserves holdings and fiscal policy pattern is not clear-cut.

JEL Classification: C23, E62, F34, F41
Key words: international reserves, fiscal policy, political risk

*California State University, Sacramento. Email: yzhou@csus.edu. I would like to thank my advisor Joshua Aizenman for his invaluable guidance and support. I also thank Carlos Végh and Nancy Marion for generously sharing their data. Comments from Airu Cheng, Carlos Dobkin, Michael Dooley, Doireann Fitzgerald, Thorsten Janus, Kenneth Kletzer, Federico Ravenna, Mark Siegler, and Carl Walsh are greatly appreciated. I gratefully acknowledge financial support from the Institute on Global Conflict and Cooperation. All errors are mine.

1 Introduction

Studies have suggested a possible link between international reserve holdings and fiscal policy in many developing countries. According to Buiter and Patel (1997), there is a channel connecting government fiscal stance and international reserves in developing countries. Specifically, formal treatment of government solvency uses the concept of net total liabilities, which, by definition, deducts foreign exchange reserves from total government liabilities in assessing fiscal stance. Put another way, international reserves are assets on governments' balance sheets. For instance, according to an article by Therea Bradley titled "Chavez vows to cut Venezuela debt, use reserves in social fund," published on Bloomberg.com on January 13, 2007, Venezuelan President Hugo Chavez vowed to trim his nation's debt by funneling $8.7 billion of its international reserves from the central bank to a social spending fund.

Besides the fact that fiscal authorities can use international reserves directly to finance fiscal spending, there is an indirect channel through which international reserves and fiscal policy can be related. Hausman et al. (1996) argue that a larger stock of international reserves may increase a government's financial room for maneuver: by raising the probability of an appropriate fiscal response, such reserves may provide the reassurance required to persuade participants in international financial markets to finance the deficits associated with countercyclical fiscal responses to economic shocks. In other words, a larger stock of international reserves may improve a borrowing country's credibility and put the country in a better position to conduct counter-cyclical fiscal policy. Indeed, Calderón and Schmidt-Hebbel (2003) have shown that both monetary and fiscal policies are counter- (pro-)cyclical when credibility is high (low) in Latin America and the Caribbean.

Developing countries are more vulnerable to economic shocks than OECD countries, and their real GDP volatility is much higher (Kaminsky, Reinhart, and Vegh, 2004). For instance, adverse foreign shocks explain a major part of Latin America's growth performance during the 1990s (Calderón and Schmidt-Hebbel, 2003). Governments in developing countries can use international reserves to smooth their economies against adverse shocks (especially when sudden stops occur), giving them the incentives to hoard more precautionary reserves.

Existing theoretical literature has provided a justification for a link between international reserves and fiscal policy. The precautionary motive argument, in particular, implies an association between fiscal policy and optimal international reserve demand by policy makers. Aizenman and Marion (2004) develop a theoretical model in which international reserves and external borrowing are

alternative ways of financing inelastic government spending in cases of costly tax collection and sovereign risk. In that model, international reserves help a country smooth consumption when there is a probability of default and a binding international credit ceiling. A greater chance of opportunistic behavior by future policy makers and political corruption reduce the demand for international reserves and increase external borrowing.

To date, however, no empirical study has integrated fiscal policy into the analysis of demand for international reserves. This paper adds to the literature by empirically investigating the association between fiscal policy and international reserves in developing countries. In addition, it studies how this association is affected by political factors and conditional access to global capital markets. It concludes that for developing countries with low political risk, international reserves and fiscal policy are indeed related: countries conducting countercyclical fiscal policies hold more reserves, whereas countries conducting procyclical fiscal policies hold fewer reserves. This relationship is stronger during economic downturns and when the countries with low political risk rely heavily on external financing. For developing countries with high political risk, the link between international reserves and fiscal policy pattern is not clear-cut.

The paper is organized as follows. Section 2 summarizes the related literature. Section 3 describes the theoretical justification and the methodology. Section 4 presents the results, and Section 5 checks for robustness. Concluding remarks are offered in Section 6.

2 Literature Review

2.1 Theoretical Literature on International Reserves in Developing Countries

2.1.1 Revived Bretton Woods System and Export Promotion: Dooley, Folkerts-Landau, and Garber (2003) argue that the economic emergence of a fixed exchange rate periphery in Asia has reestablished the United States as the center country in the revived Bretton Woods international monetary system. For the Asian countries, i.e. the periphery, development strategy is export-led growth supported by undervalued exchange rates. Thus, a single-minded emphasis on export growth has been supported by a virtually unlimited demand for U.S. financial assets in the form of official reserves. Dooley, Folkerts-Landau, and Garber (2004) extend the argument and state that the U.S. deficit

supplies international collateral[1] to the periphery, and international collateral in turn supports two-way trade in financial assets that liberates capital formation in poor countries from inefficient domestic financial markets.

2.1.2 Precautionary Motives: Aizenman and Marion (2004) argue that apart from any need to hold reserves for exchange-rate management, countries that face conditional access to global capital markets and costly tax collection will hold precautionary reserves to smooth consumption and distortions intertemporally. This helps to explain, to a large extent, the recent accumulation of reserves in Asian countries in the aftermath of financial crises. Aizenman and Marion also show that political instability or corruption could explain why countries decide to reduce the demand for precautionary reserves.

Caballero and Krishnamurthy (2003) add that countries with underdeveloped local securities markets need higher levels of reserves. This is essentially in line with the assumption of conditional access to global capital markets in Aizenman and Marion's (2004) argument.

2.2 Theoretical Literature on Fiscal Policy in Developing Countries

Recent studies suggest that fiscal policy is widely procyclical in developing countries. Gavin and Perotti (1997) point out that fiscal policy is procyclical in many Latin American countries. Later studies by Catao and Sutton (2002), Kaminsky et al. (2004), and Talvi and Vegh (2005) suggest that procyclicality of fiscal policy is common in many other developing countries.

The standard explanation for procyclical fiscal policy relies on borrowing constraints. In bad times, many developing countries cannot borrow, or can borrow only at very high interest rates, so they have to cut government spending. In good times, they can borrow more easily and do so, increasing government spending.

Another explanation for procyclicality in fiscal policy lies in political distortion. Tornell and Lane (1999) identify a "voracity effect": A shock, such as a terms-of-trade windfall, perversely generates a more-than-proportionate increase in fiscal redistribution and reduces growth. They also show that a dilution in the concentration of power leads to faster growth and a less procyclical response to shocks. Alesina and Tabellini (2005) argue that voters demand more public goods or lower taxes to prevent corrupt governments from appropriating political rents when the economy is doing well.

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[1] The empirical counterpart of international collateral is net international reserve position of the periphery country.

2.3 Related Empirical Literature

Frenkel and Jovanovic (1981) originally applied the buffer stock model to the study of international reserves. This model postulates that the reserve authority will choose an initial level of reserve holdings that minimizes its total expected costs, including the opportunity cost of higher forgone earnings and the adjustment cost. The basic goal is to optimize the trade-off between flow holding costs and fixed restocking costs.

Flood and Marion (2002) extend the previous work by scaling the dependent variable and by using a different volatility measure. The authors also add controls for exchange rate flexibility, trade openness, and financial openness. These controls capture country characteristics that might logically affect the adjustment cost in cases of depleted reserves. They use panel data for 36 developed and developing countries over the 1988–97 period. They find that the buffer stock model of international reserve holding works about as well in the era of high capital mobility as it did when capital was less mobile.

Aizenman and Marion (2004) extend the empirical literature by adding political factors into the benchmark buffer stock model. Their results support the notion that political uncertainty and corruption effectively reduce the return to holding international reserves; both uncertainty and corruption therefore are negatively correlated with reserve holdings.

3 Theoretical Justification and Methodology

3.1 Theoretical Justification

The theoretical justification for the relationship between the pattern of fiscal policy and the demand for reserves can be generated from the model in Aizenman and Marion (2004). According to this model, a country characterized by volatile output, inelastic demand for fiscal outlays, high tax collection costs, and sovereign risk will want to accumulate both international reserves and external debt. External debt allows the government to smooth consumption when output is volatile. International reserves, if they are beyond the reach of creditors, allow the government to smooth consumption in the event of a default on external debt that results in lost access to international capital markets. Moreover, by introducing political distortion, the model shows that a

higher perceived probability of future looting by an opportunistic policy maker reduces the current demand for international reserves.

In other words, the theoretical implications of the model are as follows. In the absence of political distortion, a country with volatile output, an inefficient tax collection system, and binding borrowing constraints will try to accumulate more precautionary reserves in order to stabilize its economy. Why? When adverse shocks occur, international reserves held by its central bank provide an alternative source of international liquidity and cushion some of the loss in tax revenue, putting the government in a better position to conduct countercyclical fiscal policies (i.e., higher government spending and lower tax rates during economic downturns). Thus, one would expect that, ex post, if a country with the characteristics mentioned above exhibits a countercyclical fiscal policy during economic downturns, it should have a higher level of reserves compared to others that do not conduct stabilizing fiscal policy. Otherwise, it may not have been able to conduct the countercyclical fiscal policy. This link between the fiscal policy pattern and international reserves during economic downturns will be even stronger if the country relies heavily on external financing: if its reliance on external financing is high, the country generally is believed to have higher sovereign risk than other countries, and hence its borrowing constraint is more likely to be binding during economic downturns. As a result, this country will have a greater incentive to hoard precautionary reserves. Conversely, if such a country exhibits procyclical fiscal policy during economic downturns, it may not have accumulated a stock of international reserves large enough to facilitate its stabilizing policies.

In the presence of political distortion, ceteris paribus, countries with the same characteristics will accumulate fewer international reserves. As the empirical study by Aizenman and Marion (2004) shows, political distortions significantly reduce international reserve holdings. In the presence of political distortion, therefore, the link between international reserves and fiscal policy pattern can be less obvious because of the offsetting effect of political factors.

Developing countries typically have most, if not all, of the characteristics specified in the model. Although the degree of reliance on external financing may vary across developing countries, inefficient tax collection systems, sovereign risk, and volatile output commonly are observed. Therefore, it is interesting to check empirically for the association between fiscal policy patterns and international reserve holdings.

This association may be weakened if a government can resort to other means of financing when it wants to conduct countercyclical fiscal policy during economic downturns. Consider the possible ways a typical developing economy

government finances its countercyclical fiscal spending during economic downturns. One source of financing may be seigniorage revenues. Excessive exploitation of seigniorage revenues, however, often leads to hyperinflation and instability. Thus, this means of financing is not widely adopted.

Second, the government can resort to domestic borrowing. Local securities markets in developing countries, however, are generally underdeveloped, as discussed in the World Economic Outlook, published by IMF. This results in inefficient intermediation of local savings. In most cases, therefore, the government may prefer to borrow directly from domestic banks. Note that during economic downturns, domestic as well as external real interest rates rise, and hence borrowing costs are high. In such cases, international reserves, as assets on the government's balance sheet, may come in handy. In countries characterized by financial repression and high saving rates, it is possible for the domestic interest rate to be low during busts. The link between international reserves and fiscal policy can be weak in such countries, which tend to rely on domestic borrowing during busts. Thus, when applying the model to data, it is necessary to control for domestic borrowing by the government to see if the link between fiscal policy and international reserves disappears.

In sum, according to the theory, the link between fiscal policy and international reserves is expected to have the following pattern. During economic downturns, in developing countries with low or no political distortion, international reserve levels are high if the governments conduct countercyclical fiscal policies and low if the governments conduct procyclical fiscal policies. This relationship may be stronger if these countries rely more heavily on external financing. In developing countries with high political distortion, this link may not be obvious.

3.2 Data and Methodology

3.2.1 Data

The measure of fiscal policy pattern is constructed using government financial statistics data from the International Monetary Fund (IMF). Political risk scores (PRISK) from the International Country Risk Guide (ICRG) are used to gauge the degree of political distortion or risk. According to the ICRG, PRISK has the following components:

POLITICAL RISK COMPONENTS

Sequence	Component	Points (max.)
A	Government Stability	12
B	Socioeconomic Conditions	12
C	Investment Profile	12
D	Internal Conflict	12
E	External Conflict	12
F	Corruption	6
G	Military in Politics	6
H	Religion in Politics	6
I	Law and Order	6
J	Ethnic Tensions	6
K	Democratic Accountability	6
L	Bureaucracy Quality	4
Total		100

Source: International Country Risk Guide Table-3B.

PRISK offers a comprehensive measure of institutional quality and political risk, and therefore serves as a good criterion for distinguishing countries in terms of political distortion[2]. The higher (lower) the total score, the lower (higher) the political risk.

The rest of the data are from International Financial Statistics produced by the IMF and World Development Indicator produced by the World Bank. The original panel data consisted of 132 developing economies over the 1970–2005 period. Missing data reduced the sample to 60 countries over the 1980–2005 period.

A complete list of the countries is given in Table 1. As stressed above, the link between international reserves and fiscal policy pattern may not exist in developing countries with high political distortion. Thus, it is necessary that countries be distinguished according to the level of political distortion. Based on PRISK, the 60 countries were divided into two categories: the low political risk group consists of countries with an above-median PRISK score, and the high political risk group consists of those with a PRISK score below the median.

The theory also suggests that the degree of reliance on external financing may impact the association between international reserves and fiscal policy

[2] For robustness purposes, alternative measures of political risk adopted in other studies also were used: the probability of a government leadership change by constitutional means (LeBlang 2000) and a corruption index constructed by Tanzi and Davoodi at the IMF. The results are similar.

pattern. The sample therefore is further divided into four categories based on high-low political risk and high-low reliance on external financing. The ratio of external debt to GDP, taken from International Financial Statistics, is used to measure the degree of reliance on external financing. Specifically, a 40 percent ratio of external debt to GDP is used as a threshold.[3]

3.2.2 Methodology

The fiscal policy pattern measure for this study, FISCAL, is constructed as the product of the growth rate of real government expenditure and a cycle indicator. The cycle indicator equals 1 if output is above its potential level and –1 if output is below its potential level. Whether output is above or below its potential level is determined by the sign of the cyclical component of HP filtered real GDP: a positive sign indicates a boom, while a negative sign indicates a bust. In cases of countercyclical fiscal policies, the growth rate of real government expenditure is positive in a bust and negative in a boom, so the product, FISCAL, has a negative sign. Similarly, in cases of procyclical fiscal policies, FISCAL has a positive sign. Table 2 gives the summary statistics for FISCAL in all 60 developing countries. As can be seen in the third column, the mean of FISCAL is positive for most developing countries (42 of 60), indicating that, by and large, procyclical fiscal policy is common in developing countries. This finding is consistent with other studies concerned with the fiscal policy pattern in developing countries.

The reasons for constructing the pattern of fiscal policy in this way are as follows. First, as Kaminsky et al. (2004) point out, extreme caution should be exercised in drawing conclusions about fiscal policy cyclicality based either on the primary balance or on tax revenues as a percentage of GDP, government spending as a percentage of GDP, or the primary balance as a percentage of GDP: these are all ambiguous indicators. Instead, they use correlations between government spending (or inflation tax) and the business cycle. A negative correlation between government spending and the business cycle, or a positive correlation between the inflation tax (a proxy for tax rate) and the business cycle indicates a countercyclical fiscal policy. On the other hand, a positive correlation between government spending and the business cycle or a negative correlation between the inflation tax and the business cycle indicates a procyclical fiscal policy. Kaminsky et al. use the inflation tax as a proxy for the tax rate because

[3] As pointed out by Daseking (2002), for nonindustrial countries (except heavily indebted poor countries), there is some evidence that a 40 percent debt-to-GDP ratio is a turning point at which risks of debt exposure start to increase.

tax rate data are not widely available for developing countries. The inflation tax is a useful proxy only in Latin American countries, where the inflation tax is of significant magnitude. The present analysis includes all developing countries, and thus the inflation tax is not a good proxy for the tax rate. In addition, a recent study by Alesina and Tabellini (2005) shows that in both OECD countries and developing countries, fiscal policy seems to be driven almost exclusively by government spending. Therefore, FISCAL is constructed based on the relationship between government spending and the business cycle only. Second, similar to the correlation indicator introduced by Kaminsky, et al. (2004), the constructed variable gives an unambiguous measure of the pattern of fiscal policy, with a positive sign of FISCAL indicating a procyclical policy and a negative sign indicating a countercyclical policy. Finally, FISCAL gives a time-variant measure for the fiscal policy pattern. This makes it a better measure, because it is likely that a country's ability to conduct countercyclical fiscal policy may vary over time. Alternative measures of fiscal policy pattern constructed for other studies generally do not vary over time (Catao and Sutton, 2002; Alesina and Tabellini, 2005).

The theory suggests that the link between international reserves and fiscal policy pattern should manifest itself during bad times (i.e., economic downturns). In order to reveal this link empirically, a dummy should be introduced to distinguish between good and bad times. The dummy, d_g, is equal to one if the economy is in good times, which are the periods when the cyclical component of real GDP is positive. In addition, an interaction term between the dummy and the measure for fiscal policy pattern, FISCAL, is included.

Specifically, the benchmark empirical model employed to investigate the relationship between fiscal policy pattern and international reserves is given as follows. The empirical model is based on the extended buffer stock framework adopted by Aizenman and Marion (2004).

$$\ln\left(\frac{R_{it}}{X_{it}}\right) = \beta_0^{\,i} + \beta_1 \ln(\sigma_{it}) + \beta_2 OC_{it} + \beta_3 \ln(C_{it}) + \beta_4 \ln(neer_{it}) + \beta_5 \ln(S_{it}) + \beta_6 FISCAL_{it} + \beta_7 d_g + \beta_8 FISCAL_{it} * d_g + \varepsilon_{it}. \quad (1)$$

The left-hand side of (1) is the log of actual reserve holdings(R), valued in U.S. dollars and expressed as a ratio of X, where X is generally GDP or the U.S. GDP deflator. Consistent with the existing literature, international reserves are measured as "reserves minus gold," which includes convertible foreign exchange, special drawing rights, and the unconditional drawing right with the

IMF. Given that developing countries have minimal gold holdings, "reserves minus gold" gives a valid measure of international reserves.

In the right-hand side of the equation, FISCAL is the measure of fiscal policy pattern and d_g is a dummy for good times. An interaction term between FISCAL and d_g is also included. If the estimated coefficient on FISCAL is significant, a link between fiscal policy pattern and international reserves during economic downturns can be identified. A negative coefficient would be consistent with the theoretical prediction.

OC is an enhanced measure for the opportunity cost of holding international reserves. Most studies of extended buffer stock models measure the opportunity cost simply as the difference in interest rates in the developing countries and in the United States. Aside from its other defects[4], this traditional measure is inadequate in the sense that it does not take into account inflation and changes in the value of U.S. dollars. For example, if the U.S. dollar depreciates greatly, the actual opportunity cost would be much higher than the measured one. Therefore, following a recent paper by Aizenman, Lee, and Rhee (2005), an enhanced measure is constructed for the opportunity cost of holding international reserves for each developing country:

$$OC_t = [(1+i_t) - (1+i_t^*)(1+d_t)]/(1+\pi_t), \qquad (2)$$

where i_t is the national interest rate in the developing country, i_t^* is the Treasury bill rate in the United States, d_t is the depreciation rate (domestic currency/U.S. dollar), and π_t is the CPI inflation in the developing economy. This enhanced measure for *OC* accounts for relative changes in the value of U.S. dollars and measures the opportunity cost in real terms. *OC* is expected to have a negative impact on international reserve holding, though many studies have failed to find a significantly negative impact using the traditional measure.

Consistent with the empirical literature, the following other variables in the right-hand side of equation (1) are included. σ is the volatility of reserves, which is approximated by the volatility of international transactions or the volatility of real export receipts. *C* is a proxy for adjustment costs, calculated as the average propensity to import. The variable *neer* is a control for the degree of exchange-rate flexibility, measured as the volatility of the nominal effective exchange rate. S is a scaling variable. If *x* takes the value of GDP (in millions

[4] See Ben-Bassat, Avraham and Daniel Gottlieb (1992 a & b).

of U.S. dollars), S is represented by population size, whereas if X is the U.S. GDP deflator, S is represented by population and real GDP per capita.

The volatility of reserves, σ , should have a positive impact on demand for reserves. This is because higher reserve volatility means that reserves hit their lower bound more frequently, and the central bank should be willing to hold a larger stock of reserves in order to incur the cost of restocking less frequently. The scaling variable, S, should also enter with a positive coefficient; one would expect a larger economy to hold larger amounts of reserves.

According to Aizenman and Marion (2004), the marginal propensity to import (empirically, the average propensity to import) was initially proposed as a proxy for adjustment costs (C). More recently, the propensity to import has been reinterpreted as a measure of the economy's openness and vulnerability to external shocks. It has been shown to have a positive effect on demand for international reserves. The coefficient should be positive; one would expect the demand for reserves to increase as the economy faces greater external vulnerability.

The volatility of nominal effective exchange rate ($neer$) is included to capture the potential impact of exchange rate regimes on optimal international reserve holdings. Flood and Marion (2002), Disyatat and Mathieson (2001), and Aizenman and Marion (2004) have found it to be a significant determinant. Greater exchange-rate flexibility should reduce the demand for reserves, because central banks no longer need large reserves to maintain a pegged rate or to enhance the peg's credibility. The coefficient on exchange-rate volatility therefore is expected to be negative.

In order to assess how the association between fiscal policy pattern and reserve holdings may be affected by political risk and external debt, shift and slope dummies are introduced into the benchmark regression. Specifically, the following equation is estimated over the full sample to analyze the impact of political risk on the association:

$$\ln(\frac{R_{it}}{X_{it}}) = \beta_0^{\ i} + \beta_1 \ln(\sigma_{it}) + \beta_2 OC_{it} + \beta_3 \ln(C_{it}) + \beta_4 \ln(neer_{it}) + \beta_5 \ln(S_{it}) + \beta_6 FISCAL_{it} + \beta_7 d_g + \beta_8 FISCAL_{it} * d_g + \beta_9 D_1 + \beta_{10} D_1 * FISCAL_{it} + \varepsilon_{it}. \quad (3)$$

A dummy capturing the level of political risk, D_1, is added to the benchmark regression. $D_1 = 1$ if a country is in the high political risk group and $D_1 = 0$ otherwise. An interaction term between D_1 and FISCAL is also added.

Similarly, to analyze the impact of external debt on the association, equation (4) below is estimated.

$$\ln(\frac{R_{it}}{X_{it}}) = \beta_0^{\ i} + \beta_1 \ln(\sigma_{it}) + \beta_2 OC_{it} + \beta_3 \ln(C_{it}) + \beta_4 \ln(neer_{it}) + \beta_5 \ln(S_{it}) + \beta_6 FISCAL_{it} + \beta_7 d_g + \beta_8 FISCAL_{it} * d_g + \beta_9 D_2 + \beta_{10} D_2 * FISCAL_{it} + \varepsilon_{it}. \quad (4)$$

where $D_2 = 1$ if a country is in the low external debt to GDP ratio group, and $D_2 = 0$ otherwise. An interaction term between D_2 and FISCAL is also added to the benchmark regression.

4 Results

Table 3A reports the results of regressing on the full sample, using shift and slope dummies for high-low political risk (i.e., equation (3)). The dependent variable is logged reserves to GDP ratio.[5] Regression (1) gives the basic extended buffer stock model specification in the literature, with a dummy for high-low political risk (D_1) added. Regression (2) adds the fiscal policy pattern measure, FISCAL, to regression (1); regression (3) continues to add an interaction term between FISCAL and D_1. Regression (4) further includes the dummy for good economic times, d_g, and regression (5) extends by adding an interaction term between FISCAL and the "good times" dummy. As indicated by Table 3A, the relationship between the fiscal stance and reserve holdings is indeed different for the low and high political risk groups. The interaction term between FISCAL and D_1 is significant at the 10 percent level in general and at the 5 percent level during economic downturns.

Column (3) of Table 3A shows that the relationship between FISCAL and reserve holdings is significantly negative for low political risk countries. Column (5) shows that the negative relationship is even stronger in economic downturns. This is consistent with the theory: for countries with low political risk, countercyclical fiscal policy should be associated with higher international reserve holdings whereas procyclical fiscal policy should be associated with lower international reserve holdings during economic downturns.

Higher reserve holdings could permit the fiscal authorities to conduct countercyclical fiscal policy in economic downturns. A reverse causality issue may exist, and the estimated coefficients on FISCAL may be biased. Therefore,

[5] The results are very similar when logged reserves to the U.S. GDP deflator is the dependent variable.

tests of endogeneity of FISCAL are conducted. However, neither the Wu-Hausman *F* test nor the Durbin-Wu-Hausman chi-square test can reject the null hypothesis that the fiscal policy pattern measure is exogenous.[6] The exogeneity of fiscal policy pattern could arise from the budget timeline of fiscal spending. It is common practice that the budget for fiscal spending in the current year is determined by the end of the previous year. Therefore, one can assume that the current year reserve holdings have almost negligible impact on fiscal decisions made in the previous year.

When equation (4) is estimated over the full sample, i.e., when countries are only distinguished according to their reliance on external financing, no significant difference is identified across groups[7]. However, when equation (4) is estimated over the group of low political risk countries, a significant difference between the high-low external debt subgroups is detected during economic downturns. The results are reported in Table 3B. As shown in regression (5), the interaction term between the dummy for high-low external debt (D_2) and FISCAL is significant at the 10 percent level. During economic downturns, in the low political risk group of countries, the estimated coefficient on FISCAL is –1.249 for the high external debt subgroup, and –0.604 for the low external debt subgroup[8]. This is again consistent with the prediction of the theory. During economic downturns, among low political risk countries, the relationship between FISCAL and reserve holdings is expected to be stronger for the high external debt subgroup.

Equation (1) is then estimated over subsets of the sample to further investigate how the relationship may differ across groups. Specifically, Tables 4A and 4B report the regression results when countries are divided into two groups according to political risk level. Tables 5A and 5B report the results when countries are divided into four groups according to political risk level and the level of external debt to GDP ratio.

Table 4A reports the results when logged reserves to GDP ratio is the dependent variable, while Table 4B gives the results when logged reserves to the U.S. GDP deflator is the dependent variable.[9] In both tables, regressions (1)–(4)

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[6] Wu-Hausman *F* test statistic = 0.00565, *p* value = 0.94009; Durbin-Wu-Hausman chi-square test statistic = 0.00570, *p* value = 0.93979.

[7] The interaction term, D_2*FISCAL, is not significant and the *F* statistics for the joint significance of D_2 and the interaction term is equal to 0.66, Prob > *F* = 0.419.

[8] The coefficients on FISCAL and the interaction term, D_2*FISCAL, are jointly significant. *F* statistics =7.08, Prob > *F* = 0.003

[9] Augmented Dicky-Fuller tests for panel data were conducted to check the stationarity of dependent variables. The results indicate that both dependent variables are stationary. The test

are for countries with high political risk, and regressions (5)–(8) are for countries with low political risk. Regressions (1) and (5) give the benchmark extended buffer stock model specification in the literature, excluding variables related to fiscal policy. The estimation results of the benchmark model are consistent with the existing literature.

Regardless of which scaling variable is used, the fiscal policy pattern (FISCAL) is significantly related to international reserve holdings for countries with low political risk but not for those with high political risk. Regressions (2) and (6) add FISCAL into the benchmark regressions. Regressions (3) and (7) further include the dummy for good economic times, and regressions (4) and (8) extend those equations by adding the interaction term between FISCAL and the "good times" dummy. The coefficient on FISCAL is not significant for the high political risk countries but is significantly negative for the low political risk countries across all regressions. After adding the interaction term and the good-times dummy, the fiscal measure becomes even more significant. This implies that in the group of countries with low political risk, those conducting countercyclical fiscal policies in general hold more international reserves, while those conducting procyclical fiscal policies in general hold fewer reserves. This association between fiscal policy pattern and international reserves clearly manifests itself during economic downturns in low political risk countries, which is exactly what the theoretical model predicts. In addition, for low political risk countries, a higher fraction of the variation of reserves is explained by adding FISCAL, the good-times dummy, and the interaction term. Specifically, these variables increase the adjusted R^2 from 0.8359 to 0.8395 in Table 4A and from 0.89 to 0.90 in Table 4B.[10]

The results in Tables 4A and 4B also offer new insight into the effect of the opportunity cost of international reserve holding. The conventional wisdom regarding the opportunity cost of holding reserves is that, when properly measured, the opportunity cost should have a significantly negative impact on international reserves. However, the results show a sharp contrast between countries with different degrees of political risk. The opportunity cost measure

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statistics for logged reserves to GDP ratio are –7.30134 with p value = 0.0000 (Levin, Lin, and Chu) and 178.130 with p value = 0.0005 (ADF-Fisher chi-square). The test statistics for logged reserves to U.S. GDP deflator are –4.52306 with p value = 0.0000 (Levin, Lin, and Chu) and 242.222 with p value = 0.0000 (ADF-Fisher chi-square). The null hypothesis of existence of unit root is rejected in each case.

[10] With no country fixed effects, the adjusted R^2 increases from 0.7021 to 0.7329 after adding FISCAL, the dummy for good economic climate, and the interaction term.

has a significantly negative effect on international reserve holdings in low political risk countries, but no significant effect in high political risk countries[11]. This seems to suggest that political distortions may mitigate the response to the opportunity cost of holding reserves.

Tables 5A and 5B report the results when countries are divided into four groups according to political risk level and the level of external debt to GDP ratio. In Table 5A, the reserves to GDP ratio is the dependent variable, and in Table 5B, reserves to the U.S. GDP deflator ratio is the dependent variable. Consistent with the results in Table 3B, among low political risk countries, the relationship between fiscal policy and international reserves during economic downturns is stronger if the degree of reliance on external financing is higher. For instance, in Table 5A, among low political risk countries, the coefficient on FISCAL for those with high external debt to GDP ratio is –1.220, while the coefficient for those with low external debt to GDP ratio is –0.759.

Consistent with the results in Tables 4A and 4B, no significant association between fiscal policy pattern and international reserves is identified for high political risk countries. In addition, the opportunity cost is not significant for high political risk countries.

5 Robustness

As mentioned in the theoretical justification, higher domestic borrowing by the government may weaken the link between fiscal policy and international reserves. This is because in some developing countries, domestic borrowing costs may not be high during busts, allowing governments to easily finance their countercyclical fiscal spending. Consequently, these countries may have lower incentives to hoard international reserves for stabilization purposes. If the financing role of government domestic borrowing is widespread in developing countries, one would expect to see a negative relationship between international reserve holdings and government domestic borrowing, and a weaker link between fiscal policy and international reserves. To check the robustness of the previous results, a control for government domestic borrowing—domestic banks' claims on the government as a percentage of GDP— is added into the previous extended buffer stock model. Securities and derivatives markets typically are underdeveloped in developing countries, so that government must often rely on borrowing from domestic banks. Thus, this variable is a reasonable,

[11] When the opportunity cost measure is interacted with the dummy for high-low political risk in the full sample regression, the interaction term is significant at the 1 percent level.

though not perfect, indicator for the degree of governments' domestic borrowing.

Simply including government domestic borrowing (logged) into the regression can be problematic: the amounts of international reserves and contemporaneous government domestic borrowing can be simultaneous decisions of the government. The Durbin-Wu-Hausman tests are used to check for endogeneity. Both the Wu-Hausman *F* test and the Durbin-Wu-Hausman chi-square test reject the null hypothesis that government domestic borrowing (logged) is exogenous.[12] Rejection of the null hypothesis indicates that instrumental variables techniques are required. Following the literature, the lagged value of government domestic borrowing (logged) is used as an instrument because it is uncorrelated with the error term of the regression but highly correlated with current government domestic borrowing (logged).

In Tables 6A and 6B, government domestic borrowing is added to the benchmark regression, and the countries are divided into two groups based on the level of political risk. The model is then estimated using two-stage least squares. Similar to above, Table 6A uses logged reserves to GDP ratio as the dependent variable, while Table 6B uses logged reserves to the U.S. GDP deflator ratio as the dependent variable.

Both tables show that the results are robust to the inclusion of the additional control of government domestic borrowing. For low political risk countries, the fiscal policy measure is still negatively associated with reserves holdings during economic downturns, indicating that countries exhibiting countercyclical fiscal policies hold more reserves, whereas those exhibiting procyclical fiscal policies hold fewer reserves. Again, for countries with high political risk, this relationship is not significant.

Tables 7A and 7B report the results when the countries are divided into four groups. The results again confirm previous findings: the negative relationship between fiscal policy and international reserves is strong for the group of countries with low political risk and high reliance on external financing during economic downturns.

6 Conclusion

[12] Wu-Hausman *F* test statistic = 9.38041, *p* value = 0.00246; Durbin-Wu-Hausman chi-square test statistic = 9.40520, *p* value = 0.00216.

This study investigates the empirical relationship between the pattern of fiscal policy and the demand for reserves in developing countries, and how this relationship is associated with political risk and conditional access to global capital markets. It takes to data the theoretical implications of the model in Aizenman and Marion (2004), a model explaining developing countries' international reserve holdings based on the precautionary motive argument.

The results indicate that for developing countries with low political risk, international reserves and fiscal policy have the following relationship. During economic downturns, countercyclical fiscal policies are associated with higher international reserve holdings, while procyclical fiscal policies are associated with lower reserve holdings. This relationship is stronger when the countries with low political risk rely heavily on external financing. The results for developing countries with high political risk do not indicate a clear-cut link between reserve holdings and fiscal policy pattern. These results are consistent with the theoretical predictions of the model in Aizenman and Marion (2004).

Issues that deserve further attention are the reasons for the procyclical pattern of fiscal policy in developing countries. In some countries, it may reflect politically induced distortions. In others, it may be the outcome of larger than anticipated shocks hitting the economy. Modeling and testing these issues are left for future research.

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Table 1—Sample Countries

Low Political Risk		High Political Risk	
High External Debt to GDP Ratio (21)	Low External Debt to GDP Ratio (9)	High External Debt to GDP Ratio (23)	Low External Debt to GDP Ratio (7)
Argentina	Botswana	Algeria	Bangladesh
Chile	Brazil	Bolivia	Colombia
Costa Rica	China	Cameroon	El Salvador
Cote d'Ivoire	Dominican Republic	Congo Rep	Guatemala
Ecuador	Korea, Rep.	Egypt, Arab Rep.	Haiti
Gabon	Malaysia	Honduras	India
Gambia	Paraguay	Indonesia	Myanmar
Ghana	Thailand	Mali	
Jamaica	Trinidad and Tobago	Mozambique	
Jordan		Nicaragua	
Kenya		Niger	
Madagascar		Nigeria	
Mongolia		Pakistan	
Morocco		Panama	
Oman		Peru	
Senegal		Philippines	
Tunisia		Sri Lanka	
Uruguay		Sudan	
Venezuela		Togo	
Vietnam		Turkey	
Yemen Rep.		Uganda	
		Zambia	
		Zimbabwe	

Note: Low political risk countries are the ones with average political risk score lower than the mean of all developing countries and vise versa for high political risk countries. The threshold for high versus low external debt to GDP ratio is set at 40 percent (Daseking 2002).

Table 2—Summary Statistics for Fiscal Policy Pattern Measure (1970-2005)

Group Characteristics	Country Name	Mean	Standard Deviation	Min.	Max
Low Political Risk and High External Debt to GDP Ratio	Argentina	0.0319	0.1419	-0.3588	0.3994
	Chile	0.0148	0.0767	-0.1480	0.1437
	Costa Rica	0.0015	0.1667	-0.5931	0.3289
	Cote d'Ivoire	0.0482	0.1831	-0.3673	0.6371
	Ecuador	0.0574	0.2435	-0.2616	1.0714
	Gabon	0.1175	0.2175	-0.4463	0.5853
	Gambia	0.0511	0.2332	-0.4260	0.6386
	Ghana	-0.0001	0.2251	-0.4627	0.4410
	Jamaica	0.0055	0.0944	-0.2422	0.1793
	Jordan	-0.0219	0.1451	-0.2544	0.3007
	Kenya	0.0287	0.1027	-0.0987	0.3373
	Madagascar	0.0634	0.1644	-0.2368	0.4271
	Mongolia	0.0089	0.1603	-0.2982	0.3992
	Morocco	-0.0051	0.0910	-0.2178	0.1648
	Oman	0.0286	0.1257	-0.2258	0.2320
	Senegal	0.0224	0.1141	-0.2039	0.3892
	Tunisia	-0.0075	0.0807	-0.1729	0.2178
	Uruguay	0.0273	0.1457	-0.5769	0.2996
	Venezuela	0.0219	0.1550	-0.2541	0.2350
	Vietnam	-0.0591	0.1661	-0.4168	0.1678
	Yemen Rep.	-0.0676	0.2236	-0.6908	0.1401
Low Political Risk and Low External Debt to GDP Ratio	Botswana	0.0598	0.2177	-0.1812	1.0000
	Brazil	0.0916	0.2603	-0.2061	0.8579
	China	0.0379	0.1143	-0.1577	0.3809
	Dominican Republic	-0.0079	0.1638	-0.3586	0.2844
	Korea, Rep.	0.0031	0.1043	-0.1713	0.1556
	Malaysia	0.0299	0.1508	-0.2350	0.4034
	Paraguay	0.0243	0.1393	-0.3042	0.2815
	Thailand	0.0464	0.0940	-0.1540	0.2134
	Trinidad and Tobago	0.0334	0.1047	-0.1699	0.2889

Table 2—Summary Statistics for Fiscal Policy Pattern Measure (Continued)

Group Characteristics	Country Name	Mean	Standard Deviation	Min.	Max
High Political Risk and High External Debt to GDP Ratio	Algeria	-0.0407	0.0984	-0.3314	0.1218
	Bolivia	-0.0008	0.1263	-0.2746	0.2802
	Cameroon	-0.0072	0.1684	-0.5341	0.3597
	Congo Rep	-0.0160	0.2123	-0.6930	0.2782
	Egypt, Arab Rep.	-0.0363	0.3397	-1.5133	0.3711
	Honduras	0.0023	0.1129	-0.1618	0.2628
	Indonesia	0.0217	0.1508	-0.3898	0.3855
	Mali	0.0086	0.1155	-0.2977	0.2295
	Mozambique	0.0523	0.1749	-0.2833	0.4286
	Nicaragua	-0.0617	0.5961	-2.9112	0.7721
	Niger	-0.0064	0.1477	-0.3295	0.2466
	Nigeria	-0.0193	0.2522	-0.7890	0.4616
	Pakistan	-0.0211	0.0860	-0.1920	0.2323
	Panama	0.0219	0.1560	-0.3450	0.6675
	Peru	-0.0139	0.1257	-0.3250	0.2465
	Philippines	-0.0261	0.1286	-0.4340	0.1808
	Sri Lanka	-0.0085	0.1302	-0.4974	0.1803
	Sudan	-0.0869	0.2774	-0.8843	0.3215
	Togo	0.0443	0.1481	-0.2033	0.5371
	Turkey	0.0351	0.1480	-0.2892	0.3519
	Uganda	0.1026	0.3834	-1.0323	0.9479
	Zambia	-0.0265	0.1433	-0.3277	0.2289
	Zimbabwe	-0.0057	0.1234	-0.3091	0.3185
High Political Risk and Low External Debt to GDP Ratio	Bangladesh	-0.0244	0.1187	-0.3430	0.2909
	Colombia	0.0057	0.1270	-0.2556	0.4032
	El Salvador	-0.0018	0.1149	-0.2756	0.1877
	Guatemala	0.0172	0.1264	-0.2272	0.2404
	Haiti	-0.0457	0.2601	-0.9197	0.4022
	India	0.0023	0.0999	-0.1705	0.2289
	Myanmar	-0.0315	0.1394	-0.3766	0.1873

Table 3A—Determinants of Reserve Holdings – Full Sample
(Using Shift and Slope Dummies for High-low Political Risk)

	(1)	(2)	(3)	(4)	(5)
Dependent Var	Ln(R/GDP)	Ln(R/GDP)	Ln(R/GDP)	Ln(R/GDP)	Ln(R/GDP)
D_1	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Opportunity Cost	0.000	0.000	0.000	0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Degree of Exchange Rate	-0.037	-0.068	-0.071	-0.078	-0.080
Flexibility, logged	(0.046)	(0.054)	(0.054)	(0.054)	(0.054)
Adjustment Costs,logged	1.040***	1.082***	1.090***	1.110***	1.096***
	(0.130)	(0.133)	(0.132)	(0.120)	(0.122)
Volatility of International	0.069	0.002	-0.007	-0.009	-0.015
Transactions, logged	(0.125)	(0.160)	(0.159)	(0.157)	(0.156)
Population, logged	1.829***	1.586**	1.568**	1.563**	1.561**
	(0.647)	(0.755)	(0.751)	(0.749)	(0.747)
FISCAL		-0.230	-0.538***	-0.500**	-0.808***
		(0.144)	(0.196)	(0.227)	(0.261)
D_1* FISCAL			0.469*	0.450	0.625**
			(0.263)	(0.272)	(0.272)
d_g				-0.054	-0.078
				(0.088)	(0.089)
d_g* FISCAL					0.695***
					(0.243)
Observations	1122	961	961	961	961
$\overline{R}^2$	0.8183	0.8371	0.8374	0.8374	0.8382

Note: High political risk countries: $D_1=1$; low political risk countries: $D_1=0$. All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 3B—Determinants of Reserve Holdings – Low Political Risk Group
(Using Shift and Slope Dummies for High-low External Debt to GDP Ratio)

Dependent Var	(1) Ln(R/GDP)	(2) Ln(R/GDP)	(3) Ln(R/GDP)	(4) Ln(R/GDP)	(5) Ln(R/GDP)
D_2	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Opportunity Cost	-0.026***	-0.025***	-0.031***	-0.030***	-0.038***
	(0.008)	(0.006)	(0.008)	(0.008)	(0.009)
Degree of Exchange Rate	0.057	0.045	0.044	0.055	0.052
Flexibility, logged	(0.068)	(0.067)	(0.066)	(0.069)	(0.068)
Adjustment Costs,logged	0.913***	0.970***	0.967***	0.951***	0.913***
	(0.180)	(0.183)	(0.182)	(0.170)	(0.175)
Volatility of International	0.090	0.051	0.050	0.057	0.046
Transactions, logged	(0.111)	(0.116)	(0.117)	(0.118)	(0.116)
Population, logged	2.520**	2.404**	2.424**	2.418**	2.426**
	(0.980)	(1.016)	(1.017)	(1.023)	(1.016)
FISCAL		-0.483**	-0.656**	-0.689**	-1.249***
		(0.203)	(0.271)	(0.301)	(0.346)
D_2* FISCAL			0.547	0.505	0.645*
			(0.357)	(0.343)	(0.356)
d_g				0.065	0.022
				(0.108)	(0.111)
d_g* FISCAL					1.174***
					(0.323)
Observations	468	460	460	460	460
$\overline{R}^2$	0.8354	0.8375	0.8376	0.8375	0.8399

Note: Countries with low external debt to GDP ratio: D_2=1; Countries with high external debt to GDP ratio: D_2=0**.** All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 4A—Determinants of Reserve Holdings – Two Groups (Dependent Variable: reserves to GDP ratio, logged)

	High Political Risk				Low Political Risk			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opportunity Cost	0.000	-0.000	-0.000	-0.000	-0.027***	-0.025***	-0.025***	-0.031***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.008)	(0.006)	(0.007)	(0.008)
Degree of Exchange	-0.081	-0.140*	-0.160*	-0.162*	0.055	0.045	0.058	0.056
Rate Flexibility, logged	(0.061)	(0.081)	(0.080)	(0.081)	(0.070)	(0.067)	(0.070)	(0.069)
Adjustment Costs, logged	1.092***	1.126***	1.205***	1.199***	0.948***	0.970***	0.952***	0.916***
	(0.158)	(0.165)	(0.153)	(0.154)	(0.181)	(0.183)	(0.170)	(0.175)
Volatility of International	0.092	-0.025	-0.021	-0.024	0.077	0.051	0.059	0.049
Transactions, logged	(0.173)	(0.254)	(0.255)	(0.253)	(0.113)	(0.116)	(0.117)	(0.116)
Population, logged	1.496*	1.042	1.013	1.013	2.436**	2.404**	2.400**	2.402**
	(0.799)	(0.993)	(0.981)	(0.981)	(1.025)	(1.016)	(1.021)	(1.016)
FISCAL		-0.047	0.018	-0.059		-0.483**	-0.535**	-1.023***
		(0.192)	(0.222)	(0.229)		(0.203)	(0.250)	(0.294)
d_g			-0.172	-0.186			0.075	0.036
			(0.128)	(0.129)			(0.109)	(0.112)
FISCAL*d_g				0.402				1.105***
				(0.403)				(0.329)
Observations	654	501	501	501	468	460	460	460
$\overline{R}^2$	0.8063	0.8389	0.8403	0.8402	0.8359	0.8375	0.8375	0.8395

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 4B—Determinants of Reserve Holdings – Two Groups (Dependent Variable: reserves scaled by US GDP deflator, logged)

	High Political Risk				Low Political Risk			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Opportunity Cost	0.002*	0.002*	0.002**	0.002*	-0.031***	-0.034***	-0.033***	-0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.008)	(0.008)	(0.009)	(0.010)
Degree of Exchange	-0.115*	-0.116*	-0.126*	-0.127*	-0.003	-0.016	-0.002	-0.003
Rate Flexibility, logged	(0.065)	(0.065)	(0.068)	(0.069)	(0.079)	(0.078)	(0.086)	(0.084)
Adjustment Costs,	0.438**	0.446**	0.467**	0.465**	-0.026	0.011	0.001	-0.014
logged	(0.188)	(0.193)	(0.190)	(0.192)	(0.235)	(0.239)	(0.233)	(0.244)
Volatility of International	0.025	0.024	0.026	0.025	0.238*	0.196	0.200	0.187
Transactions, logged	(0.224)	(0.223)	(0.222)	(0.221)	(0.124)	(0.127)	(0.128)	(0.126)
Population, logged	-5.891*	-5.956*	-5.152	-5.112	1.731	1.811	1.773	1.780
	(3.118)	(3.156)	(3.365)	(3.397)	(1.963)	(2.003)	(2.009)	(2.015)
Real GDP per Capita,	1.167	1.141	1.424	1.425	1.648***	1.699**	1.639**	1.592**
logged	(1.261)	(1.283)	(1.350)	(1.350)	(0.595)	(0.619)	(0.628)	(0.633)
FISCAL		0.089	0.125	0.087		-0.542**	-0.600**	-1.004***
		(0.172)	(0.175)	(0.191)		(0.243)	(0.283)	(0.351)
d_g			-0.134	-0.141			0.088	0.059
			(0.096)	(0.101)			(0.114)	(0.118)
FISCAL*d_g				0.202				0.918**
				(0.387)				(0.359)
Observations	509	509	509	509	475	467	467	467
$\overline{R}^2$	0.85	0.85	0.86	0.86	0.89	0.90	0.90	0.90

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 5A—Determinants of Reserve Holdings – Four Groups (Dependent Variable: reserves to GDP ratio, logged)

	High Political Risk		Low Political Risk	
	High External Debt to GDP Ratio	Low External Debt to GDP Ratio	High External Debt to GDP Ratio	Low External Debt to GDP Ratio
Opportunity Cost	-0.000	-0.125	-0.043***	-0.022
	(0.002)	(0.377)	(0.012)	(0.020)
Degree of Exchange	-0.148	-0.240**	0.084	-0.009
Rate Flexibility, logged	(0.088)	(0.084)	(0.092)	(0.081)
Adjustment Costs, logged	1.400***	0.954***	1.015***	0.901**
	(0.339)	(0.145)	(0.269)	(0.315)
Volatility of International	0.037	-0.276***	-0.042	0.154
Transactions, logged	(0.319)	(0.073)	(0.155)	(0.172)
Population, logged	0.922	0.981*	2.423*	2.313**
	(1.197)	(0.421)	(1.263)	(0.730)
FISCAL	0.006	-0.932	-1.220***	-0.759*
	(0.257)	(0.798)	(0.389)	(0.394)
d_g	-0.129	-0.343	-0.013	0.106
	(0.156)	(0.192)	(0.148)	(0.133)
FISCAL*d_g	0.196	2.052	1.124**	1.195**
	(0.465)	(1.352)	(0.436)	(0.461)
Observations	388	113	312	148
$\overline{R}^2$	0.84	0.84	0.84	0.84

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 5B—Determinants of Reserve Holdings – Four Groups (Dependent Variable: reserves scaled by US GDP deflator, logged)

	High Political Risk		Low Political Risk	
	High External Debt to GDP Ratio	Low External Debt to GDP Ratio	High External Debt to GDP Ratio	Low External Debt to GDP Ratio
Opportunity Cost	0.003**	0.350	-0.057***	-0.028
	(0.001)	(0.363)	(0.011)	(0.024)
Degree of Exchange Rate	-0.104	-0.194*	0.040	-0.128
Flexibility, logged	(0.076)	(0.094)	(0.101)	(0.075)
Adjustment Costs, logged	0.724*	0.211	0.031	0.202
	(0.362)	(0.341)	(0.328)	(0.361)
Volatility of International	0.107	-0.230	0.063	0.434*
Transactions, logged	(0.284)	(0.120)	(0.165)	(0.230)
Population, logged	-4.308	-3.429	0.306	1.689*
	(3.804)	(4.837)	(2.114)	(0.867)
Real GDP Per Capita,	1.781	-0.765	0.710	2.824***
logged	(1.483)	(1.341)	(1.335)	(0.657)
FISCAL	0.168	-1.107	-1.333***	-0.481
	(0.211)	(0.875)	(0.407)	(0.474)
d_g	-0.102	-0.257	0.039	0.048
	(0.128)	(0.164)	(0.169)	(0.103)
FISCAL*d_g	-0.083	2.817	1.247***	-0.016
	(0.415)	(1.468)	(0.385)	(0.504)
Observations	396	113	319	148
$\overline{R}^2$	0.84	0.93	0.85	0.94

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 6A—Determinants of International Reserves – Two Groups Using 2SLS
(Dependent Variable: reserves to GDP ratio, logged)

	High Political Risk			Low Political Risk		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Domestic Borrowing, logged	-0.483***	-0.526***	-0.529***	-0.182**	-0.177**	-0.161**
	(0.091)	(0.092)	(0.092)	(0.078)	(0.080)	(0.079)
Opportunity Cost	0.010	0.012	0.012	-0.021	-0.021	-0.028
	(0.028)	(0.028)	(0.028)	(0.024)	(0.024)	(0.024)
Degree of Exchange Rate Flexibility, logged	-0.090*	-0.117**	-0.117**	0.081	0.088	0.084
	(0.047)	(0.047)	(0.047)	(0.052)	(0.054)	(0.054)
Adjustment Costs,logged	0.032	0.042	0.043	0.117	0.121	0.108
	(0.110)	(0.110)	(0.110)	(0.131)	(0.132)	(0.131)
Volatility of International Transactions, logged	0.958***	0.919***	0.919***	2.327***	2.326***	2.374***
	(0.283)	(0.281)	(0.282)	(0.367)	(0.367)	(0.365)
Population, logged	1.124***	1.212***	1.212***	0.894***	0.884***	0.841***
	(0.155)	(0.156)	(0.157)	(0.191)	(0.192)	(0.192)
FISCAL	-0.172	-0.076	-0.063	-0.525**	-0.557**	-1.118***
	(0.168)	(0.169)	(0.189)	(0.230)	(0.238)	(0.331)
d_g		-0.251***	-0.249***		0.045	0.005
		(0.078)	(0.079)		(0.084)	(0.085)
FISCAL*d_g			-0.069			1.158**
			(0.432)			(0.478)
Observations	475	475	475	421	421	421

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 6B—Determinants of International Reserves – Two Groups Using 2SLS
(Dependent Variable: reserves scaled by US GDP deflator, logged)

	High Political Risk			Low Political Risk		
	(1)	(2)	(3)	(4)	(5)	(6)
Government Domestic	-0.507***	-0.535***	-0.544***	-0.187**	-0.185**	-0.170**
Borrowing, logged	(0.090)	(0.090)	(0.090)	(0.085)	(0.085)	(0.085)
Opportunity Cost	-0.001	0.002	0.003	-0.033	-0.033	-0.039
	(0.028)	(0.028)	(0.028)	(0.024)	(0.024)	(0.024)
Degree of Exchange Rate	-0.103**	-0.118**	-0.115**	0.035	0.043	0.039
Flexibility, logged	(0.048)	(0.048)	(0.048)	(0.053)	(0.054)	(0.054)
Adjustment Costs,logged	0.083	0.092	0.096	0.129	0.132	0.119
	(0.108)	(0.108)	(0.108)	(0.137)	(0.137)	(0.136)
Volatility of International	-5.276***	-3.886**	-3.927**	2.102**	2.050**	2.138**
Transactions, logged	(1.581)	(1.661)	(1.665)	(0.835)	(0.839)	(0.836)
Population, logged	0.877**	1.336***	1.331***	1.754***	1.701***	1.717***
	(0.393)	(0.428)	(0.429)	(0.329)	(0.337)	(0.336)
Real GDP Per Capita, logged	0.559***	0.582***	0.582***	0.124	0.119	0.080
	(0.165)	(0.165)	(0.165)	(0.195)	(0.196)	(0.196)
FISCAL	-0.005	0.061	0.109	-0.632***	-0.669***	-1.163***
	(0.165)	(0.166)	(0.185)	(0.230)	(0.237)	(0.330)
d_g		-0.221***	-0.214**		0.059	0.023
		(0.084)	(0.085)		(0.086)	(0.087)
FISCAL*d_g			-0.255			1.017**
			(0.425)			(0.477)
Observations	475	475	475	421	421	421

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 7A—Determinants of International Reserves – Four Groups Using 2SLS
(Dependent Variable: reserves to GDP ratio, logged)

	High Political Risk		Low Political Risk	
	High External Debt to GDP Ratio	Low External Debt to GDP Ratio	High External Debt to GDP Ratio	Low External Debt to GDP Ratio
Government Domestic	-0.647***	-0.227*	-0.092	-0.558***
Borrowing, logged	(0.118)	(0.132)	(0.098)	(0.118)
Opportunity Cost	0.011	0.132	-0.040	-0.024
	(0.031)	(0.405)	(0.032)	(0.028)
Degree of Exchange	-0.114**	-0.182*	0.102	0.042
Rate Flexibility, logged	(0.054)	(0.101)	(0.068)	(0.067)
Adjustment Costs,logged	0.020	-0.065	-0.008	0.198
	(0.132)	(0.163)	(0.169)	(0.163)
Volatility of International	0.994***	0.652	2.438***	0.869
Transactions, logged	(0.335)	(0.500)	(0.429)	(0.724)
Population, logged	1.358***	1.169***	0.990***	0.470
	(0.213)	(0.173)	(0.240)	(0.321)
FISCAL	-0.045	-0.517	-1.206***	-0.654
	(0.211)	(0.533)	(0.415)	(0.470)
d_g	-0.206**	-0.382***	-0.021	-0.092
	(0.095)	(0.120)	(0.108)	(0.118)
FISCAL*d_g	-0.146	0.991	1.090*	1.113*
	(0.489)	(0.976)	(0.602)	(0.613)
First-stage F statistics	49.97 [0.000]	62.80 [0.000]	60.27 [0.000]	18.43 [0.000]
Observations	374	101	308	113

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.

Table 7B—Determinants of International Reserves – Four Groups Using 2SLS
(Dependent Variable: reserves scaled by US GDP deflator, logged)

	High Political Risk		Low Political Risk	
	High External Debt to GDP Ratio	Low External Debt to GDP Ratio	High External Debt to GDP Ratio	Low External Debt to GDP Ratio
Government Domestic Borrowing, logged	-0.644***	-0.242*	-0.086	-0.113
	(0.116)	(0.127)	(0.101)	(0.149)
Opportunity Cost	0.002	0.442	-0.054*	-0.047*
	(0.030)	(0.377)	(0.032)	(0.024)
Degree of Exchange Rate Flexibility, logged	-0.104*	-0.207**	0.072	-0.102*
	(0.056)	(0.097)	(0.071)	(0.056)
Adjustment Costs,logged	0.076	-0.045	-0.007	0.106
	(0.131)	(0.164)	(0.176)	(0.140)
Volatility of International Transactions, logged	-4.340**	-0.918	0.096	-0.129
	(2.019)	(3.166)	(1.183)	(1.032)
Population, logged	1.369***	0.320	0.682	3.443***
	(0.504)	(0.781)	(0.659)	(0.387)
Real GDP Per Capita, logged	0.788***	0.348	0.238	0.559*
	(0.228)	(0.221)	(0.244)	(0.296)
FISCAL	0.138	-0.611	-1.268***	-0.680*
	(0.206)	(0.491)	(0.410)	(0.383)
d_g	-0.166	-0.297**	0.052	-0.087
	(0.103)	(0.118)	(0.112)	(0.099)
FISCAL*d_g	-0.401	1.496	1.044*	0.402
	(0.481)	(0.911)	(0.595)	(0.501)
First-stage F statistics	37.71 [0.000]	53.53 [0.000]	45.39 [0.000]	15.85 [0.000]
Observations	374	101	308	113

Note: All regressions include country fixed effects. Constant terms not reported. Standard errors in parentheses are corrected for heteroskedasticity and serial correlation within countries. ***denotes significance at the 1-percent level; **denotes significance at the 5-percent level; * denotes significance at the 10-percent level.