Business Cycle Responses and Resilience of the Chilean Economy During the Last Fifty Years*

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Abstract

In this paper we use a VAR model to analyze the response of the Chilean business cycle to shocks and the capacity of the Chilean economy to withstand them (resilience). Novel features in the analysis include the introduction of an expanded set of variables to capture the impact of external shocks and domestic shocks —including policy variables; the use of an extended sample since the 1950s; and the introduction of block exogeneity to capture the small open economy feature and to better deal with identification issues. Among key results, we find that foreign shocks have been the dominant source of business cycle fluctuations, followed by monetary policy shocks, while fiscal policy shocks explain relatively little; and that despite of the increased synchronization of the domestic business cycle with international conditions, the resilience of the Chilean economy to external shocks has increased during the nineties, with countercyclical policies playing an important role in such a positive development.

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I. INTRODUCTION

After marked fluctuations in the business cycle of the last half of the century, the Chilean economy appears less volatile and more resilient to external shocks. Being Chile a small and increasingly open economy, the amplitude of the cyclical fluctuations that have characterized the business cycle over the years have been always suspected to be closely related to changes in external conditions.[1] However, many open questions still remain in this regard. To what extent the pronounced output fluctuations are associated with ups and downs in external conditions, and to what extent they can be attributed to domestic sources? Are real or financial external shocks the most important sources of fluctuations? Has the increasing international integration implied greater synchronization of the domestic cycle with the external economic conditions? Does the latter imply greater external vulnerability or, on the contrary, resilience to external shocks has somewhat improved?

In trying to answer these kind of questions, we adopt an empirical approach using a vector autoregressive (VAR) model with block exogeneity. We take the VAR model, adapt it to focus on the behavior of a small open economy, and use it to characterize and decompose the behavior of the Chilean business cycle. Since our model includes a comprehensive set of variables, we can evaluate the importance of both external, policy, and other domestic variables in the business cycle. In this context, we are able to assess how the economy has responded to different stochastic disturbances that have affected it, to measure the contribution of these variables to the business cycle fluctuations, and to analyze the resilience of the Chilean economy over the last half of the century.

A key feature in our analysis comes from imposing some plausible restrictions on relations among variables, following recent developments in model specification and estimation procedures to estimate the VAR model. Like Cushman and Zha (1997), Dungey and Pagan (2000), Hoffmaister and Roldós (2001), and Buckle et al (2002), we use block exogeneity for international variables to capture the small open economy feature in the associated dynamic responses and for domestic policy variables to better deal with identification issues.

Several interesting results emerge from this analysis. First, real and financial external shocks have significant effects on domestic economic activity. The significant impact in the cyclical behavior of the economy following the financial external shocks represented by the volatility of the international financial markets and the net capital inflows is a reflection of the financial restrictions faced by an emerging economy like Chile. Among domestic policy shocks, demand management policies and structural policies affect the business cycle fluctuations, as it is also the case of other domestic shocks such as investors confidence. Altogether, however, foreign shocks have been the dominant source of domestic output fluctuations, followed by monetary policy and structural policies while fiscal policy and

[1] For a review of empirical regularities characterizing business cycles in Chile, see Belaisch and Soto (1998) and, more recently, Bergoeing and Suarez (2001). For a Real Business Cycle (RBC) model applied to Chilean data, see Bergoeing and Soto (forthcoming).

domestic equity explain a relatively low fraction of the volatility of the business cycle. Second, we provide evidence of an increased resilience of the Chilean economy to external shocks during the nineties. Such a positive development has taken place even as the deeper integration of the economy with the rest of the world has resulted in an increased synchronization of the domestic business cycle with international conditions, which underscores the significant countercyclical role played by policies.

The paper is organized as follows: Section II provides a historical overview of the Chilean economy since 1950. Here, the paper outlines the main issues related to growth, recessions, and cyclical behavior. Section III presents a description of the data and the methodological issues associated to the VAR framework. Section IV analyzes the impact of foreign, policy, and other domestic shocks on the business cycle and the sources of its fluctuations; while Section V provides insights on the shock resilience of the economy using historical decomposition analysis. The final section summarizes the results and their implications for economic policy.

II. HISTORICAL OVERVIEW OF THE CHILEAN ECONOMY SINCE 1950

A. Growth and Recessions

Over the last half of the century the GDP growth rate of the Chilean economy displays an upward sloping trend, with a starting point around 3 percent in the early fifties, a mid-point around 4 percent in the early seventies, and an ending point around 5 percent towards the end of the sample period in 2003. The initial period is characterized by frequent but relatively moderate peaks and troughs as well as a somewhat low but stable medium-term growth rate. Between the seventies and the nineties, however, two very deep recessions took place, with their troughs observed in 1975 and 1982, respectively.[2] From 1990 onwards, peaks and troughs return to be moderate as in the first period, but with a significantly higher medium-term growth rate (Figure 1).

Recessions have not been uncommon during the 53 years covered in our sample (1950-2003). Indeed, there are 6 periods of negative growth. Two of them in the fifties (1954 and 1959), three of them between the early seventies and the early eighties (1972-73, 1975, and 1982-83) and only one of them in the late nineties (1999).

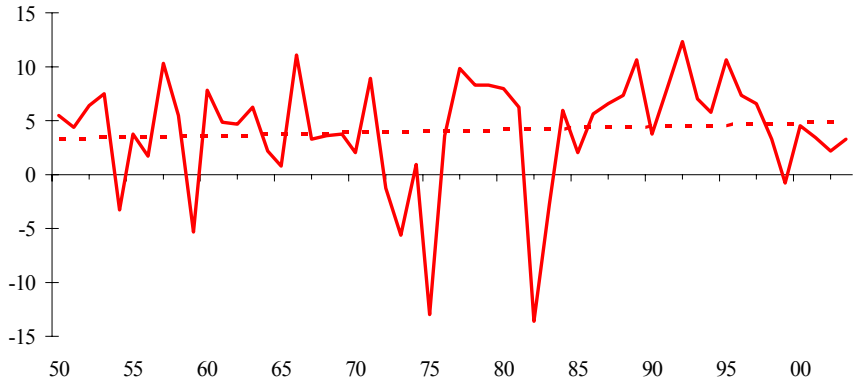
The relatively moderate recessions of the fifties are associated to important domestic economic policy events. The recession in 1954 came about after the very large monetary expansion at the beginning of the government of Carlos Ibañez (1952-58), followed by a surge in inflation, and then a stabilization program under the Klein-Sacks mission.[3] But price stability was not conquered then, and the efforts of the Alessandri's administration (1958-

[2] Observed fluctuations in the annual growth rate were as large as 24 percent, e.g. from -13.6 percent in 1982 to 10.6 percent in 1989.

[3] Ffrench Davis (1973) and Zahler (1977) contain detailed discussions of the economic policies applied in Chile in the 1950s and 1960s.

1964) to use the exchange rate as a tool for controlling inflation ended in the second recession, that of 1959, when the fixed parity of the Chilean currency[4] against the US dollar collapsed. Since then, and until the early seventies, there were slowdowns in economic activity, but no other recession took place.[5]

Figure 1: Chile's Annual GDP Growth 1950-2003



The recessions between the seventies and the eighties were more frequent and much deeper and included a full blown economic and financial crisis. The 1972-73 recession was a result of a deep social and political crisis during the Allende's administration (1970-73) which ended up with a military coup and 17 years of authoritarian rule.[6] A sharp deterioration in external conditions, particularly of the terms of trade during a period with very limited access to external financing due to the recent political turmoil of the early seventies, lead to the 1975-76 recession. Such a recession was followed by a period of rapid growth, which ended all the sudden with the deep and prolonged recession of 1982-83, the second of the Pinochet regime (1973-1990), and the worst during the period of analysis. This recession resulted from a sudden stop in capital inflows that forced the reversal of the (unsustainable) current account deficit. As the terms of trade deteriorated and the international real interest rates peaked, the adjustment required a sharp real exchange rate depreciation. The vulnerabilities of the banking system aggravated the recession. The very rapid increase in bank credit during the late seventies and early eighties—largely associated to foreign currency loans and connected lending— resulted in a severe deterioration of the loan portfolio and very high exposure to exchange rate risk. Although the fiscal balance was in surplus and public debt was nil, the peso came under severe market pressures that precipitated the second collapse of a fixed parity in the last fifty years of Chilean economic

[4] The escudo at that time.
[5] The period 1964-70 corresponds to Frei-Montalva's administration.
[6] A complete discussion of the policies of the Allende's administration and of the economic reforms during the Pinochet regime can be found in Edwards and Cox-Edwards (1987).

history. Notwithstanding the economy wide crisis, a default on external debt was avoided to a large extent thanks to the initial low level of public debt.

During the nineties, the short-lived and quite mild recession of 1999 is the only one observed, perhaps due to the stronger resilience built throughout years of significant reforms and institutional changes, including the contributions of a solid banking system and a coherent macroeconomic policy framework.[7] In the 1998-99 episode, as the previous ones of 1975 and 1982, a sharp deterioration in external conditions required a reversal in the current account deficit, yet this time from a much moderate level. The private sector reacted reducing domestic demand and adjusting asset portfolios to increase the holding of net foreign assets. The latter, together with the sharp contraction in the supply of external financing, exerted strong pressures over the exchange rate. Perhaps the recession could have been avoided if monetary policy would not have over reacted to limit currency depreciation by narrowing the exchange rate band.[8] The monetary authority feared that the currency depreciation may lead to an acceleration of inflation above the target and to financial system distress associated to the foreign currency exposures. Thus, domestic real interest rates reached extraordinarily high levels and economic activity dipped. The over reaction was evident when, the following year, inflation fell below the floor of the target range, while the financial system did not experience any substantial problems. However, it was rapidly corrected as the exchange rate was let to float in the last quarter of 1999 and interest rates entered in a prolonged phase of sustained reductions that have been instrumental for the recovery.

Most observers of the Chilean economy are of the view that the outstanding performance of the economy during the nineties can be explained in terms of the process of reforms and stabilization that began in the seventies and continued during most of the eighties and the nineties. The legitimacy offered by a peaceful transition to democracy, additional opening up of the economy, further development of domestic financial markets including a deeper integration to international financial markets, and a significant strengthening of the macroeconomic policy framework including fiscal consolidation and a successful price stabilization have been considered key factors. Since the late nineties, the fiscal authorities adopted a self-imposed rule that targets a structural surplus of 1 percent of GDP while allowing the automatic stabilizers to operate throughout the cycle. And, since the early nineties, the Central Bank was given full operational and administrative independence, and its Board of Directors adopted an inflation targeting regime that has been improved over the years. Given the currently supportive external environment, and the strength of its policy framework and institutional arrangements, Chile is very well positioned to return soon to faster medium-term growth.

[7] The prolonged slowdown of the economy that followed the downturn, which is only recently coming to an end, has mirrored the unsupportive external environment that prevailed until recently.
[8] See Le Fort (2000).

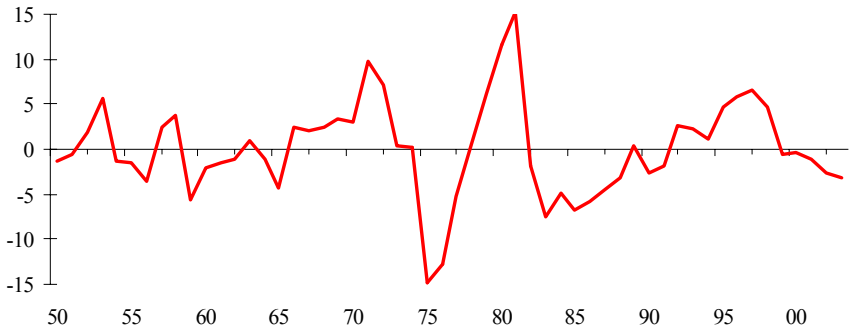
B. GDP Cycles

In this paper we measured the Chilean business cycle over the last half of the century as the deviations of GDP from its long-term trend (using Hodrick-Prescott filter). As shown in Figure 2, the evolution of the output gap over the sample period is anything but monotonous, with marked fluctuations and changing patterns. There are different ways of dating the cycles, and that can deliver different results in terms of identifying specific cycles. In the approach herein followed, eight different cycles are identified as presented in Table 1.[9] The average length of the cycle —which includes a low and a high phase— is seven years. A pattern that is very clear is that the cycles until the mid sixties were much shorter (around five years on average). The amplitude of the cycles also increased over time, until reaching a maximum in the fifth and sixth cycle (1969-76 and 1976-84) to decline substantially in the last two.

Table 1: Chile GDP Cycles 1950-2003

Platforms	Duration	Max Gap	Min Gap	Volatility
1950-55	5.5	5.6	-1.5	2.8
1955-58	4.0	3.8	-3.5	3.9
1958-64	6.0	0.9	-5.6	2.1
1964-69	5.0	3.4	-4.2	3.1
1969-76	7.0	9.8	-14.8	9.4
1976-84	8.0	15.2	-7.4	8.3
1984-90	6.0	0.5	-6.8	2.6
1990-04	14.5	6.6	-3.2	3.3
Average	**7.0**	**5.7**	**-5.9**	**4.4**

Figure 2: Chile's GDP Gap 1950-2003
(hp filtered)



[9] The discussion in Cashin (2004) is illustrative in terms of how cycle dating depends on a set of the self-imposed rules, the series over which those rules are applied, and the starting point of the sample, among other things. The cycle dating of Table 1 follows closely one set of rules contained in that paper.

The fifties and sixties were periods in which the economy was fairly closed to the rest of the world, with external demand conditions displaying very low correlation with the Chilean business cycle. Hence, despite the relatively unfavorable external demand and terms of trade, the economy was rather insulated, with an output gap that was close to zero on average, and with relatively low volatility. In contrast, the volatility of the output gap increased substantially between the seventies and eighties —along with the magnitude of the cyclical changes— and the average output gap was negative. Also, the volatility of most other variables is the highest of the three periods, including that of external demand conditions, terms of trade, net capital flows, growth in real balances, and fiscal expenditure. As we show in section V, however, the volatility of the output gap relative to that of international conditions as a whole increased substantially during this period. Finally, in the nineties, the output gap has been positive on average, and its volatility moderated significantly (Figure 2 and Table 2).

III. METHODOLOGICAL APPROACH

A. Data

The data used in this paper is of annual frequency and covers the period 1950-2003. Our empirical model includes 12 variables, derived from both international and domestic series. International series are used to construct five variables intended to measure real and financial external shocks. Domestic variables include a proxy for the Chilean business cycle, namely GDP gap, which is our main object of interest, a group of five variables aimed to control for domestic policy shocks, and a variable meant to capture domestically-driven financial shocks. Table 2 summarizes the 12 variables that are included in our empirical model.

Note that most of variables are measured in terms of gaps, i.e. deviations from the long-term trend calculated through a Hodrick-Prescott filter.[10] Our first variable is a proxy for the external demand conditions relevant to the Chilean economy, and is constructed from sectoral indices of World Merchandise Export Volume published by the World Trade Organization (WTO).[11] In order to aggregate them in a single index that captures the dynamism of the external demand for Chilean products, we use the sectoral share of Chilean exports. As with most domestic series, the source used to construct the sectoral share of Chilean exports is Braun et. al. (2000), publication that contains many series for the Chilean Economy during the period 1810-1995.[12] For the extension of the export shares series until 2003, our source is Central Bank of Chile (CBCh). The same combination of sources is used

[10] In order to prevent the typical tail problems common to this type of filtering process, we use data of up to five years prior to 1950, when available. We also use forecasts of up to two years for those variables that are included in gaps, based on official forecasts when available. These "extra" observations are then dropped.

[11] The sectoral indices include agricultural products, mining products and manufactures. See "Merchandise exports, production and gross domestic product, 1950-2003" in http://www.wto.org/english/res_e/statis_e/statis_e.htm.

[12] The publication is part of a series of documents that include also Jeftánovic et. al. (2000 and 2003) which purpose is the recompilation of long-span statistics for a large set of variables for the Chilean economy.

to obtain the terms of trade, variable that represents the other real external shock in our empirical model.[13]

Table 2: List of Variables

Variable	Type
External demand[(a)]	External/Real
Terms of trade[(a)]	External/Real
Foreign interest rate[(b)]	External/Financial
Foreign equity[(c)]	External/Financial
Net capital inflows[(d)]	External/Financial
Openness[(e)]	Domestic/Policy
Real exchange rate[(a)]	Domestic/Policy
Money[(f)]	Domestic/Policy
Fiscal revenue[(f)]	Domestic/Policy
Fiscal expenditure[(f)]	Domestic/Policy
Domestic equity[(b)]	Domestic/Financial
Output[(a)]	Main variable of interest

(a) Dev. of log from HP trend.
(b) Dev. of real rate or return from HP trend.
(c) Dev. of std. dev. of real returns from HP trend. The annual standard deviation is calculated from daily data.
(d) Dev. of ratio over GDP from HP trend.
(e) Ratio over GDP.
(f) Real growth rate.

The other three external variables are intended to measure financial shocks faced by the Chilean economy. Firstly, the foreign real interest rate corresponds to the average secondary market rate of the 3-Month Treasury bill minus the annual CPI inflation of the US economy (source: IMF). Secondly, we include a foreign equity variable as a proxy for the uncertainty of international financial markets. This variable is constructed by taking the annual standard deviation of daily real returns from the Dow Jones index (source: New York Stock Exchange, NYSC). Thirdly, net capital inflows to the Chilean Economy as percentage of GDP is calculated as the current account deficit net of international reserves accumulation over GDP until 1988 (Braun et. al.) and it is directly taken from the Balance of Payments Statistics of the CBCh onwards.

Most domestic variables are related to policy shocks. The first one—the de facto openness of the Chilean economy, i.e. the exports and imports share of GDP— is constructed until 1987 as the sum of export and imports in Chilean pesos taken from Jeftánovic et. al. (2000), deflated by the Chilean CPI taken from Jeftánovic et. al. (2003), and divided by real GDP taken from Braun et. al. (2000); and from 1989 onwards the source is the Balance of Payments Statistics of the CBCh. The second variable—the real growth of money— is taken

[13] In an alternative specification of the model the terms of trade is replaced by two variables: the real price of oil and copper (source: IMF).

from the Monetary and Financial Statistics of the CBCh, available since 1960, and complemented with Jeftánovic et. al. (2003) for the previous period. We use two variables as proxies for fiscal policy, namely the real growth of fiscal revenue and fiscal expenditure. These two variables are taken from Jeftánovic et. al. (2000) up to 1986, and from the Budgetary Office of the Chilean Ministry of Finance (DIPRES) onwards. Finally the real exchange rate is taken from Jeftánovic et. al. (2003) until 1989, and from the CBCh onwards.

We also include domestic equity, a variable aimed to capture business confidence. This variable is constructed as the real returns of the stock index (IPSA), which are taken from Braun et. al. until 1969 and from the Santiago Stock Exchange onwards.

Last but not least, and indeed our main variable of interest, the business cycle is constructed with data on real GDP taken from Braun et. al. until 1995 and the CBCh onwards. Table 3 presents descriptive statistics of the 12 variables that are included in our empirical model plus oil and copper prices:

Table 3: Descriptive Statistics of Variables

Period / Variable	*external demand*	*foreign interest rate*	*foreign equity*	*terms of trade*	*oil price*	*copper price*	*openness*	*net capital flows*	*real exchange rate*	*domestic equity*	*output*	*money*	*fiscal revenue*	*fiscal expend.*
Average per Period														
50-69	-0.8	0.1	0.0	0.7	0.0	-1.0	22.1	0.1	2.4	3.0	0.1	2.1	7.0	6.8
70-90	0.6	0.0	0.4	0.2	0.4	1.3	32.3	-0.2	-0.8	-3.0	-0.7	7.6	2.7	3.4
91-03	0.3	-0.2	-0.2	-1.0	-1.2	-3.9	44.7	0.1	-1.5	1.0	1.4	9.6	6.3	6.9
50-03	0.0	0.0	0.1	0.1	-0.2	-0.8	31.5	0.0	0.2	0.2	0.1	6.1	5.2	5.5
Standard Deviation per Period														
50-69	4.9	1.7	3.4	11.6	8.4	11.9	5.6	1.0	13.1	21.1	2.9	14.8	13.3	8.8
70-90	6.4	1.6	4.7	14.1	28.5	17.6	11.7	3.3	24.7	30.6	7.6	22.9	8.7	14.6
91-03	2.3	1.2	3.3	5.6	16.0	15.3	3.9	2.4	7.3	36.0	3.3	6.6	5.6	3.1
50-03	5.1	1.5	3.9	11.4	19.8	15.0	12.0	2.4	17.5	28.5	5.3	17.2	10.2	10.6
Correlation Cofficient of Variable Against Output Gap per Period														
50-69	0.1	-0.2	0.2	0.2	-0.4	-0.3	0.3	0.1	0.6	0.5	1.0	0.1	-0.2	-0.1
70-90	0.5	0.0	-0.3	0.4	0.1	0.3	-0.2	0.5	-0.4	0.3	1.0	0.4	0.1	0.4
91-03	0.5	0.5	-0.4	0.3	-0.3	0.5	-0.6	0.3	-0.8	-0.6	1.0	-0.2	0.1	0.2
50-03	0.4	0.0	-0.2	0.3	0.0	0.2	0.0	0.4	-0.3	0.1	1.0	0.3	0.1	0.3

B. Specification

We use a VAR model of the Chilean economy that contains 12 equations corresponding to each of the variables described above. To achieve identification of the structural parameters we follow the popular and straightforward approach known as Choleski decomposition. However, we depart from this traditional VAR approach by imposing block exogeneity restrictions consistent with the fact that the Chilean economy is a small open economy, meaning that domestically determined variables cannot affect the international block. Indeed, this approach—which let us to reduce the overall number of parameters estimated for most equations—together with our relatively large annual sample, enable us to estimate a VAR with such a large number of endogenous variables. Moreover, the dynamic structure of this model based on annual frequency data is adequately handled by including

only one lag.[14] The block exogeneity approach for small open economies was an extension firstly used by Cushman and Zha (1997) for the Canadian economy. More lately, Dungey and Pagan (2000), Hoffmaister and Roldós (2001), and Buckle et. al. (2002) used such an approach in applications to Australia, Brazil and Korea, and New Zealand, respectively.

Thus, the equations in our model are arranged in a way that takes into account the fact that a Choleski decomposition identification scheme depends theoretically on the order of the equations, with the lag structure of the model consistent with the small open economy case.[15] Table 4 summarizes the order of the equations and the lag structure of the model.

Note first that most of the equations of variables pertaining to the international block precede the equations of variables pertaining to the domestic block. Thus, the first three international variables—external demand conditions, foreign interest rate, and uncertainty in international financial markets—are completely exogenous to the other variables included in the model but are interrelated among each other. That differs from the case of the terms of trade, which is affected (only) by the previous three variables but does not affect them.[16] However, the last variable of the international block, net capital inflows to the Chilean economy, features no lag restrictions, since it could be potentially affected by all the variables included in the model, and it is allowed to be contemporaneously affected by the four international variables that precede it in terms of the order of the equations. The lag structure of the equation associated to a measure of trade openness, a medium-term oriented domestic policy decision, only depends on the lag for itself.[17]

[14] This is unlikely to be the case for a model based on data with quarterly frequency, which presumably may require four lags. The latter feature together with the fact that quarterly data for most of the series that we use in this model are available only since 1986, and some of them only since the early 1990s, prevents the estimation of a VAR with a large set of endogenous variables for Chile based on quarterly data.

[15] It is worth mentioning that some different orders were considered without apparent changes in the results, suggesting that the structure of our lag restrictions limits considerably the ordering problem with respect to a non-restricted (Choleski) VAR.

[16] In the alternative specification in which terms of trade is replaced by both oil and copper prices (see footnote 13), the oil price is allowed to affect the external demand conditions, the foreign interest rate, and the uncertainty in international financial markets, and vice-versa.

[17] Presumably trade openness is correlated with all the external variables including net capital flows contemporaneously.

Table 4. Order of Equations and Lag Structure of the Model

Dependent Variables \ Independent Variables	external demand	foreign interest rate	foreign equity	terms of trade	net capital flows	openness	output	money	fiscal revenue	fiscal expend.	real exchange rate	domestic equity
external demand	■	■	■									
foreign interest rate	■	■	■									
foreign equity	■	■	■									
terms of trade	■	■	■	■								
net capital flows	■	■	■	■	■	■	■	■	■	■	■	■
openness						■						
output	■	■	■	■	■	■	■	■	■	■	■	■
money		■			■		■	■	■	■	■	
fiscal revenue				■			■		■			
fiscal expend.							■		■	■		
real exchange rate	■	■	■	■	■	■	■	■	■	■	■	■
domestic equity	■	■	■	■	■	■	■	■	■	■	■	■

The equation that accounts for monetary policy is assumed to depend on the lag of itself, the foreign real interest rate, capital inflows, the real exchange rate, and the two variables that are aimed to capture fiscal policy, namely fiscal revenue and fiscal expenditure. The first one of these two variables is assumed to depend on the lag of itself, the terms of trade, and the output gap. Finally, fiscal expenditure is assumed to depend on the lags of itself, output, and fiscal revenue. Other equations within the domestic block are those associated to the real exchange rate, domestic stock returns, and the business cycle. These equations feature no lag restrictions. The first two of them for being domestic asset prices and the third one because we do not want to restrict the relationships of our main object of interest: the business cycle.

It is worth mentioning that the previous VAR specification satisfies the stability condition as all the eigenvalues lie inside the unit circle, and that the evidence presented in the following sections is robust to several changes. First, in terms of different orderings used to identify the orthogonal shocks, there were no major qualitatively changes in the results of the paper. The only evident difference was found once output was shifted to be below domestic policy conditions: all impulse response functions looked relatively similar, but the contribution of monetary policy to the business cycle fluctuations was significantly lower in this case, with almost all the effect being captured by domestic equity. Second, the results are also robust to reducing or expanding the variables included in the model. One of the reductions that was considered was the elimination of capital inflows, so as to leave the whole group of external variables completely block exogenous.[18] In this case, most of the

[18] Since the model included already two external financial variables (foreign interest rate and international capital markets uncertainty) it was suggested to us that these two variables might be enough to capture changes in external financing conditions to the Chilean economy. The evidence, however, pointed towards an

(continued)

effect was captured by a higher persistency of the output gap. In terms of expanding the model, the terms of trade was replaced by two separate variables, namely the real price of oil and copper, respectively. Again, results were qualitatively similar regarding the relationship between the other variables and the business cycle. In addition, given Chile's geographical characteristics we included a dummy variable to capture natural catastrophes (both earthquakes and climatic conditions). Contrary to our expectations, domestic output did not display a statistically significant response to a positive innovation in this natural catastrophes dummy variable,[19] and all the other variables maintained their impact and significance.[20]

IV. Macroeconomic Responses and Sources of Fluctuations

A. External Shocks

Foreign Real Shocks

External demand shock

The responses to a positive innovation to the external demand is shown in Figure 3 Chilean output expands on impact with a lasting effect of around two years. The peak response occurs in the first year. The external demand shock is also transmitted immediately into the real exchange rate and the terms of trade in different directions. In particular, the appreciation of the real exchange rate and its negative effects on output does not offset the positive effect that is generated with better terms of trade. Economic activity then begins to drop off in response to tighter monetary policy as the economy began to expand.

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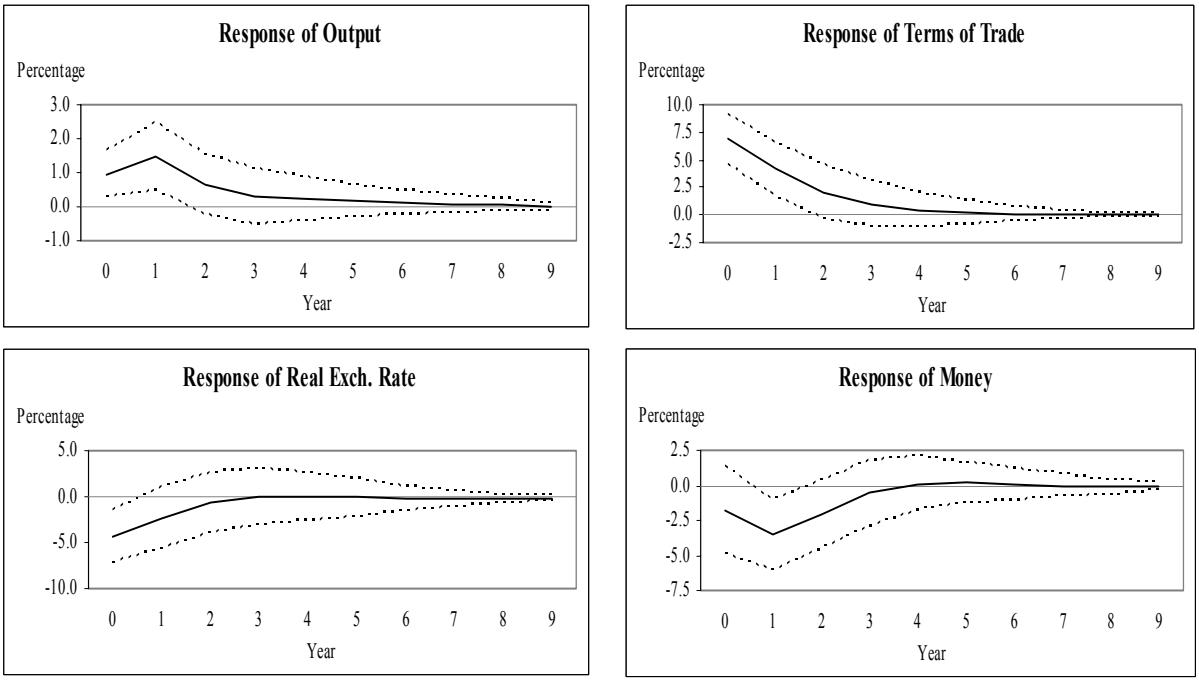
independent effect of capital inflows. To capture such an effect but in a more exogenous way, net capital inflows to Argentina, Brazil, and Mexico as a percentage of their combined GDP were included instead of net capital inflows to the Chilean economy. But the former variable turned out to be statistically insignificant, suggesting that the common factor between capital inflows to the most important Latin American economies and capital inflows to Chile is not very relevant.

[19] Eartquakes and sustained droughts were represented by a dummy variable. Droughts were considered if the cumulative shortfall from normal rainfall accumulated over the last four years exceeded one year of normal rainfall - 0.1 standard deviation (308 millimeters per year). Following this definition, years of droughts are 1969, 1970, 1971, 1976, and 1996. Annual data on total rainfall was obtained in the National Office of Meteorology. Similarly, only earthquakes with a magnitude above 7 in the Richter scale and taking place at less than 50 kilometers from the surface were considered as a natural disaster with macroeconomic relevance. Following this definition, years of earthquakes are 1960, 1971, 1975, 1985, and 1995. This data is reported in Servicio Sismológico (2003).

[20] All these estimates are available from the authors upon request.

Figure 3: Responses to external demand shock

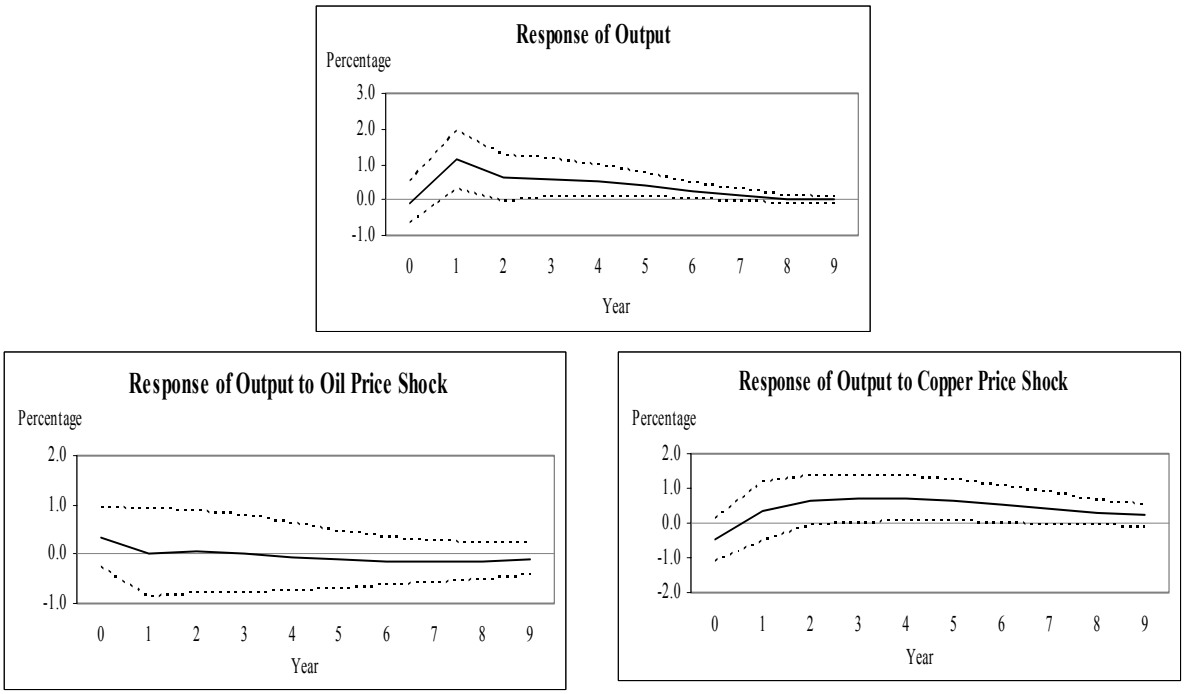


Terms of trade shock

Responses to a rise in terms of trade are shown in Figure 4 and are consistent with conventional wisdom. In particular, an improvement in the terms of trade implies a positive impact on the business cycle. The effect on domestic output appears to be higher from the first year on, with a lasting effect of five years even with a persistence of the terms of trade shock of only two years.

A terms of trade shock could come from a rise in the price of exports or a fall in the price of imports. Generally, emphasis has been placed on copper and oil prices in the case of Chile. An alternative VAR that includes these prices instead of the terms of trade shows that both shocks have the expected effects on the business cycle, but their respective impulse-response functions are not statistically significant. This may suggest that the dominant source to explain business cycle fluctuations are a composite of exports and imports prices and not copper and oil prices by themselves. Thus, the public discussion of the significant impact of the copper price over the business cycle may be somewhat overstated.

Figure 4: Responses to terms of trade shocks

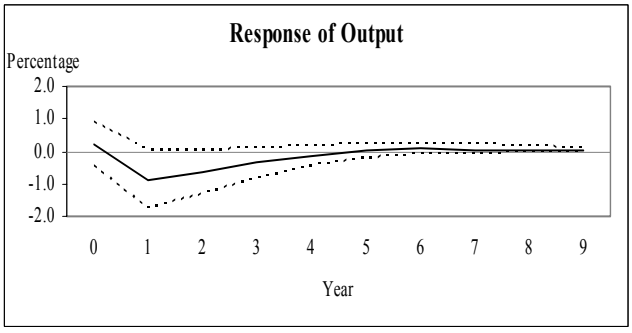


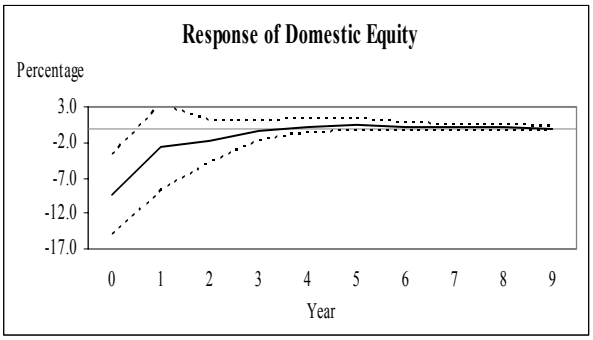
Foreign Financial Shocks

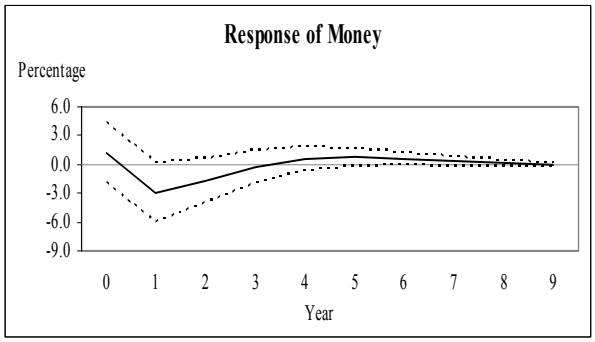
Foreign interest rate shock

The responses to a rise in the foreign interest rate are illustrated in Figure 5. This shock is transmitted into lower monetary aggregates in the first year. The corresponding increase in domestic interest rate translates into a lower demand for domestic equities, reducing its real returns immediately. Consequently, domestic output eventually falls in response to monetary policy tightening and the fall in equities.

Figure 5: Responses to foreign interest rate shock



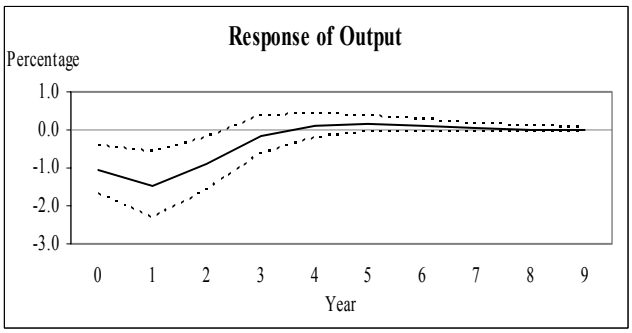


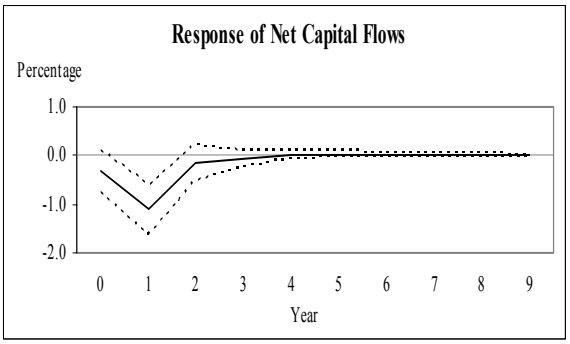


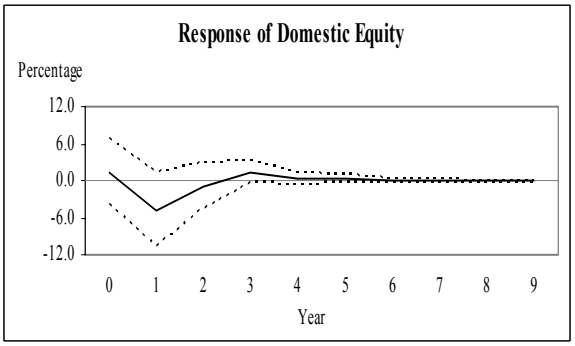
Foreign equity shock

Figure 6 shows that an increase in the volatility of world equities causes a negative impact on the real return of Chilean equities and a decline in capital flows. This may reflect higher external financing costs that could have an impact on the risk premium associated to emerging markets. Therefore, the combination of these negative forces have an immediate negative effect over the business cycle that lasts 2 to 3 years.

Figure 6: Responses to foreign equity shock



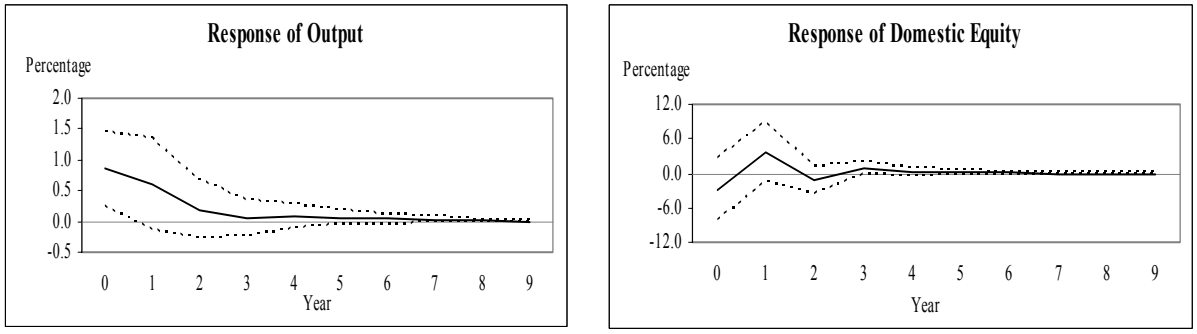




Net capital flows shock

The responses to an increase in net capital flows are shown in Figure 7. As expected, there is an expansion of the business cycle on impact that lasts one year. The latter reflects the financial restrictions faced by an emerging economy as it is the case of Chile, in the sense that those restrictions implied that net capital flows with its ups and downs have a significant impact in the cyclical behavior of the economy.

Figure 7: Responses to net capital flows shock



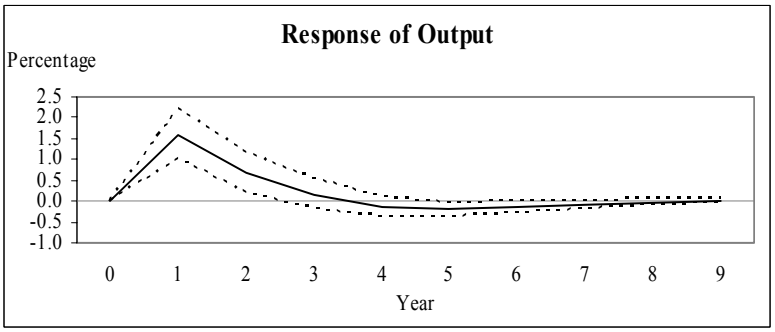
B. Domestic Shocks

Domestic Policy Shocks

Monetary policy shocks

The responses to a monetary policy shock are shown in Figure 8. After an expansionary monetary policy shock, the impulse-response function for the business cycle displays a hump-shaped pattern with a peak effect in the first year and a significant persistence of two years.

Figure 8: Responses to monetary policy shocks

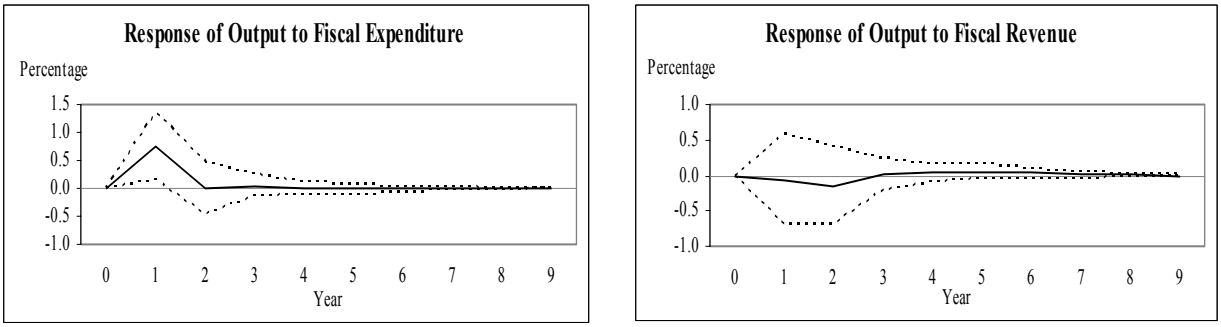


Fiscal policy shocks

The first issue to be resolved in an empirical study of fiscal policy shocks is what indicator to use as a measure of policy stance. A usual candidate for this role is the fiscal deficit. There are, however, several well-known problems with this measure that make it a weak indicator of discretionary fiscal policy. The fiscal deficit captures both exogenous policy shifts as well as automatic reaction of fiscal variables to the state of the economy. In addition, even when changes in the deficit reflect purely discretionary policy decisions, it is obvious that the source of the change —whether it is a revenue adjustment or a change in government spending— is important for the expected response of the private sector. Thus, we consider the effects of both expenditure and revenue separately. On one hand, fiscal expenditures have a higher component of policy discretion. On the other hand, fiscal revenues are explained not only by fluctuations in the tax regime, but also by endogenous reactions following changes in economic activity.

Figure 9 shows the responses to a positive innovation to fiscal expenditure and revenue, respectively. The response of the business cycle is expansionary and statistically significant in the case of government spending but there is no major response before a revenue shock, suggesting that domestic demand is relatively unresponsive to changes in fiscal revenues.

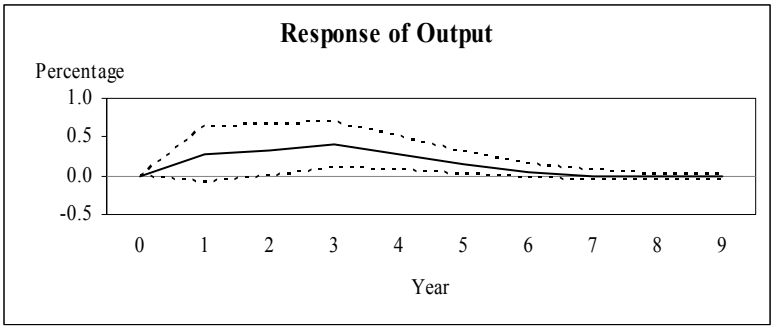
Figure 9: Responses to fiscal policy shocks



Real exchange rate shocks

A real exchange rate shock has a positive impact on the Chilean business cycle as is shown in Figure 10. However, the impact on output takes two years to become significant, lasting for two other years as well.[21]

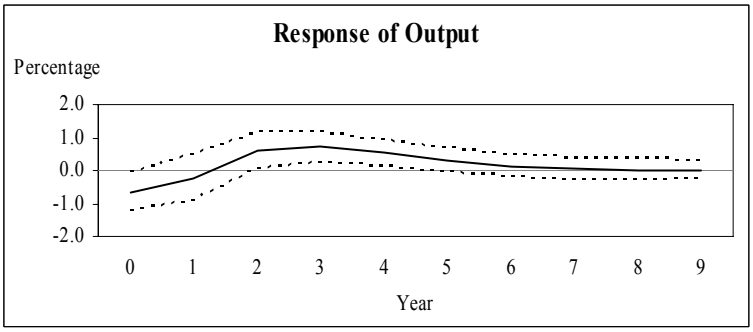
Figure 10: Responses to real exchange rate shocks



Openness shock

Figure 11 shows that the business cycle reacts positively but with a lag of three years and a lasting effect of two years to an increase in the openness of the economy. Since we use de facto openness, the variable reflects a combination of policy decisions and endogenous reactions. Assuming that the trajectory of the variable is influenced mostly by policy, greater openness have helped in moderating the impact of external shocks.

Figure 11: Responses to openness shock



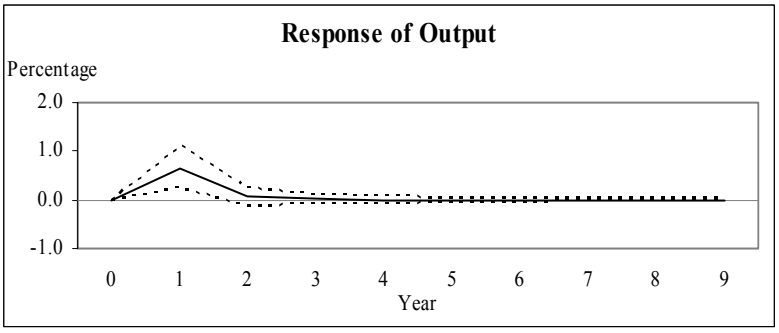
[21] An increase in the real exchange rate represents a real depreciation of the Chilean Peso.

Other Domestic Shocks

Domestic equity shock

Figure 12 shows the responses to a positive innovation to domestic equity returns. This financial domestic shock has a positive impact in the business cycle in the first year, but the effect vanishes thereafter.

Figure 12: Responses to domestic equity shock



C. Sources of Business Cycle Fluctuations

This section presents the variance decomposition analysis to determine what fraction of the variance of the Chilean business cycle is attributable to each shock (Table 5).

Table 5: Chilean Business Cycle Variance Decomposition

Step	Std. Error	External Demand	Foreign Interest Rate	Foreign Equity	Terms of Trade	Net Capital Flows	Openness	Output	Money	Fiscal Rev.	Fiscal Exp.	Real Exchange Rate	Domestic Equity
0	0.029	9.29	0.51	10.88	0.05	7.44	4.43	67.40	0.00	0.00	0.00	0.00	0.00
1	0.044	13.65	3.57	14.21	5.74	4.86	2.16	39.57	11.46	0.02	2.50	0.33	1.95
2	0.047	13.57	4.68	15.43	6.47	4.38	3.33	35.69	11.78	0.10	2.18	0.68	1.71
3	0.048	13.26	4.96	14.77	7.41	4.18	4.96	34.09	11.32	0.10	2.09	1.23	1.63
4	0.049	13.07	4.89	14.42	8.23	4.10	5.83	33.18	11.08	0.10	2.03	1.49	1.59
5	0.049	13.00	4.82	14.30	8.65	4.06	6.08	32.77	11.07	0.11	2.01	1.55	1.57
6	0.049	12.99	4.81	14.27	8.80	4.05	6.12	32.63	11.10	0.11	2.00	1.55	1.56

The results can be summarized as follows: first, foreign shocks have a substantial effect on business cycle volatility, especially external demand and foreign equity (volatility) shocks have been the dominant source of domestic output fluctuations. In particular, foreign shocks represent 28 percent of business cycle fluctuations in the first year, reaching 42 percent from the third year. Second, domestic equity shocks and fiscal policy shocks have relatively little impact on the business cycle. On the contrary, the fraction of business cycle fluctuations explained by trade openness and the terms of trade is much larger. Finally, monetary policy shocks play an important role in explaining the forecasting error variance of the business cycle.

V. SHOCK RESILIENCE OF THE CHILEAN ECONOMY

A. Historical Decomposition

The variance decomposition analysis presented in the previous section confirms the common wisdom that the fluctuations in Chilean business cycle are largely explained by external shocks. The prominence of external shocks is due to the condition of being a small open economy—both to trade and financial flows— with an export structure that is not sufficiently diversified and with limited access to international financing. Indeed, compared to domestic shocks, external shocks explain more than twice as much of the business cycle fluctuations

A complementary way to analyze the estimation output of a VAR is to look at the historical decomposition.[22] In particular, in this section we concentrate on analyzing the effects of different combination of shocks on output, including how the response of output to those shocks has evolved over time. Thus, by dividing business cycle fluctuations into different components —international conditions, policy conditions, other domestic shocks, and a remainder which includes the inertial or lagged effect and the error term, i.e. other shocks that are not controlled for— we can assess how the importance of these different components has evolved over time. Moreover, to the extent that we find that the effects of international conditions have been moderated by policies, then we would gather support for the belief that the resilience of the economy to external shocks has increased.[23]

Figures 13 and 14 show the business cycle fluctuations divided by the different components described above. Thus, the international conditions component includes external shocks—both real (external demand, and terms of trade) and financial (foreign interest rate, volatility of international financial markets, and net capital flows); the policy conditions component includes the effects of changes in monetary and fiscal policy (both from the revenue and expenditure side), as well as the effects of changes in structural policies,

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[22] We decompose the historical values of a set of time series into a basis projection and the accumulated effects of current and past innovations. This decomposition allows us to observe whether movements in the business cycle were likely the result of a combination of innovations or mostly explained by a specific variable. The historical decomposition is based on the following partition of the moving average representation:

$y_{t+j} = \sum_{s=0}^{j-1} \Psi_s u_{t+j-s} + \left[X_{t+j}\beta + \sum_{s=j}^{\infty} \Psi_s u_{t+j-s} \right]$, where the first sum represents that part of y_{t+j} due to innovations in periods t+1 to t+j. The second part is the forecast of y_{t+j} based on information available at time t. If u has n components, the historical decomposition of y_{t+j} has n+1 parts: the forecast of based upon information at time t (the term in brackets); and for each of the n components of u, the part of the first term that is due to the time path of that component.

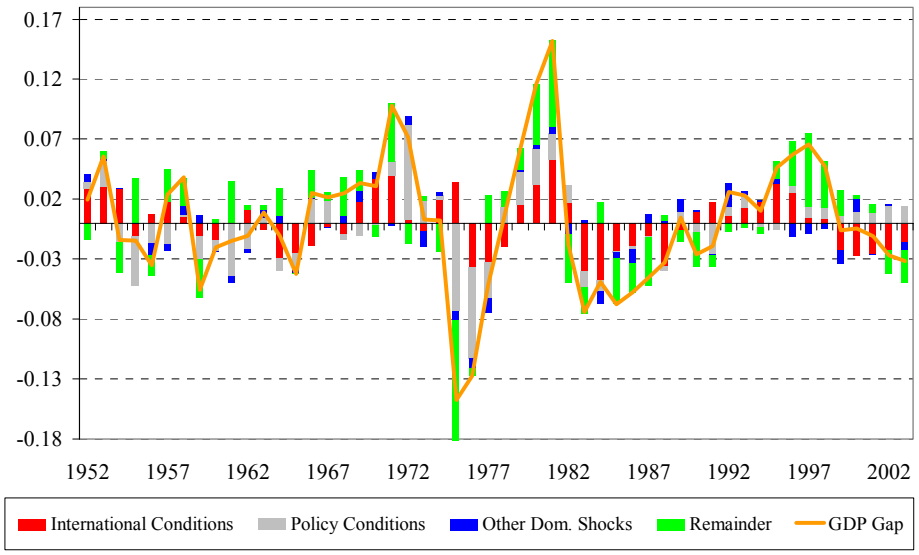
[23] Data limitations prevents using a more straightforward way of looking at this issue, namely the estimation of separate VARs within two sub samples, which would amount to look for evidence of a structural breaks in the responses of output to international conditions, policies, and/or other domestic shocks.

captured by the degree of openness to international trade and the real exchange rate.[24] Finally, other domestic conditions refer to the effect of changes in the domestic stock market prices that are beyond the medium-term average return, thus trying to capture the animal spirits.

From Figure 13 it is apparent that cyclical output fluctuations are explained mainly by international and policy components, while the effect of other domestic shocks appear to be much smaller. In addition, the remainder component, lagged output and error term, also plays an important role owing mainly to the autocorrelation of the output cycle.

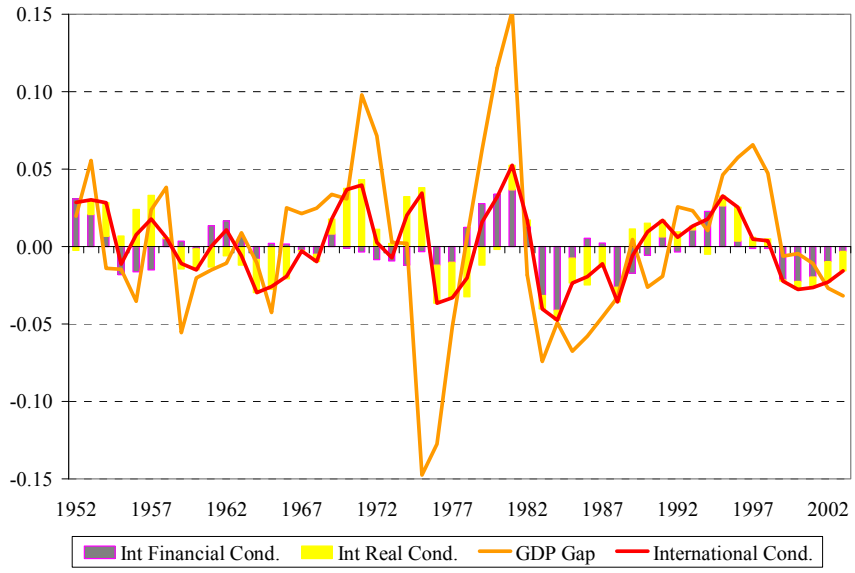
As shown in Figure 14, the real and financial international conditions seem to have had similar contributions to the cyclical fluctuations of output, and the total effect of international conditions on the output cycle do not show significant changes in terms of magnitude across the sample. This is not the case of the policy component, which appears to have had more wide effects on the cycle in the first two-thirds of the sample period. Insofar the policy components are concerned, the effects on cyclical output fluctuations of monetary and fiscal policy is larger that that of exchange rate and trade policies (structural component). The rest of this section contains a more in depth analysis on the basis of the statistical properties of the historical decomposition.

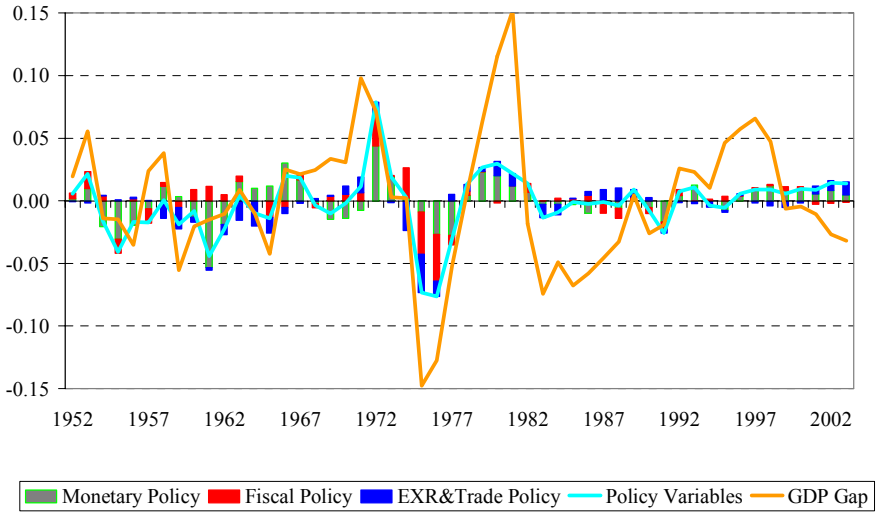
Figure 13: GDP Cycle and Components



[24] We consider this variable as a structural policy given the different exchange regimes that have characterized the Chilean economy throughout the sample period, implying that the adjustment process follow by this relative price have changed over time due to exchange rate policy decisions.

Figure 14: (a) international conditions; (b) policy conditions



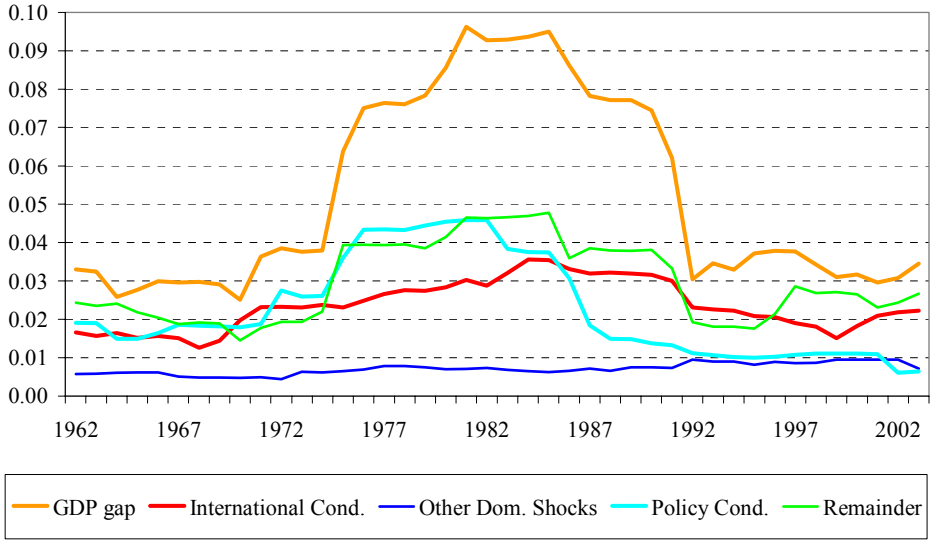


B. Volatility and Resilience

Output volatility as measured by the 10-year rolling standard deviation of the output gap reached peaks in the late 1970s and early 1980s as shown in Figure 15. The differences are such that during peak years the gap volatility reached up to 3 times that of the calmer years, that is the 1960s and 1990s. The volatility of some of the components of the output gap also reached sustained peaks that extend from the mid 1970s to the early 1980s --that is the case of the policy conditions and of the remainder. In the case of international conditions

peak volatility was reached in the mid-1980s. Other domestic shocks have presented a relatively stable and low volatility along the sample period.

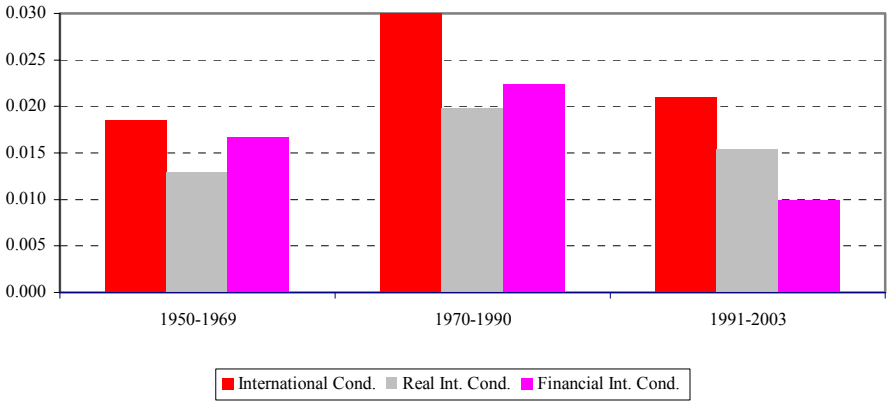
Figure 15: Volatility of GDP Gap and Components
(10 year rolling Standard Deviation)

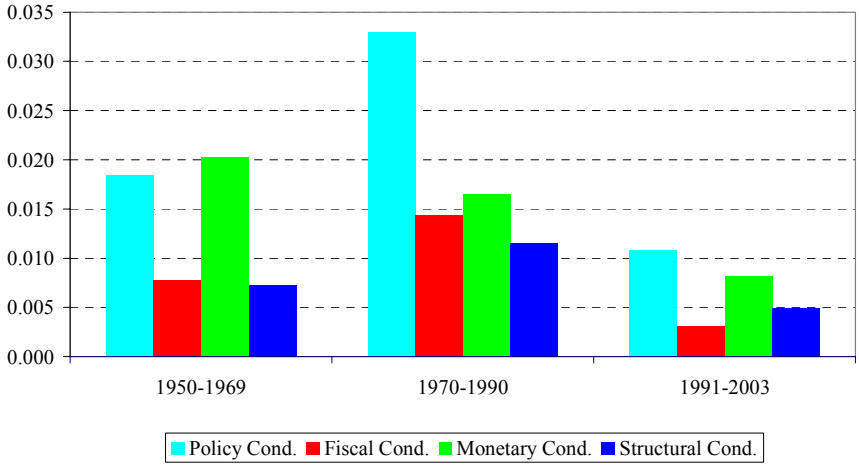


The peak in the GDP gap volatility cannot be associated to a single factor. While it is true that the volatility of the international conditions increased in a sustained fashion until the mid-1980s and then declined, the volatility of policy conditions and of the remainder also contributed to the peak. As a consequence the increase and posterior fall of the volatility of the output gap was much more marked than that of any individual component considered by its own.

The volatility of the overall international conditions, and its real and financial components reached a maximum in 1970-1990, falling markedly in the 1990s as presented in Figure 16. However, the reduction in the volatility of external conditions towards the last decade in the sample period is not nearly as marked as that of the output gap or that of the policy conditions.

Figure 16: Volatility of Gap components: (a) international conditions; (b) policy conditions





Indeed, the volatility of the policy conditions component registered the largest reduction, even more than that of the volatility of the output gap itself. The latter suggests that demand-management and structural policies have made an (economically) significant contribution towards moderating the business cycle fluctuations —both in terms of magnitude and amplitude—an outcome that reflects the strengthening of the macroeconomic policy framework and a continue process of institutional building. Looking at this result in a more disaggregated fashion, while the volatilities associated to structural and monetary policies fell to about half their previous values, the volatility of fiscal policy fell much markedly.

Resilience is commonly defined as the capacity to withstand shocks. Hence, it can be understood as the capacity of the economy to limit the volatility of the output gap when confronting exogenous shocks. To measure resilience against external shocks —the most important type of exogenous shocks confronted by the Chilean economy— we compute the ratio of the volatility of external shocks to the volatility of the output gap.[25] As presented in Table 6, resilience to external shocks deteriorated markedly in the seventies and eighties, to improve sharply during the nineties, to a level slightly higher to that of the fifties and sixties. The deterioration in the resilience to external shocks in the seventies and eighties was both against external shocks of a financial and a real nature. However, the subsequent recovery of resilience during the nineties was concentrated in terms of external shocks of a financial nature.

Table 6: Resilience to External Shocks

(Volatility Ratios of External Conditions Against the Output Gap)

	Total	**Financial**	**Real**
1950-1969	0.61	0.42	0.55
1970-1990	0.40	0.26	0.29
1991-2003	0.63	0.46	0.30

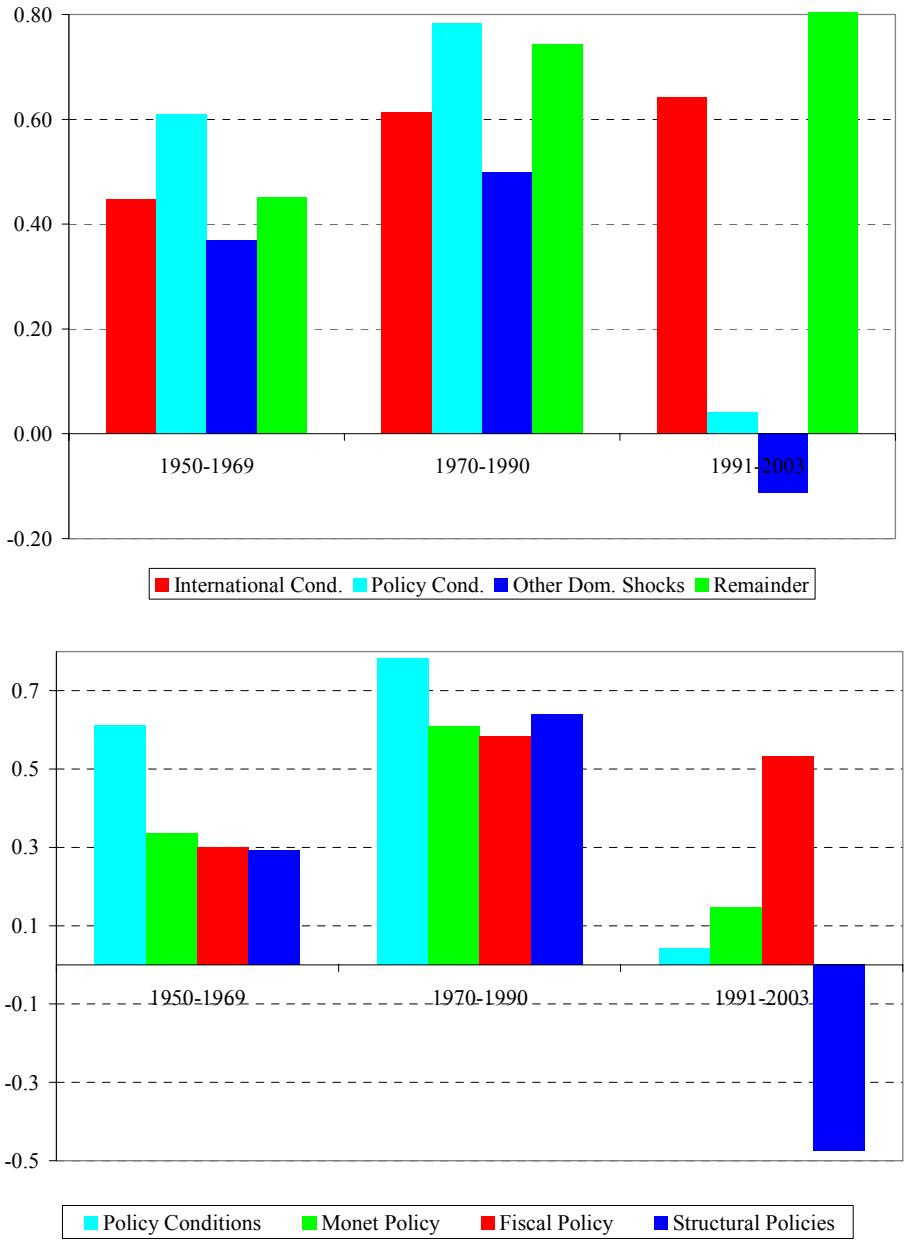
C. Correlation and Synchronization

As the integration of the economy with the rest of the world deepens, the synchronization of domestic business cycle with external conditions is expected to increase. However, the evidence gathered in the previous section points toward an economy that has become more resilient to external shocks. An interpretation that allows reconciling these facts together is that policy actions can play a role of shock absorbers. Hence, an improved resilience against external shocks may result from a more effective contribution of policy actions in stabilizing output. For instance, a shift in the properties of the policy component, from pro-cyclicality (positive correlation with the output gap) to countercyclicality (negative correlation).

Over time, the Chilean business cycle has become increasingly associated to the international conditions, with the correlation coefficient increasing from 0.45 in the first period (1950-1969) to 0.6 in the second (1970-1989) and to almost 0.65 in the third (1990-2003). In other words, the domestic and external business cycle have indeed become more synchronized (Figure 17).

[25] An alternative way to look at resilience is by analyzing the contributions of the different components along the cyclical downturn. A preliminary analysis along this line is conducted in the appendix.

Figure 17: Correlations of GDP GAP with (a) main components (b) policy conditions

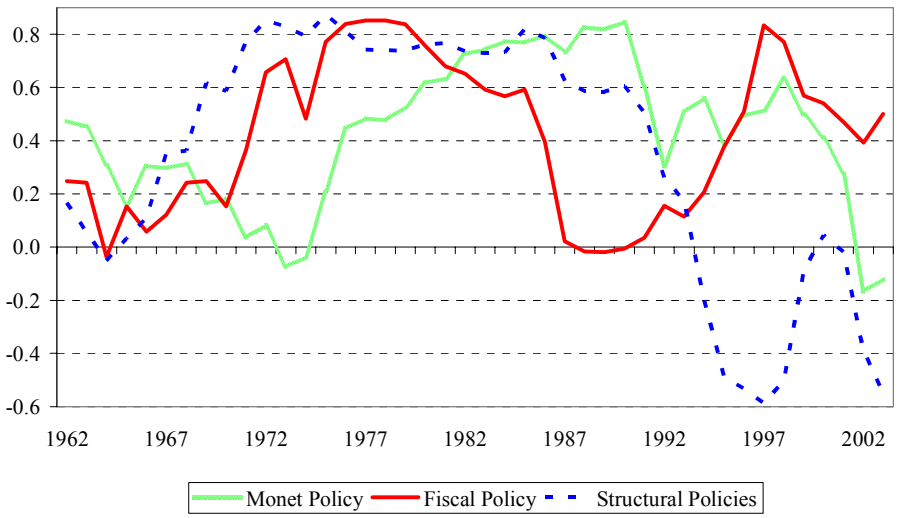


In sharp contrast with the pattern of increasing correlations commented above, the correlation of policy conditions with the output gap increased only from the fifties and sixties to the seventies and eighties, to drop dramatically so as to become almost zero during the nineties, i.e. policy actions —which used to be highly pro-cyclical in the past— have played a cyclically neutral role since the early nineties. A closer look to the correlation with the individual variables contained in the domestic policy component, shows that the reduction in the correlations during the nineties has been widespread, but the shift from pro-cyclicality to counter cyclicality is fully captured in terms of structural policies for the period as a whole.

Hence, the continuous trade opening (which allows the trade balance to adjust more smoothly to negative external shocks) as well as the increasingly flexible exchange rate (which translates into an enhanced role of the real exchange rate as shock absorber) have been the main contributors to the increased resilience throughout the nineties. Monetary policy also contributed to the elimination of the pro-cyclicality of policy conditions during the 1990s; however, that is not the case for fiscal policy, since its correlation with the business cycle remained stable as compared to that of the 1980s.

Although, as a whole, the countercyclical role of economic policies became evident only in the last period (1990-2003), a more detailed look at the timing of the fall in the correlation of domestic policies with the output gap (Figure 18) shows that the correlation with fiscal policy started falling since the early eighties, but increased again in the mid 1990s, while the correlations with monetary and structural policies started falling in the late eighties becoming negative over the last years in the sample. The process has not been continuous though, with some reversals associated to significant episodes in policy making.

Figure 18: Correlation of GDP Cycle vs. PolicyConditions Components
(10 year rolling correlation coefficients)



Thus, the correlation of the output gap with structural policies fell sharply after the widening of the exchange rate band was initiated (in 1991), reaching a negative value in the mid 1990s. The correlation increased towards 1998, probably associated to the narrowing of the exchange rate band, and fell again from 1999 onwards, after the elimination of the band.

In the late eighties the correlation of monetary policy and the GDP gap was positive and quite high (0.8). In the 1990s, as the independent Central Bank developed its inflation targeting framework and gained credibility the correlation of the monetary policy component fell continuously, with a short interruption in 1998 as a result of the episode of narrowing of the exchange rate band and hike in interest rates that paved the way to the short-lived recession experienced by the Chilean economy in 1999. After that, the correlation has

continued to fall, with monetary policy becoming counter-cyclical in 2002 and 2003. This result reflects the full-fledged inflation targeting framework currently in place, and the associated reduction in the interest rates over the last four years.[26]

Finally the correlation of fiscal policy and the output gap fell markedly after the 1982 debt and banking crisis, even reaching negative values towards the latter part of the 1980s. In the second half of the 1980s a strong economic recovery from the depressed post-crisis conditions took place within the framework of a Fund supported program, which included an important fiscal consolidation effort, which accounts for the negative correlation between the output gap and the fiscal component. However the correlation of the fiscal policy and the GDP gap increased again during the 1990s, becoming positive in 1992 and reaching a maximum in 1997 as fiscal policy regained its characteristic pro-cyclicality. In this period, a policy of constant nominal fiscal surpluses was pursued and, as a result, fiscal expenditures reproduced the cyclical pattern of fiscal revenue, which is largely determined in Chile by private spending due to the significant role of the VAT in total revenue. Over the end of the nineties, i.e., in the current administration of President Lagos, the pro-cyclicality of fiscal policy has been corrected, by adopting a fiscal rule that allows automatic stabilizers to operate fully across the cycle. Going forward, the operation of this fiscal rule should translate in a correlation of the fiscal component with the business cycle converging towards zero.

Overall, the strengthening of the policy framework during the last period in the sample (including the floating exchange rate regime, the adoption of the fiscal rule, and the further refinements of the inflation targeting framework) seem to have played a significant role in the observed increased resilience of the economy, which bodes well for such a positive development to be sustainable going forward.

VI. CONCLUDING REMARKS

In this paper we estimate a VAR model fitted for the case of a small open economy like Chile by means of introducing block exogeneity into the lag structure of the model. First, to take a relatively long span view, we make use of an extended sample since the 1950s. Second, to better capture the characteristics of the Chilean economy, we include an expanded set of variables that let us to account for the impact of external shocks (both of a real and financial nature), and domestic shocks, including policy variables that capture both demand management and structural policies, and other domestic shocks. With this toolkit, we analyze the associated dynamic responses of the business cycle to several shocks (impulse responses), the sources of business cycle fluctuations (variance decomposition), and the shock resilience of the Chilean economy (historical decomposition).

Several interesting results emerge. First, in terms of the impulse response analysis, real external shocks (domestic demand and terms of trade) have significant effects on

[26] The latter have contributed to the recovery from the prolonged period of economic slowdown that followed the downturn. According to most analysts, the negative output gap is expected to be closed at or around 2005.

domestic economic activity. We provide evidence that the terms of trade, which reflects a composite of exports and imports prices, better captures the dynamic response of the economy than copper and oil prices by themselves. Furthermore, financial external shocks are transmitted to the domestic economy through several channels, and do also have significant effects on domestic economic activity. The significant impact in the cyclical behavior of the economy following a shock in either the volatility of international financial markets or net capital flows reflects the financial restrictions faced by an emerging economy like Chile. Among domestic policy shocks, demand management policies (represented by monetary policy and government spending) and structural policies (represented by the real exchange rate and trade openness) significantly affect the business cycle fluctuations, as it is also the case of other domestic shocks such as business confidence (represented by the stock returns). On the contrary, we did not find evidence to support the belief that natural catastrophes (droughts and earthquakes) have a significant impact on the economic activity.

Second, in terms of the variance decomposition analysis, we find, on one hand, that foreign shocks have a substantial effect on business cycle volatility, especially external demand and foreign equity (volatility) shocks, which have been the dominant source of domestic output fluctuations. Other external shocks in order of importance and at some distance include the terms of trade, net capital flows and international interest rates. Monetary policy is the most important source of business cycle fluctuations among policy variables following closely the contribution of the most important external shocks. On the other hand, we find that structural and fiscal policy policies explain a relatively low fraction of the business cycle fluctuations.

Finally, in terms of the historical decomposition analysis, we provide ample evidence of an increased resilience of the Chilean economy during the nineties. Such a positive development has taken place even as the deeper integration of the economy with the rest of the world has resulted in an increased synchronization of the domestic business cycle with international conditions, which underscores the significant countercyclical role played by policies, particularly monetary and structural policies.

To highlight only the most straightforward policy implication of the results presented in this paper, let us underscore that good policies matter, and demand management policies are a necessary complement of structural policies. This is clearly demonstrated by the increased resilience of the Chilean economy throughout the nineties, a period in which domestic policies have been rather complementary. In the seventies and eighties profound economic reforms were implemented, which undoubtedly played an important role in the outstanding growth performance that took place in Chile between the mid-eighties and until 1997, i.e. before the prolonged slowdown period that resulted from the aftermath of the Asian-Russian crisis and the unsupportive external environment that characterized the global economy until recently. In terms of cyclical behavior, however, policies in the seventies and eighties were highly pro-cyclical. As a result, the economy was vulnerable to external shocks, and, indeed, two large recessions affected the economy during that period. Hence, the incumbent and future Chilean economic authorities should continue on the path of strengthening the macroeconomic policy framework, and skillfully managing it. If so, we

should expect the Chilean economy to improve even more its already high level of shock resilience. If not, resilience could perfectly deteriorate, and given the uncertainties embedded in the global environment, the economy may come back to more turbulent times.

Regarding future research, adding more structure to the small open-economy VAR could yield further insights by allowing a more accurate identification of shocks. In particular, the changing policy framework over the last fifty years is an important barrier to successfully fitting a more particular structure to the contemporaneous matrices implicit in the VAR estimation. One way to tackle this issue is to pursue a similar study using quarterly data for the last decade. Some preliminary exercises suggest that for a model fitted on a quarterly sample that covers a shorter period, a structural VAR could potentially be well-equipped to capture the dynamics of the data. Yet, taking into consideration the typical autocorrelation pattern that characterizes data at this frequency, the number of variables included in the VAR may need to be adequately streamlined.

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APPENDIX

A. Resilience and Cyclical Downturns: A Preliminary Analysis

The external shocks appear to have played an increasingly important role in the cyclical downturns of output. Similarly for other domestic shocks, although at a much smaller scale. Netting out from the GDP gap the remainder component (persistency and error term), the external conditions explain on average for the period 1980-2003 about 68 percent of the cyclical downturns, as compared to 38 percent for the whole sample. Policy conditions explain 30 percent of the cyclical contractions in GDP for the period 1980-2003 and 58 percent for the whole sample. Other domestic shocks account only for about 1 percent in the latter period and 4 percent in the whole sample (Table A.1).

TABLE A.1: Decomposition of the Delta GDP Gap From Cyclical Peak to Bottom 1/
(Percentage Explained by the Different Components)

	International Conditions	Policy Conditions	Other Shocks
1953-1954	5	91	4
1958-1959	44	52	4
1971-1975	5	89	6
1981-1983	70	27	3
1989-1990	-137	152	85
1997-2002	242	-47	-95
average 50-03	**38**	**58**	**4**
Average80-03	**68**	**30**	**1**

1/ Net of the remainder component.

Looking at individual episodes of downturns, the contribution of the international conditions to the downturns appears to have been on the rise, explaining fully the 1997-2002 downturn, with policy conditions acting countercyclically and partly compensating the effect of international conditions. Other domestic shocks appear to have played a minor role except in the last two downturns, acting countercyclically in the last cyclical downturn (1997-2003) and representing 85 percent of the 1989-1990 downturn. In that particular downturn, international conditions improved, i.e. the "contributed" negatively to the downturn, which was explained by policy conditions and other shocks. Finally, as reported in Section V, policy conditions became countercyclical in the last downturn, with the relative contribution of policies to the fluctuation of the output gap being negative (-47 percent).

Despite the increasing importance of external shocks in explaining the downturns, the economy has become more resilient to external shocks also in terms of the characteristics of the downturns. The size of the downturns has become more reduced, at least partly as the result of the countercyclical role played by policy conditions. As it can be seen in Figure A.1,

the fall in the net output gap is much more reduced in the last two downturns (1989-1990 and 1997-2002) than in their two previous counterparts (1971-1975, and 1981-1983). Most notably, in each of the two large downturns the effects of policy conditions played a very significant role in the contraction. In 1971-75, policy conditions represented a contraction of the output gap of -0.08. Similarly, in 1981-83, policy conditions explained a fall of -0.04 in the output gap. In sharp contrast, in the 1997-2002 downturn, policies played a counter-cyclical role contributing to partly compensate the contraction originated in the deteriorating international conditions.

Figure A1: Delta Gap Components Cyclycal Peak to Bottom