Capital Flows and Destabilizing Policy in Latin America

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Abstract

Motivated by the excessive macroeconomic volatility experienced in Latin America, we examine the possible contribution of monetary and fiscal policies to this outcome. In contrast with previous literature, we consider the possible simultaneity between policy and GDP growth by using GMM VAR econometric techniques. Additionally, we explore the direct impact international capital inflows have on these policies. Our evidence suggests that for the group of countries we consider, most practice destabilizing fiscal and monetary policy, and capital inflow consistently influences policy in a pro-cyclical direction.

Keywords: Fiscal and Monetary Policies, Capital Flows, Latin America

JEL Classification: E59, E62, F39

Resumo

Tendo como motivação a excessiva volatilidade macroeconômica em países da América Latina e a possível contribuição das políticas monetárias e fiscal para tal volatilidade, este trabalho examina a hipótese de estes países praticarem políticas fiscal e monetária pró-cíclicas. Em contraste com a literatura anterior, considera-se aqui a possiblilidade de determinação simultânea entre políticas macroeconômicas e crescimento do PIB e por isto se utiliza estimações de métodos de momentos generalizados – GMM e Vetores Autoregressivos – VAR. Adicionalmente, explora-se o impacto direto que fluxos de capital internacional podem ter no direcionamento das políticas monetária e fiscal. A evidência sugere que, para o grupo de países examinados e no período de análise, a maioria praticou políticas desestabilizadoras, e que o fluxo de capital externo influenciou consistentemente as políticas na direção pró-cíclica.

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1. Introduction

Do Latin American countries engage in destabilizing fiscal and monetary policy? Do international capital flows influence this policy choice? At first pass, it is hard to imagine that policy makers would engage in actions which exacerbate recessions and make for a tougher economic climate for their citizens and themselves. Literature on this notion is fairly recent however it is suggestive that governments in these countries are attempting to maximize their interest when engaging in this sort of policy. This is especially the case with fiscal policy. When faced with financial constraints or incomplete financial markets, often a developing country's best option is to spend according to their revenue. While developing country governments might like to use fiscal policy to counteract temporary reductions in GDP, they are simply unable to find the needed finance.

The literature also suggests that developing countries, especially Latin American, experience far more macroeconomic volatility than developed economies, and that economic fluctuations in developing countries impose a significant welfare loss to these nations.[1] Important for our purposes, the literature also suggests that the reaction of fiscal and monetary policies to these shocks may exacerbate this volatility. Figure 1 demonstrates this issue for fiscal policy, where for Brazil (on the left), indicates a positive correlation between GDP growth and government consumption relative to GDP (consistent with pro-cyclical policy), while the United Kingdom (on the right), shows a negative relationship (consistent with counter cyclical policy).
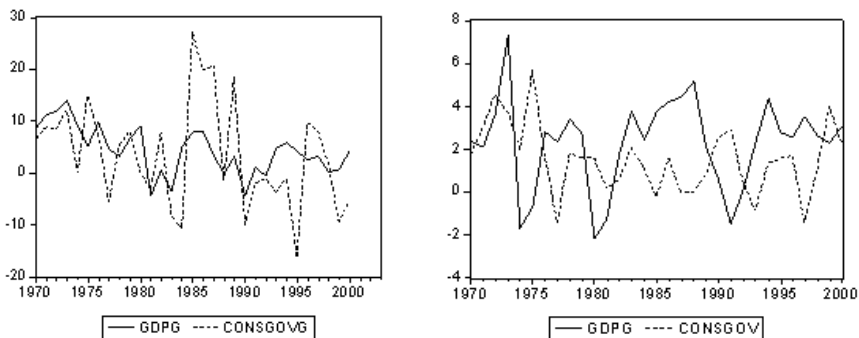

Fig. 1. Brazil and United Kingdom growth and fiscal policy

[1] See Aizenman et al. (1996), Pallage and Robe (2000) and Loyaza et al. (2007) among others.

We identify two problems in the existing literature and focus on addressing them in this paper. First, the empirical literature on pro-cyclical fiscal and monetary policy is mainly descriptive and so additional empirical work such as ours serves to expand this literature. [2] Secondly, the small number of empirical papers typically use ordinary least squares for their estimation. [3] However pro-cyclical behavior implies that fiscal and monetary policies also affect economic growth, creating the problem of endogenous regressors. While the literature has identified pro-cyclical policy, there exists the possibility endogenous regressors may have created biases in existing conclusions.

We attempt to deal with the problem of endogenous regressors by trying to identify exogenous variation in growth using a post-hoc principle. More specifically we use generalized method of moments (GMM) with instrumental variables (IV) to investigate the contemporaneous correlation, and Vector Autoregression models (VAR) to deal with the dynamic relationship, between policy and economic growth in four Latin American countries. Using these approaches, we avoid the problem of simultaneous determination of right and left hand side variables. In order to contrast our Latin American results we also engage in a "control group" exercise of sorts by empirically testing for pro-cyclical fiscal and monetary policy in two developed countries (the United States and United Kingdom).

Our results suggest that most of the developing countries studied engage in pro-cyclical fiscal and monetary policy, even when controlling for endogenous regressors. This is in line with results in the earlier literature. We find, however, that in contrast with this previous literature, our evidence suggests Chile implements countercyclical fiscal policy. Interestingly we also find both the US and UK follow countercyclical fiscal policy while the latter engages in countercyclical monetary policy as well.

A second issue with previous research on this topic concerns the main cause of pro-cyclical policy. Even though the theoretical literature generally considers financial constraints as the basis for pro-cyclical fiscal policy, part of this literature indicates that volatility in international capital flows is the primary reason for destabilizing fiscal policy. Furthermore others suggest that pro-cyclical fiscal policy is a result of misallocation of resources, where developing country governments fail to generate enough surpluses during good economic times to be used during downturns.

To investigate the role of capital flows in policy decisions, we estimate the direct impact capital flows have on fiscal and monetary policy decisions. Once policy behaves in a pro-cyclical way, the relation between capital flows and policy decisions however may not be unidirectional. Therefore, in order to avoid the problem of endogenous regressors, we again employ GMM IV estimation as well as VAR models. Our results indicate that with few exceptions, international capital flows have a direct impact on policy decisions in a way that leads to pro-cyclical policy.

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[2] See for example Gavin et al. (1996), Carvalho (2001) and Ocampo (2002, 2003).

[3] Calderon and Schmidt-Hebbel (2003) is an exception.

This remainder of this paper proceeds as follows. Section 2 provides a survey of the literature on pro-cyclical capital flows and pro-cyclical fiscal and monetary policy. Section 3 details the econometric methodology and empirical results, while Section 4 provides data and empirical evidence and Section 5 concludes and provides some discussion on policy implications.

2. Literature Review

2.1. *Pro-cyclical capital flows*

The literature on pro-cyclical international capital flows to developing countries is fairly new and brings to the open macroeconomy the ideas and evidence presented by Gertler (1988), Bernanke and Gertler (1989), Kiyotaki and Moore (1997), Fazzari et al. (1988) and Bernanke et al. (1998) in the closed-economy context. Diaz-Alejandro (1983, 1984) analyzes the Latin American external debt/economic crises of the early 1980's and concludes that financial constraints at the beginning of the decade impacted Latin American countries at different stages of development, structural organization and with different trade commodities. [4]

Gourinchas et al. (2001) investigate the role of lending booms in Latin American countries and infer that increases in the international capital supply tends to lead to growth based on domestic credit booms and increases the probability of balance of payment crises and subsequent economic downturns. Aghion et al. (1999a,b) provides a theoretical model that explains this phenomenon of growth with large external borrowing followed by a subsequent recession with no access to international liquidity.

Analyzing the phenomenon of sudden reversals in capital flows Calvo and Reinhart (1999), a significant paper in this literature, suggest that sudden reversion in capital flows is largely related to a fall in GDP in developing countries, especially in Latin America. In an attempt to explain why Latin America experiences so much volatility in output, Caballero (2000) identifies international financial links and undeveloped domestic financial markets as key causes. He further argues that international capital flows induce pro-cyclical fiscal policy which produces more volatility, while undeveloped domestic financial markets do not help smooth private consumption and public expenditure during recessions.

Ocampo (2002) discusses the relation between capital flows and growth in Latin America concluding that it behaves in a pro-cyclical way. This paper suggests that this pro-cyclicality is related to the credit constraints the private and public sector face in Latin American countries. An increase in capital inflow in this context would lead to an increase in government expenditure, private sector investment

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[4] Some Latin American economies rely on oil exports and were positively affected by the oil price shocks of the 1970's. See Griffith-Jones and Sunkel (1986) for a similar and deeper analysis of the 1980's debt crises.

and consumption in ways related to lending booms described by Gourinchas et al. (2001).

Finally, Fernandez-Arias and Panizza (2001), and Calderon and Schmidt-Hebbel (2003) provide empirical evidence of a pro-cyclical capital inflow. Calderon and Schmidt-Hebbel (2003) argue that there is evidence that capital inflow affects growth positively, but that also there is evidence that growth gives feedback to capital inflows creating the possible bias of endogenous regressors.

In summary the literature on pro-cyclical capital flows to developing countries brings a conclusive interpretation that capital inflows influence and are influenced by the business cycle in developing countries. The underdevelopment of the domestic financial system in these countries creates the need for external finance. [5] Once capital flows are considered very volatile, as inferred by Espinosa-Veiga et al. (2000), business cycles in developing country will fluctuate severely, imposing a high welfare loss to the people of these countries, as calculated by Pallage and Robe (2000). [6]

2.2. *Pro-cyclical fiscal policy*

The literature on pro-cyclical fiscal policy is extensive, and most attention has focused on the role of financial constraints in promoting pro-cyclical fiscal policy. The basic premise is that during bad economic times, many developing countries no longer have access to international capital and thus are unable to run deficits to engage in countercyclical fiscal policy. During good times, developing country governments can borrow more easily as international capital markets now become accessible, and so governments increase spending while they have the opportunity. The literature is composed of theoretical papers like Aizenman et al. (1996), Talvi and Vegh (2000) and Riascos and Vegh (2003), and empirical papers that investigate the question using econometric OLS regressions, like Gavin et al. (1996), Gavin and Perotti (1997), IMF (2002) and Calderon and Schmidt-Hebbel (2003). As well papers that analyze pro-cyclical fiscal policy in a descriptive way, include Carvalho (2001), Goldfajn (2001), and Ocampo (2002, 2003).

In an example of a theoretical analysis of the question, Riascos and Vegh (2003) show that pro-cyclical government consumption is consistent with a standard neoclassical model of fiscal policy in which policymakers optimally choose both the level of government consumption and taxes. Riascos and Vegh (2003) argue that when markets are complete, such as in developed countries, the correlation

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[5] Ferreira da Silva (2002) offers a good empirical study, with panel data GMM-IV estimation, showing that countries with more developed financial systems have smoother economic fluctuations. It explains that this finding is supported by the balance sheet view, where countries with more developed banking systems will face reduced agency and verification costs, and as consequence, will be more able to smooth consumption and investment over the business cycle. As a consequence, countries with more developed financial systems should exhibit less volatile business cycles.

[6] Pallage and Robe (2000) calculate that economic volatility in developing countries is 15-30 times larger than the US, and that the resulting welfare loss would be enough to trade a reduction of 1 point percent in economic growth forever.

between government consumption and output is zero (as it is in G-7). [7] However it becomes optimal to let government spending be pro-cyclical when markets are incomplete as in Latin American countries. Incomplete markets therefore induce substantial volatility in both private and public consumption.

In the empirical literature, Gavin et al. (1996) find that Latin American economies are about two to three times more volatile than industrial countries. They suggest that this volatility is in part a consequence of pro-cyclical fiscal policy in the region. These pro-cyclical responses are most pronounced during recessions and according to the paper seem to be related to the inability to access international capital markets in the face of adverse shocks.

While the financial constraint explanation for pro-cyclical fiscal policy is intuitively appealing, it does beg a few questions, as Alesina and Tabellini (2005) point out. Why do countries not simply accumulate reserves during good times when capital markets are open to them, for use when bad times hit and capital markets are essentially closed? Or why would international lenders not lend to developing countries during recessions?

One alternative explanation focuses on the role of government misconduct or weak institutions in developing countries. Papers such as Talvi and Vegh (2000) and Calderon and Schmidt-Hebbel (2003) raise this possibility. Another more recently developed alternative emerges from Alesina and Tabellini (2005) who argue that pro-cyclical fiscal policy is due to the incentives faced by voters and less than benevolent governments. This therefore leads to the sort of pro-cyclical fiscal policy exhibited across many developing countries. Carvalho (2001) and Ocampo (2002, 2003) make a similar argument and suggest that the pro-cyclical volatility of capital inflow produces a pro-cyclical fiscal policy, while IMF adjustment reinforces this pro-cyclical policy.

2.3. *Pro-cyclical monetary policy*

The literature on pro-cyclical monetary policy in developing countries is less developed than the pro-cyclical fiscal policy literature. Papers in this area include Calvo and Reinhart (2000), Carvalho (2001), Gomez (2001), Caballero (2002), and Calderon and Schmidt-Hebbel (2003). Two main explanations emerge regarding why developing countries may exhibit pro-cyclical monetary policy. The first focuses on the role of exchange rates in determining monetary policy. As discussed by Calvo and Reinhart (2000), countries fear floating exchange rates due to their effects on inflation, and therefore employ a managed float which makes monetary policy a function of capital movements. During times when international capital is attracted to the domestic economy, countries are forced to lower interest rates to offset the effect of this inflow on the exchange rate, and during times when international capital leaves the economy, countries are forced to raise interest rates in order to

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[7] This result for G-7 countries is consistent with Barro's smoothing government consumption theory.

defend the value of the currency. This therefore induces procyclicality in monetary policy.

The other explanation considers inflation targeting. Under this explanation, we see pro-cyclical monetary policy as an increase in capital inflow appreciates the exchange rate, eases pressure on prices, and consequently leads to a reduction in the domestic interest rate. Similarly, capital outflow would depreciate the exchange rate, causing pressure on prices and subsequently forcing policy makers to increase domestic interest rates.

The only econometric study in this literature is Calderon and Schmidt-Hebbel (2003), that investigates pro-cyclical monetary (and fiscal policy) by comparing volatility in GDP with volatility in the real interest rate. Calderon and Schmidt-Hebbel (2003) control for institutional maturity measured by moderation in risk spread in the international market. They find that many developing countries do follow pro-cyclical policies, but countries with mature institutions (low risk-spread) escape this destabilizing behavior.

3. Empirical Approach [8]

3.1. *Do countries engage in pro-cyclical fiscal and monetary policy?*

This paper addresses two questions. The first is whether developing countries practice pro-cyclical fiscal and monetary policies. Clearly endogeneity is an important issue when investigating the relationship between policy and growth. While we are interested in determining whether economies practice pro-cyclical fiscal and monetary policy, we need to be aware of possible endogeneity arising from the fact that there may be a positive correlation due to short-run effects of policy on growth. We address this problem of endogeneity using two econometric approaches: generalized methods of moments – instrumental variable (GMM-IV), which allows us to analyze the contemporaneous relationship between policy and economic growth; and Vector Autoregression (VAR) estimation, an approach which allows us to deal with the dynamics in macroeconomic time series.

In the case of testing fiscal policy, we use a GMM-IV version of the equation estimated by Gavin and Perotti (1997), where we use a lag of GDP growth to instrument for the endogenous regressor in the following equation:

$$Policy_t = \alpha_0 + \alpha_1 \triangle GDP_t + \alpha_2 Policy_{t-1} + \alpha_3 X_t + \varepsilon_t \qquad (1)$$

where *policy*$_t$ is fiscal policy at time t as measured by the primary surplus (defined as budget surplus minus nominal interest paid as percentage of GDP) and X_t represents a vector of control variables. [9]

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[8] The models were also estimated using White's heteroskedasticity consistent coefficient covariance and they did not show much diffence in the standard deviations.

[9] We also estimated fiscal policy using the growth of government consumption. The results are generally consistent with those using the primary surplus.

With this identification strategy we are solve the endogeneity problem by instrumenting based on time. Equation (1) imposes a structural relationship between growth and policy, and through our choice of instrument, we are essentially assuming lagged growth is exogenous with respect to current policy. [10] Given the use of annual data this is a fairly reasonable assumption.

When testing monetary policy procyclicality we again employ Equation (1), however *policy* is now monetary policy and is measured by the real money market interest rate or short-term treasury rate deflated by consumer price inflation. [11] Central banks can easily access and influence the money market interest rate and as a result this rate better reflects the intention of the monetary authority. We do not use other financial market rates like lending and deposit rate, as proxies, as previous analysis shows that lending and deposit rates do not necessarily follow monetary policy decisions.

Equation (1) is estimated both with and without control variables. Our control variables include the change in oil prices in order to control for productivity shocks as well as inflation as in Gavin and Perotti (1997). [12] If governments in developing countries are using pro-cyclical fiscal policy, we would expect $\alpha_1 < 0$, which can be interpreted as a reduction in GDP growth leads to an increase in the government primary surplus. Similarly, if governments are using pro-cyclical monetary policy, we would expect $\alpha_1 < 0$, which can be interpreted as a reduction in growth leads to an increase in real interest rates.

Following Gavin and Perotti (1997), we also estimate Equation (1) with special attention to the state of the economy to investigate whether there is asymmetry in policy decisions depending on the state of the economy. We have defined the state of the economy based on whether or not GDP growth is above or below a linear time trend. [13] The resulting equation is as follows:

$$Policy_t = \alpha_0 + \alpha_1(\triangle GDP_t^* D_{good}) + \alpha_2(\triangle GDP_t^* D_{bad}) + \alpha_3 Policy_{t-1} + \alpha_4 X_t + \varepsilon_t \tag{2}$$

where D_{good} captures growth above the linear time trend, and D_{bad} captures growth below the linear time trend. At the end the joint effect of these two parameters should represent the same effect found when estimated with only the change in GDP (the linear regression). For our purposes, a negative α_1 would indicate a

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[10] Our choice of instruments follows Campbell and Mankiw (1989).

[11] Governments do not decide real interest rates, the decision variable is nominal interest rates. However real rates are a better measure, and we follow Calderon and Schmidt-Hebbel (2003) on this choice. It is worth noting though that this selection potentially contains an identification problem. Pro-cyclical policy corresponds to a response to expected inflation that is greater than one (i.e. the Taylor principle), however inflation might end up being larger than expected and therefore ex-post real rates could fall rather than rise as the policy intended.

[12] Results are robust in both cases and so we comment only on the results with controls.

[13] It is worth noting our definition of good and bad states based on a time trend proved to be generally in line with that using the Hodrik Prescott filter. For sensitivity purposes, we also used the dummy definition employed by Gavin and Perotti (1997) and found similar results to our time trend results.

pro-cyclical fiscal or monetary policy in good times and a negative α_2 would mean the same in times of low GDP growth.

Our second method employed, to capture dynamics, is the Vector Autoregression model, which is as follows:

$$Policy_t = \alpha_{11} + \sum_{p=1}^{\rho} \alpha_{12p}\triangle GDP_{t-p} + \sum_{p=1}^{\rho} \alpha_{13p}Policy_{t-p} + \alpha_{14}X_t + \varepsilon_{1t}$$

$$\triangle GDP_t = \alpha_{21} + \sum_{p=1}^{\rho} \alpha_{22p}\triangle GDP_{t-p} + \sum_{p=1}^{\rho} \alpha_{23p}Policy_{t-p} + \alpha_{24}X_t + \varepsilon_{2t} \quad (3)$$

where the policy and control variables are the same as in our GMM estimations. We expect the signs in the first equation of our VAR to be similar to those explained for the GMM estimation, while the second equation gives us an idea of the economic and statistical significance that the feedback of policy would have on economic growth in the next period. The VAR approach is less structural than the IV approach, but by being more general in terms of timing (lags of growth can affect policy), it shows the robustness of the IV results. To check whether policy depends on the state of the economy, we also estimate Equation (3) based on growth above and below a linear time trend as discussed for Equation (2).

3.2. *Do capital flows impact policy decisions?*

The second question we address is whether capital flows have a direct impact on policy decisions. Here, we consider that policy is affected by movements in capital flows, but also can give feedback to capital flows. Our concern with endogenous regressors is the same as in our investigation of pro-cyclical policy and therefore we use the same approach discussed over the previous pages. We use GMM-IV estimation for the contemporaneous correlation and VAR to investigate the dynamic relationship between policy and capital flows. This is summarized in Equation (4):

$$Policy_t = \alpha_0 + \alpha_1 Capital\ Flows_T + \alpha_2 Policy_{t-1} + \alpha_3 X_t + \varepsilon_t \quad (4)$$

where *capital flows$_{t-1}$* is used to instrument for *capital flows$_t$*, and our controls variables are the change in oil prices and inflation.

Again, with this sort of identification strategy, we are assuming that lagged capital flows are exogenous with respect to current policy. Essentially we are assuming that financial agents are not anticipating future policy in making their current economic decisions. In fact with the inclusion of lagged policy in the regression it is future policy that is different from current policy that agents are not anticipating. Given the use of annual data again this is a reasonable assumption.

Further, our VAR model is as follows:

$$Policy_t = \alpha_{10} + \sum_{p=1}^{\rho} \alpha_{11p} Capital\ Flow_{t-p} + \sum_{p=1}^{\rho} \alpha_{12p} Policy_{t-p}$$
$$+\alpha_{13}X_t + \varepsilon_{1t}$$
$$Capital\ Flow_t = \alpha_{20} + \sum_{p=1}^{\rho} \alpha_{21p} Capital\ Flow_{t-p} + \sum_{p=1}^{\rho} \alpha_{22p} Policy_{t-p}$$
$$+\alpha_{23}X_t + \varepsilon_{2t} \tag{5}$$

with the same controls X_t as in our GMM-IV estimation.

The expected signs are similar to those detailed in our pro-cyclical policy tests. [14] A negative parameter on capital flows would suggest that capital inflows have a pro-cyclica" impact on fiscal policy. [15] In the case of monetary policy, a negative parameter would indicate that an increase in capital inflow reduces real interest rates, characterizing a pro-cyclical impact. To address whether capital flows impact policy differently according to the state of the economy, we also apply to Equations (4) and (5) the same transformation seen in Equation (2).

It is worth noting that our IV approach and VAR approach discussed over the previous pages are quite related and both correspond to a Granger-causality type test. Assuming that current growth (capital flows) is positively related to lagged growth (capital flows), then a test of the sign of the lags in the VAR is the same as the IV test. That is, IV using the lag is essentially like regressing policy on lagged growth (capital flows) with the relationship between current and past growth taken into account as is done in a VAR set-up.

4. Data and Empirical Evidence

4.1. *The data*

As in previous work in this literature we use annual data to test for pro-cyclical policy in Latin America. The countries considered are Argentina, Brazil, Chile, and Mexico. In order to contrast these results with developed country results we also investigate fiscal and monetary policy for the United States as well as the United Kingdom.

Our dataset spans from 1970 to 2000 and is based on data from the World Bank's *Global Development Finance 2003* CD-ROM and *World Development Indicators 2002* CD-ROM as well as the IMF's *International Financial Statistics and Government Financial Statistics Yearbook.* [16]

The primary surplus is generally measured by subtracting nominal interest paid from the overall budget of the central government. In the case of Brazil we use

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[14] Once capital flows are procyclical, an increase in capital flows is positively correlated with GDP growth.

[15] This means an increase in capital inflows leads to a loose policy.

[16] When necessary, data was also collected from the respective country's central bank or Finance Ministry.

general government that includes state enterprises and local governments. Our measure of monetary policy is measured as the real money market interest rate (or short term treasury rate) deflated by CPI. Lastly, our aggregate measure of net capital flow is created by adding net transfer on debt (all flows minus interest payments), net flow on foreign direct investment and on portfolio investment, and subtracting profit remittances. [17] We also use a measure of private net transfers from the World Bank (excluding official loans and short term debt) to check for robustness. Both measures of net capital flow provide similar results, though with different levels of statistical significance. We use the first measure (normalized by exports) for the analysis detailed in this paper. Additionally, given the use of time series analysis, stationarity of the series is checked using the Augmented Dickey-Fuller (ADF) test with a maximum lag length of four. [18]

4.2. Argentina

4.2.1. Fiscal policy

The fiscal policy results which follow for Argentina as well as the other countries under consideration are based on the fiscal policy variable in first differences. However in order to bring as much evidence to bear on this question, estimates using the fiscal policy measure in levels (where stationary) are also available. These results can be found in the Appendix A.

On the basic question of the cyclicality of fiscal policy, the results in the second column of Table 1 indicate that for both the non-state dependent GMM and non-state dependent VAR results there is no statistical evidence that GDP growth affects Argentina's primary surplus. [19] Allowing for different states, there is however VAR evidence of pro-cyclical fiscal policy during recessions.

Concerning capital flows and fiscal policy, both GMM and VAR non-state dependent results suggest international capital influences the primary surplus in a pro-cyclical direction. The state dependent results also suggest that capital flows impact fiscal policy (though with the caveat of significance only during the good state).

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[17] These data are not available for the US and UK in the *Global Development Finance* dataset. Therefore we measure net capital flow as the sum of the current account deficit with changes in international reserves. In all cases we normalize net capital flow by exports.

[18] We use the 10% level of significance to reject the unit root (see tests in the appendices). We also use the 10% level of significance in order to reject the null hypothesis that a parameter equals zero (no relationship) in our estimations. For the VAR estimations we use the Schwarz information criterion to choose the lag length. This criterion tends to indicate the lowest-lag Vector Autoregression, which is preferable when dealing with a short span of data such as ours. We also use White's heteroskedasticity-consistent covariance matrix, making heteroskedasticity the general case.

[19] It is possible that privatizations implemented during the 1990's in Argentina are influencing our results via their impact on the primary surplus. The financial gains from privatization are not considered fiscal revenue in the calculation of the fiscal deficit. With Argentina's abroad privatization process, it is possible that the income generated from this process isolated the fiscal policy from behaving in a procyclical way and from depending on external funds (even though part of the privatization funds came from foreign direct investment and so are counted in the capital inflow measure).

Table 1

Testing for pro-cyclical fiscal policy and the influence of capital flows: Argentina

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.000	Non-state dependent	-0.029**
State dependent (good)	1.786	State dependent (good)	-0.035**
State dependent (bad)	-2.374	State dependent (bad)	-0.020
VAR		VAR	
Non-state dependent	0.000	Non-state dependent	-0.015*
State dependent (good)	0.059	State dependent (good)	-0.016*
State dependent (bad)	-0.188*	State dependent (bad)	-0.010

*,**,*** indicates 90%, 95%, 99% significance.

4.2.2. *Monetary policy*

Table 2

Testing for pro-cyclical monetary policy and the influence of capital flows: Argentina

Monetary policy		Monetary policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	-7.168**	Non-state dependent	-0.6826*
State dependent (good)	293.51	State dependent (good)	-0.684*
State dependent (bad)	-574.92	State dependent (bad)	-0.680**
VAR		VAR	
Non-state dependent	-2.814**	Non-state dependent	-0.329*
State dependent (good)	-2.382*	State dependent (good)	-0.278*
State dependent (bad)	-4.074	State dependent (bad)	-0.700*

*,**,*** indicates 90%, 95%, 99% significance.

Turning to monetary policy, the GMM and VAR results of Table 2 indicate pro-cyclical monetary policy for Argentina. For the non-state dependent results, the negative sign on GDP growth points toward an increase in the real interest rate when there is a reduction in GDP growth and vice-versa. When examining policy in different states of the economy, we do not identify any statistically significant relation in the GMM results, while the VAR results indicate pro-cyclical monetary policy during good times. The investigation of the direct effect of capital flows on monetary policy presents the expected negative sign (higher capital inflow lowers interest rate) in both GMM and VAR estimations. The results based on different

states of the economy also suggest that capital inflow always impacts monetary policy in a pro-cyclical direction.

4.3. Brazil

4.3.1. Fiscal policy

The results of Equation (1) using the primary surplus in levels show statistically weak evidence of pro-cyclical policy, even though the signs are in the expected direction. [20] However, for first differences (where the effect of GDP growth is on the change of fiscal policy), there is strong and consistent evidence that the primary surplus moves in a pro-cyclical manner as seen in Table 3.

Table 3
Testing for pro-cyclical fiscal policy and the influence of capital flows: Brazil

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	-0.597**	Non-state dependent	0.848
State dependent (good)	-0.468*	State dependent (good)	-1.566
State dependent (bad)	-1.022*	State dependent (bad)	2.988
VAR		VAR	
Non-state dependent	-0.435**	Non-state dependent	0.680
State dependent (good)	-0.587*	State dependent (good)	-1.002
State dependent (bad)	-0.266	State dependent (bad)	2.168

*,**,*** indicates 90%, 95%, 99% significance.

The non-state dependent GMM and VAR results both point to pro-cyclical fiscal policy. For different states of the economy, the GMM results suggest that fiscal policy is always procyclical, while the VAR results indicate support for pro-cyclical policy only during good times. In the case of the effect of capital flows on fiscal policy, there does not appear to be any statistically significant support for capital flows influencing Brazilian fiscal policy. There exists historical evidence that huge increases in government consumption did not occurr together with large capital inflows and this may be the reason why we are unable to find statistically significant signs of pro-cyclical capital influence in these equations.

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Table 4

Testing for pro-cyclical monetary policy and the influence of capital flows: Brazil

Monetary policy			Monetary policy	
GMM	Effect of growth		GMM	Effect of capital flows
Non-state dependent	-2.987**		Non-state dependent	-19.392**
State dependent (good)	-1.833*		State dependent (good)	-17.775*
State dependent (bad)	-14.808		State dependent (bad)	-42.201*
VAR			VAR	
Non-state dependent	-1.432*		Non-state dependent	-17.037***
State dependent (good)	-1.215*		State dependent (good)	-15.803*
State dependent (bad)	-1.824*		State dependent (bad)	-32.297

*,**,*** indicates 90%, 95%, 99% significance.

4.3.2. *Monetary policy*

In the case of Brazilian monetary policy, the non-state dependent GMM as well as VAR results support the notion of pro-cyclical monetary policy in which the real interest rate increases when the country faces a reduction in growth. Allowing for different states of the economy, again the evidence is supportive of pro-cyclical monetary policy. The results for different states show that monetary policy is pro-cyclical regardless of whether the country is in a good or bad state. The results for Equations (5) and (6) provide evidence that capital flows directly affect real interest rates in Brazil. Both the GMM and the VAR estimates indicate that an increase in capital inflows leads to a decrease in real interest rates and vice-versa. The data shows that this impact is for the most part statistically significant in good and bad states as well.

4.4. *Chile*

4.4.1. *Fiscal policy*[21]

The GMM results of Table 5 fail to find any significant relation between GDP growth and Chilean fiscal policy, as is the case for the VAR results, regardless of whether we consider the non-state dependent or state-dependent cases. However the VAR results using levels for the fiscal policy measure do in fact provide strong support for countercyclical fiscal policy.[22]

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[20] See the Appendix A for these results. Also recall that for the case of Brazil we use a measure of general government for the Brazilian primary surplus using data from the IMF and Central Bank of Brazil.

[21] Due to the short sample available for Chilean interest rates, we investigate only fiscal policy for Chile.

[22] This is the case for non-state and state dependent results. See the Appendix A for more on these results.

Table 5
Testing for pro-cyclical fiscal policy and the influence of capital flows: Chile

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	-0.015	Non-state dependent	-0.090**
State dependent (good)	0.070	State dependent (good)	-0.065***
State dependent (bad)	-0.228	State dependent (bad)	-0.116
VAR		VAR	
Non-state dependent	-0.005	Non-state dependent	-0.043*
State dependent (good)	0.021	State dependent (good)	-0.040
State dependent (bad)	-0.067	State dependent (bad)	-0.046**

*,**,*** indicates 90%, 95%, 99% significance.

It is possible that the existence of a fund for the stabilization of copper prices may explain the ability of Chile to implement the countercyclical fiscal policy identified in the levels results in this study. This fund, created in 1985, saves resources when the price of copper is above a threshold, which is then used when copper prices are below the threshold. Even though the relative importance of copper revenue has declined in the Chilean public budget throughout the 1990s, it accounted for almost 30% of all fiscal revenue during the late 1980s. [23] The capital controls implemented by Chile during this period may also be influencing our findings. In the early 1990's the government eliminated capital outflow controls and implemented a control to capital inflow where a significant part of the inflows would be required to stay in the Central Bank for a year. This would discourage short term capital inflows, reducing the impact of excess international liquidity in domestic policy and macroeconomic volatility in the Chilean economy.

It is interesting to note, however, that even though there is no evidence that Chile follows pro-cyclical fiscal policy, the data indicates that net capital flows have a direct impact on policy. An increase in capital inflows helps predict a loosening of fiscal policy. This evidence is captured by both approaches. This says that fiscal policy in Chile reacts to capital inflows in the direction the recent literature suggest, but this behavior is not sufficient to make policy procyclical.

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[23] (Kaminski et al. 2004, pp. 31–32), suggest the adoption of fiscal rules designed to promote public saving in good times may have contributed to these type of findings.

4.5. *Mexico*

4.5.1. *Fiscal policy*

Table 6
Testing for pro-cyclical fiscal policy and the influence of capital flows: Mexico

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	-0.743*	Non-state dependent	-0.093**
State dependent (good)	-0.052	State dependent (good)	-0.004
State dependent (bad)	-7.133	State dependent (bad)	-0.178***
VAR		VAR	
Non-state dependent	-0.272***	Non-state dependent	-0.060**
State dependent (good)	-0.220	State dependent (good)	-0.040
State dependent (bad)	-0.483**	State dependent (bad)	-0.085*

*,**,*** indicates 90%, 95%, 99% significance.

Investigating the impact of capital inflows on fiscal policy, we find that the non-state dependent GMM and VAR results provide support that capital flows affect the primary surplus in a pro-cyclical direction. The results for different states of the economy indicate a statistically significant pro-cyclical impact of capital flows when economic growth is below average.

4.5.2. *Monetary policy*

In Table 7, we find no evidence of pro-cyclical monetary policy for Mexico. Both the GMM and VAR results have mostly countercyclical signs although they are not statistically significant. The results concerning policy in different states have countercyclical signs in periods of high growth and pro-cyclical signs in periods of low growth but again they are not statistically significant. The effect of capital inflows on real interest rates is also not statistically significant. Examining policy in different states, however, we find evidence that capital inflows impact monetary policy in a pro-cyclical direction during bad times.

Mexico may be a case where the authorities act to increase interest rates during bad times to fight capital outflows, but it is possible that the increase in inflation ends up being larger than the increase in nominal interest rates, resulting in an ex-post decrease in real interest rates. In fact, having taken a look at nominal interest rates, it appears Mexico has increased nominal interest rates during particularly bad times (particularly during the 1982 and 1995 crises). Additionally it is possible that the fact that México is close to the US makes IMF requirements to this economy less restrictive than those imposed on other Latin American countries.

Table 7

Testing for pro-cyclical monetary policy and the influence of capital flows: Mexico

Monetary policy		Monetary policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.489	Non-state dependent	-0.024
State dependent (good)	0.520	State dependent (good)	0.113
State dependent (bad)	-1.741	State dependent (bad)	-0.375
VAR		VAR	
Non-state dependent	0.152	Non-state dependent	-0.014
State dependent (good)	0.215	State dependent (good)	0.054
State dependent (bad)	-0.047	State dependent (bad)	-0.134**

*,**,*** indicates 90%, 95%, 99% significance.

4.6. USA

4.6.1. Fiscal Policy

For comparison sake, we also provide results for two developed countries, the United States and the United Kingdom. The US non-state dependent GMM results of Table 8 do not show statistically significant evidence of a relationship between fiscal policy and economic growth, though the non-state dependent VAR results do provide evidence of countercyclical policy. The results (both GMM and VAR) based on different states show statistically significant evidence that the US implements countercyclical fiscal policy during good times.

Table 8

Testing for pro-cyclical fiscal policy and the influence of capital flows: USA

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	1.039	Non-state dependent	1.519
State dependent (good)	0.512**	State dependent (good)	2.566**
State dependent (bad)	-3.256	State dependent (bad)	-8.379**
VAR		VAR	
Non-state dependent	0.300*	Non-state dependent	1.363
State dependent (good)	0.288**	State dependent (good)	2.039**
State dependent (bad)	0.84	State dependent (bad)	-3.907*

*,**,*** indicates 90%, 95%, 99% significance.

Concerning the influence of capital flows on fiscal policy, both GMM and VAR non-state dependent results do not indicate that capital flows impact fiscal policy. Looking at the asymmetric impact, we find that capital flows affect policy in a countercyclical direction during good times and in a pro-cyclical direction during bad times.

4.6.2. *Monetary policy*

We find no statistically significant relation between monetary policy and economic growth in the US. Both the non-state dependent GMM and VAR results have countercyclical signs but are not statistically significant. The results concerning policy in different states have a countercyclical sign in periods of high growth and a pro-cyclical sign in periods of low growth but again none of these are statistically significant.

The non-state dependent results for the effect of capital inflows on real interest rates do not provide statistically significant results, although the parameter estimates do indicate a countercyclical direction. With different states, capital flows appear to impact monetary policy in a countercyclical direction in the good state based on our VAR estimates.

Table 9

Testing for pro-cyclical monetary policy and the influence of capital flows: USA

Monetary policy		Monetary policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.984	Non-state dependent	3.246
State dependent (good)	0.404	State dependent (good)	3.331
State dependent (bad)	-2.351	State dependent (bad)	-3.567
VAR		VAR	
Non-state dependent	0.182	Non-state dependent	2.330
State dependent (good)	0.193	State dependent (good)	2.795***
State dependent (bad)	-0.014	State dependent (bad)	-2.176

*,**,*** indicates 90%, 95%, 99% significance.

4.7. *United Kingdom*

4.7.1. *Fiscal policy*

In Table 10, both non-state dependent GMM and VAR results prove to be statistically insignificant though possess the correct sign for countercyclical fiscal

policy in the UK. [24] When considering good and bad states of the economy, the evidence is statistically significant for the good state. Investigating the direct impact of capital inflow on fiscal policy we find evidence which support a pro-cyclical influence particularly during bad times.

Table 10

Testing for pro-cyclical fiscal policy and the influence of capital flows: UK

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.431	Non-state dependent	-17.855
State dependent (good)	0.427***	State dependent (good)	2.654
State dependent (bad)	-0.540	State dependent (bad)	-17.840*
VAR		VAR	
Non-state dependent	0.240	Non-state dependent	-6.238**
State dependent (good)	0.345***	State dependent (good)	-1.645
State dependent (bad)	0.131	State dependent (bad)	-13.945*

*,**,*** indicates 90%, 95%, 99% significance.

4.7.2. *Monetary policy*

Finally, in the case of UK monetary policy, the evidence suggests the UK follows countercyclical monetary policy. This evidence is supported by both GMM and VAR estimates. The GMM results for different states of the economy show evidence of countercyclical monetary policy during good times, while the VAR estimations suggest that it is valid in both states. We find no statistically significant evidence of any relationship between capital flows and monetary policy in the UK.

4.8. *Summary tables*

Tables 12 and 13 summarizes our evidence that most of our Latin American countries do practice procyclical monetary and fiscal policy, while this is not the case for our two developed countries. Argentina, Brazil, and México follow pro-cyclical fiscal policy, while Chile follows a counter-cyclical policy. Regarding monetary policy, we find that Argentina and Brazil follow a pro-cyclical monetary policy, while we could not make a clear conclusion about México and did not have enough data to consider Chile. The USA and United Kingdom follow counter-cyclical fiscal policy and the latter also engages in countercyclical monetary policy.

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[24] Levels evidence provides statistically significant support for countercyclical fiscal policy beyond that in table 10.

Table 11

Testing for pro-cyclical monetary policy and the influence of capital flows: UK

Monetary policy		Monetary policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.687*	Non-state dependent	-0.434
State dependent (good)	0.595*	State dependent (good)	7.319
State dependent (bad)	-0.960	State dependent (bad)	-3.347
VAR		VAR	
Non-state dependent	0.328*	Non-state dependent	-0.155
State dependent (good)	0.470*	State dependent (good)	2.043
State dependent (bad)	0.148***	State dependent (bad)	-3.683

*,**,*** indicates 90%, 95%, 99% significance.

Table 12

Policy direction and international capital influence

	Argentina	Brazil	Chile	Mexico	USA	UK
Fiscal Policy						
Direction						
GMM	P	P*	C	P*	C	C*
VAR	P	P*	C*	P*	C*	C*
Capital Influence						
GMM	P*	P	P*	P*	C	P
VAR	P*	C	P*	P*	C	P*
Monetary Policy						
Direction						
GMM	P*	P*	na	C	C	C*
VAR	P*	P*	na	C	C	C*
Capital Influence						
GMM	P*	P*	na	P	C	P
VAR	P*	P*	na	P	C	P

P is for pro-cyclical policy or pro-cyclical influence of international capital movement.

C is for counter-cyclical policy or counter-cyclical influence of international capital movement.

* is for statistical significance (at least 10%).

Please see Appendix A for detailed estimation results in Table A.1.

Table 13
Policy direction and international capital influence under different state of the economy

	Argentina	Brazil	Chile	Mexico	USA	UK
Fiscal Policy						
Direction						
GMM - Good	C	P*	C	P	C*	C*
GMM - Bad	P	P*	C	P	P	P
VAR- Good	C	P*	C*	P	C*	C*
VAR - Bad	P*	P	C	P*	C	C
Capital Influence						
GMM - Good	P*	P	P*	P	C*	C
GMM - Bad	P*	C	P	P*	P*	P*
VAR- Good	P*	P	P	P	C*	P
VAR - Bad	P	C	P*	P*	P*	P*
Monetary Policy						
Direction						
GMM - Good	C	P*	na	C	C	C*
GMM - Bad	P	P	na	P	P	P
VAR- Good	P*	P*	na	C	C	C*
VAR - Bad	P	P*	na	P	P	C*
Capital Influence						
GMM - Good	P*	P*	na	C	C	C
GMM - Bad	P*	P*	na	P	P	P
VAR- Good	P*	P*	na	C	C*	C
VAR - Bad	P*	P	na	P*	P	P

P is for pro-cyclical policy or pro-cyclical influence of international capital movement.

C is for counter-cyclical policy or counter-cyclical influence of international capital movement.

* is for statistical significance (at least 10%).

Please see Appendix A for detailed estimation results in Table A.2.

5. Concluding Comments

This paper addresses two questions. First is there empirical evidence that developing countries practice pro-cyclical fiscal and monetary policy? Second, do capital flows impact policy decisions in these countries? With a sample of four Latin American countries over the period of 1970 to 2000, we find evidence suggesting yes to both questions, though not unequivocally. For our first question, we find they do practice pro-cyclical fiscal and monetary policy, though Chile is an exception when it comes to fiscal policy, where it is countercyclical, and Mexico is the exception for monetary policy. For the second question we find that capital flows generally have a pro-cyclical impact on policy decisions in these countries. Our results suggest capital inflows impact fiscal policy for three of our four countries. We also find some evidence that monetary policy is directly influenced by capital inflows for all developing countries studied, as found in previous literature.

Comparing these results to the developed country benchmark, we find the evidence suggests both the US and UK follow countercyclical fiscal policy and that the latter engages in countercyclical monetary policy. Taken with our Latin American findings, this suggests developing countries adopt pro-cyclical monetary and fiscal policy in contrast with what we see in developed nations. This is in line with what has been suggested by the earlier literature. This study also suggests that capital flows have a strong influence on the policy direction.

An immediate conclusion we draw is the fact that Chile appears to follow countercyclical policy may be evidence of the efficiency of some kind of fiscal saving mechanism during good times, which enables Chile to implement countercyclical policy. Regarding the impact of capital flows, a possible conclusion of these findings is that some prudential regulation in capital mobility may help reduce the destabilizing effect of fiscal and monetary policy and so reduce macroeconomic volatility in these countries over the short run. Others in the literature have advocated this solution, as seen in Espinosa-Veiga et al. (2000), Carvalho (2001), and Ocampo (2003). Over the longer run, the solution may require measures that help develop the domestic financial system, reducing the existence of credit constraints, as detailed by Ferreira da Silva (2002).

These findings suggest the robustness of many of the literature's earlier results for fiscal policy, as taking the GMM approach to deal with the problem of endogenous regressors has yielded results largely consistent with earlier findings. As well, they provide additional empirical support for the pro-cyclical monetary policy literature. We suggest for further research more could be done to incorporate more developing countries and more frequent data to compare regional policy responses to movements in capital flows.

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Appendix A. Results for Levels Fiscal Policy Measure

Table A.1
Testing for unit root using

Augmented Dickey-Fuller test statistic p-value (H0 have a unit root)	
Argentina	
GDP growth	0.0044
Primary deficit	0.9097
CPI	0.0206
Real interest rate	0.0016
Net capital flows/export	0.0985
Brazil	
GDP growth	0.0291
Primary deficit	0.0761
CPI	0.0287
Real interest rate	0.0259
Net capital flows/inflow	0.0211
Chile	
GDP growth	0.0075
Primary deficit	0.0076
CPI	0.0746
Real Interest Rate	-
Net capital flows/export	0.0820
Mexico	
GDP growth	0.0123
Primary deficit	0.6099
CPI	0.1503
Real interest rate	0.0349
Net capital flows/export	0.0750
Petrol	0.5778

We use 10% probability to reject the Null.

Therefore we use data in first difference in case non stationary.

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Table A.2

Testing for pro-cyclical fiscal policy and the influence of capital flows: Brazil

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	-0.902	Non-state dependent	-2.764
State dependent (good)	-0.781	State dependent (good)	-9.840
State dependent (bad)	-1.458	State dependent (bad)	4.383
VAR		VAR	
Non-state dependent	-0.225**	Non-state dependent	5.850
State dependent (good)	-0.275	State dependent (good)	-6.391
State dependent (bad)	-0.160	State dependent (bad)	2.784

*,**,*** indicates 90%, 95%, 99% significance.

Table A.3

Testing for pro-cyclical fiscal policy and the influence of capital flows: Chile

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	1.151	Non-state dependent	-0.10
State dependent (good)	2.216	State dependent (good)	-0.009
State dependent (bad)	6.843	State dependent (bad)	-0.139
VAR		VAR	
Non-state dependent	0.157*; 0.132*	Non-state dependent	-0.005; -0.034*
State dependent (good)	0.182*	State dependent (good)	0.005
State dependent (bad)	0.065	State dependent (bad)	-0.060*

*,**,*** indicates 90%, 95%, 99% significance.

Table A.4
Testing for pro-cyclical fiscal policy and the influence of capital flows: UK

Fiscal policy		Fiscal policy	
GMM	Effect of growth	GMM	Effect of capital flows
Non-state dependent	0.799**	Non-state dependent	-11.855
State dependent (good)	0.674*	State dependent (good)	-3.627
State dependent (bad)	-1.146	State dependent (bad)	-20.690*
VAR		VAR	
Non-state dependent	0.412*	Non-state dependent	-3.025
State dependent (good)	0.535*	State dependent (good)	1.227
State dependent (bad)	0.214	State dependent (bad)	-9.973***

*,**,*** indicates 90%, 95%, 99% significance.