CYCLICAL INDICATORS OF FISCAL POLICY IN LATIN AMERICAN COUNTRIES (WITH SPECIAL REFERENCE TO CHILE)

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1. Introduction

In recent years, numerical fiscal rules have been established in most Latin American countries; at least ten countries have some legislative body constraining explicitly the Government in its fiscal results. Nevertheless, the so-called "leyes de responsabilidad fiscal" are quite different among countries; in Brazil, since 2000, targets of primary surplus are set for three years in the pre-budget law; in Colombia, since 2003, the structural primary balance has to be consistent with medium term debt sustainability; in Peru and Ecuador, primary expenditures have a maximum growth of 3.5 per cent per year; in Argentina, current expenditures cannot surpass GDP growth. In addition, these laws put in place tax funds (Argentina, Peru) or reinforced existing raw material stabilization funds (Ecuador, Mexico, Venezuela).

No mechanisms that ensure a systematical counter-cyclical fiscal policy are considered, except for the case of Chile. For instance, in Argentina the tax stabilization fund has not operated since its creation in 1999, and in Ecuador, Mexico and Venezuela the amounts of reserves in the oil funds are not significant, since most of the incomes are distributed within the year with social or regional purposes.

Yet, in none of these countries the laws are aimed at avoiding pro-cyclical policies, especially in good times. This is crucial, since as we will argue in this document both GDP gap and terms of trade have important fiscal effects. In part, this is due to the lack of consensus regarding the methods of estimation of the cyclical components of the budget. Indeed, in a highly volatile macroeconomic environment, "normal conditions" are quite difficult to define, and so are the gaps that have to be estimated to identify the cyclical position of the economy.

Even if there are a growing number of national studies that compute the magnitude of the cyclical components of fiscal results, still authorities do not make use of these calculations in the budget formulation process. At the national level, there have been very few attempts to include cyclically adjusted indicators in the discussion of the orientation of fiscal policy.[1]

In the first section of this paper, the cyclical part of the fiscal balance is estimated for some selected countries, following the usual methods, determining the output gap, evaluating the cyclical revenues of raw material exporters (when

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[*] ECLAC, United Nations. The author would like to thank Varinia Tromben for her help in providing data and carrying out the econometric estimations.

[1] See, for instance, Martner (2000), where fiscal indicators are calculated for 19 Latin American countries.

Table 1

Fiscal Balance of Central Government
(percent of GDP)

Country	1995	2000	2001	2002	2003	2004	2005
Argentina	–1.9	–2.1	–4.0	–0.6	0.2	2.0	0.4
Bolivia	–1.3	–4.6	–7.0	–8.0	–7.1	–5.4	–3.5
Brazil	–1.7	–3.1	–3.7	–6.4	–2.5	–1.3	–3.5
Chile	3.4	–0.6	–0.5	–1.2	–0.4	2.1	4.7
Colombia	–2.0	–5.4	–5.3	–4.9	–4.7	–4.3	–4.8
Costa Rica	–3.5	–3.0	–2.9	–4.3	–2.9	–2.7	–2.1
Dominican Rep.	0.1	–2.1	–2.4	–2.7	–5.2	–4.0	–0.7
Ecuador	–0.6	0.1	–1.0	–0.7	–0.4	–1.0	–0.5
Mexico	–0.6	–1.3	–0.7	–1.8	–1.1	–1.0	–0.8
Peru	–3.4	–2.8	–2.8	–2.1	–1.8	–1.3	–0.7
Uruguay	–1.9	–3.5	–4.5	–4.9	–4.6	–2.5	–1.6
Venezuela	–4.4	–1.7	–4.4	–4.0	–4.4	–1.9	1.7

Source: ECLAC, United Nations.

relevant), estimating econometrically tax income elasticities, and finally computing the cyclically adjusted balances.

The second section describes the Chilean experience, where for the last five years a structural balance rule is the basis for the budget formulation process. The experience shows that, even in a very volatile environment, due to very frequent external shocks, fiscal rules can improve general welfare. Moreover, an appropriate combination of counter-cyclical monetary and fiscal policies is very powerful in stabilizing GDP fluctuations in emerging countries.

2. Cyclical factors in Latin American countries

2.1 Fiscal position and the output gap

As it can be seen in Table 1, fiscal position has improved since the large deficits of 2001-02 in almost all Latin American countries. In 2005, although many nations are still in deficit, except for Argentina, Chile and Venezuela, the numbers are much smaller, and debt has diminished substantially in the last four years

Figure 1

Argentina, Brasil and Uruguay: GDP Gap, 1990-2005
(percent of trend GDP)

Source: Author's calculations.

(attaining 44 per cent of GDP in 2005 on average). As usual, this improvement is a combination of discretionary measures and automatic effects, namely the recovery of GDP and of the terms of trade.

In the discretionary side, recent years were characterized by a tight control of public expenditures in all countries, in part as a result of the application of numerical fiscal rules. As discussed in Martner and Tromben (2005), the adjustment particularly affected public investment. In the revenue side, many countries created new taxes that, although in some cases distortionary, permitted significant increases in collection (for instance, taxes on bank transactions in Argentina, Brazil, Colombia and Peru stand for more than one points of GDP, and in Argentina the export tax established in 2003 collects more than two points of GDP).

In the automatic side, for the nine countries included in this study, the evolution of the GDP gap[2] since the early nineties is very similar, alternating a positive phase until 1998-99, and a negative one since then. This cycle has been much more traumatic in Argentina, Uruguay and Venezuela, where negative GDP gap attained values of –15 per cent between 2002 and 2003.

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[2] The trend GDP is estimated using HP filter for the period 1980-2010, using CEPAL forecasts for 2006-07 and assuming a 5 per cent rate of growth of GDP until 2010.

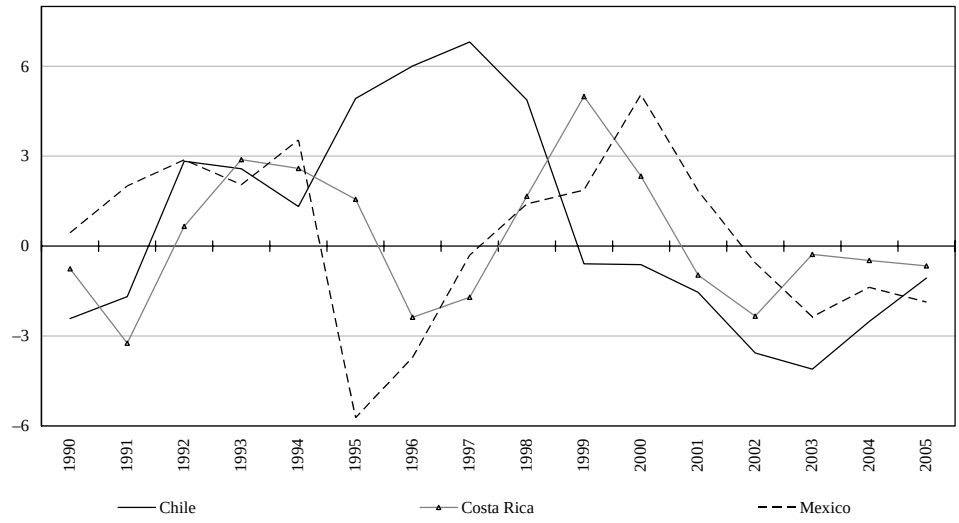
Figure 2

Colombia, Ecuador and Peru: GDP Gap, 1990-2005
(percent of trend GDP)

Source: Author's calculations.

Figure 3

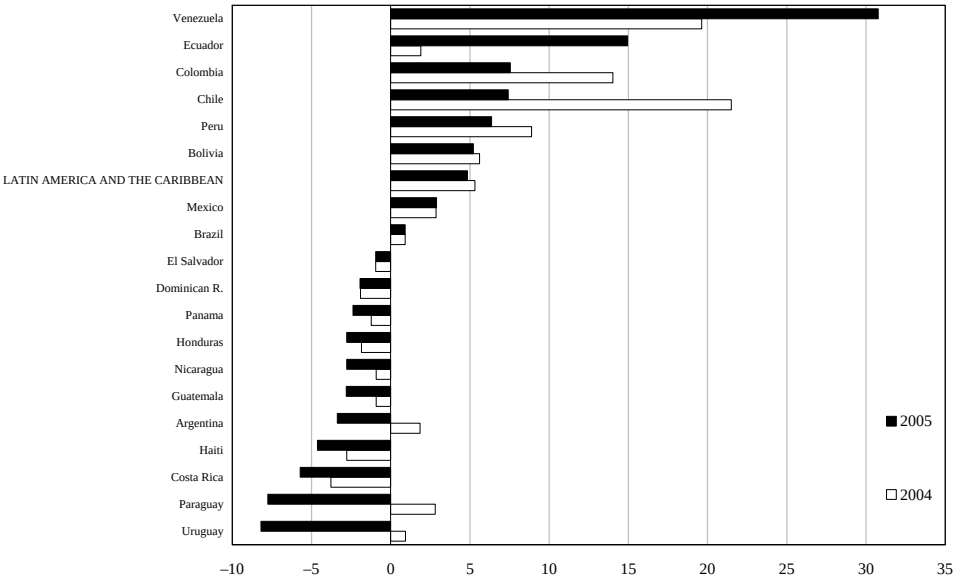
Chile, Costa Rica and Mexico: GDP Gap, 1990-2005
(percent of trend GDP)



Source: Author's calculations.

Figure 4

Terms of Trade in Latin American Countries
(percentage of variation in years 2004 and 2005)



Source: ECLAC, United Nations.

In many countries, assuming a 5 per cent growth of GDP in the next three years, the turning point is 2005. From now on, the output gap and hence the cyclical component of budget, will be nil or positive if the average growth of 5 per cent of the years 2004-05 lengthens in the future.

2.2 The terms of trade

As it can be seen in Figure 4, on average the terms of trade expanded around 5 per cent a year in 2004-05. But the panorama is very diverse, since the improvement is only significant in oil exports countries (Venezuela, Ecuador and Colombia) and copper exports countries (Chile, Peru, and other commodities in the case of Bolivia). In other countries, especially those that depend on manufactured exports or "maquila" (Central American countries and the Dominican Republic), the terms of trade diminished the last two years, a result explained by the Chinese and East Asian competition in industrialized markets, and especially in the United States.

The case of Mexico is a combination of the previous trends, with an increase of nominal oil exports and a sharp decline of manufactured exports, resulting in an

under average improvement of the terms of trade in 2004-05. In other South American countries, like Argentina, Brazil, Paraguay and Uruguay, there has been a slight improvement of terms of trade, with the expansion of nominal exports in 2005, especially with the rise of prices of soybean and other commodities.

This situation has very different fiscal effects, even though the general improvement of the economy helped in the reduction of public deficits. In Oil producer countries, most of the enterprises are state-owned (Brazil, Colombia, Ecuador, Mexico, Venezuela), with the exception of Argentina. In this country, there is a special tax to exports (up to 10 per cent) since 2003, and hence the exports boom has also benefited public sector income. In Peru almost all copper exports are private, and in Chile half of them.

2.3 Fiscal revenues: an estimation of the cyclical component for selected countries

As it can be seen in Table 2, in many countries the main incomes of central government are tax based. This is the case of Argentina, Colombia, Peru and Uruguay. In Ecuador, Mexico and Venezuela, the revenues of oil exports are quite significant, even exceeding tax revenues in the last country. In Chile, in the last two years copper revenues increased significantly, from 0.9 in 2003 to nearly 4 points of GDP in 2005.

In Table 3 the estimation of total tax income elasticity is shown. The long term value is near unit in Chile, Costa Rica and Peru. In Argentina, Colombia and Mexico the value is much higher than one, probably because in recent years GDP components were very volatile.

With these values, and applying an HP filter to break up cyclical and trend oil incomes in Ecuador, Mexico and Venezuela, a min-max analysis of cyclical factors (Table 4) can be made. It shows that, even if tax burden is low compared to OECD standards, the high volatility of copper and oil prices, and of course the huge fluctuations of GDP, gives rather significant values of the cyclical component of fiscal balance.

The impact of fluctuations in overall balances cannot be underestimated, especially when setting short term fiscal targets of fiscal flows and public debt. The potential gains of adopting counter-cyclical rules are significant, as the case of Chile shows.

3. A successful story: The Chilean case

In May 2000, the new president announced the fiscal rule of a structural surplus of 1 per cent of GDP. This rule was maintained during the whole presidential period, defining the formulation process from 2001 to 2006. In August 2001, the consultant committee of the long term price of copper is established, and

Table 2

Composition of Fiscal Revenues
(percent of GDP)

Country	2000	2001	2002	2003	2004	2005
Argentina	25.0	23.6	23.8	26.7	28.7	
Tax revenues	21.5	20.9	19.9	23.4	26.4	26.7
Other	3.5	2.7	3.9	3.3	2.3	
Brazil						
Tax revenues	32.5	34.0	35.6	34.9	35.9	37.4
Other						
Chile	21.7	21.8	21.1	20.8	22.2	24.5
Tax revenues	17.8	18.2	18.1	17.4	17.2	18.8
Other	3.9	3.6	3.0	3.5	5.0	5.7
of which: copper	0.9	0.5	0.5	0.9	3.0	3.8
Colombia	13.0	14.6	14.9	15.0	15.7	16.1
Tax revenues	11.2	13.2	13.3	13.7	14.4	14.9
Other	1.7	1.4	1.5	1.3	1.2	1.2
Oil (including tax revenues)	1.6	1.8	1.9	1.7	2.0	1.9
Costa Rica	21.3	23.0	22.2	22.7	22.0	22.6
Tax revenues	18.9	19.9	20.1	20.2	20.1	20.5
Other	2.4	3.0	2.1	2.5	1.9	2.1
Ecuador	20.4	18.1	18.4	16.6	15.7	16.7
Tax revenues	10.2	11.2	11.0	9.7	9.6	10.3
Other	10.2	6.9	7.3	6.9	6.1	6.4
of which: oil	8.8	6.0	5.5	5.4	4.7	4.3
Mexico	21.6	21.8	22.2	23.2	23.2	23.8
Tax revenues	12.1	12.9	13.2	12.6	11.5	10.4
Other	9.5	9.0	9.0	10.6	11.7	13.4
of which: oil	7.2	6.7	6.5	7.7	8.3	8.7
Peru	15.2	14.5	14.5	15.1	15.2	16.0
Tax revenues	14.0	14.2	13.8	14.7	14.9	15.4
Other	1.2	0.3	0.8	0.4	0.2	0.7
Uruguay	20.3	20.8	21.2	21.4	21.6	21.6
Tax revenues	16.9	17.4	17.6	18.6	18.5	18.5
Other	3.5	3.3	3.6	2.9	3.1	3.0
Venezuela	20.2	20.8	22.2	23.4	24.6	28.6
Tax revenues	12.9	11.4	10.6	11.3	13.0	15.8
Other	7.3	9.4	11.5	12.1	11.6	12.7
Oil (including tax revenues)	10.0	9.4	10.5	11.6	11.5	13.9

Source: ECLAC, United Nations.

Table 3

Total Tax Elasticity Estimation
(dependent variable: log of total tax revenues)

	Argentina	Chile	Colombia	Costa Rica	Mexico	Peru
Constant	–4.82	–2.82	–21.97	–1.55	–1.93	0.99
	–2.28	*–3.45*	*–3.06*	*–2.40*	*–1.50*	*–1.82*
Log (Total Tax Revenues) (–1)	0.60	0.32	0.27	0.38	0.76	0.61
	4.78	*2.59*	*1.67*	*3.21*	*8.30*	*7.15*
Log (GDP) [short run elasticity]	0.67	0.78	1.95	0.64	0.31	0.41
	2.89	*5.05*	*3.57*	*4.79*	*2.34*	*4.32*
R^2	0.91	0.96	0.76	0.94	0.88	0.91
F	100.9	276	32.1	152.3	62.59	144.1
Number of observations	45	62	46	57	49	49
Solved Static long run equation						
Log GDP [long run elasticity]	1.67	1.15	2.66	1.03	1.30	1.05
	4.55	*23.8*	*7.34*	*15.8*	*3.85*	*7.86*

Notes: Test *t* in italic. Seasonal effects were added in the estimations.
Source: Author's calculations.

the consultant committee of trend GDP a year later.[3] In 2004, the new accounting methodology of the 2001 IMF manual is implemented. In 2005, the cyclical effect of taxes from private copper companies is estimated separately.

The structural balance is estimated with the following simple formula:

$$SB = EB - ET + [ST\,(SY/Y)^{\varepsilon}] - EC + SC$$

where:
SB is structural balance, *EB* is effective (accrual) balance;
ET is effective tax income, including social security revenues;
ST is structural tax income;
SY is trend GDP, *Y* is GDP, ε is income tax elasticity;
EC is effective copper income, and *SC* is structural copper income.

[3] Also, the method of estimation is published. See Marcel *et al.* (2001).

Table 4

GDP Gaps and Cyclical Fiscal Balance

Country	Tax Burden	GDP Gap *(percent of trend GDP)*		Cyclical Balance *(percent of GDP)*	
	2005	Minimum	Maximum	Minimum	Maximum
Argentina	26.7	–16.6 (2002)	10.5 (1998)	–6.7 (2002)	4.1 (1998)
Brazil	37.4	–5.7 (1992)	2.3 (1997)	–1.6 (1992)	0.3 (1997)
Chile	18.8	–4.3 (2003)	6.8 (1997)	–2.0 (2002)	3.7 (2005)
Colombia	20.4	–4.2 (2002)	4.9 (1997)	–4.3 (2002)	4.4 (1997)
Costa Rica	21.0	–3.2 (1991)	5.0 (1999)	–0.7 (1991)	0.8 (1999)
Ecuador	14.9	–5.0 (1999)	3.9 (1997)	–2.2 (1999)	1.8 (1996)
Mexico	11.0	–5.7 (1995)	5.1 (2000)	–2.5 (1995)	1.7 (2005)
Peru	15.4	–10.8 (1992)	7.9 (1997)	–1.8 (1992)	1.2 (1997)
Uruguay	23.4	–14.1 (2002)	9.7 (1998)	–3.2 (2002)	2.3 (1998)
Venezuela	12.6	–18.4 (2003)	6.5 (1992)	–3.8 (1994)	6.1 (1997)

Source: Author's calculations.

Following IMF's methodology (see Hagemann, 1999), the application of the fiscal rule involves the following steps:

1. Estimation of the Cobb-Douglas production function inputs. Since 2002, the committee of fifteen experts annually defines the trend growth of labor, the capital stock and the total productivity factor.
2. Estimation of trend GDP, with an estimation of capital stock (adjusted for utilization) and HP filtering of the series of hours worked (adjusted for education) and TPF, using the estimated production function ($Y = A\ K^{\alpha} + L^{1-\alpha}$).
3. Estimation of the long term price of Copper (following the estimation of the consultant Committee of experts).
4. Estimation of cyclical tax incomes with GDP gap (using a value of 1.05 for income elasticity of tax), and estimation of incomes from CODELCO (the public copper company, adjusting physical sales of the firm for the difference between forecasted effective price and the long term price.
5. The structural revenues are then obtained, discounting cyclical factors.

Table 5

Chile: Central Government Overall and Structural Balances
(percent of GDP)

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006(e)
Overall balance	2.0	0.4	–2.1	–0.6	–0.5	–1.2	–0.4	2.1	4.7	5.3
Total cyclical component	1.2	–0.2	–1.3	–0.8	–1.4	–1.8	–1.2	1.3	3.7	4.3
Of which:										
Tax revenues	1.0	0.5	–0.4	–0.3	–0.4	–0.7	–0.8	–0.4	–0.3	–0.1
Copper	0.2	–0.7	–0.9	–0.5	–1.0	–1.0	–0.4	1.7	3.9	4.4
Structural balance	0.8	0.6	–0.8	0.1	0.9	0.6	0.8	0.8	1.0	1.0

Source: Dipres (2005) and Dipres (2006).
(e) Official estimations.

6. The level of expenditures consistent with the structural surplus of 1 per cent of GDP can be estimated.

Once these variables are defined, overall expenses are set in the budget process according to the expected growth of structural revenues.[4] Hence, public expenditure growth is defined in terms of trend GDP (and the long term price of copper), regardless effective GDP fluctuations. This in theory ensures a stable multi-annual path to public expenditure, reducing the probability of severe adjustments and bringing in practice some certainty to the execution of public projects and programs.

This rule was first applied in a period of negative output gap (the cyclical component of the budget was negative in the period 2001-03, with a maximum level of 2.0 points of GDP in 2002; see Table 4). In the present period, 2004-06, the rule is applied in the upper size of the business cycle, when pressures to spend tend to increase. The notorious similitude between average structural and effective balance shows that the rule operated symmetrically in both sides of the business and copper cycles in the period 2001-06. A basic requirement is then fulfilled: fiscal policy's neutrality throughout the complete business cycle.

The process can be illustrated with the 2006 formulation of the budget. External Committees defined a long term price of 99 cents of US dollars for the pound of copper, and a trend GDP of 5 per cent. As the forecasted price of copper was fixed in 240 cents in mid 2006, the cyclical revenues are obtained multiplying the difference with expected physical sales during the year. The forecasted growth of

[4] This procedure is a direct result of the debate of the 1990s. An influential paper was Marcel (1997), the Budget director in the period 2000-06. See also a previous application of cyclically-adjusted indicators for Chile in Martner (1996).

effective GDP is 5.5 per cent, but the GDP gap, defined in levels, is still negative in 2006 (–0.9 per cent), and so are the cyclical tax incomes.

Note that the cycle of tax revenues is very long; in the whole period 1999-2006 its impact has been negative. This means that in the next years (at least 3 or 4) the GDP gap will mechanically be positive. By contrast, the cycle of copper prices is much shorter, and indeed more significant. Paradoxically, copper revenues are normally low, when compared to tax income, but its impact in the cyclical balance is higher. Along the whole period under analysis, cyclical tax revenues reached a maximum of one point (with a GDP gap of 6 per cent, a tax burden around 18 per cent and a near unit income elasticity), while copper cyclical incomes reached 3.9 points of GDP in 2005, and probably 4.4 points in 2006.

Interestingly, the election period of December 2005 did not alter the rule: there was a widespread consensus in maintaining the concept of structural balance. A candidate suggested a zero structural balance; the others were to maintain the current scheme. The elected president will apply the 1 per cent GDP rule for the four years of her mandate, probably without significant changes in the budget formulation process.

Of course, the uncertainty of this kind of indicator remains high. First, the estimation of structural revenues is problematic. Even if the value of a long term tax elasticity of 1.05 has been corroborated by a recent study (see Dipres, 2004), the old methodology, too aggregated, does not take into account the huge impact in tax collection of the benefits of private copper companies. Indeed, the tax revenues of private copper companies are not correlated with GDP, but rather with the GAP of the copper price. As its amount is growing, the new methodology separates these revenues from the rest.

The other question deals with the estimation of trend GDP. As Figure 5 illustrates, retrospectively the calculations are quite different. For instance, the estimation of trend GDP growth of 2001 for the period 1987-94 is on average one point higher than the 2006 estimation for the same period. As it is well known, the results of filtering methods depend on the starting point (see for instance Ley, 2005). Indeed, the HP estimation is not very different than the official one, since the latter also applies filtering techniques for inputs (Figure 6). But, most important, the existence of the external committee validates the methods used and reinforces the credibility of the process.

The fiscal rule of Chile ensures the free operation of fiscal stabilizers. This is illustrated in Figure 7, where, for the nine Latin American countries included in this study, the changes in the cyclically adjusted primary balance fiscal policy are compared to GDP gap,[5] for the period 1990-2005, showing the pro-cyclical bias of fiscal policy. Almost all the computed episodes are either fiscal loosening with positive gaps, or fiscal tightening with negative gaps. The graph also show the case

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[5] See Martner and Tromben (2004) for the details of the estimation.

Figure 5

Chile: Official Estimation of Trend Growth in Different Periods

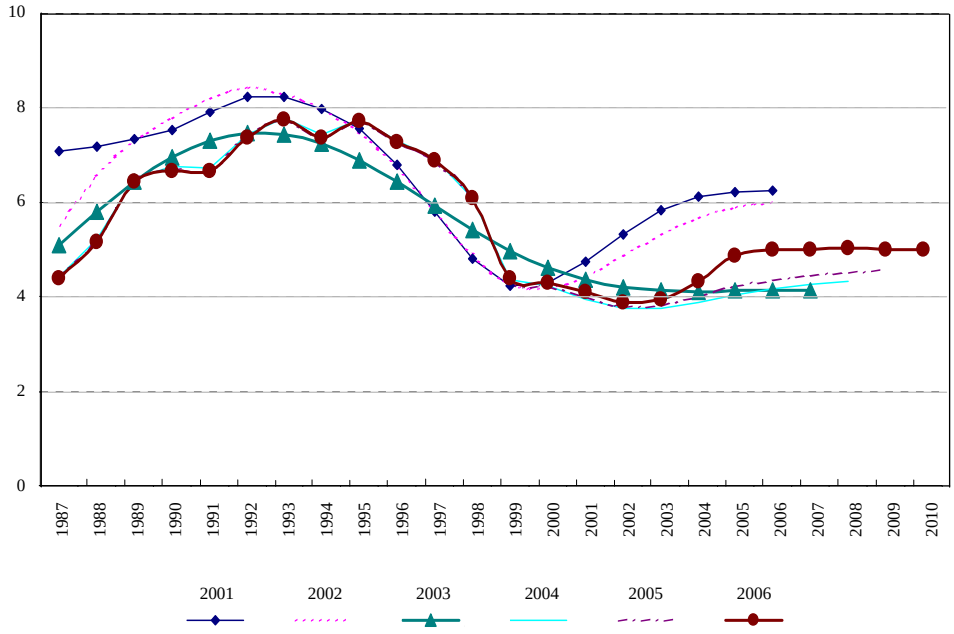


Figure 6

Official and HP Estimation of the Output Gap

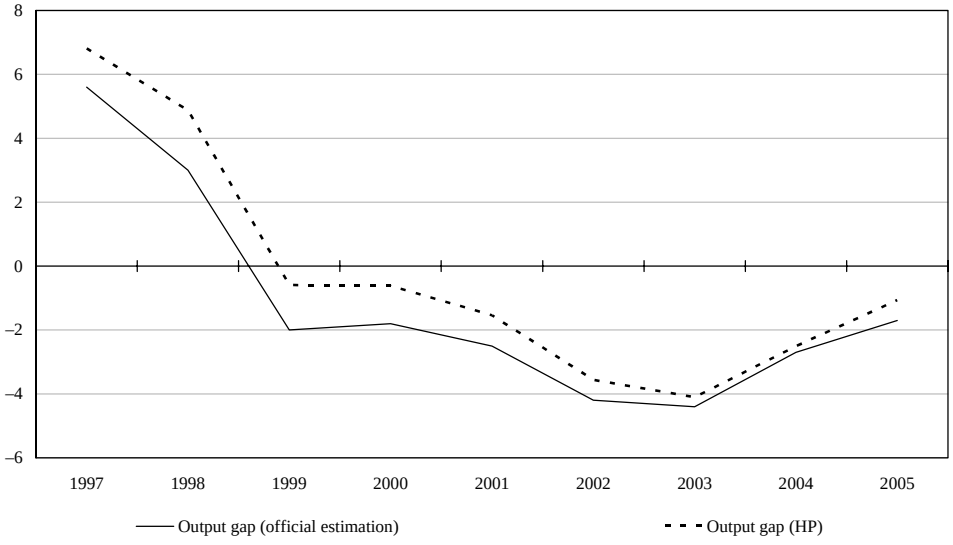
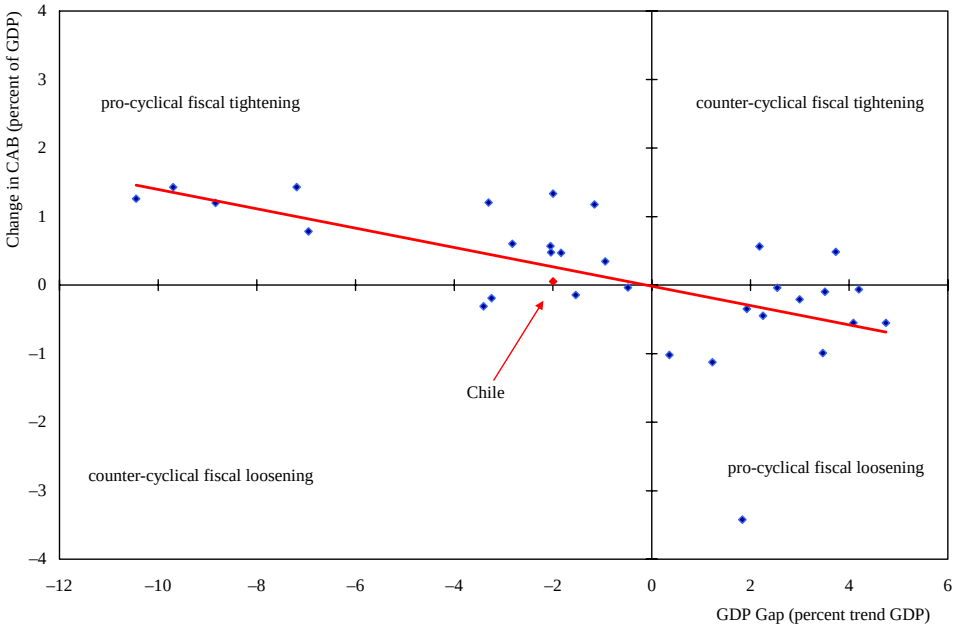


Figure 7

Fiscal Episodes, 1990-2000



Source: Author's calculations.

of Chile for the period 1999-2005, where GDP gap was 2 per cent on average and the cyclically adjusted primary balance did not change.

Hence, the case of Chile is perhaps unique in that sense, as it is strictly defined as a fiscal stabilizer, with no room to discretionary policies. If, as in European Commission (1997), fiscal policy can be defined as:

$$d = d_e - (\alpha + \beta)GAP$$

Where d is the public deficit, d_e is the structural component of public deficit, α the marginal sensitivity to the GDP gap (cyclical deficit), and β the reaction of authorities to the cycle (discretionary deficit). The value of the semi-elasticity α is around 0.2 (there are cyclical fluctuations only in the revenue side, since there are no automatic unemployment expenses), a low value compared to OECD standards, but the impact of copper has to be added. In the case of the rule of Chile $\beta = 0$, simply because the budget is not changed during the year. For the last 15 years, the budget approved in November was generally fully executed, with no revisions within the year.

Indeed, during the years of crisis, there was a discretionary reaction when unemployment surpassed 10 per cent. As an unemployment insurance mechanism

was only created in 2003, the Government did react during winter months, traditionally with a lower level of activity, first creating jobs directly and in recent years subsidizing private employment. The budget resources were reallocated, with no aggregate impact on fiscal balance.

As Table 5 shows, the fiscal rule did stabilize the economy. When comparing the two main shocks in the economy in the last thirty years, with an index measure that reflects the combined effect of terms of trade, exports volume and capital inflows, the differences are striking. In 1982-83 monetary and fiscal policies were pro-cyclical, and hence multiplied the impact of external shocks, resulting in an unemployment rate of more than 20 per cent. By contrast, with worse external conditions in 2001-02, the combined effect of counter-cyclical monetary and fiscal policies did manage to stabilize GDP and protect employment, even with a rise in public investment.

Table 6

External Crisis and Fiscal Policy

Variable	1982-1983	2001-2002
Index of external conditions[(1)]	–4.0	–5.1
GDP growth	–8.2%	2.8%
Unemployment	20.4%	9.0%
Public investment growth	–13.2%	7.8%

Source: Ministerio de Hacienda and Banco Central de Chile.
[(1)] The index of external conditions is a composite, computed as percent of GDP, including the effects of terms of trade, exports volume and capital inflows.

4. Concluding remarks

The fact that only one country of Latin America do rely on cyclical adjustment methods in conducting their fiscal policy, considering the potential gains of such a measure, is somewhat puzzling. Indeed, the best way to face GDP and terms of trade volatility is to ensure a stable path of public expenditures. Despite all the efforts made, it has not been the case until now. Probably, most of the countries did not succeed to combine properly sustainability and stabilization objectives of fiscal policy.

The calculations made show that the cyclical factors of fiscal results are very significant, attaining six points of GDP in some cases, and certainly more than three in most of the nine countries included in this study. Contrary with the usual statement, where the role of automatic stabilizers in emerging countries is

disregarded because of low tax burden, it is noteworthy to emphasize that GDP and terms of trade volatility are sufficient arguments to undertake the task of estimating accurately the cyclical component of budget results.

In that sense the case of Chile is very interesting, since external Committees do fix key projections of trend GDP and the long term of Copper price, the main variables of fiscal revenues forecast. This procedure, in principle, should reduce the optimistic bias of fiscal projections, and at the same time enhance the credibility of the whole budgetary process. It is worth mentioning that the definition of fiscal targets in structural terms is broadly accepted, not only in technical circles, but even in the parliament and in political parties.

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