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CHILE

Selected Issues

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Approved by the Western Hemisphere Department

June 29, 2001

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I. Social and Demographic Indicators

Area (thousand sq. km.)	756.1	GDP (2000)	Ch$ billion	37,775
			US$ billion	70.0
Population		GDP per capita (US$), 2000		4,603
Total 2000 (est., million)	15.2			
Urban population (in percent of total)	85.6	Health		
Density (per sq. km)	20.1	Population per physician (1998)		840
Annual rate of growth, 1996-2000 (percent per year)	1.4	Population per hospital bed (1998)		484
Population characteristics (1998)				
Life expectancy at birth (years)	75.4	Access to electricity (1996)		
Crude birth rate (per thousand)	17.5	Percent of dwellings		
Crude death rate (per thousand)	5.5	Urban		99.4
Infant mortality rate (per thousand live births)	10.2	Rural		74.8
Mortality rate between ages 1 and 4 (per thousand)	0.5			
		Access to safe water		
Income distribution (1998)		Percent of population (1995)		91
Percent of total income received:		Urban		99
By richest 10 percent of households	41.0	Rural		47
By poorest 20 percent of households	4.1			
Gini coefficient	0.57	Education		
		Adult literacy rate (1998)		95.4
Distribution of labor force, in percent of total (2000)		Enrollment rates, percent of the age group		
Agriculture and fishing	13.8	Primary education (1998)		98.3
Mining	1.4	Secondary education (1998)		86.9
Industry	14.4	Tertiary education (1997)		33.8
Construction	7.2			
Services and Trade	62.6			

II. Economic Indicators, 1997-2001

	1997	1998	1999	Est. 2000
(In percent of GDP)				
Origin of GDP				
Agriculture, forestry, and fishing	7.3	7.4	7.4	7.6
Mining and quarrying	8.4	8.7	10.2	10.1
Manufacturing	15.3	14.5	14.6	14.5
Construction	5.3	5.2	4.7	4.5
Commerce	17.3	17.3	16.9	16.8
Transport, storage, communications	8.2	8.6	9.0	9.3
Other	38.1	38.3	37.2	37.3
(Annual percent changes, unless otherwise indicated)				
National accounts and prices				
Real GDP	7.4	3.9	-1.1	5.4
Real GDP per capita	5.9	2.5	-2.4	4.0
GDP deflator	4.0	2.5	3.5	4.1
Consumer price index (period average)	6.1	5.1	3.3	3.8
Consumer price index (end of period)	6.0	4.7	2.3	4.5
Unemployment rate (in percent)	6.1	6.2	9.7	9.2
(Ratios to GDP)				
Gross domestic investment	27.2	27.4	22.1	23.4
Of which: public investment	5.3	5.2	4.3	3.7
Gross national savings	22.3	21.8	22.0	22.0
External savings	5.0	5.7	0.1	1.4
Private consumption	65.0	65.7	64.3	63.3
Public consumption	10.5	11.0	11.8	12.2
Public finances				
Central government				
Total revenues	23.9	22.9	22.0	23.1
Total expenditures	21.8	23.0	24.4	24.1
Of which: interest	0.5	0.7	0.4	0.5
Savings	5.7	3.6	1.6	2.6
Primary balance	2.6	0.6	-2.0	-0.5
Overall balance	2.1	-0.1	-2.4	-1.0
Consolidated public sector 1/				
Primary balance	0.4	-1.6	-3.2	-2.1
Overall balance	-0.1	-2.3	-3.6	-2.6

Chile: Basic Data

	1997	1998	1999	Est. 2000
(12-month percentage changes, unless otherwise indicated)				
Money and credit				
Liabilities to private sector	16.3	9.7	15.7	9.5
Of which:				
Narrow money (M1A)	16.6	-5.5	20.4	7.9
Broad money (M3)	13.0	8.5	5.1	5.1
Net domestic assets of financial system 2/	6.9	12.5	3.9	11.9
Of which:				
Credit to nonfinancial public sector (net)	-2.0	2.1	2.6	1.5
Credit to private sector	11.7	4.1	2.0	6.5
Liabilities to the private sector, in percent of GDP	93.0	96.0	108.9	109.1
Three-month inflation-indexed interest rate (in percent)	6.8	9.6	6.0	5.4
(In billions of U.S. dollars, unless otherwise indicated)				
Balance of payments				
Current account	-3.7	-4.1	-0.1	-1.0
Merchandise trade balance	-1.6	-2.5	1.7	1.4
Exports (f.o.b.)	16.7	14.8	15.6	18.2
Imports (f.o.b.)	-18.2	-17.3	-14.0	-16.7
Services and transfers (net)	0.6	0.3	0.1	0.0
Of which: interest	1.4	1.5	1.5	1.9
Capital and financial account	7.4	3.3	-0.8	1.2
Foreign direct investment	3.4	2.2	4.4	-1.1
Portfolio investment	2.4	-0.8	0.1	-0.3
Other capital (net)	1.6	1.9	-5.3	2.6
Errors and omissions	-0.4	-1.2	0.2	0.0
Overall balance	3.2	-2.1	-0.7	0.2
Exports (in percent of GDP)	28.1	26.7	29.0	31.8
Imports (in percent of GDP)	30.9	30.9	27.2	30.8
Current account (in percent of GDP)	-5.0	-5.7	-0.1	-1.4
Merchandise exports (in US$, annual percentage change)	8.2	-11.0	5.3	16.3
Merchandise imports (in US$, annual percentage change)	10.5	-4.8	-19.6	19.9
Terms of trade (annual percentage change)	2.6	-12.6	0.9	0.1
Real effective exchange rate (12-month perc. change)	9.7	-6.1	-6.3	2.4
International reserve position and external debt (as of December 31)				
Gross official reserves	17.8	16.0	14.7	15.7
(in months of imports of goods)	11.8	11.1	12.7	11.3
Net official reserves	17.8	16.0	14.7	15.7
Net reserves of the banking system	0.4	0.9	3.9	2.9
Outstanding external debt, in percent of GDP 3/	35.6	43.4	50.5	52.7
Public	6.8	7.8	8.6	8.0
Private	28.8	35.6	41.9	44.7
Total debt service ratio (in percent of exports)	20.8	20.6	25.2	25.9
Of which: interest	6.8	8.0	7.8	8.6
Gross reserves/short-term debt (in percent) 3/	496.4	385.2	367.8	229.9
IMF data (as of April 30, 2001)				
Membership status:				Article VIII
Quota				SDR 856.1 million
Fund holdings of Chilean pesos				SDR 597.4 million
(as percent of quota)				
Outstanding purchases and loans				None
SDR Department				
Net cumulative allocation				SDR 121.9 million
Holdings				SDR 20.1 million

Sources: Chilean authorities; World Bank; IMF; and Fund staff estimates.

1/ Includes central bank losses.
2/ Changes as percent of liabilities to the private sector at beginning of period. Flows based on end-of-period exchange rates.
3/ Excludes short-term trade credit.

I. Overview

1. This paper presents four studies on selected issues of the Chilean economy. Chapter II discusses the new framework for fiscal policy represented by the authorities' target of a central government structural surplus of 1 percent of GDP. Chapter III presents and tests a hypothesis that helps explain the observed persistence of unemployment in Chile after the 1998–99 recession. Chapter IV examines whether the variance of the cyclical component of output in Chile and eleven other countries increased during the 1990s, a period during which the variance of inflation declined. Chapter V estimates alternative measures of potential output for Chile, analyzing the role of the copper sector, and presents two scenarios for future potential output growth.

2. Soon after taking office in March 2000, Chile's new government committed itself to a strengthening of the fiscal position, defining its objective in terms of the *structural* balance of the central government, with an annual surplus of 1 percent of GDP to be first achieved in 2001 and then maintained. The chapter **"Chile's Structural Balance Target: Design and Implementation Issues"** explains the derivation of the new structural balance measure, which adjusts Chile's traditional balance to better capture changes in the government's net worth and subsequently extracts two estimated temporary components of revenue. It also analyzes the comprehensiveness of the measure, the estimation of the output gap, and the treatment of revenue fluctuations due to changes in the price of copper exported by the state-owned company Codelco.

3. The chapter concludes that the measure of the structural balance is a relatively smoother and more controllable indicator of the central government fiscal stance than the actual balance, permitting a tighter standard of accountability, and allowing the government to commit itself to a precise target without having to suppress automatic stabilizers. Consistent application of the new framework would rule out a trend deterioration in the central government balance, potentially bringing benefits from enhanced credibility, and helping to focus policy discussions on medium-term issues. Whether the new structural balance measure can also be interpreted as an approximate indicator of the underlying position of the overall public sector will depend mainly on the performance of accounts not covered by the target (e.g., state enterprises and central bank losses), and on the accuracy with which temporary fluctuations in copper prices can be identified. The chapter also considers practical issues related to the use of the new structural balance measure as an ongoing target, noting a number of institutional and operational choices the Chilean authorities may wish to consider.

4. The chapter **"Unemployment Persistence in Chile"** studies the slow response of Chilean labor markets to output recovery after the 1998–99 economic recession and is thus concerned with the asymmetric behavior of employment over the business cycle. It presents a simple model explaining how negative cyclical shocks leading to a significant labor reallocation across economic sectors can lead to unemployment persistence. Consistent with modern business cycle literature, aggregate shocks are not only the primary factors

responsible for unemployment fluctuations, but also affect unemployment persistence by altering job creation/job destruction flows across sectors. Adjustment costs to labor flows associated with job search and matching costs can explain the slow response of labor markets especially when negative shocks are concentrated on labor-intensive sectors.

5. The chapter concludes that employment fluctuations across sectors in Chile explain partially the unemployment persistence after controlling for the impact of aggregate shocks. The chapter also discusses some institutional factors that introduce rigidities in labor markets and thus may have contributed to unemployment persistence.

6. The chapter **"An Investigation of Output Variance Before and During Inflation Targeting"** notes that there has been a generalized reduction in inflation variance both in noninflation targeting and in inflation targeting countries in the 1990s. Given the perception that efforts to keep the inflation rate very low and stable are likely to result in relatively large output fluctuations, the chapter studies whether conditional output variance has increased as inflation variance has declined in a sample of six non-inflation targeters and six inflation targeters in 1976–2000.

7. The study uses two models of real output behavior. The first model is based on the empirical regularity that transitory output fluctuations are asymmetric, and also allows the variance of the shocks to the cyclical and to the trend components to depend on whether the economy is in a recession or not. The second model is a restricted version of the first one; it assumes symmetric output fluctuations and constant output variance. The estimation of both models assumes parameter uncertainty and thus allows time-varying parameters. The chapter finds evidence that the decline in inflation variance has not been accompanied by an increase in output variance, with the possible exception of one country in the sample. Either output variance during the 1990s did not change (which includes the case of Chile) or fell.

8. The chapter **"Potential Output Growth in Chile during 1986–2000, and in the Future"** presents alternative estimates of potential output growth over the last 15 years, and draws some implications for future output growth. The chapter recognizes the special nature of the mining industry, based on the extraction of a nonrenewable resource, and treats this sector separately. The study applies four methods to estimate potential output growth: (1) the standard Hodrick-Prescott filter, (2) a version of the Hodrick-Prescott filter in which the growth-smoothing parameter of the filter is determined endogenously, (3) Clark's local linear trend model, and (4) a production function approach.

9. The estimates of average trend output are quite robust across methods, but the profile of potential output varies significantly, resulting in quite different estimates of the output gap for some years. Two alternative scenarios for future output growth are also presented: the first one assumes no increase in the participation rate and a deceleration in the growth of total factor productivity, and results in an annual potential output growth rate of 5 percent. The second one is more optimistic and generates an annual potential output growth rate of 6 percent.

II. Chile's Structural Balance Target: Design and Implementation Issues[1]

A. Introduction

10. Soon after Chile's current government took office in early 2000, to begin the six-year term of President Lagos, it announced a self-imposed fiscal target, set in terms of a *structural balance*. This new fiscal balance measure and target is defined with respect to the accounts of the central government, its derivation involving first a number of significant accounting adjustments to the traditional official measure, then the extraction of two estimated temporary components, both on the revenue side. One such component, standard in structural balance estimates, is the revenue effect of the deviation of output from its potential level. The other is an adaptation, which recognizes the significance of copper exports to government income in Chile and is based on the deviation of the copper export price from a specified reference price. The government announced that it would target a surplus of 1 percent of GDP for the resulting structural balance in each of the budget years 2001 through 2005.

11. The objectives of this paper are to set out the essential characteristics of the Chilean approach to setting a target for the fiscal accounts and to contribute an analysis of the possible rationale, strengths and limitations of the approach. As the approach is now in its first year of operation, and because it has not yet been rigidly formalized and institutionalized, it is natural to suppose that it may evolve further, and this paper seeks to be useful to this process, setting out areas for further consideration.

12. This "Chilean approach" can be considered in three aspects. First is Chile's newly defined structural balance *as an indicator*, involving the conceptual definition and meaning of the structural balance, as well as technical measurement issues. A second aspect is the intention to use this particular indicator not only for information, but as the single indicator used to define the *targeted fiscal policy stance* in any one year. Third, the approach *as a sort of policy rule,*[2] in which the authorities chose to announce in 2000 the particular structural surplus target of 1 percent of GDP, to be pursued on an ongoing basis—that is, at least

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[1] Prepared by Steven Phillips (WHD). The author thanks the authorities at the Chilean Ministry of Finance for their cooperation and comments. He is also grateful for comments and suggestions from seminar participants at the Banco Central de Chile, and, at the IMF, from Adrienne Cheasty, as well as Anthony Annett, Marco Cangiano, Frederique Mahfouz, and Steven Symansky of the Fiscal Affairs Department, and from Saul Lizondo, as well as Ketil Hviding, Rodolfo Luzio, Francisco Nadal-De Simone and Lorenzo Perez of Western Hemisphere Department. The author is responsible for any errors.

[2] This chapter refers informally to the new fiscal policy framework as a "rule," even though it might not meet a strict definition of that term. This point is discussed later in the paper.

through the term of the current government administration. Of course, these aspects are not entirely distinct: the design of an indicator must be influenced by the uses for which it is intended, and the way the indicator is used may need to take into account unavoidable shortcomings of the indicator.

13. The organization of paper is as follows. Section B provides background on the general notion of the structural balance and its potential uses, contrasts the Chilean approach with related fiscal policy practices elsewhere, and then considers the circumstances of the Chilean economy that may motivate a fiscal policy rule for the structural balance. Sections C and D deal with design of a structural balance measure for Chile. Section C emphasizes that this process must begin with a fundamental choice of the concept of interest, the measure of the *actual fiscal balance* from which the structural balance will be estimated; Section D examines how the chosen balance is stripped of certain components, yielding the estimated structural balance. Section E discusses the use of the Chilean authorities' structural balance measure not only as the exclusive guide for fiscal policy in a given year, but also as the basis for a type of ongoing policy rule. Section F offers concluding remarks.

B. Background and the Chilean Setting

Why might a structural balance measure be useful?

14. For any country's government, the structural balance (SB) is an unobservable concept, being the estimated answer to a counterfactual question: what would the fiscal balance have been if all temporary influences had been absent?

15. One reason an SB concept might be useful merely as an indicator—as a complement to the actual fiscal balance—is simply that it is a less noisy signal, by construction. The fundamental fiscal policy *questions of sustainability/solvency* are long-run issues which temporary "noise" in the actual fiscal balance makes more difficult to analyze.[3] The SB may be useful also as a basis for defining policy targets to be maintained over time: in particular, given that an economy and its fiscal balance are subject to temporary shocks, reference to structural balance may help avoid unnecessary policy adjustments. Beyond being unnecessary, such "procylical" adjustments may also be undesirable, either for exacerbating output shocks, or because of adjustment costs associated with fiscal policy shifts.

16. A further interpretation of a SB measure is also possible, though problematic. The SB might also be seen *as an indicator of the discipline and effort* applied by the fiscal policymakers, for whom some quantitative standard of accountability may be needed. It is natural to think of the temporary components discarded in the structural balance computations as reflecting nondiscretionary changes in the fiscal balance, so the SB is likely to be a better—perhaps much better—indicator of discretionary policy shifts than the actual

[3] If a government were liquidity-constrained, such "noise" might be of interest.

(unadjusted) fiscal balance. However, the SB is flawed as a measure of discretionary fiscal policy stance, since many sources of nondiscretionary shifts in the fiscal balance will not be extracted in the SB computation.[4] Moreover, the conceptual classification of fiscal policy into discretionary and nondiscretionary components is a slippery one, as Hagemann (1999) and others have cautioned.

17. In analyzing the new Chilean SB measure, these two potential roles—hereafter referred to as the "sustainability indicator" and "discipline indicator" roles—will often need to be distinguished. As will be seen, in certain respects the two roles may be compatible, but in others—especially in the treatment of shocks to copper export income—there may be conflict.

18. On a related point of background, any fiscal balance indicator can be analyzed in terms of its level, and/or in terms of how it changes from year-to-year. In the case of the SB, the more ambitious—and challenging, in terms of accurate measurement—interpretation is associated with the level. The level of the balance is essential to evaluating solvency/sustainability issues. On the other hand, for purposes of assessing fiscal policy discipline, an SB measure may not need to be highly accurate in terms of its level. It may be enough that year-to-year changes are measured accurately in order to gauge discipline, avoid time-inconsistency problems, and to avoid procyclical fiscal policy responses. This distinction can be especially relevant in judging the significance of "omissions" from an SB measure. In the Chilean case, for example, the chosen measure does not capture quasi-fiscal losses of the central bank, which have tended not to fluctuate much from year to year (apart from a slowly declining trend in recent years).

Comparison to related practices in other countries

19. Recent years have seen an increase in the application of fiscal policy rules around the world, particularly in advanced economies.[5] These rules can be grouped into ceilings on the stock of public sector debt, ceilings on public expenditure, and floors (or targets) for the public sector balance.

20. The new Chilean approach falls into the third group, but it stands out in being based on an SB measure. Other countries have generally taken a different approach to avoiding the potentially procyclical implications of a fiscal balance rule, instead defining their targets in terms of multiyear averages. Neither approach is without potential weaknesses. For example, the multiyear approach may not correspond with the full period of all business cycles. The discretion the multiyear approach allows could be an advantage, but it also leaves open the

[4] That is, all shocks that are permanent, plus any temporary shocks not captured by the algorithm for estimating the SB.

[5] The references here to practices outside Chile are drawn from the extensive discussions found in Kopits and Symansky (1998) and Hemming and Kell (2001).

possibility of election year expenditure booms, for example, or postponed adjustment to shocks and last-minute, possibly procyclical, rushes to comply with the targets. The analytically more ambitious SB-based approach addresses the cyclicality issue in a direct, and in principle superior, manner. Whether this superiority holds in practice depends in part on the accuracy of the output gap estimate used to derive the SB, an issue discussed in Section C. Moreover, since it is well known that judgmental choices must be made in estimating any country's SB, the resulting potential for nontransparency may undermine credibility of policies based on it.

21. A further difference is that while some countries have chosen to define their balance targets/rules in terms of the current account only—excluding public sector investment expenditure—the Chilean target refers to the central government's overall balance. "Golden rule" targets excluding public investment expenditure have a certain rationale, but they are subject to an operational problem that could undermine their meaningfulness and credibility: the difficulty of objectively and transparently classifying public expenditure as either investment or consumption. The Chilean approach eliminates this potential room for maneuver and discretion.

22. Two other points of comparison can be noted. First, most fiscal balance rules do not refer to the entire public sector. New Zealand is an exception, but most rules apply to the general government, or, as in Chile, to the central government. This question of coverage is taken up in Section C. Second, the Chilean approach appears unique in making an adjustment related to the terms of trade.

23. In all, the Chilean approach seems to have its closest parallel in Switzerland's (proposed) new fiscal framework, in that a specific target level would be established for each year, with a cyclical adjustment made on the revenue side. As in Chile, the Swiss rule would constrain all spending by the central government, not just its current expenditures. Still, the Swiss approach would differ in significant ways, including its being constitutionally based and permanent in nature, defining escape clauses from the rule, and in requiring that a shortfall from the target in one year be offset in subsequent years.[6]

The Chilean approach: background and possible motivations

24. Chile has no recent history of large and sustained public sector deficits. The central government balance has often been in surplus, in the context of fast growth, implying that public debt/GDP ratios have for a long time been on a downward trend, and by now is at comfortably low levels (indeed, levels enviable by the standards of other countries now

[6] Strictly speaking, the Swiss approach also differs in that it involves an expenditure, rather than a deficit, target. However, the expenditure target is tied to cyclically adjusted revenue. See Danninger (2001) for a full analysis of the Swiss approach.

following fiscal balance rules). Clearly, Chile's new fiscal policy approach is not an emergency effort to quickly acquire fiscal policy credibility where there was none before.

25. One rationale more relevant to the Chilean case would be to avoid—in a sense, to rule out—a gradual erosion of the fiscal stance and fiscal policy credibility. Until now, the fiscal position has been determined essentially one year at a time, in annual budget decisions; there has been no systematic practice to counteract the risk that so-called deficit bias would come into play. In addition to locking-in the benefits of credibility hard-won in the past, a fiscal balance rule might essentially bring forward, to the present, the benefits of future solid fiscal positions. Such benefits could take the form of lower interest rates. The spread on Chilean sovereign debt, recently in the neighborhood of 200 basis points, is much less than most emerging market spreads, but it still could suggest that some room remains for improving credibility.[7] An SB-based rule can be a way to put a medium-term orientation on fiscal policy, to communicate to markets a clear indication of how fiscal policy will be conducted over a horizon longer than the current budget year.

26. Many countries that have applied fiscal balance rules have first done so in the context of a planned fiscal consolidation, to be implemented over a number of years. The intentions of the new government that announced Chile's SB-based rule could be seen as fitting this pattern. According to the authorities' calculations, the structural balance for 1999 was a low point (the first deficit in almost 10 years) at –0.8 percent of GDP, from which it would take two years to reach the ongoing target of a surplus of 1 percent of GDP.[8] Thus both 2000 and 2001 can be seen as transition years, in which the underlying fiscal stance is being tightened. Framing this commitment to firming the fiscal accounts in terms of an SB measure has allowed the authorities to commit to a particular quantitative target without the rigidity in the face of shocks that would be implied by a target for the actual fiscal balance.

27. Another factor suggesting relevance and usefulness of an SB measure for Chile is the volatility of factors influencing the fiscal balance. The central government's balance has not been stable. Year-to-year changes have been significant, and recently, in the second half of the 1990s, the central government's balance deteriorated sharply in just a few years (albeit from a large surplus). Partly this is because the fiscal accounts in Chile are subject not only to the usual output cycle effects, but also to significant influence by copper price shocks. If such shocks are mainly temporary, an SB target might be particularly useful in Chile. The Chilean authorities have explained that one motivation for adopting an SB target is the desire to

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[7] Many of the smaller advanced economies, and even a handful of emerging markets, pay smaller spreads. Of course, sovereign bond spreads may reflect factors other than perceptions of fiscal policy, but Chile already appears quite strong according the usual indicators of external vulnerability. See Phillips (2000).

[8] The authorities estimate the SB outcome for 2000 to have been +0.2 percent of GDP, so more than half the distance to the target was closed in the first of two transition years.

smooth expenditure, creating stable conditions for the development of long-term social and investment programs.

28. On the other hand, Chile's new fiscal policy framework is not without potential costs. Continuous pursuit of a fixed SB target would require an essentially immediate (same year) adjustment to any shock not captured by the SB measure. It would also mean forsaking an active, discretionary countercyclical role for fiscal policy. On this, it is true that the scale of automatic stabilizers allowed by Chile's SB target is limited in that the SB computation makes no adjustment for possible cyclically induced expenditure fluctuations. For example, if during an economic downturn the government introduces temporary employment programs, as has happened in the past, the associated additional expenditure will have to be offset by tightening elsewhere.[9] However, the SB's adjustments on the revenue side are not negligible, as will be seen in Section C.[10]

29. Chile's monetary policy regime, involving a floating exchange rate and an inflation-targeting rule, is also relevant. With inflation the primary target of the monetary authorities, monetary policy would be expected to often, though not always, operate with some countercyclical effect. Indeed, the announcement of the SB policy rule was made not long after the central bank suspended its exchange rate target band and announced an inflation target band.

30. The above discussion presumes that Chile's SB target is indeed to be met each year, and that its level is to remain fixed; i.e., that there are no shocks or circumstances under which either the target would be deliberately missed or its level would be revised. As discussed in Section E, the authorities' announcements regarding the new fiscal framework have not addressed this subject.

C. Design of the SB Measure: Choosing the Appropriate Concept

31. Developing an SB measure requires more than extracting temporary fluctuations. Significant decisions must first be made regarding the concept of interest: what fiscal balance measure should be used as the basis for estimating the structural balance? Two kinds of questions then emerge, regarding *scope* and *measurement*.

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[9] Because such programs in Chile have been ad hoc, it would be difficult to statistically model a cyclical component using data on past expenditure.

[10] In comparison to the proposed Swiss rule, for example, the adjustment made on the revenue side is roughly twice as large in Chile (for a given output gap, as a percent of GDP). The difference reflects the much larger ratio of central government revenue to GDP in Chile.

Scope of the measure: broad or narrow concept of the public sector?

32. Chile publishes actual fiscal balance data for a range of definitions of the public sector, but the central government balance alone has been chosen as the basis for the SB measure and target.

33. Such a narrow focus can be supported by a number of considerations. One could be a desire to focus on that part of public sector activity most under central government control, thus allowing tighter accountability to be placed on the central government. Regarding the exclusion of the state enterprise sector, it can be argued that state enterprises should be free to act like private enterprises—e.g., their investment expenditure plans should proceed based on anticipated returns, rather than being potentially constrained by a target for the overall public sector balance. Also, certain parts of the public sector (e.g., municipal governments) may be excluded in light of other requirements that force them to essentially balance their budgets over time. Arguments along these lines have been put forward by the Chilean authorities.[11]

34. Counterarguments, in favor of a wider definition of the public sector, tend to focus on the role of the SB as an indicator of sustainability rather than discipline (and so are less concerned with the question of controllability). In principle, if too many accounts were excluded from a fiscal balance indicator, it would cease to have meaning in terms of its *level* and therefore sustainability. Regarding the state enterprise sector, if the central government is the ultimate guarantor of these companies' liabilities, then the performance of these firms is relevant for the net worth of central government. The practical significance of this point depends on the size and financial soundness of the state-owned sector. However, as long as such enterprises are open to potential government influence in the future, including them in the fiscal balance measure could boost credibility, since it would be clear that any future quasi-fiscal activities would be captured.

35. In the Chilean case, the main elements of the public sector left outside the structural balance measure are the following:

- The **quasi-fiscal deficit of the central bank.** This deficit is not insignificant, being in the neighborhood of 1 percent of GDP recently, and over most of the last 10 years, according to the definition used by IMF staff. The imbalance is chronic, and not a reflection of any recent temporary fluctuation or policy decision. Although these losses have been slowly

[11] See also "Statement by the Chilean Authorities" dated August 9, 2000 available at the IMF website at http://www.imf.org/external/country/CHL/index.htm, to the effect that fiscal policy in Chile is conducted only through the (central government) budget.

declining in recent years, they seem unlikely to shrink substantially in the near future without the central government acting to recapitalize the central bank.[12]

- **Public (nonfinancial[13]) enterprises.** This sector remains substantial, with aggregate revenue of about 12 percent of GDP, or more than one-third of the nonfinancial public sector total, in recent years. It has not been a source of large quasi-fiscal deficits: the overall balance of this sector is typically in deficit by ½ or 1 percent of GDP in any given year, and the balance on current account is in surplus. Barring a sharp deviation from this track record, the public enterprise sector does not pose a threat to the solvency of the public sector. On the other hand, the central government balance does not exist in isolation from the finances of state enterprise sector, being influenced by sizable taxes, profit transfers, and other financial flows both from and to these companies. If the government were to begin to use a profitable public company as a vehicle for quasi-fiscal expenditure, for example, the costs of this decision would at first show up in the central government accounts, via a reduction in profit income transferred to the government; however, once profits were reduced to zero, further quasi-fiscal expenditure would have no reflection in the central government balance. Another potential complication is that if ad hoc transfers from enterprises to the central government are possible, the central government's balance becomes a less reliable indicator (whereas such flows would of course not affect the measured balance of the combined public sector). Finally, from an institutional perspective, in principle it would be possible to incorporate the state enterprises fully into a broader structural balance concept and target, since the annual budgets of these companies are subject to central government approval.

- **Military sector**. Statistics for the central government balance—which are the basis for structural balance computation—only partially cover the military sector. Rather than the military's total expenditure, the amount recorded corresponds to the funds transferred to the military from the central government budget. This figure must understate total expenditure by the military sector, which has other sources of income, mainly direct transfers received from CODELCO, the state-owned copper company, typically on the order of 0.4 percent of GDP each year.[14] Any military expenditure financed by credits from foreign suppliers is also not captured.

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[12] The deficit measured by Fund staff refers to the gap between the flows of interest payments and those of interest receipts; it would diminish if the positive spread between the average interest rate paid on the central bank's liabilities and the average rate earned on its assets were to narrow.

[13] The following discussion is based on official data, which do not include *Banco del Estado*.

[14] The omission from the structural balance of the military sector's CODELCO-financed expenditures is therefore not distinct from the omission of the state enterprise sector, which of course includes CODELCO.

- **Municipal governments.** Measured in terms of revenue, Chile's municipal governments together represent only about 2 percent of GDP. Institutional constraints on municipalities' borrowing assure that their aggregate overall balance is essentially zero.[15]

36. The public sector flows excluded from Chile's new SB measure are together substantial. However, the parts of the public sector omitted from the SB measure are not necessarily ignored from policy consideration. Thus, in making the case for targeting a central government surplus (rather than a balance of zero), the authorities have among other points referred to flows not reflected in their SB measure, in particular, the central bank losses. Moreover, as long as figures for the state enterprise sector continue to be published, analysts will be able to construct their own broader indicators of the public sector balance, and the fiscal authorities can be assured that any significant deterioration in the state enterprise sector would draw comment. In other words, the omission of this sector from the new SB balance target does not represent a reduction in transparency or a weakening of the incentives for fiscal discipline.

Accounting issues and adjustments

37. The SB is based on a traditional indicator, the cash balance (*balance efectivo*) of the central government. However, before proceeding to extract temporary components, the authorities have chosen to first transform this series through a set of accounting adjustments. The result is the new adjusted balance (*balance ajustado).*

38. The *balance ajustado* is guided by the objective of better capturing changes in government net worth. Pursuit of this objective can also be discussed in terms of moving from cash-based to accrual-based accounting. Thus, several accounting adjustments consistent with this objective have been made:

- Privatization receipts, and other flows related to purchase and sale of assets, are now all recorded "below the line" (in the traditional cash balance, some of these flows are registered above the line). Similarly, both the extension and recovery of loans by the government are also recorded below the line. On the other hand, funds the government may receive as a lump sum for granting private concession arrangements (as opposed to outright privatization), as well as capital transfers made by the government, will continue to be recorded above the line.

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[15] Over the last 10 years, the aggregate balance of municipal governments has in each year remained within $1/10^{th}$ of 1 percent of GDP. (An additional, purely practical reason to exclude the municipalities is that their fiscal data are available only with a considerable lag.)

- The special accounting treatments used in the traditional balance to record the operation of Chile's Copper Stabilization Fund (CSF) are undone.[16] This is a sizable adjustment, and by itself causes the fiscal balance measure to be much more volatile (see Figure 1). In a sense, the smoothing previously accomplished by the CSF will now be handled instead in the derivation of the SB from the adjusted balance, discussed in the next section.

- Oil Price Stabilization Fund. An adjustment is made to capture quasi-fiscal flows related to the regulation of domestic fuel prices. In 2000, this price-smoothing scheme cost ½ percent of GDP, which was reflected not in the central government balance, but in the accounts of ENAP, the state-owned oil company. Thus this adjustment can be seen as partially correcting for the omission of state enterprises from the SB measure.

- Pension Recognition Bonds *(bonos de reconocimiento)*. A generation ago, to arrange a transition from the old government-run pension system, a commitment was made that workers leaving the old system would receive upon their retirement bonds recognizing the contributions they had paid in to the old system (see Appendix I for details). The traditional treatment of these bonds uses cash accounting, but the new adjusted balance takes an accrual approach, to be consistent with the net worth principle. The difference between treatments varies over time, but in 2000, for example, government expenditure related to recognition bonds was 1.1 percent of GDP according to the traditional treatment, and 0.8 percent of GDP according to the new accrual treatment.

39. The SB measure does not attempt any adjustment for the effect on the government's net worth of each year's depletion of nonrenewable state copper reserves. In principle, a fully net worth-consistent approach would take into account this nonrenewability in the calculation of the adjusted balance and thus also in the structural balance. However, such an approach would be technically difficult and likely to produce very uncertain estimates.[17] Instead, the Chilean authorities have simply noted the fact that copper is a nonrenewable resource as another reason why the central government should aim at a surplus.

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[16] Thus withdrawals from this fund (during periods of lower copper prices) are no longer treated as revenues, and deposits into this fund (during periods of higher copper prices) are no longer deducted from revenues.

[17] Complexities include the fact that observed copper revenues of the vertically integrated CODELCO represent not merely the sale of copper (ore) assets, but also the extensive extraction, transportation, and processing services that are bundled into the refined product actually marketed. Moreover, any estimate of the value of the copper ore depleted in a given year would hinge on the assumed price at which it could otherwise have been sold in the future. As discussed later, copper prices are quite difficult to forecast.

40. In conclusion, the new adjusted balance is a significant intermediate step in the derivation of the structural balance. While it cannot be a perfect measure of changes in public sector net worth,[18] it certainly comes much closer than the traditional measure.

D. Design of the SB Measure: Estimation and Extraction of Temporary Components

41. Estimation of a government's structural balance is partly an art, since numerous methodological options emerge and require judgment. In choosing one approach among the many possible, analytical ambition and the quest for precision may need to be balanced with pragmatism and communicability to a wide audience. The latter would argue for aiming to extract only the most significant types of temporary fluctuations.

42. The Chilean authorities have taken a selective, and generally intuitive, approach. The SB derivation extracts components from the revenue side only. In particular, net tax revenue is adjusted in light of an output gap estimate, and the central government's receipts from CODELCO are adjusted in light of the level of copper export prices. These two revenue components, and the shocks for which they are adjusted, are treated separately in the SB calculation.

43. Figures 2 and 3 provide a preview of the results of these procedures. As can be readily appreciated, removal of these components has a substantial effect in most years, and this effect reflects mainly the copper income adjustment, although the tax revenue adjustment is not insignificant. Note that these two adjustments appear positively correlated (see Figure 3), though their derivations, and the revenue categories to which they refer, are entirely distinct.

Effect of the output gap on revenue

44. The Chilean SB methodology seeks to remove the effect of the output gap on net tax revenue. At roughly 20 percent of GDP, such revenue represents the bulk of central government receipts. Additionally, the methodology also seeks to remove the effect of the output gap on certain health care contributions (this adjustment is relatively small and will not be discussed separately here). The basic method applies an estimated elasticity of these revenues to an output gap measure derived using a production function approach and the Hodrick-Prescott (HP) filter. The elasticity estimate of 1.05 is in line with estimates for other countries, and any error in this respect is likely to be relatively unimportant.[19]

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[18] In addition to the points just discussed, it can be noted that the government accounts remain on a cash, rather than accrual basis. Of course, since the measure refers only to the central government, it does not capture changes in *public sector* net worth arising from the state-owned enterprise sector.

[19] The elasticity estimate refers to the same year relationship between revenue and output (no lags are involved).

45. More important to the SB derivation is the estimation of the output gap. The authorities' methodology yields a cyclical component of output that at times is large enough to have economically significant effects on revenue. For example, in a cyclical peak in 1997, output exceeded its estimated potential level by 3.2 percent, but only two years later, output was at a cyclical trough, 3.4 percent below potential. Applying the revenue elasticity, one sees that between these two years the estimated cyclical component of revenue swung from about +0.6 percent of GDP to about –0.7 percent of GDP. These values, however, are the extremes; both the level of the adjustment and its short-run movements are typically much smaller (see Figure 3). As would be expected, the authorities' estimated output gap series averages close to zero over time. Another intuitive property of the estimated series is its close negative relationship with annual unemployment data.

46. Natural questions here are the accuracy of the output gap estimation, and whether errors in this estimate are likely to be important. Estimates of potential output—for any country—have a reputation for not being robust, in two senses. First, a range of methodological choices makes possible a range of results. For example, Nadal-De Simone (2000a) shows how the choice of the smoothing parameter used in a HP procedure applied to Chilean output data can affect the results: using the conventional smoothing parameter value gives a 1999 output gap of –3.7 percent (a bit deeper than the authorities' estimate noted above), but using the estimated "optimal" parameter gives a smaller estimated cycle in general, and for 1999 a narrower output gap of –2.3 percent.[20] In terms of revenue, this is the difference between cyclical components of –0.7 and –0.4 percent of GDP, respectively. On the other hand, using a Kalman filter method, Nadal-De Simone (2000b) obtains a wider gap of about –4 percent for the same year. (As Chapters IV and V illustrate, other methods can yield a still larger range of output gap estimates.)

47. Second, for a given methodology, output gap results may not be robust over time. For example, a shock that appears permanent when first observed may later appear to have been temporary, once data for subsequent years are available. Such a problem in fact arises from the HP filter widely used to estimate potential output, but which suffers from an end-sample bias tending to understate the amplitude of the cyclical component in the most recent years.

48. It seems that some uncertainty will attach to any estimate of potential output. Fortunately, this may not necessarily be an overwhelming problem in the context of an SB measure used for an ongoing targeting rule. It may be enough to get the broad pattern of the output cycle right, beyond which some mismeasurement of its amplitude may be tolerable. As long as there is no bias in the pattern of errors accumulated over time—if negative (positive) errors during downturns are offset by positive (negative) errors during booms—

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[20] Nadal-De Simone's results refer to a direct application of the HP filter to the quarterly output series (i.e., without a production function), a conventional lambda value of 1,600, and an estimated "optimal" lambda for Chile of only 541. Thus a lower value of lambda corresponds to a smaller temporary component, and a more volatile potential component.

then the usefulness of the SB measure in terms of establishing solvency and policy credibility will not be undermined.[21] At the same time, transparency and credibility considerations suggest the worth of selecting and publishing one estimation methodology and then sticking with this choice over time.

Effect of copper prices on revenue

49. The copper-related adjustment in the authorities' SB calculation focuses narrowly on the static effect of copper price fluctuations on CODELCO's export earnings, rather than attempting to remove all temporary revenue fluctuations linked to the copper sector.[22] The extracted component is not estimated but calculated directly as a function of the gap between CODELCO's actual export price and the *reference price* of copper, both in U.S. dollar terms, scaled by the physical volume of CODELCO's exports and a peso/dollar conversion factor. During the period 1987–2000, it ranged from a a maximum of +4.5 percent of GDP in 1989 to a minimum of –1.0 percent of GDP in 1999, with a mean absolute value of 1.4 percent of GDP. Thus, as Figure 3 shows, the copper-related adjustment is substantial, and much larger than the revenue adjustment related to the output gap, which has a mean absolute value of 0.4 percent of GDP.

50. Clearly, the copper reference price is key to the derivation and interpretation of the structural balance measure and target. The procedure to be used in the future to arrive at the reference price has not yet been formalized, though it is understood that establishment of a commission for this purpose is planned. So far, the authorities' structural balance calculations have used the reference price already established for the purposes of the Copper Stabilization Fund (recall Section C). The Chilean authorities have interpreted this reference price as the long-term price of copper; they have indicated that if the outlook for long-term copper prices were to change substantially, the reference price would need to be modified accordingly.

51. The path of this reference price has been fairly smooth over the last 10 years; compared to market prices during this period, the reference price appears almost constant. The implication is that the calculation of the SB so far has treated nearly all of the large copper price fluctuations observed during this period as temporary, so that nearly all revenue fluctuations due to copper prices have been removed from the fiscal balance.

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[21] Accuracy of the output gap measure might matter for other purposes. Presumably, the "loss function" for output gap measurement errors depends on whether the scale of existing automatic stabilizers is ideal, on the sensitivity of output to changes in the fiscal balance, and on adjustment costs associated with fiscal policy shifts in general.

[22] Thus the methodology does not attempt to extract temporary revenue components related to cycles in the volume of copper production, or to effects of price fluctuations on copper export volume (or possible effects of the volume of Chilean production on world copper prices). Moreover, the analysis is confined to receipts from CODELCO (government revenue from the privately owned copper companies is much smaller).

52. Since actual copper prices show considerable year-to-year volatility, the fiscal balance is greatly smoothed by this procedure, yielding a much clearer indicator of year-to-year changes in fiscal policy discipline. Less obvious, however, is whether the copper price adjustment used so far has also improved measurement of the underlying fiscal position, aiding analysis of sustainability issues. The matter involves the statistical properties and predictability of copper prices.

53. If the authorities' SB derivation implicitly has treated most copper price fluctuations as temporary, the first question must be whether a substantial temporary component to copper prices in fact exists. A priori, pure random walk behavior—with no temporary component—seems implausible, since it would not be consistent with the existence of some cost-based floor, or substitute-based ceiling, on copper prices.[23] Moreover, futures market prices for copper suggest that market participants believe that there is a component to copper prices that is temporary, though only slowly mean-reverting.[24] Although unit root tests are not encouraging, failing to reject the null hypothesis[25], these tests do not directly address the question of whether an important temporary component exists. Most relevant is the recent work of Engel and Valdes (2001), who use Cochrane's Variance Ratio statistic to gauge whether a substantial temporary component exists (i.e., even if a permanent component is also present. Their results—which use a Monte Carlo analysis to learn the small sample properties of the statistic—indicate that such a component does exist.

54. Unfortunately, existence of a temporary component does not necessarily mean that it will be easy to identify and measure that component at any given time, that a "long-run" price can be confidently identified, or that reasonable success will be had in predicting copper prices. Indeed, the possibilities of distinguishing temporary fluctuations from permanent copper price shocks—in real time, as they occur—look dim. Engel and Valdes

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[23] In 1999, for example, many copper mine closures around the world were reported to be linked to low prices.

[24] Copper futures prices are nearly as volatile as spot prices, and indeed *short-run* movements of the two are highly correlated. This property suggests that market participants believe that most shocks affecting copper prices are either permanent or temporary but long-lived. Further examination favors the latter interpretation, since such prices seem to indicate that markets expect some degree of mean-reversion. Looking at daily data over the last seven years for 27-month contracts (the longest published by the LME) shows a clear pattern: the future price was always greater than (less than) the spot price, whenever the spot price was below about US$0.80 (above about US$0.90) per pound. (During this period, the spot price ranged widely, from about US$0.60 to US$1.50, while the future price ranged from about US$0.75 to US$1.15.)

[25] Nadal-De Simone (2000c) shows that even the Perrone (1997) test—which allows for structural breaks—cannot reject the null hypothesis of a unit root.

(2001) argue that no structural model of copper prices has managed to generate decent out-of-sample forecasting performance, and they demonstrate that in general time-series models—even sophisticated ones—also forecast poorly. Among the large set of time-series models they evaluate, only two manage to beat a random walk at forecasting real copper prices five years ahead. That is, most models seem to *have no predictive power at all*. Even the two models that outperform a random walk do so by small margins, and it is not clear whether the difference is statistically significant.

55. Another issue is whether most temporary price shocks disappear quickly enough that Chile—and investors in Chile—could feel confident that these require no fiscal adjustment. The simple AR(1) model Engel and Valdes identify as having the best forecasting performance seems to imply that a typical price shock would have a half-life of about four years.[26] In contrast, Cashin et al. (1999), using a median-unbiased estimator, estimate the half-life at about 6½ years.[27] Such a result suggests that actual copper prices could stay substantially below the reference price level, for example, for many years at a time.

56. In conclusion, the substantial adjustments for copper prices made in Chile's SB measure are of uncertain validity in terms of capturing changes in net worth. The validity of the procedure depends both on the properties of copper prices (and the poorly understood factors driving them) and on the accuracy of the chosen level of the reference price. While it is not difficult to question this reference price, it is difficult to argue that a particular alternative value or forecasting procedure would be superior, or even useful. Unfortunately, any mechanically-derived reference price is likely to be a poor predictor of copper prices in the future, and a judgmentally determined one may not do any better, while possibly sacrificing some transparency.

57. One simple and transparent alternative approach would abandon the effort to predict the direction of copper price movements, taking whatever is the current price of copper as the reference price, but this of course would mean a much more volatile revenue side of the SB measure. With every copper price movement treated as if it were entirely permanent, fulfillment of any fixed SB target level—one percent of GDP or otherwise—would imply a much more erratic path of expenditure than under the approach chosen by the Chilean

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[26] Author's calculation, from OLS estimation of an AR(1) process in the logarithm of real copper prices, using annual data over 1908-99. The estimated autoregressive coefficient of 0.84 may be biased downward however, if a unit root is present. For what it is worth, the steady-state level implied by this estimation is US$1.12 per pound of copper (in 1999 prices), roughly 20 percent above the authorities' reference price of copper for 1999.

[27] The Cashin et al. estimate is based on monthly data for a shorter sample, 1957–98. For purposes of comparison, Cashin et al. also provide an OLS estimate in the same sample, which implies a half-life of 2½ years, but they argue that such estimates are biased downward.

authorities. This point suggests that a different form of SB target could be considered, so as to not require full and immediate (i.e., same year) adjustment to all copper price shocks. In that case, the SB would be allowed to fluctuate somewhat, but it would deteriorate as an indicator of policy discipline.

58. Alternatively, as an intermediate approach, the SB's copper adjustment could be designed not around some estimate of a long-run price but rather around the price expected to prevail on average over the coming years. In other words, the adjustment would be calculated using a reference price intended to represent an expected "medium-term" price. The Chilean authorities are understood to be considering an approach of this kind. The difficulties inherent in any copper price forecasting exercise would remain, but by focusing on a shorter horizon the reference price would tend to be closer to the current actual price, and the copper price adjustment used to derive the SB would accordingly tend to be smaller.

E. The Structural Balance Measure as a Fiscal Policy Target

59. The Chilean authorities intend to use their SB measure not only as an indicator but also as the sole basis for a fiscal policy target. This section discusses the nature of the commitment to this target, a number of operational choices made to implement the target, and the level of the target itself.

Institutional basis and permanency

60. A number of countries with fiscal balance rules or targets have chosen to harden these by giving them some form of legal status, either as a law or through some more permanent, constitutional route. Such steps may boost credibility and address the time-inconsistency problem. In contrast, the SB target announced by the new Chilean government in 2000 is not set in law; it is so far a self-imposed commitment, a goal that President Lagos' administration has established for its own six-year term. Thus the conduct of fiscal policy in 2001, for example, is formally governed by the budget law enacted in the last quarter of 2000.[28] Similarly, there exists no legal framework to specify sanctions or require a policy response in the event of slippage from the SB target.

61. According to the definition proposed by Kopits and Symansky (1998), the new Chilean practice might not represent a true fiscal policy "rule," since it is not clear that the SB targeting framework is intended to apply on a permanent basis.

Some operational choices

62. While the Chilean framework is not strict in terms of legal basis and enforcement mechanisms, compared to other countries' approaches, it seems unusually strict in specifying

[28] Of course, this budget was constructed to be consistent with the SB target, and the government emphasized this point during the budget presentation and discussion.

a point target to be met *every year*, rather than leaving some room for "adjust now, or adjust later" decisions. Adding to the relative rigidity of the Chilean approach is the fact that the target refers to the overall balance of the central government, rather than just the current account balance: if a lumpy public investment becomes necessary, it would have to be offset somewhere else. On the other hand, if cash flows between the public enterprise sector and the central government are not entirely predetermined but can be influenced by ad hoc decisions, this would allow the authorities some leeway in complying with a target covering the central government accounts only.

63. Complete policy control of the measured SB is unlikely, however, both because the SB still includes nondiscretionary elements, and because the SB calculations are subject to revision (especially, when new GDP data arrives and induces a change in estimated potential output). Therefore, unintended deviations from the SB target, on some scale, can be expected. Precisely because the target path is predetermined, any such deviations recognized ex post will *not* trigger a fiscal policy response. (For example, a realization that the previous year's SB surplus had turned out below target would not prompt an upward revision of the SB target for the current or subsequent years.) *Within* a given budget year, however, the authorities do plan to make at least one mid-course reassessment, and possibly a policy adjustment, if needed. In the second quarter of the year, they will update and revise their projections of the output gap and of the traditional, adjusted, and structural balances of the central government, presenting these figures to congress and making them public. It is understood that if the updated SB projection for the current year were to deviate significantly from the targeted surplus, the authorities would attempt to adjust fiscal policy for the remainder of the year as necessary to achieve the target. Such within-year adjustments would require distinguishing between temporary and permanent output shocks in real time, as they occur.

Choice of a fixed(?) level for the SB target

64. The Chilean authorities have announced that their target is a structural surplus of 1 percent of GDP to be pursued on an ongoing basis. Certainly, specifying a target path that is constant ex ante is consistent with the logic of the SB calculation, but might the target at some point be revised, in light of new information? The authorities' announcements have not referred to circumstances in which it would be appropriate either to modify the level of the target, or to temporarily but deliberately deviate from it (i.e., neither to recognize such possibilities, nor to rule them out). In principle, such modifications could be justified under some circumstances, but it also possible that their use could backfire.

Choice of a particular target level

65. The particular level to be chosen for the SB target is a difficult question. In presenting their choice of a surplus of 1 percent of GDP, the authorities have offered a *qualitative* rationale, noting arguments that might favor some surplus. In particular, they have referred to several factors, including the central bank's losses, the government's reliance on revenue arising from the sale of nonrenewable copper assets, and the existence of several types of

contingent liabilities, including the government's minimum pension guarantee.[29] (Thus the authorities have chosen to adjust the level of the target, rather than their measure of the SB, to recognize or compensate for these factors—perhaps, because such adjustments are difficult to quantify precisely, or because the calculated adjustments would be volatile.) The authorities have also motivated the chosen target level as representing a certain improvement in public saving over previous years, intended to raise the national saving rate.

66. Although a more rigorous and explicit approach to determining the SB target level might seem preferable, any formal derivation of an "optimal" target level would likely be sensitive to modeling and parameter assumptions and therefore be endlessly debatable. A more feasible goal is to identify a target level that would follow some intuitive criterion that is both easily communicated to the public and consistent with the principle of sustainability. One possibility, in which sustainability of the policy would be readily apparent, would target an overall deficit of zero; in terms of sustainability and maintaining solvency, this approach would of course be more than sufficient for a growing economy already having comfortably low public debt ratios. An alternative approach would choose the target level to stabilize the ratio of the government's net liabilities to GDP at its current level.

67. As noted, Chile's ratio of public sector debt to GDP has declined markedly over the years, and is now already enviably low; the solvency of the state is not now an issue. Accordingly, reducing, or halting the growth of, the debt/GDP ratio has not been a part of the discussion of the new fiscal framework in Chile (in contrast to Switzerland, for example, where the rule is in fact known as the "debt brake"). Still, it is natural to ask what might be the implications for this ratio if Chile were to consistently achieve its new SB target on an ongoing basis. Several considerations would be relevant:

- Assuming that achieving a (central government) surplus of 1 percent of GDP would mean also achieving, on average, actual surpluses at the same level, then the question turns on the coverage of the indicator and the performance of the public sector accounts not included in the targeted measure. Central bank losses and the balance of the state enterprises would have to be taken into account. If the overall balance of the combined public sector did tend to be negative, the rate of growth of its total debt stock would need to be compared to that of output.

- A more subtle question is whether running SB surpluses would indeed imply, on average, actual surpluses at the same level. As long as the estimated output gap is on average close to zero, then the related revenue adjustment made in deriving the SB would have the same property. More complex is whether the gap between the actual and reference prices

[29] In some other countries, discussions of fiscal balance objectives have focused on demographic trends, and the implied need to save in advance of higher government expenditure on pensions still many years ahead. Such considerations are less relevant in the Chilean context, given the nature of the pension system.

of copper, and thus also the copper adjustment for the SB, would turn out on average to be zero. Since even temporary copper price shocks seem to be long-lived, there is the possibility that the actual central government balance would be weaker than the reported SB for an extended period. As an indication of the potential magnitudes involved, an actual copper price that is 10 U.S. cents below the reference price (now about 90 U.S. cents per pound) would represent a difference in the central government balance of roughly ½ percent of GDP.

F. Concluding Remarks

68. Chile's new SB measure and target should be viewed in light of the financial strength of the public sector, in particular that public sector indebtedness is already at a comfortably low level. For Chile, a SB target may be useful as a way of locking-in this favorable initial condition. Previously, decisions about the fiscal policy stance in Chile, as in many countries, were made essentially one year at a time, and without reference to a quantitative framework or benchmark. The new fiscal policy rule should work to prevent "deficit bias" from coming into play, and, by providing a signal about the medium-term stance of policies, it may yield credibility benefits, such as a lower premium on foreign borrowings.

69. A significant by-product of the authorities' SB derivation is their new *adjusted balance*. Regular publication of this measure and its derivation would enhance fiscal transparency. Although the scope of the adjusted balance measure is not fully comprehensive, and it is therefore imperfect as a measure of changes in public sector net worth, the omissions involved are not serious enough—under present circumstances—to invalidate analysis based on it. (If the public sector's initial net worth position were weaker, if the SB target were set lower, or if there were to occur a major deterioration in the accounts of the public enterprise sector, then the comprehensiveness and accuracy of the fiscal balance measure would be more critical.) Instead, the issues here may be more a matter of transparency. Especially, transparency could be enhanced if the measure were expanded to include the central bank balance and the state enterprises. If not the latter, transparency would be served by the continued publication of consolidated fiscal data for the nonfinancial public sector, and by publication of data demonstrating adherence to rules governing transfers between the public enterprise sector and the central government. As regards the treatment of the central bank losses, the most transparent solution would be for the government to recapitalize the bank. Finally, transparency of the new fiscal framework could be further enhanced if the processes to be used to estimate potential output and to specify the reference price of copper were formalized and made public. If it were considered important to leave room for methodological flexibility and informed judgment in estimating these critical parameters, then consideration could be given to delegating their determination to an independent body.

70. A notable characteristic of Chile's fiscal policy rule is its strictness or rigidity, in the sense that the authorities have chosen a point target they intend to meet every year. So far, the authorities have not indicated interest in establishing escape clauses or in defining and announcing some kind of band defining tolerable deviations around the target. In a different

sense, however, the Chilean rule is not as strict as those used in some other countries, in that it represents a self-imposed commitment of the current government, without its own legal or constitutional basis.

71. Chile already enjoys a low ratio of total public sector debt to output; whether this would decline further under the new SB target will depend on, inter alia, copper export price shifts and how policy responds to these, the performance of the public sector accounts not covered by the new target, and the pace of economic growth.

72. The most difficult questions, in both the derivation and targeting of the SB measure, relate to copper prices. So far, the derivation has been based on a nearly constant reference price, implying that nearly all of the substantial revenue effects of copper price fluctuations are excluded from the targeted variable. This procedure yields a much smoother, and much more controllable, fiscal balance indicator; however, it is unclear that it advances medium- and long-term analysis of the fiscal position. An alternative measurement approach based on the opposite extreme of treating all copper price movements as permanent could be transparently applied, but it could also be incorrect, and in some cases it might prompt unnecessary and undesirable fiscal adjustments—if the SB target were kept at a fixed level and met each year. If such an indicator were used, in order to avoid inducing erratic expenditure movements, the form of the SB target would probably need to be reconsidered, so that full and immediate (same year) fiscal adjustment would not be required. A further, essentially intermediate, alternative would be to aim the reference price at the price expected to prevail on average over the medium term.

TREATMENT OF PENSION RECOGNITION BONDS (*BONOS DE RECONOCIMIENTO*)

73. The question of the accounting treatment of the recognition bonds is an idiosyncratic, transitional issue arising from fundamental policy decisions made two decades ago.

74. At the time of Chile's pension reform, the contributions workers had made in the past, under the old government-administered pension system, were "recognized" in a promise to issue a bond to each worker as he or she reaches retirement age. Importantly, the value of each such bond is predetermined, being based on contributions to the old system, but also growing at specified real rate of interest until the date of retirement.

75. Only when a worker retires is the recognition bond formally "issued." At that time, the bond is transferred to the worker's private pension fund company (AFP), which receives a cash payment from the government in return for assuming the obligation to henceforth pay an annuity to the worker. Such a transaction can be seen as a rearrangement of the government's balance sheet, implying no change in the government's net worth.

76. The traditional accounting practice in this area is simple and consistent with cash accounting: when a bond is transferred to an AFP, it is recorded above the line, as a one-time expenditure "bullet." Thus the transaction does influence the measured fiscal balance, even though it represents no change in the government's net worth.

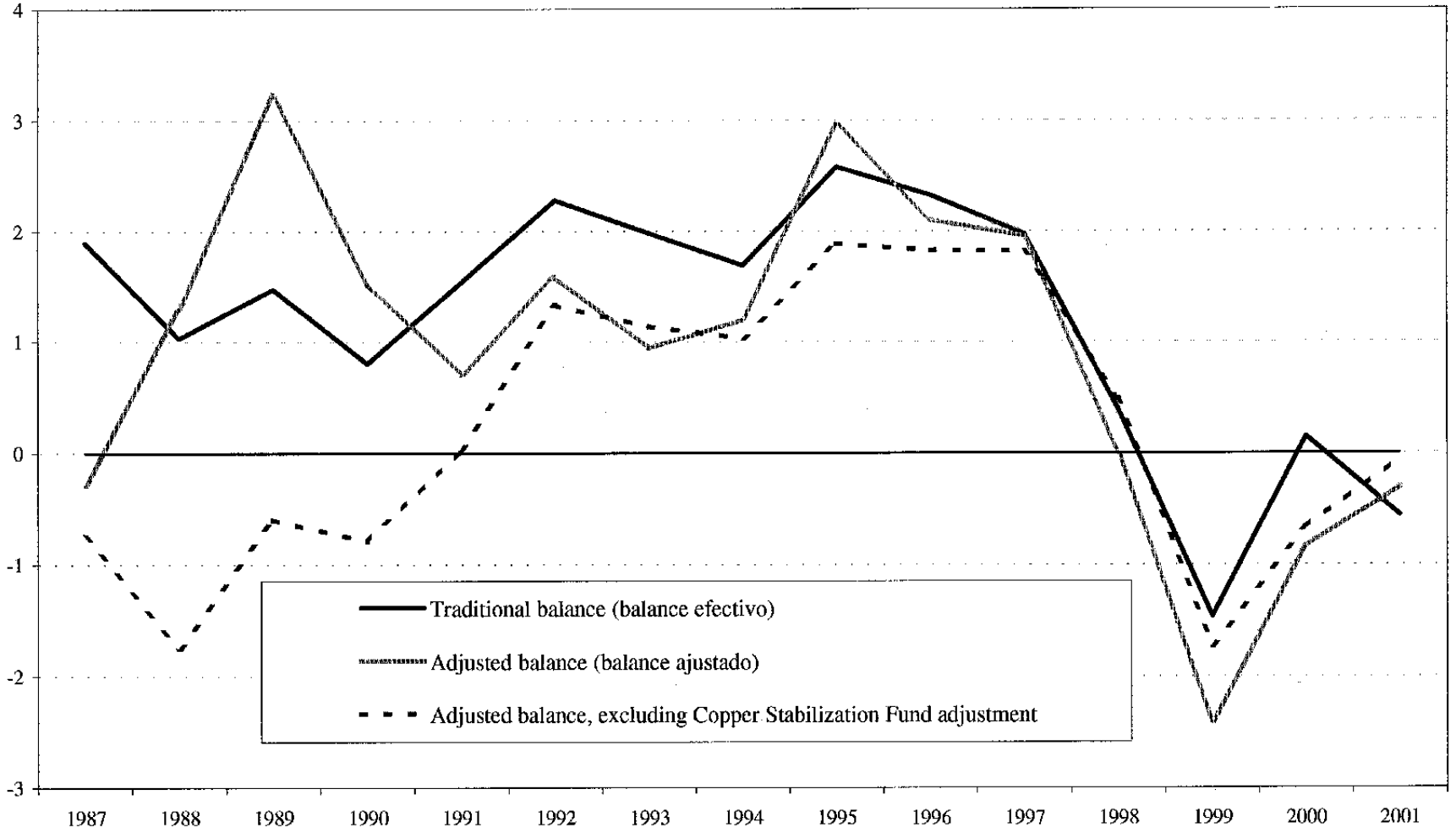
77. For the purpose of the new adjusted balance, and therefore also the SB measure, a new treatment of these bonds will be used. Consistent with the net worth criterion, accrual accounting will be applied from the outset, i.e., recording the creation of a government liability, and showing an equal expenditure above the line, *back at the time a bond was originally promised.*[30] It also means, in subsequent years before a worker's retirement, recording as expenditure the accrued (albeit capitalized) interest associated with his or her bonds. On the other hand, when a bond is finally transferred to an AFP, this itself would have no effect on the deficit.

78. In time, the influence of the recognition bonds on both the traditional and new central government balance measures will of course fade away. Recently, as the number of affected workers reaching retirement continues to increase, the cash flows involved have been rising,

[30] It might be argued that these liabilities existed, in some sense, even prior to the issuance of the recognition bonds, but only then were they formalized and made concrete.

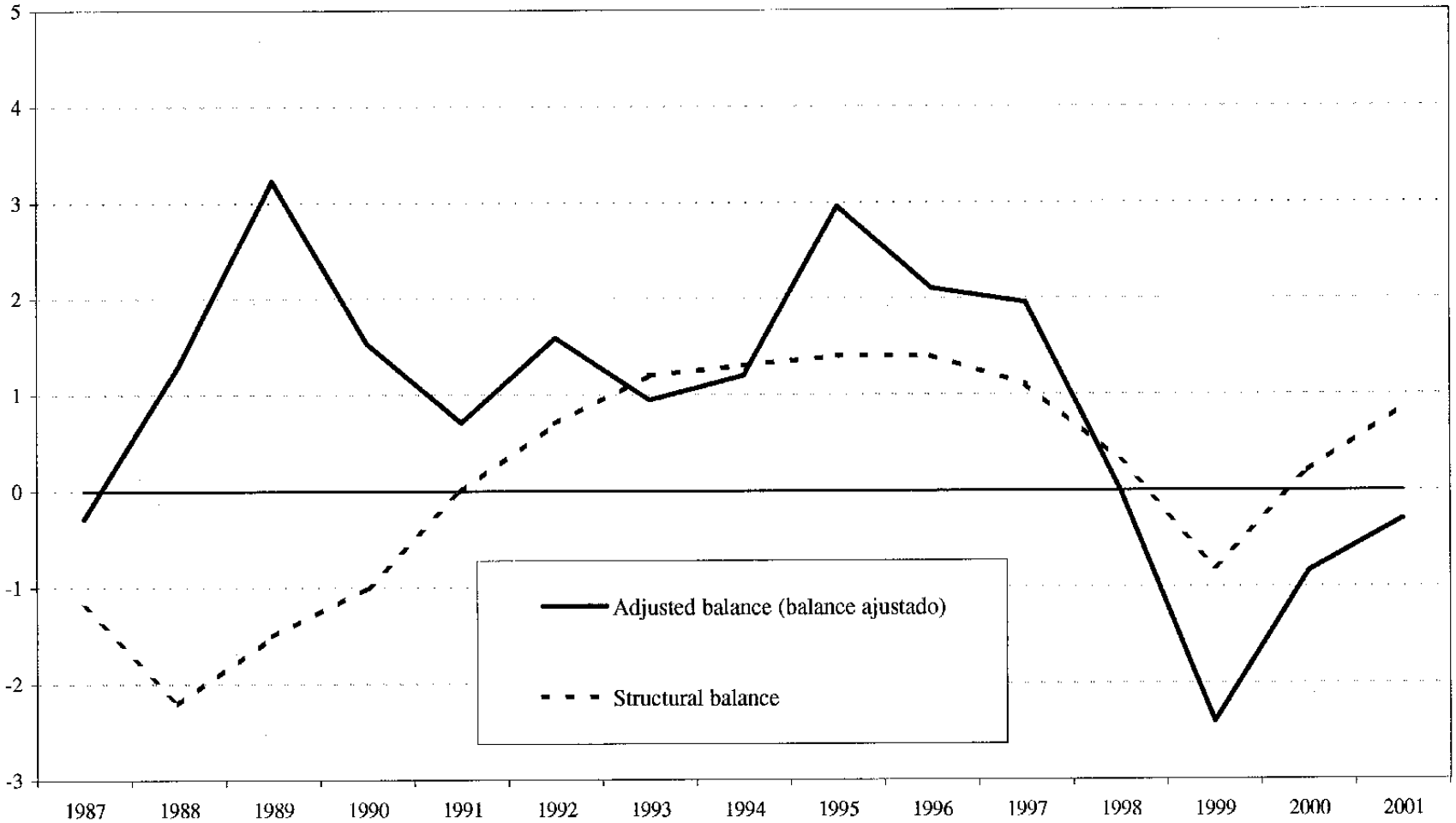
and they will remain a substantial influence on the cash balance for some time. On the other hand, the interest flows recorded under the accrual approach continue their gradual decline, still substantial, but down to a projected 0.7 percent of GDP in 2001.

Figure 1. Chile: Traditional Central Government Balance and New Adjusted Balance, 1987-2001 1/
(percent of GDP)



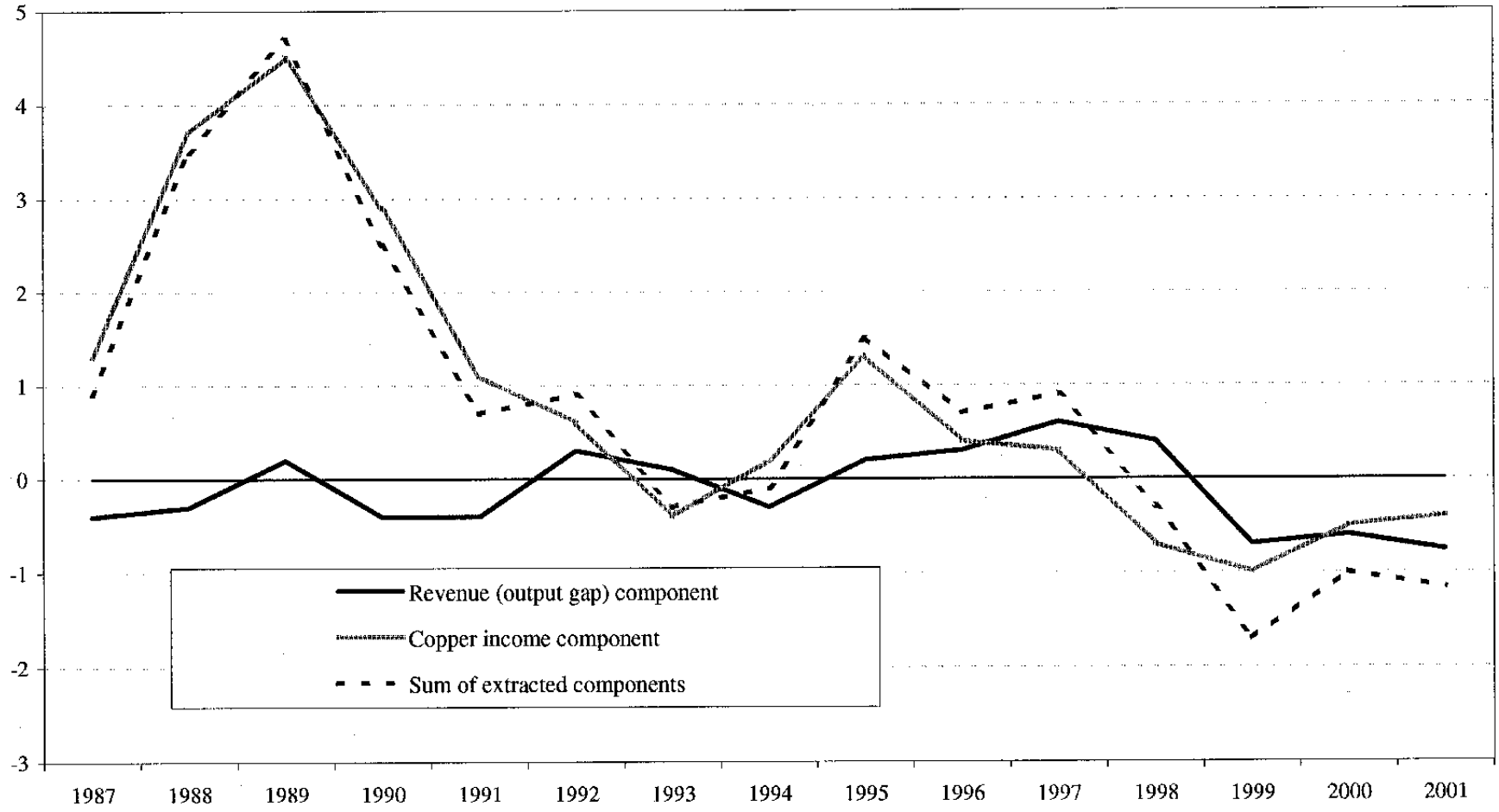
1/ Data for 1987-2000 are from the Chilean Ministry of Finance. Figures for 2001 are staff projections, following the Chilean methdology.

Figure 2. Chile: Estimated Structural Balance of the Central Government, 1987-2001 1/
(percent of GDP)



1/ Data for 1987-2000 are from the Chilean Ministry of Finance. Figures for 2001 are staff projections, following the Chilean methdology.

Figure 3. Chile: Components Extracted in Derivation of Structural Balance, 1987-2001 1/
(percent of GDP)



1/ Data for 1987-2001 are from the Chilean Ministry of Finance. Figures for 2001 are staff projections, following the Chilean methodology.

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III. Unemployment Persistence in Chile [31]

A. Introduction

Motivation and stylized facts

79. In 1998–99, the Chilean economy suffered its first recession after an extraordinary period of high and sustained economic growth lasting 15 years. The combination of external shocks, originating from the Asian crisis in 1997, the Russian crisis in October 1998 and the Brazilian devaluation in January 1999, led to adverse terms of trade and diminished supply of external finance. These shocks, together with tight monetary conditions, prompted a sharp fall in domestic demand and economic activity. From the fourth quarter of 1998 to the third quarter of 1999, Chile's annual GDP growth rate decreased by 2.7 percent while domestic demand fell by 14 percent. Yet, the cyclical downturn proved short lived as economic activity recovered at a strong pace by the fourth quarter of 1999.

80. Following the economic downturn, labor market conditions deteriorated significantly. Total unemployment grew by more than 50 percent on a annual basis throughout 1999 while total employment experienced a prolonged downturn trend. As a result, unemployment shot up to an annual average rate of 9.7 percent in 1999, compared to an annual average rate of 6.9 percent in the decade prior to the economic downturn.[32] In 2000, despite the initial strength of the recovery in economic activity, unemployment remained high averaging 9.2 percent.

81. Recent discussion on the response of the labor market to the economic crisis has pointed out to the weak job creation capacity of the economy. A question arises whether the 1998–99 economic shock would have only a temporary effect on labor market dynamics or whether it could have a highly persistent impact on job creation.

82. Large, cyclical shocks could lead to a significant transformation of employment by sector, occupation and skill. Rapid output adjustments imply increases in temporary unemployment as contracting sectors shed workers before expanding sector rehired them. This cyclical unemployment reflects the time required for job search in the context of higher job destruction. However, if skills required for the new jobs in expanding sectors are substantially different from those in the contracting sectors, then a deterioration in employment could become a more serious problem of persistent mismatch. Unemployed workers moving to expanding sectors would have to acquire the necessary skills involving a

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[31] Prepared by Rodolfo Luzio. The author would like to thank for the helpful comments provided by Saul Lizondo, Ketil Hviding, Fransisco Nadal-De Simone, Steven Phillips, and participants at Banco Central de Chile seminar in Santiago, in particular, Pablo Garcia.

[32] Excluding government-sponsored temporary employment programs average unemployment went up to 10.5 percent in 1999.

costlier training process. Correspondingly, employment dynamics resulting from an economic downturn accompanied by significant shifts across sectors and occupations would reflect a more protracted response to economic recovery.

Objective of the chapter

83. The focus of this chapter is to understand the extent to which aggregate shocks leading to significant labor reallocation across economic sectors help explain unemployment persistence despite the resumption in aggregate output growth. Following the business cycle literature, we view aggregate shocks as the primary factors determining unemployment fluctuations. More significant, economic disturbances inducing labor to be reallocated across sectors affects labor market flows due to search and matching costs. An increase in job reallocation across sectors could lead to a sharp decline in job creation, an increase in unemployment duration, and a possible reduction in labor force participation. Consequently, aggregate shocks generating a high output volatility across sectors could help explain continued unemployment persistence long after aggregate activity recovers.

84. Our main argument does not imply that sector reallocations represent the driving factors explaining output volatility at high frequencies. Rather, we claim that an uneven labor demand adjustment across sectors can exacerbate the consequences of "productivity shocks" as discussed by the real business cycle literature. We expect that asymmetric output adjustments across sectors have important consequences to the dynamics of key aggregate variables.

85. Output fluctuations and labor reallocation across sectors could help explain the persistence in unemployment and weakness in job creation in Chile. Much of the decline in employment can be explained by the sharp downturn in two sectors in the economy: construction and manufacturing. Employment in construction and industry fell by more than 20 percent and 10 percent in 1999 respectively. Since both sectors account for 30 percent of nonagricultural total employment, changes in employment flows in these two sectors are largely responsible for the increase in aggregate unemployment and might explain its persistence.

86. The model we present in this chapter helps elucidate the relationship between changes in aggregate employment and asymmetric output response to shocks across sectors. The model integrates a labor market matching model in a two sector economy. The labor market matching approach follows the basic framework developed by Mortensen and Pissarides (1994), which explicitly formulates the searching process that firms and workers undertake and the bargaining process between parties to share the rent from job matching. By introducing a labor matching model in the context of a two-sector economy, we show through a numerical simulation the effects that asymmetric productivity shocks across sectors have on the dynamics of aggregate labor market flows and economic activity.

87. More important, we present empirical evidence relating employment fluctuations across sectors on aggregate unemployment using Chilean data from 1986 to 2000. Rather

than attempting to estimate a structural econometric specification, our analysis follows a more parsimonious approach as presented by Lilien (1982) and further refined by Abraham and Katz (1986) and Mills, Peroni and Zevoyianni (1995). We use a baseline unemployment equation and proxies of employment and output dispersion across sectors to test whether the asymmetric response across sectors to unexpected aggregate shocks is significantly related to changes in aggregate unemployment and can explain its persistence.

88. As labor market regulations play a fundamental role in determining labor market outcomes, we summarize some of the main elements of labor market legislation in Chile and discuss how institutional rigidities could affect the response of labor markets to shocks. This discussion aims at providing a background to understanding how labor market regulations affect employment dynamics and to refer to some of the empirical literature that shows the impact of regulations on unemployment in the case of Chile.

Organization of the chapter

89. The chapter is organized as follows. Section B provides a brief description of labor market trends over the past two decades, characterizing its dynamics over the business cycle. It also presents the salient facts showing the increased employment fluctuation across sectors following the 1998–99 recession. In section C, we present the basic theoretical framework and discuss the results from the numerical simulation exercise. Section D shows the results of the empirical analysis testing the relevance of employment fluctuations across sectors after controlling for the impact of aggregate shocks. In section E, we summarize the main elements of labor market legislation shedding light on the impact of institutional rigidities on unemployment persistence. We conclude by summarizing the main findings from analysis and discuss basic policy implications.

B. Main Characteristics of Chilean Labor Market (1980–2000)

90. In this section, we describe the main characteristics of the labor market in Chile. We present a broad view of its basic trends over the past two decades and compare them to other countries' experiences. Outlining the basic characteristics of labor market dynamics over the business cycle, we note the procyclical nature and persistence of employment measures. Finally, we present evidence on the asymmetric effect of the 1998–99 shock across sectors pointing out how employment variation can largely be explained by changes in construction and industry.

Labor market facts: trends and cross-country comparison

91. Table 1 sets out some information on general labor market characteristics across a sample of economies. We focus on the past two decades to point out some basic differences among countries. Not surprisingly, there is much variation across economies without any one definable pattern. Cross-country comparison using labor market figures are notoriously unreliable given the accounting differences across countries. Nonetheless, some indication of how some measures of labor market for Chile fare against other countries serves as a prelude to explaining the behavior of unemployment in Chile.

92. Chile's averaged unemployment in the past two decades was the highest among the countries shown in the table, except for Spain. In the 1990s, however, unemployment in Chile fell considerably below the high level of some European countries, but remained above the level of the United States and that of fast-growing economies such as Korea, Taiwan and Singapore. In general European countries are not noted for the flexibility of their labor markets. Nonetheless, labor market rigidities are not the only reasons for high unemployment as observed in the case of the United Kingdom with its flexible labor markets.

93. Total employment growth rate in Chile during the 1980–2000 period was above those of most countries in Table 1. These differences do not take into account differences in rates of population growth. Nonetheless, employment growth in Chile slowed down significantly in the 1990s.

94. Labor force participation figures show some important differences across countries. While developed economies show high levels of labor force participation (except for Spain), fast-growing emerging economies tend to have relatively low levels. In the case of Chile, labor force participation has shown a sharp increase until the mid 90s largely associated to the incorporation of female workers.

95. Real wage growth in Chile outstripped that of developed economies. Differences in real wage growth generally reflect labor productivity gains. As expected, fast-growing emerging economies tend to outperform developed countries given that labor productivity changes are higher in developing countries adopting new technologies and improving their human capital. Labor productivity in Chile has seen large gains in the past decade before edging down as a result of the crisis in 1998–99.

Labor market dynamics over the business cycle

96. We now outline key stylized facts about the cyclical behavior of the Chilean labor market. We follow the standard approach of quoting standard deviations and correlations of the changes in the cyclical components of employment, unemployment, real wages, and labor productivity with respect to output.[33] The main thrust of these statistics is to show the relative volatility of these variables to aggregate activity fluctuations over the business cycle and their relative co-movements.[34]

97. From table 2, we observe that employment and unemployment tend to lag output. While employment is procyclical, unemployment is countercyclical. Labor productivity is highly correlated to output and is contemporaneous to output. In contrast, real wages show a very low correlation with output, employment or unemployment. Moreover, the cyclical

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[33] See for instance Hansen (1985).

[34] We follow the standard procedure of detrending data using the Hodrick-Prescott filter. Though the accuracy of this procedure has been subject to criticism, this procedure remains valid for our main purpose of pointing out the salient facts.

component of employment is much less volatile than output while unemployment shows a much higher degree of volatility. These basic observations of Chilean data behavior are similar to those of the United States and the United Kingdom[35] In Chile, labor market fluctuations are fundamentally connected to the business cycle.

98. As a corollary, a generalized observation in the business-cycle literature is that total hours worked increase and decrease at the same time as output even though employment fluctuations are much lower. This implies that employers prefer to adjust average hours worked (intensive margin) rather than shedding workers (extensive margin). The existence of hiring and firing costs explain why employers are usually hesitant to layoff workers when they perceive output changes as only temporary.

99. The presence of hiring and firing costs could also provide some insight on why measures of employment dynamics show strong persistence over the business cycle. To measure this persistence in the Chilean labor market, we use the unit root test of Cochrane (1988). This test is based on the simple observation that if a variable is a random walk, then the further ahead it goes in time, the more uncertainty there is about the level of the variable. The two-period variance of a random walk should be twice the one-period variance. Cochrane (1988)'s unit root test examines how the variance of the k-period difference changes relative to k times the variance of one-period difference.[36] If this measure converges below unity, then the variable considered behaves in a random walk manner, meaning that shocks only have a temporary impact on the variables behavior. If the test measures goes above one, shocks leave a more persistent effect on the variables behavior suggesting that the effect of the shock is amplified over time.

100. Figure 1 shows the persistence of unemployment, employment and real wages for the case of Chile. While employment and real wages persistence measures edge down below unity, the unemployment measure goes above unity and continues to increase showing that there is high persistence in unemployment.

Employment fluctuations across sectors in the late 1990s

101. Figure 2 illustrates the relation of the high unemployment persistence to the aggregate economic downturn in 1998–99. It also shows that during the same period the variance of employment across sectors increased significantly. The downturn in employment was largely led by construction and industry. The third panel in figure shows that net employment changes in these two sectors alone accounted for more than 100 percent of net nonagricultural employment. While employment in these sectors was contracting sharply,

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[35] See Prescott (1986) and Millard, Scott and Sensier (1997).

[36] The actual statistic is $h_k = \frac{kVar(\Delta x_t)}{Var(\Delta_k x_t)}$

other sectors, particularly in service related sectors, expanded. This evidence suggests that important job reallocation across sectors occurred in the period following the recession.

102. Table 3 shows that output recovery in 2000 was largely concentrated on more capital-intensive sectors. Electricity, transportation, financial services and mining led the recovery by increasing productivity as seen from the poor net employment creation in these sectors. These sectors accounting for about 35 percent of total output are significantly the most productive sectors in the economy; they employ about 17 percent of total employed workers. The fact that the aggregate shocks affected more on labor-intensive sectors and that the subsequent recovery was led by the capital-intensive sectors sustains the protracted employment response at the aggregate level. In the following section, we develop a simple numerical exercise that simulates the asymmetric productivity shock across sectors leading to slow adjustment in the unemployment rate.

C. Theoretical Model: Specification and Simulation

103. The model presented in this chapter provides a simple formal analysis to understand how cyclical, temporary shocks inducing significant job reallocation across sectors can have a more lasting impact on unemployment. We consider a labor market matching model in the context of a two-sector economy. We borrow the labor matching framework from Mortensen and Pissarides (1994) and so introduce a friction on labor flows in terms of an implicit search cost. In this respect, the chapter follows the literature of job search and the business cycle, first formulated in a general equilibrium context by Andolfatto (1995) and Merz (1996). We proceed in a similar fashion to Rogerson (1987) and Phelan and Trejos (2000) that consider a multi-sector economy in the context of labor-market search and business cycle framework.

104. The objective of this section is to illustrate how the labor market response to an aggregate economic downturn varies depending on the nature of the cyclical shock. In the context of the model, we compare two alternative scenarios where different productivity shocks to the two sectors in the economy could have a significantly different effect on the labor market adjustment process, while having a similar impact on the output downfall. First, we show the impact of a temporary negative productivity shock on the labor-intensive sector of the economy coupled with a positive shock to the less labor-intensive sector of the economy. We compare this case to one where the temporary shock affects evenly the two sectors of the economy. We show that the first scenario leads to a much higher unemployment persistence even though the initial impact on aggregate activity is the same in both cases. These simulation experiments seek to provide a rationale for why unemployment persistence could be higher in the context of cyclical aggregate downturn.

105. Notwithstanding the results from the model, the simulation of the model does not follow a rigorous calibration of the Chilean economy given the simplicity of the model. The results are only meant to illustrate a possible explanation for the case of high unemployment persistence in Chile. Appendix 1 has a detailed explanation of the model and the assumptions made for the simulations.

106. The model is founded on two constructs, a matching function that characterizes the search and recruiting process by which new job-worker matches are created and an idiosyncratic termination shock that captures job exit process. The job-worker matching process is similar to a production process in which employment is produced as a intermediary production input. In this context, the output corresponds to the flow of new matches that is produced with search and recruiting efforts supplied by workers and employers respectively. The market matching function is thus a simple construct describing this search and recruiting process.

107. By inserting the labor market matching process into a simple dynamic model, we can solve the dynamic planning problem through a social planner formulation rather than a competitive equilibrium. Because the technological frictions in the job market search do not generate externalities on the labor market, the solution to the social planner problem represents also a solution to the decentralized competitive equilibrium problem. The job matching frictions translate into search costs and do not represent market failures. Resorting to a simpler dynamic planning problem allows us to compute a solution to the resource allocation problem and so simulate the impact of uneven productivity shocks across sectors on the dynamics of aggregate labor market flows and aggregate output.

Simulation results

108. Using the calibration assumptions presented in the appendix section, we study the dynamic response of labor markets and output to temporary shocks to productivity across sectors. We analyze the following two scenarios. We first consider a decrease in productivity in the two sectors of the economy of about 7.5 percent. By assumption, sector 1 is the low labor-demand sector while sector 2 represents the high-labor demand sector. In the second scenario, we suppose a productivity drop of 20 percent to the high labor-demand sector (i.e sector 2) and a 10 percent increase in the low labor-demand sector (i.e. sector 1). In both cases, the magnitude of the initial aggregate output downturn is the same and equivalent to approximately 9 percent.

109. Figure 3 presents graphs illustrating the path of convergence to the steady-state equilibrium of total unemployment, output, total hours supplied and hours spent doing recruitment for the two cases considered. We find that unemployment shows significant persistence relative to the output adjustment for both scenarios. More important, unemployment persistence is significantly higher in the second scenario while the aggregate output adjustment processes are roughly the same in the two cases. Total hours supplied and recruitment efforts also decrease by a larger margin in case 2 than in case 1.

110. The basic intuition behind these results is related to the trade-off between the costs and benefits from recruiting efforts. The gradual adjustment in employment in the two scenarios considered is due to the convexity of new hires to the recruiting efforts. Given that hiring workers in the next period imply the sacrifice in hours per worker that has to be put into the matching process, recruitment efforts entail an explicit cost of forgone production. In the margin, firms have to equate the increased gain from an additional worker next period

to the cost of forgone production due to the increased recruitment effort. Given the convexity of the matching function, adding workers following the output adjustment is costlier than the cost of the foregone production so recruitment efforts are less intensive than one would expect. The low intensity of recruitment efforts explains the gradual adjustment in employment.

111. Another important feature of the model is that it allows for a complete divisibility of labor. This suggests that the effect of output downfall is concentrated on the intensive margin (i.e. hours worked) rather than the extensive margin. This explains why changes in total hours are much more pronounced than changes in employment. These two assumptions (i.e. convexity and divisibility) explain the large shift in total hours and the slow adjustment in employment in both the two scenarios considered.

112. Our analysis also shows that while the adjustment process in aggregate output is roughly similar in the two scenarios, unemployment persistence in the second one is higher than in the first one. The main difference between the two cases considered is that the relative costs between sectors in the two experiments are different. In the second scenario, the growing sector (i.e. sector 1) does not increase enough hours worked and the number of hires relative to the shrinking sector (i.e. sector 2). This implies the fall in aggregate output and employment. For the growing sector, the gains from hiring new workers increase, but so do the costs of foregone output in terms of recruitment effort. Because internal costs in the sector 1 increase, the adjustment in employment is slower, and so the aggregate adjustment in unemployment is slower. Correspondingly, the differences in the cost-benefit trade-offs in the two scenarios explain the differences in unemployment persistence.

113. The difference in these examples illustrate how shocks leading to a similar output recovery paths entail different adjustment rates in employment. In particular, uneven shocks across economic sectors result in higher unemployment persistence. In the next section, we provide some empirical evidence relating the uneven response of employment adjustment across sectors to unemployment persistence as illustrated in these simple experiments.

D. Empirical Analysis

114. In this section, we test the basic conjecture of the chapter using Chilean data. We want to know whether aggregate shocks generating significant labor reallocation across economic sectors contribute significantly to unemployment persistence despite the resumption in aggregate output growth. Economic disturbances requiring labor to be allocated across sectors could induce a longer adjustment period in labor markets due to search and matching costs. This section provides the empirical ground to the qualitative findings of the model described in the previous section. Rather than attempting to estimate a structural econometric specification, we follow a more parsimonious approach as presented by Lilien (1982) and further refined by Abraham and Katz (1996) and Mills, Peroni and Zevoyianni (1995).

115. Our approach uses a baseline unemployment equation and tests whether shocks leading to significant labor reallocation across sectors have an impact on changes in aggregate unemployment. The specification of the baseline unemployment equation follows Barro (1997) by modeling changes in the unemployment rate as a function of unanticipated aggregate shocks. To measure labor reallocation across sectors, we adopt Lilien (1982)'s procedure to construct an employment dispersion index. Responding to Abraham and Katz's criticism of Lilien's measure, we purge the employment dispersion index of aggregate shocks. This allows us to test whether changes in unemployment are significantly related to net employment across sectors after controlling for the effect of aggregate shocks.

116. The main component of the empirical analysis is to identify a measure of unanticipated shocks. We try two alternatives. First, we consider purely exogenous variables as proxies to unanticipated shocks. In the case of Chile, we use changes in copper prices, changes in the real exchange rate, changes in terms of trade and changes in foreign financing conditions as potential candidates. This approach is similar to an instrumental variable estimation insofar as changes in these variables are expected to be uncorrelated to anticipated aggregate demand changes.

117. In the second alternative, we construct a measure of unanticipated aggregate shocks by using the residuals from an estimated money demand equation. The estimated residuals from a money growth model reflect are meant to capture a variety of possible aggregate shocks unanticipated by economic agents, and so do not reflect only the effect of monetary policy actions. Insofar as monetary aggregates are endogenous processes in the context of an inflation targeting monetary framework such as in Chile, estimating unanticipated money demand changes provides a robust proxy for unanticipated aggregate shocks. To estimate a money growth equation, we use a single-equation error correction model following the methodological lines espoused by Hendry (1993).

Identifying unanticipated aggregate shocks

118. We begin our empirical analysis by estimating measures of unexpected and expected money growth. We use these measures to construct the baseline unemployment model. To develop a forecasting equation for money growth, we search for an equation specification. Our specification considers a single-equation error correction model relating money growth Δm_t, output growth Δy_t, changes in inflation Δi_t, interest rates Δr_t, and unemployment Δu_t. The model stipulates a cointegrating relationship among these variables. The rejection of the Augmented-Dickey-Fuller tests for the each of the first differences of the selected variables shows that they are integrated of order 1. More important, Johansen (1988)'s test for existence of a cointegrating relationship shows that we can reject, at a 1 percent confident level, the null of no-cointegrating vectors in favour of the alternative of having at least one.[37] We include a time trend to the cointegrating vector in order to capture the effects of financial

[37] These results are available from the author upon request.

innovation. Various studies on the gains from financial liberalization in emerging economies show that financial innovation occurs over time in a gradual manner through a learning-by-doing process.[38]

119. The proposed money growth equation model has the following form:

$$\Delta m_t = \sum_i^k \alpha_i \Delta m_{t-i} + \sum_i^l \beta_i \Delta i_{t-i} + \sum_i^m \gamma_i \Delta r_{t-i} + \sum_i^n \omega_i \Delta y_{t-i} + \sum_i^s \theta_i du_{t-i} - \phi EC_{t-1} + \varepsilon_t$$

We first derive the error correction estimator EC_{t-1} as a residual from a cointegration regression of levels of money demand relating money demand to income, inflation, unemployment and interest rates. The cointegrating regression also includes the leads and lags of the first differences in output, inflation, interest rate and unemployment as suggested by Phillips and Loretan (1991) in order to achieve an efficient estimate of the cointegrating vector.

120. Table 4 presents the results from the money growth regressions using two different specifications. The results are robust to a variety of misspecification and parameter constancy tests.[39] From the money growth regression, we use the residuals as a measure of unanticipated money growth $resm_t$.

Employment dispersion

121. We construct an employment dispersion index across sectors as a measure of the magnitude of the disturbances in labor reallocations across sectors. We use Lilien (1982)'s measure of a weighted sample variance of cross-sectoral employment growth rates:

$$\sigma_t^2 = \sum_i^n \left(\frac{e_{it}}{E_t} \right) * \left(\Delta \log(e_{it}) - \Delta \log(E_t) \right)^2$$

where e_{it} represents the employment in sector i, and E_t stands for total employment. Responding to Abraham and Katz's criticism of Lilien's measure, we purge the employment dispersion index from aggregate shocks. We regress the relative change employment for each sector on a measure of anticipated aggregate shocks derived from the money growth regressions. We then use the residuals from these equations to construct the purged

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[38] See Arrau, De Gregorio, Reinhart and Wickham (1995) for a study assessing the effect of financial innovation on the demand for money in developing economies.

[39] Results from tests for misspecification and parameter constancy can be obtained from the author upon request.

dispersion as a weighted sample variance of employment residuals for each sector. In our estimations below we use both the original and the purged dispersion indices.

Baseline unemployment equation

122. The two general specifications of the unemployment equation are:

$$\Delta u_t = \sum_i^k \alpha_i \Delta u_{t-i} + \sum_i^j \beta_i resm_{t-i} + \sum_i^L \lambda_i \Delta \sigma_{t-i} + \varepsilon_t$$

and

$$\Delta u_t = \sum_i^k \alpha_i \Delta u_{t-i} + \sum_i^J \gamma_i \Delta q_{t-i} + \sum_i^L \lambda_i \Delta \sigma_{t-i} + \varepsilon_t$$

where $resm_t$ stands for the residual from the money growth equation and q_t represents the instrumental variables to capture the effect of the unanticipated aggregate shocks, which in our specification correspond to changes in the copper price, the real exchange, terms of trade and an index of Chilean corporate bond spreads.

123. Tables 5 and 6 summarize the main results from these regression estimations using the various proxies for unanticipated aggregate shocks and the two measures of dispersion index. The main observation from these regression results is that the dispersion index, using both the purged and nonpurged measures, remains consistently significant for all specifications onsidered.

124. This is a robust indication that the dispersion of net employment across sectors does have an impact on unemployment changes. In particular, the first lag of the dispersion index, irrespective of being purged, is positively and significantly correlated to changes in unemployment. However the third lag of the index is negatively correlated and significant and the magnitude of the coefficient is similar to the previous one. This suggests that even though the dispersion index is related to changes in unemployment the persistence is relatively transient. A simple impulse response function analysis shows that a temporary shock to the dispersion index does not have a long-lived effect on unemployment changes. Correspondingly, while being significantly correlated to unemployment, the measure of employment dispersion across sectors explains only partially the persistence in unemployment.

125. We also note that the exogenous variables used as instruments to proxy unanticipated aggregate shocks (changes in copper prices, changes in real exchange rate and changes in corporate bond spreads) cannot explain changes in unemployment. In contrast, the estimated unanticipated aggregate shock using the money growth residual proves a more significant proxy for unexpected aggregate shocks insofar as these lead to changes in unemployment. Also the sign of the unanticipated aggregate shock is negative suggesting that an unexpected negative shock leads to a higher unemployment in the next period.

126. Nonetheless, it is worth noting that the parsimonious approach to model specification suggests the potential for misspecification error. Such criticism remains a valid if the dispersion index (though purged from the aggregate shocks captured by the money growth model) were correlated to an omitted variable, also correlated to the dependent variable. In such case, the result would be biased and not significant. We have tried to reduce this type of error by controlling for the various variables presented in the regressions and the robustness of the results indicate that the margin error for misspecification might be small.

127. To conclude, this empirical exercise provides evidence, at least partially, to the fact that economic disturbances leading to significant labor reallocation across sectors help explain the increase in unemployment after controlling for business cycle effects. More specifically, in the case of Chile, shocks leading to higher unemployment in the late 1990s were largely concentrated on labor intensive sectors of the economy such as construction, commerce and industry. However, the evidence found also suggests that the measure of employment dispersion does not have a long-lived effect on unemployment changes and explain only partially the persistence in unemployment. We note that that the evidence presented is limited insofar as we do not consider microeconomic factors such as institutional rigidities in labor markets that could give much hindsight towards understanding unemployment persistence in Chile.

E. Labor Market Legislation

128. Labor market regulations play a fundamental role in determining labor market outcomes by altering the labor matching process, employment costs and incentives to work. Seeking to improve workers' welfare, these institutions aim at increasing their income security through employment protection legislation, severance payments, minimum wage, and social security benefits in case of sickness, work accidents and old age. They also benefit workers by strengthening their bargaining power through collective bargaining and union support. However, these regulations come at a costs as they introduce some implicit and explicit costs restraining labor market flexibility. Because labor market rigidities limit the labor matching process, they contribute to the slow response of labor markets to business cycle fluctuations.

129. In this section we review of some of the basic characteristics of the two set of labor market reforms in Chile over the past two decades.[40] The first reform was implemented in the early 1980s by the military regime that started in 1973, while the second was carried out during the early 1990s by the first democratic government. Given the highly protected and rigid labor market legislation prevailing in the 1960s, which was significantly relaxed during the first years of the military regime, the reforms in the 1980s and 1990s sought to modernize labor relations, reduce labor market distortions and increase labor market flexibility. The

[40] For a more detailed review of labor market reforms, see Mizala (1998) and Edwards and Cox Edwards (2000).

reforms covered three basic areas: (i) employment protection, (ii) collective bargaining and wage setting, and (iii) social security.

Employment protection

130. The Labor Plan of 1980 made significant amendments to job security legislation. It established severance payments as part of the overall job contract guaranteeing a minimum severance of a month wages per year of tenure with a five-month ceiling. As an extension to this reform, legislation was enacted in 1984 ruling out economic or financial needs as "just cause" for dismissal, effectively entitling workers with the severance payment benefit.[41] The 1990 reform extended the minimum severance payment to eleven months, but also reinstated the notion of dismissals with "economic cause." Nonetheless, it placed the burden of proof of "economic cause" on employers while imposing a 20 percent surcharge for failure to provide legal proof in court.

131. The two sets of reform have maintained a tenure-based severance scheme that tends to lead to two contrasting effects on labor flows. On the one hand, by increasing firing costs of longer-tenured workers, it reduces aggregate job destruction flows, but shifts the burden to shorter-tenured workers, who generally are entering the labor force, in particular young workers.[42] More important, it decreases the incentives of shorter-tenured workers to acquire specific skills as they face a much higher probability of dismissal.[43] On the other hand, by making the ex-post cost of employment higher, such policy discourages hiring, hence reducing the gross job creation flows. Having a lower job creation rate implies in general a higher unemployment duration, which imposes an extra costs to the matching process: the longer the worker is unemployed, the harder it is for him/her to maintain his/her skills.[44]

132. Recent studies on labor market legislation construct various indexes seeking to quantify the overall costs of job security regulations in the case of Chile and compare it to other countries.[45] Among the most relevant findings of the this literature, we have that job

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[41] The principle of "just cause" for dismissal includes "grave faults" such as criminal behavior and absenteeism.

[42] Using Chilean data from 1960 to 1997, Pages and Montenegro (1999) shows the distortions of tenure-job security on employment composition by reducing youth employment.

[43] Mizala and Romaguera (1996) evaluates job training programs developed by the Chilean government. In particular, they study participation rates of initiatives aiming at young workers such as Chile Joven.

[44] Heckman (199A) shows a positively sloping hazard function for the conditional probability of remaining unemployment.

[45] See, in particular, Edwards and Cox Edwards (2000) and Heckman and Pages (2000).

protection has increased in Chile since the early 1980s and it remains among the highest in from an international comparative perspective. More important, studies show that job security policies have a substantial impact on the level and distribution of employment in the case of Chile as they adversely affect employment of young workers.[46]

Collective bargaining and wage setting regulations

133. The Labor Reform in the 1980s represented a major push towards labor market liberalization by opening labor negotiations to market forces. It made union affiliation voluntary and decentralized collective bargaining to limit it at the firm level. Moreover, it limited the power of workers to repudiate preexisting contracts by allowing temporary layoffs and replacements in case of strikes. While ruling out economy-wide wage adjustments, these reforms introduced a minimum wage setting. Without departing from the main liberalizing thrust of the previous regulation, the 1990s reforms imposed stricter conditions for worker replacement in case of strike and reinstated severance payments to striking workers that are laid off. In 1998, the government committed to an increase of the minimum wage of 40 percent in nominal terms over a period of three years, resulting in a 25 percent in real terms over that period.[47]

Social security privatization

134. In 1981, the military regime introduced a major social security reform replacing the inefficient, government-run pay-as-you-go system for a privately managed system based on individual retirement accounts.[48] The new system mandates individuals to save for their own retirement through individual contributions managed by competing private administrators (AFP). As AFPs use individual contributions to invest in financial assets rather using them to finance the consumption of current retirees, the new system brought a significant reduction in payroll taxes.

135. The reform has lowered social security contributions to about 20 percent of gross earnings, down from 30 percent in 1979.[49] Gruber (1997) estimates that the payroll tax burden fell by 25 percent on Chilean firms. A reduction in payroll taxes entails, in principle,

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[46] See Pages and Montenegro (1999) for empirical evidence.

[47] Preliminary results from a recent study by Bravo and Contreras indicate that the increase in the minimum wage since 1997 has had a negative impact on employment among young workers.

[48] Diamond and Valdes-Prieto (1993) provide a detailed analysis of the privatized system and a comparison to the previous system.

[49] Of the 20 percent contribution, 10 percent goes toward retirement, 7 percent towards heath and 3 percent towards disability.

lower labor costs encouraging employment creation and labor force participation. Even though there is mixed evidence on the incidence of payroll taxation on unemployment,[50] the reform increased the competitiveness of firms and reduced the proportion of the social contributions perceived as pure tax. More important, Chile has benefited from a more efficient system that has raised savings and capital investment, increasing the economy's potential output growth.

F. Conclusion

136. This chapter has argued that negative cyclical shocks leading to a significant labor reallocation across economic sectors have an effect on unemployment persistence. It has presented both theoretical arguments and empirical evidence supporting this view, based on the simple observation that the aggregate downturn in 1998–99 was led by labor-intensive sectors, while the subsequent recovery was concentrated on more capital-intensive sectors.

137. The simple model developed illustrates how economic disturbances inducing labor to be reallocated across sectors lead to a sharp decline in job creation and an increase in unemployment duration due to job search costs. Using a simple labor matching approach, the analysis demonstrates how job search and labor recruiting costs could introduce sufficient friction to the labor market reallocation process to allow for a slow adjustment, specially when economic sectors are unevenly exposed to the negative impact of aggregate shocks. The model thus provide a rationale for why unemployment persistence could be higher in the context of a cyclical aggregate downturn.

138. The empirical analysis shows that the employment dispersion across economic sectors, after controlling for the impact of aggregate shocks, has a positive and significant effect on unemployment. Nonetheless, this effect is not a long-lived one and explains only partially the high unemployment persistence. The analysis suggests that the protracted unemployment cycle would run its course as recovering economic activity in labor-intensive sectors translates into higher job creation.

139. Nonetheless, a business-cycle approach to understanding unemployment persistence in Chile remains a limited one insofar as it does not explicitly consider institutional factors introducing rigidities in labor markets. As argued in the text, labor market regulations could adversely affect labor market outcomes and dynamics by reducing incentives to work, increasing employment costs and altering the labor matching process. As suggested by a large literature on labor markets, the minimum wage and job protection policies tend to have a negative impact on the level and distribution of employment as they adversely affect employment of young workers. In particular, high severance costs reduce the job creation

[50] Gruber (1997) finds that the incidence of lower payroll taxation was translated into wages, with no effect on employment.

response to output recovery as firms want to make sure that growth is sustained before hiring additional workers. Similarly, wage indexation prevents the downward adjustment of real wages despite the pressure from labor markets as the pool of unemployed workers increases following the downward output adjustment. Correspondingly, these institutional factors together with the nature of cyclical adjustments across sectors represent important elements explaining the high unemployment persistence in Chile.

APPENDIX

BASIC MODEL FRAMEWORK

140. We first describe the main assumptions on the economy underscoring its production technology, its labor market matching function, agents preferences and resource constraints. We explain how we could aggregate across individuals and derive a social planner maximization problem. This allows us to characterize the maximization problem in terms of a Bellman formulation. We then derive the optimization conditions and describe the properties of the solution.

141. Consider a two-sector economy populated by a continuum of identical, long-lived individuals $\omega \in [0.1]$. In each period, these agents in the economy either work for one of the sectors in the economy or are unemployed. Let n_i be the fraction of individuals working for each sector $i \in \{1,2\}$.

142. **Production technology**: Assume a very simple production function with constant returns to scale where the only input is labor described by the number of total hours employed in production: $y_i = f_i(n_i l_i) = a_i n_i l_i$. The parameter α_i corresponds to labor productivity. Our measure of labor l_i measures the total hours employed per worker net of the effort spent by workers in the matching process: $l_i = h_i - e_i$. That is, workers in sector i not only spend time producing good x_i but are also responsible for recruiting. So $n_i e_i$ represents sector i total recruitment effort.

143. **Matching technology**: Following Mortensen and Pissarides (1994), we represent a job-search process in terms of a matching function describing the flow at which unemployed workers meet vacancies in a particular sector. The matching process is similar to a production process in which employment is the outcome from the search and recruitment efforts supplied by workers and employers. Let $m_i = n_i M(e_i, u)$ be the flow of matched workers in sector i given that the unemployment rate is $u = 1 - \sum_i n_i$ and the recruiting effort e_i. As in Mortensen and Pissarides (1994), we assume an exogenous job termination rate γ and a Cobb-Douglas matching function: $M(e_i, u) = \beta u^{\theta} e_i^{1-\theta}$. With this specification we can describe the following employment transition function of for each sector:

$$n_{it+1} = n_{i_t}(1-\gamma) + n_i \beta u_i^{\theta} e_{it}^{1-\theta}$$

Correspondingly, next period's employment in sector i depends the fraction of workers that stay in the market.

144. **Preferences:** Assume a time separable utility function for the infinitely live individual ω having a constant discount factor δ, constant elasticity of substitution among

consumption goods $c_t = (c_{1t}, c_{2t})'$ and separable leisure. The net present value of individual ω is equal to:

$$W_i(\omega) = \sum_t \delta^t \{U(c_t, h_{it})\}$$

where utility function follows a simple log specification:

$$U(c_t, h_{it}) = \alpha \ln(c_{1t}) + (1-\alpha)\ln(c_{2t}) - \frac{1}{\lambda}\ln(h_{it})$$

145. In this economy, the agents make decisions about consumption c_t and total working hours h_t, while firms choose the amount of recruitment effort e_{it}. Given that all individuals are identical ex-ante, their consumption and working hours allocation should be the same. Hence, the competitive equilibrium solution is equivalent to solving the allocation problem of a social planner maximizing aggregate utility $\int_\omega W(\omega)d\omega$ given total output. Given the recursive structure of this infinite-horizon, deterministic problem, we formulate the economy's allocation problem in terms of a Bellman function representation:

$$V(n_t) = \max_{h_t, e_t} \{U(c_t, h_t) + \delta V(n_{t+1})\}$$

$$\text{subject to: } \begin{array}{l} n_{it+1} = n_{it}\left[(1-\gamma) + \beta e_{it}^{1-\theta} u_t^{\theta}\right] \\ c_{it} = a_i n_{it}(h_{it} - e_{it}) \end{array}$$

146. In this programming problem, the social planner, given current labor distribution by sector $n_t = (n_{1t}, n_{2t})'$, chooses current total labor hours and recruitment effort in each sector $(h_t, e_t) = ((h_{1t}, h_{2t})', (e_{1t}, e_{2t})')$ to maximize total current utility of consumption net of total labor disutility. The first constraint of the maximization program corresponds to the transition equation of the state vector n_t determining the labor market matching process, characterized by the matching function and job termination rate. The second constraint represents the resource constraint for each of the sectors.

Lemma 1: *There exists a solution to the dynamic programming problem above such that the implied dynamic system converges to a unique steady state solution with the following characteristics:*

(i) There is positive Unemployment in steady state: $u^* = 1 - n_1^* - n_2^* > 0$;

(ii) Average labor hour per is the same in each sector: $h^* = h_1^* = h_2^*$;

(iii) Total recruitment effort is the same in each sector: $e^* = e_1^* = e_2^*$.

Proof: The proof of the existence and uniqueness of the value function is given by the results in Chapter 4 of Lucas and Stokey (1989). To find the characteristics of the steady state solution solve the first-order condition and envelope condition at the steady state:

FOCs:
$$\frac{\partial u(c)}{\partial c_i} a_i n_i - \lambda \eta m_i h_i^{\eta-1} = 0$$
$$-\frac{\partial u(c)}{\partial c_i} a_i n_i + \delta V'(n_i)(1-\theta)\beta e_i^{-\theta} u^{\theta} = 0$$

ENV: $V'(n_i) = \frac{\partial u(c)}{\partial c_i} a_i (h_i - e_i) - \lambda h_i^{\theta}$

From the first constraint at the steady state, we have that $e_i = \left(\frac{\gamma}{\beta} u^{-\theta}\right)^{\frac{1}{1-\theta}} = e$ for any i. Similarly, after some algebraic manipulation of the FOCs and ENV, we have that:

$h_i = \left(1 + \frac{\beta}{\delta(1-\theta)\gamma}\right)\left(\frac{\eta}{\eta-1}\right) e$ for all i.

We have thus from the FOC that $\frac{\partial u(c)}{\partial c_i} a_i = \lambda \eta h^{\eta-1}$ for all i, implying that relative shadow price of good j with respect to good i corresponds to the relative labor productivity of each sector $\frac{a_j}{a_i}$.

Finally to show that unemployment is positive in the steady state, we do it by contradiction. Suppose $u = 0$, then $e \to \infty$ implying that $h \to \infty$ and $\frac{\partial u(c)}{\partial c_i} \to \infty$ which is a contradiction.

147. We make the following assumptions on the parameters of the model in order to do the simulation:

Preference parameters: consumption elasticity of substitution parameter $\alpha = 0.4$; leisure substitution parameter $\mu = 8$; discount factor $\delta = 0.95\text{^}(1/4)$.
Technology parameters: productivity in sector 1 $a_1 = 150$; productivity in sector 2 $a_2 = 75$.
Labor matching technology parameters: unemployment matching elasticity $\theta = 0.2$; termination rate $\gamma = 0.2\text{^}(1/4)$, β parameter is chosen so that the unemployment rate in the steady state is 6.5 percent.

148. The consumption elasticity parameter is chosen arbitrarily so that agents prefer to consume more of the good produced in sector 2. Also we assume that sector 1 is twice as productive as sector 2. These two assumptions imply that sector 2 is more labor intensive than sector 1. The steady state employment share in these two sectors is $(n_1, n_2) = (0.36, 0.575)$.

Table 1. Chile: Comparing Labor Statistics Across Countries

(In percent)

	Labor Force Participation Rate			Employment Growth			Unemployment Rate			Real Wage Growth		
	80-00	80-90	90-00	80-00	80-90	90-00	80-00	80-90	90-00	80-00	80-90	90-00
OECD												
Canada	75.8	75.0	76.4	1.6	1.8	1.2	9.2	9.4	9.5	1.1	0.8	1.2
France	67.1	67.0	67.0	0.4	0.3	0.5	9.0	9.0	11.2	0.6	0.8	0.4
Germany	70.6	67.9	72.8	2.0	0.6	3.5	6.7	6.8	7.7	0.2	1.2	-0.7
Mexico	...	...	...	3.3	1.8	4.8	3.6	3.7	3.0	...	...	...
South Korea	62.3	59.8	64.5	2.1	2.6	1.7	3.7	3.8	3.2	4.4	5.3	3.5
Spain	62.1	61.1	62.6	0.8	0.3	1.3	17.3	17.5	19.6	0.7	0.0	1.3
Sweden	79.5	81.4	77.9	0.0	0.6	-0.6	2.4	2.5	6.2	1.0	0.6	1.1
United Kingdom	75.2	74.7	75.7	0.5	0.6	0.3	9.2	9.6	7.9	2.5	3.0	2.0
United States	65.8	64.8	66.7	1.5	1.7	1.3	7.1	7.3	5.8	0.8	0.5	1.1
Non-OECD												
Argentina	...	...	...	1.6	1.2	1.8	9.0	5.6	11.8	...	...	...
Chile	53.3	51.4	54.1	2.8	3.6	1.9	9.4	11.6	7.3	...	...	...
Taiwan	...	...	...	1.9	2.6	1.4	2.1	2.1	2.0	...	...	...
Singapore	...	...	...	3.2	3.0	3.2	3.0	3.6	2.5	...	...	...

Source: Fund staff estimates.

Table 2. Chile: Business Cycle Facts of Chile's Labor Market

		Correlations with Output						
	Std. Dev.	-3	-2	-1	0	1	2	3
Employment	0.35	0.40	0.19	0.23	0.35	0.11	-0.25	-0.24
Unemployment	1.93	-0.30	-0.41	-0.56	-0.41	0.07	0.10	0.24
Wages	0.40	-0.10	-0.07	-0.17	0.07	0.13	-0.16	0.23
Productivity	0.74	-0.18	-0.09	0.02	0.87	0.13	0.14	0.18
Employment with wages		-0.08	-0.01	0.05	-0.01	-0.07	-0.15	-0.02
Unemploymnet with wages		0.10	0.04	-0.11	0.06	-0.02	0.12	0.01

Note: All variables correspond to first difference of the cyclical component of the seasonally adjusted variable using the Hodrick-Prescott filter to detrend the data. The first column shows standard deviations divided by the standard deviation of output.

Table 3. Chile: Employment and Output by Sector 1/

		Agriculture/ Fishing	Commerce	Construction	Electricity	Industry	Mining	Other Services	Financial Services	Transpor-tation
Employment share	1999-2000	14.0	18.7	7.9	0.6	14.9	1.5	27.1	7.4	7.9
Output share	1999-2000	7.5	16.9	4.6	2.4	14.6	10.0	11.2	13.6	9.1
Relative productivity	1999-2000	0.6	0.9	0.6	4.1	1.0	7.1	0.4	1.8	1.2
Output growth	1998	5.6	4.1	0.7	4.4	-1.5	7.4	2.6	5.6	9.2
	1999	-0.7	-3.5	-10.0	1.7	-0.7	16.2	0.9	-1.0	2.7
	2000	7.6	4.7	0.0	17.3	4.3	4.0	1.8	4.8	9.5
Employment growth	1998	0.7	2.9	6.0	-6.2	-1.9	-6.7	1.4	6.2	4.9
	1999	-2.3	2.1	-20.0	-3.3	-9.5	-12.1	5.1	2.8	-3.7
	2000	-0.4	0.6	1.4	-6.2	0.1	-3.2	4.9	0.4	2.2

Source: Central Bank of Chile.

1/ Annual average.

Table 4. Chile: Money Growth Regression

Specification 1 Regression on Change in Money Demand				Specification 2 Regression on Change in Money Demand			
Variable	Lag	Coeff.	Std. Error	Variable	Lag	Coeff.	Std. Error
Change in money demand	2	0.144 **	0.071	Change in money demand	5	0.121 ***	0.055
	3	0.081	0.053			-0.011 ***	0.002
	5	0.143 ***	0.047	Inflation change	1	-0.027 ***	0.003
	6	0.088 *	0.049		2	-0.019 ***	0.003
Change interest rates		-0.040 ***	0.003		3	-0.013 ***	0.003
	1	-0.025 ***	0.003		4	-0.010 ***	0.003
	2	-0.009 ***	0.004		6	0.004 *	0.002
	3	-0.010 ***	0.004		0	0.060	0.045
	4	-0.008 **	0.004	Change in unemployment	6	0.074 *	0.041
	6	0.009 ***	0.004	Output change	1	0.148 *	0.080
					2	0.168 **	0.088
					3	0.184 ***	0.077
EC residual		-0.200 ***	0.086	EC residual		-0.136 *	0.097
Dummy 03/92		0.187 ***	0.015	dummy 01/92		-0.071 ***	0.017
Dummy 01/92		-0.095 ***	0.020	dummy 03/92		0.193 ***	0.017
R^2		0.75		R^2		0.70	
\sigma		0.01		\sigma		0.02	
DW		1.80		DW		1.81	
RSS		0.03		RSS		0.04	
AR		1.60 [0.1407]		AR		1.86 [0.0806]	
ARCH		1.60 [0.1407]		ARCH		2.33 [0.0283]	
Normality		1.5963 [0.1407]		Normality		1.45 [0.0860]	

Source: Central Bank of Chile.

Note: *** significant at 1 percent confidence interval
** significant at 5 percent confidence interval
* significant at 10 percent confidence interval

Table 5. Chile: Unemployment Equations

Dependent Variable: Unemployment Changes	Lag	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Unemployment changes	1	0.68 **	0.09	0.69 **	0.09	0.70 **	0.09	0.71 ***	0.09
	2	-0.06	0.11	-0.05	0.11	-0.03	0.11	-0.03	0.11
	3	-0.30 **	0.11	-0.31 **	0.11	-0.30 **	0.11	-0.30 ***	0.11
	4	0.38 **	0.09	0.38 **	0.09	0.34 **	0.10	0.35 ***	0.09
Unanticipated monetary shock	0	0.09	0.20	0.05	0.20				
	1	-0.52 **	0.19	-0.51 **	0.19				
	2	-0.02	0.19	-0.03	0.19				
	3	-0.25	0.20	-0.23	0.19				
	4	-0.16	0.19	-0.15	0.19				
Dispersion index	0	-0.73	0.55			-0.49	0.59		
	1	1.13 **	0.57			1.28 **	0.61		
	2	-0.07	0.60			-0.17	0.64		
	3	-1.22 **	0.59			-1.37 **	0.62		
	4	0.95	0.59			0.72	0.60		
Purged dispersion index	0			-0.91	0.65			-0.75	0.67
	1			1.92 **	0.68			2.01 ***	0.71
	2			-0.22	0.71			-0.32	0.74
	3			-1.85 **	0.70			-2.03 ***	0.73
	4			1.08 *	0.67			1.01	0.70
Copper prices changes	0					-0.03	0.06	-0.04	0.05
	1					-0.03	0.06	-0.02	0.06
	2					0.01	0.06	0.02	0.06
	3					-0.05	0.06	-0.07	0.06
	4					0.03	0.05	0.03	0.05
R^2 =		0.51		0.54		0.47		0.50	
\sigma =		0.03		0.02		0.03		0.03	
DW =		1.95		1.90		1.89		1.84	
RSS =		0.07		0.06		0.07		0.07	
AR 1- 7 F(,) =		0.671	[0.6962]	1.308	[0.2552]	1.015	[0.4259]	1.440	[0.1984]
ARCH 7 F(,) =		0.135	[0.9954]	0.248	[0.9715]	0.272	[0.9634]	0.254	[0.9695]
Normality Chi^2(2)=		10.182	[0.0062]	9.294	[0.0096]	6.831	[0.0329]	6.254	[0.0439]
Xi^2 F(,) =		0.672	[0.8802]	0.675	[0.8767]	0.710	[0.8437]	0.683	[0.8696]
RESET F(,) =		0.340	[0.5609]	0.136	[0.7126]	0.118	[0.7317]	0.026	[0.8722]

Source: Central Bank of Chile.
Tab
Note: *** significant at 1 percent confidence interval
** significant at 5 percent confidence interval
* significant at 10 percent confidence interval

Table 6. Chile: Unemployment Equations

Dependent Variable: Unemployment Changes									
	Lag	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Unemployment changes	1	0.65 ***	0.20	0.71 ***	0.09	0.75 ***	0.18	0.77 ***	0.19
	2	0.01	0.22	-0.03	0.11	0.01	0.20	0.02	0.20
	3	0.13	0.22	-0.29 ***	0.11	-0.09	0.20	-0.14	0.20
	4	0.11	0.20	0.33 ***	0.09	0.17	0.17	0.22	0.16
Dispersion index	0	-1.24	1.43			-1.64	1.56		
	1	-0.05	1.48			2.79 **	1.37		
	2	0.38	1.56			0.22	1.37		
	3	-3.10 **	1.58			-2.58 **	1.37		
	4	1.38	1.63			1.14	1.53		
Purged dispersion index	0			-0.73	0.67			-2.22	1.65
	1			2.14 ***	0.71			3.44 **	1.46
	2			-0.48	0.74			0.23	1.62
	3			-1.75 ***	0.73			-3.79 ***	1.52
	4			0.73	0.70			2.29	1.81
Changes in real exchange rate	0	0.51	0.46	0.03	0.17				
	1	-1.22	0.80	-0.05	0.18				
	2	0.41	0.81	-0.12	0.17				
	3	0.42	0.74	0.15	0.17				
	4	-0.11	0.41	-0.26	0.16				
Changes in corporate bond spreads	0					-0.04	0.04	-0.03	0.03
	1					0.07 *	0.04	0.06 *	0.03
	2					0.05	0.04	0.04	0.03
	3					0.00	0.04	0.02	0.03
	4					-0.03	0.04	-0.02	0.03
R^2 =		0.64		0.50		0.67		0.73	
\sigma =		0.03		0.03		0.03		0.03	
DW =		1.85		1.87		1.90		1.87	
RSS =		0.03		0.07		0.02		0.02	
AR 1- 7 F(,) =		0.942	[0.4963]	1.082	[0.3811]	0.538	[0.7964]	1.050	[0.4282]
ARCH 7 F(,) =		0.393	0.393	0.720	[0.6550]	0.205	[0.9792]	0.218	[0.9749]
Normality Chi^2(2)=		0.002	[0.9991]	4.253	[0.1192]	1.326	[0.5153]	5.831	[0.0542]
Xi^2 F(,) =				0.748	[0.8021]				
RESET F(,) =		0.393	[0.5361]	0.116	[0.7337]	0.152	[0.6993]	0.008	[0.9286]

Note: *** significant at 1% percent confidence interval
** significant at 5% percent confidence interval
* significant at 10% percent confidence interval

Figure 1: Measures of Persistence

Source:Original data from Banco Central de Chile

Figure 2. Chile: Output Growth and Unemployment

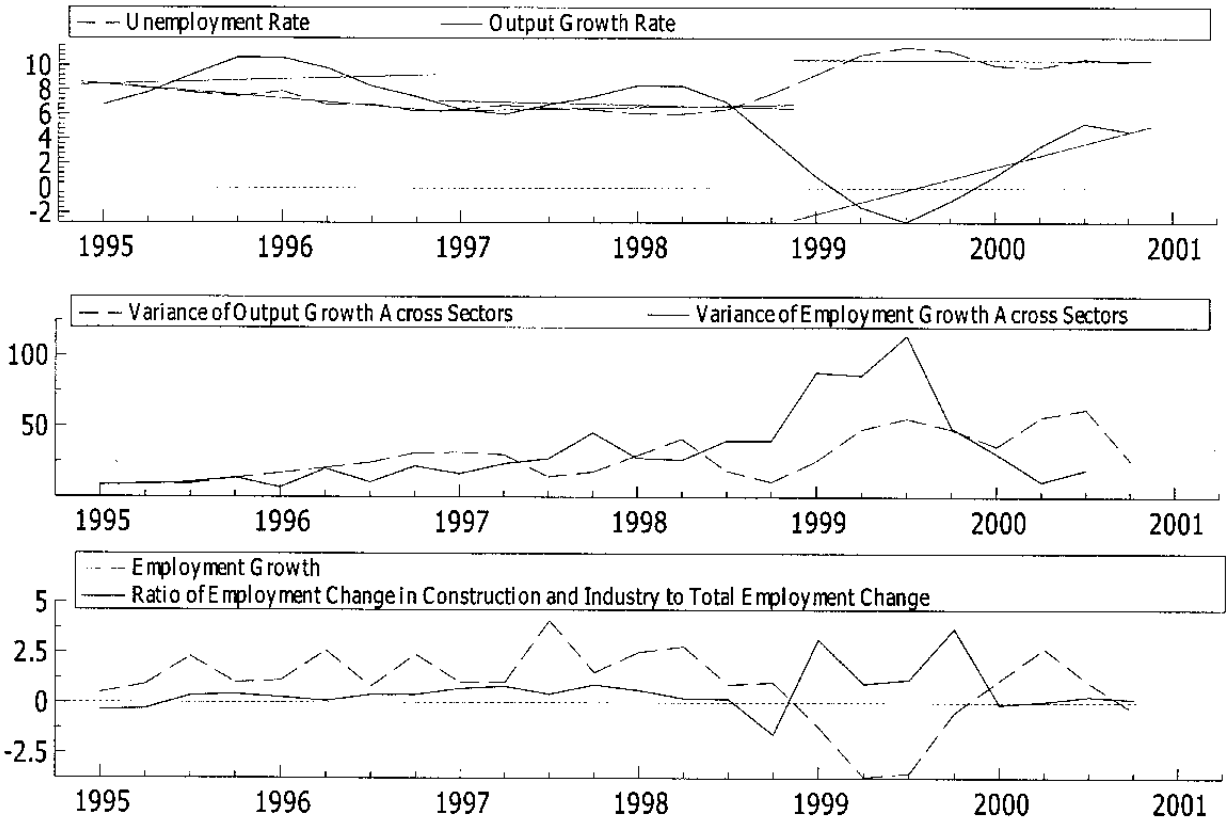


Figure 3a: Unemployment Deviation from SS

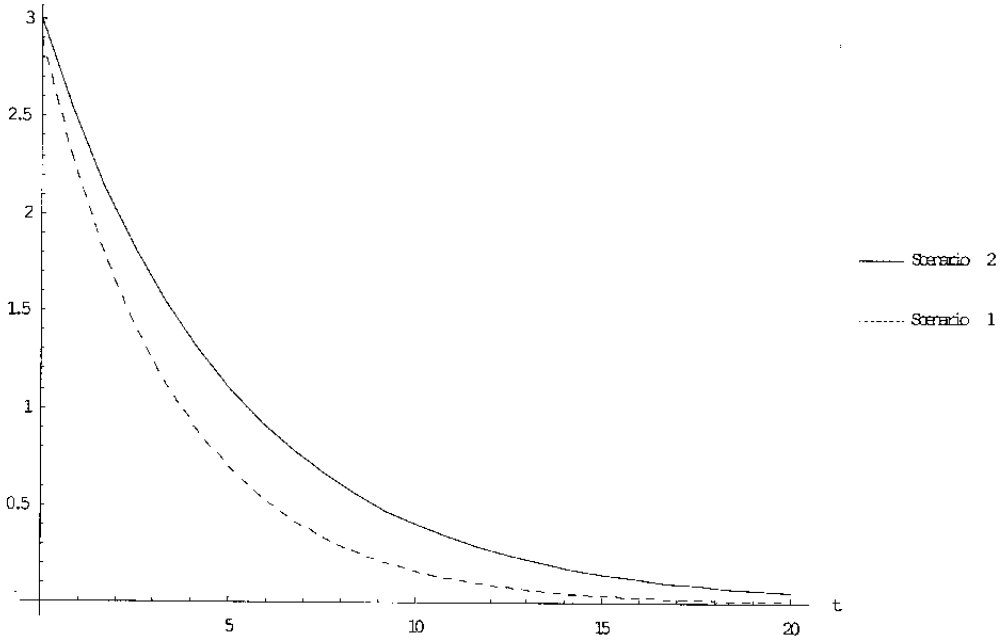


Figure 3b: Output Growth Deviation from SS

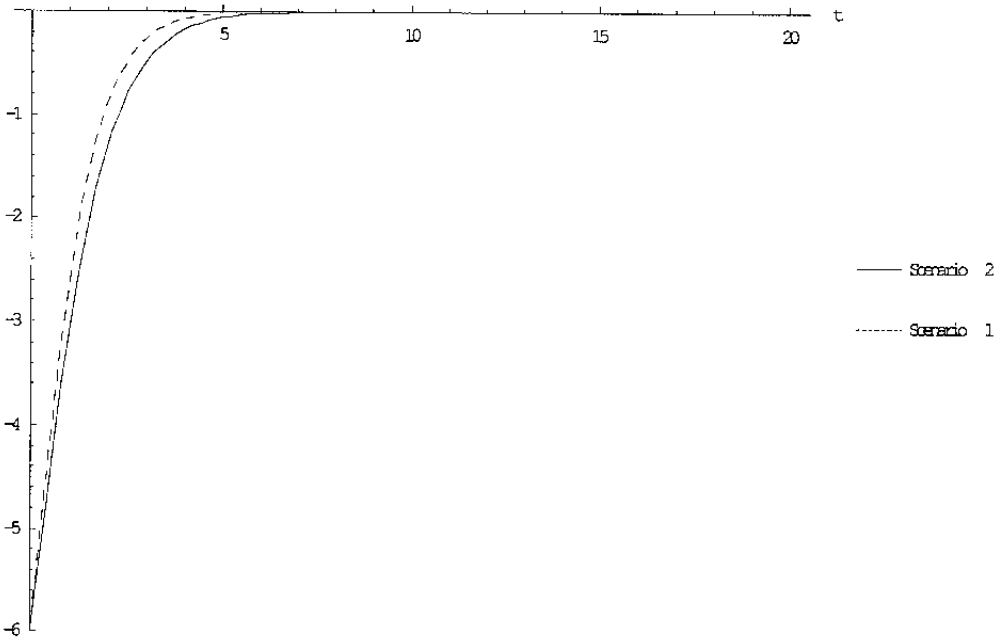


Figure 3c: Recruitment Effort Deviation from SS

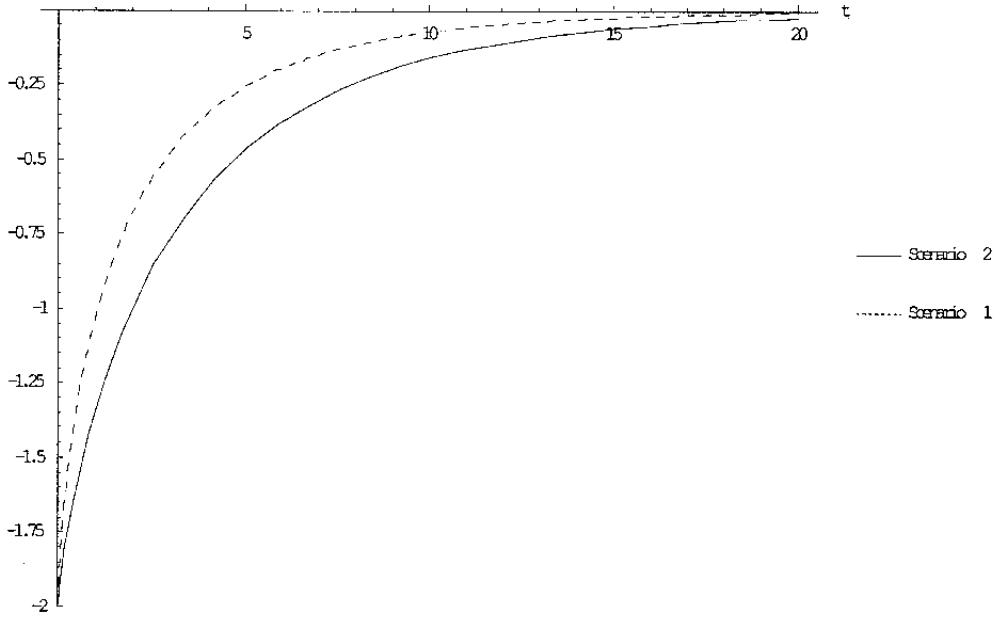
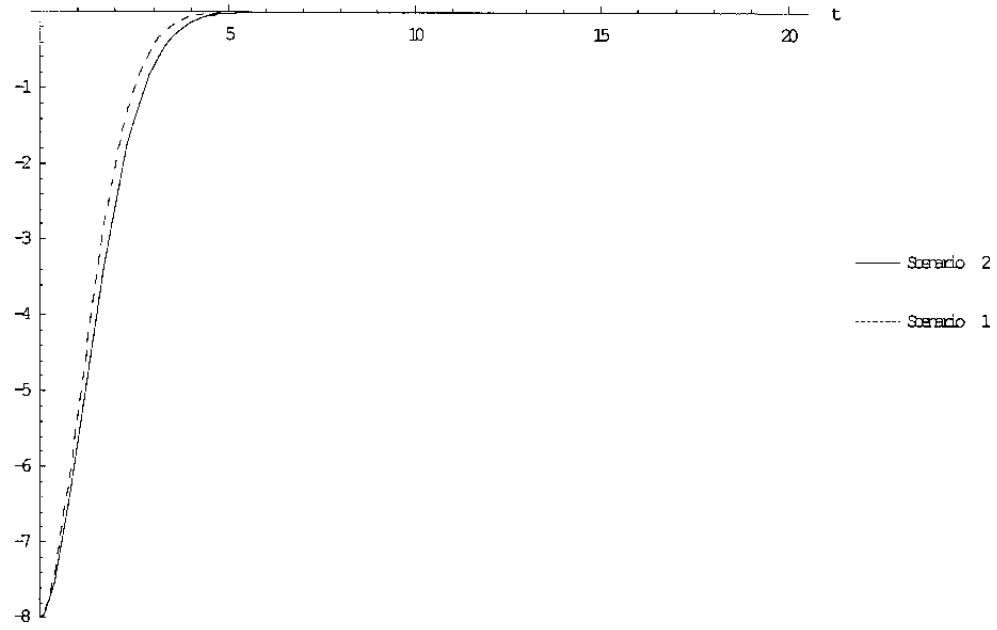


Figure 3d: Hours Worked Deviation from SS



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IV. An Investigation of Output Variance Before and During Inflation Targeting [51]

A. Introduction

149. Chile has been targeting inflation since 1991. In the period through 2000, the central bank targeted a declining end-year annual inflation level, and in 2001 started targeting inflation within a band of 2 to 4 percent as measured by the CPI.[52] The level and the width of the band recognize, among other factors, the short-run downward rigidity of prices, and an implied short-run inflation/output variance trade-off (*Banco Central de Chile*, 2000). The theoretical rationale for that trade-off was first presented in 1979 by Taylor who argued that while there is no *long-run* trade-off between inflation and output average *levels*, there is a long-run trade-off between inflation and output *variance*. Taylor (1994) explained the rationale for this trade-off in an intuitive way. The discussion was cast, however, in terms of the variance of inflation and the variance of *short-run* divergences of output from potential (henceforth, output variance will refer to the variance of output around its potential). The inflation/output variance trade-off implies that efforts to keep the inflation rate "too low and stable" will result in relatively larger output and employment fluctuations. Since Taylor's seminal work, a myriad of papers have addressed the inflation/output variance trade-off both theoretically and empirically, and a consensus seems to have been reached, at least among central bankers, on the existence of a short-run inflation/output variance trade-off.[53]

150. As in Chile, central banks in several countries in the 1990s moved away from conducting monetary policy on the basis of traditional intermediate targets, such as the growth of monetary aggregates or exchange rates, and embraced some form of inflation targeting.[54] This monetary policy change has been accompanied by a reduction in inflation

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[51] I thank Ketil Hviding, Rodolfo Luzio and Steven Phillips for their comments on previous versions of this paper. I thank Saul Lizondo for his analysis of the model, Chang-Jin Kim for his patience and assistance with programming, and Sam Ouliaris for very useful discussions. I also thank participants at the seminar organized by the Central Bank of Chile in Santiago on May 2, 2001. Last but not least, this paper would not have been possible without the careful and able computational help of Sean Clarke.

[52] This compares with an average inflation of about 38 percent in the 1970s and about 21 percent in the 1980s.

[53] For a summary of the discussion on the trade-off, see Clarida et al. (1999).

[54] Deciding the date when a country has explicitly adopted an inflation-targeting *framework* could be controversial (Schaechter et al., 2000). Following Bernanke and Mishkin (1997), this chapter acknowledges that inflation targeting is not a monetary policy rule but rather a framework for monetary policy. Inflation targeting frameworks specify an explicit quantitative

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and inflation variance.[55] The reduction in inflation and inflation variance, however, seems more generalized as it has also been observed in other countries that have not explicitly adopted inflation targeting.[56] To illustrate the generality of the phenomenon, Figures 1 and 2 show four-year moving average standard deviations of CPI inflation between 1975 and 2000 in six noninflation targeters and six inflation targeters.[57] As a result, and mindful of Taylor's trade-off, some observers have argued against trying to stabilize inflation "too much." They have been influential in the formulation and implementation of monetary policy as well as in the design of monetary policy frameworks (Svensson, 2000 and 2001). The inflation/output variance trade-off seems particularly relevant for inflation targeting countries as a key characteristic of inflation targeting frameworks is the need to decide on the level and the variance of inflation that are going to be targeted. In general, the level of targeted inflation as well as its variance (often reflected by a band around the target level of inflation) has been significantly lower than their historical values.

151. This paper does not try to estimate the short-run trade-off between inflation and output variance. Instead, given the observation that inflation variance has fallen in the last decade in many countries, it sheds some light into the issue of whether that falls in inflation variance has been accompanied by an increase in output variance. The evidence on output variance can inform the debate on the effect of reducing inflation variance on output variance because it refers to a range of countries that are quite different in terms of their economic structure, the shocks to which they are exposed, and the approaches they have followed to achieve their inflation objectives. Given the decade-long experience with inflation targeting, this evidence should matter for the design and further development of monetary policy frameworks. This empirical evidence can also provide a starting point for stochastic simulations of output behavior at relatively low levels and variances of inflation.

152. Therefore, this study estimates output conditional variance for a sample of six noninflation targeters and six inflation targeters during the period 1976–2000. It uses a set of

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target for a price index, set a tolerance range around the target, and set a time interval in which the target must be hit (Leiderman and Svensson, 1995). They also include institutional measures to increase central banks' discipline and accountability (Mishkin, 2000). This characterization is consistent with the fact that the inflation targeters chosen in this study have pursued different routes and speeds in the process of adopting their respective inflation targeting frameworks.

[55] The mean and the variance of inflation are positively correlated because the distribution of price changes tends to be non-normal.

[56] This observation has prompted some observers to downplay the role of inflation targeting frameworks in reducing inflation (e.g., Dueker and Fischer, 1996, and Lee, 1999). For an alternative interpretation, see Nadal-De Simone (2001).

[57] Three-year moving average standard deviations convey the same impression.

time-varying parameter models that allow for the variance of the shocks to the cyclical and to the trend components of output to depend on the state of the economy. The main conclusion is that there is evidence that the decline in inflation variance has not been accompanied by an increase in output variance, with the possible exception of Canada. Either output variance in the 1990s has not changed (e.g., in Chile and the United States) or has fallen (e.g., in France and New Zealand).

153. Next section discusses some methodological issues and the models of output behavior estimated. Section C describes the data used and discusses the results of the estimations. Section D concludes the paper.

B. The Models of Output Behavior

154. At least three major methodological problems have to be tackled in studying the behavior of output. First, we need a model to describe the interaction between nominal and real variables; however, there is no agreement in the profession on this issue.[58] Second, we need to account for the transition between policy regimes (an issue virtually ignored in the literature). Third, we need to allow for the possibility that the shift to an inflation-targeting regime or structural changes in some countries in the sample alter the trade-off between inflation and output variability.

155. To deal with the first problem, we will consider two alternative models of real output behavior. The first one is a model proposed by Friedman (1964, 1993) and based on the empirical regularity already observed by Keynes (1936). Observing real output behavior, Keynes noted that: "the substitution of a downward for an upward tendency often takes place suddenly and violently, whereas there is, as a rule, no such sharp turning point when an upward is substituted for a downward tendency". In a related observation, Friedman argued that the amplitude of a real output contraction is strongly correlated with the succeeding expansion but the amplitude of an expansion is not correlated with the amplitude of the succeeding contraction. Moreover, he observed that output could not exceed a ceiling level determined by the resources and the technology available to the economy but that occasionally output is plucked downward by a recession. Those two regularities are referred to henceforth as Friedman's "plucking model."[59] They imply that real output fluctuations are asymmetric and recessions are transitory.[60] The second, alternative, model of output behavior

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[58] See McCallum (1997).

[59] The model is different from real business cycle models in that output shocks in the latter are always permanent.

[60] There is a thriving literature that looks at the problem from the employment viewpoint. For example, Caballero and Hammour (1994) find that job destruction is more cyclically responsive than job creation, and that while job creation is symmetric around its mean, job

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is a restricted version of the first model, assuming constant output variance (both for the trend and the cyclical components) in normal times and in recessions.

156. Business cycle asymmetries such as the one suggested by Keynes and Friedman have been studied in the literature (e.g., Neftcy, 1984, Hamilton, 1989, DeLong and Summers, 1986, Sichel, 1993, Diebold, Rudebusch and Sichel, 1994, and Razzak, 2001). Goodwin and Sweeney (1993) apply Friedman's correlation method to a set of eight OECD countries. They find that although there is weak support for the asymmetry hypothesis, there is substantial support for the proposal that the output ceiling plays a major role in business cycle fluctuations. Recently, Kim and Nelson (1999) estimated formally for the first time the importance of downward shocks and tested successfully Friedman's plucking hypothesis for the United States.

157. The second issue is that, with few exceptions, the empirical literature assumes that economic agents learn about the new regime immediately, thus ignoring that there is a period of transition between policy regimes (Clarida et al., 1999). Studies usually assume that there is no parameter uncertainty, and/or uncertainty about the distribution of future random shocks. As a result, output losses that normally accompany a disinflation period (i.e., a transition) under conditions of imperfect credibility tend to be confused with the eventual output losses that result from the inflation/output trade-off once the regime has been in place for a "long period of time."[61]

158. To allow for the possibility that parameters change as a result, for instance, of structural reforms, this study will use time-varying parameters (to capture the learning process of economic agents).[62] It will also allow for changes both in the conditional and in the unconditional variance of output so that shocks to output may have different variance depending on what state the economy is when the shock occurs (Kim 1993a and 1993b). It is expected that this approach will help reduce the importance of a precise determination of the starting date of inflation targeting regimes, and also take into account structural changes that occurred in several countries during the sample period.

159. Finally, as pointed out by Cecchetti and Ehrman (2000), if the trade-off (frontier) between inflation and output variability is stable, a move to inflation targeting would be a move along that trade-off line to a point where inflation is less variable but output is more variable. However, it is also possible that a shift to an inflation-targeting framework acts as a

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destruction is highly asymmetric. This may suggest that the output behavior asymmetries noted by Friedman are smoothed out through the asymmetry in the job creation process.

[61] This concept is taken from Sargent (1987), chapter XVII.

[62] Wong (2000) found that the response of output and the price level to monetary shocks was quite variable in the United States in the sample period 1959:1-1994:12 and suggests using time-varying parameter models to study the effects of monetary policy on output and prices.

commitment device and, via increasing the credibility of policymakers, help to achieve both *lower inflation variance and lower output variance.*[63] If the trade-off is unstable, time-varying parameter models become one way of taking care of that instability.

160. This study will proceed in two steps. First, Friedman's model of the business cycle will be estimated for 12 countries, six of which started implementing some form of inflation targeting during the 1990s. Second, a restricted version of the plucking model that assumes a constant output variance in normal times and in recession will also be estimated. The models will be used to explore the behavior of output variance before and during inflation targeting. Comparisons across countries as well as over time for the same country will be made.

161. Consider the unobserved components model of the log of real GDP (y_t). Fluctuations of y_t are decomposed into a trend component (T_t) and cyclical component (C_t):

$$y_t = T_t + C_t. \qquad (1)$$

Friedman (1993) suggested that the potential output (the "ceiling maximum feasible output") could be approximated by a random walk with all sorts of disturbances including the technological disturbances:

$$T_t = g_t + T_{t-1} + v_t \qquad (2)$$

$$g_t = g_{t-1} + w_t \qquad (3)$$

$$w_t \sim N(0, \sigma_w^2) \qquad (4)$$

$$v_t \sim N(0, \sigma^2{}_{v,S_t}) \qquad (5)$$

$$\sigma^2_{v,S_t} = \sigma^2_{v0}(1 - S_t) + \sigma^2_{v1} S_t \qquad (6)$$

$$S_t = 0 \text{ or } 1, \qquad (7)$$

where the stochastic trend component T_t is subject to two kinds of shocks: shocks to its level v_t, and shocks to its growth rate w_t. Thus, equations (2)–(3) allow for productivity shocks.

162. Equations (5)–(6) allow for the possibility that the variance of shocks to the level of y_t be different depending on whether the economy is in normal times ($S_t = 0$) or in recession times ($S_t = 1$) (equation 7). To account for that, S_t is assumed to evolve according to a first-order Markov process:

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[63] Section 4.2.2 in Clarida et al. (1999) suggests this point.

$$P_r\left[S_t = 1 \middle| S_{t-1} = 1\right] = p \qquad (8)$$

$$P_r\left[S_t = 0 \middle| S_{t-1} = 0\right] = q. \qquad (9)$$

S_t depends on its previous state.

163. To allow for asymmetric deviations of y_t from its trend, the cyclical component is assumed to be subject to two types of shocks:

$$C_t = \theta_1 C_{t-1} + \theta_2 C_{t-2} + u_t^* \qquad (10)$$

$$u_t^* = \pi_{s_t} + u_t \qquad (11)$$

$$\pi_{s_t} = \pi S_t, \pi < 0 \qquad (12)$$

$$u_t \sim N\left(0, \sigma^2{}_{u,S_t}\right) \qquad (13)$$

$$\sigma^2_{u,s_t} = \sigma^2_{u0}\left(1 - S_t\right) + \sigma^2_{u1} S_t, \qquad (14)$$

where π_t is an asymmetric, discrete shock, which depends upon the unobserved variable S_t, and u_t is the usual symmetric shock. During normal times $S_t = 0$, and so $\pi_{S_t} = 0$; therefore, the economy is near its potential or trend output. During the recession times, $S_t = 1$, and the economy is hit by a transitory negative shock $\left(\pi_{s_t} = \pi < 0\right)$. Temporary disturbances are plucking down real GDP. Equations (13) and (14) allow for the possibility that the variance of the symmetric shock u_t is different during the normal and the recession times.

164. The model of output behavior usually used the literature views economic fluctuations as symmetric movements around a stochastic trend. One model of that kind is Clark's (1987), which is a restricted version of the plucking model, the restrictions being $\pi = 0, \sigma^2_{v0} = \sigma^2_{v1}$, and $\sigma^2_{u0} = \sigma^2_{u1}$. Both the unrestricted plucking model as well as its restricted (Clark's) version will be estimated.

C. Data Analysis and Estimation Results

Data analysis

165. The noninflation targeting countries considered in this study are: two large economies (the United States and Japan); two economies that are part of the European Union (France and the Netherlands), and two small open economies (Korea and Singapore). The set of countries that started introducing inflation-targeting in the 1990s (and for which there are

enough data points to allow a reasonable econometric analysis) comprises Australia, Canada, Chile, New Zealand, Sweden, and the United Kingdom.[64] Although some debate surrounds the date in which those countries adopted inflation targeting, it can be said that New Zealand adopted an inflation targeting framework in 1990 and Canada in 1991. Chile started announcing decreasing annual inflation targets in 1991, and adopted an inflation-targeting framework in 2000. The United Kingdom adopted inflation targeting framework in 1992 and Australia and Sweden in 1993.

166. The quarterly real GDP data are from International Financial Statistics (IFS) for all countries except Japan, New Zealand, and Singapore, for which national sources were used due to significant differences between them and IFS. The sample lengths (see column 2 of Table 1) depend on the availability of data for each country. The data used in the estimations are in natural logarithms. The seasonal component of all the series has been removed using X-11.

167. The series were tested for the presence of unit roots using the modified Dickey-Fuller t-test ($DFGLS^{\tau}$) proposed by Elliott, Rothenberg, and Stock (1996), a point-optimal invariant test which has a substantially improved power when an unknown mean or trend is present in the data.[65] Table 1 shows that the null of a unit root with a constant and a linear trend cannot be rejected for any country with the exception of Singapore.[66] Real GDP changes for all countries are stationary.

Estimation results

168. The plucking model and Clark's model were formulated in state-space form and estimated using Kim's approximate maximum likelihood estimator (Kim, 1994) based on the prediction error decomposition produced by a Kalman filter. The plucking model was estimated restricting the probability values "p" and "q" to lie between 0 and 1 and the variances to be positive; Clark's model was also estimated with the restriction that the variances be positive.

169. Tests for serial correlation of the forecast errors and squared forecast errors for the whole sample are presented in Tables 2.1 and 2.2 for the plucking model and Clark's model,

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[64] The list of countries that currently have some form of inflation targeting also includes the Czech Republic, Poland, Israel, South Africa, and Brazil, but they have not been considered in this study because they all started inflation targeting after 1998. Spain and Finland did inflation targeting during the early 1990s, but they abandoned it to join the European Union.

[65] The lags used in the unit-root tests are chosen using the Schwarz Information Criterion and checking that the residuals are white noise using the Box and Pierce Q statistics.

[66] For Singapore, the Phillips-Perron test with a constant and a trend was also run. As the test did not reject the null of unit root, the country was kept in the sample.

respectively. The plucking model estimate for Canada shows no serial correlation either in the level or in the square of the standardized forecast errors. For France and New Zealand, there is some serial correlation with 24 lags of the standardized forecast errors. For Chile, there is serial correlation in the standardized forecast errors for all lags, and in the squared standardized forecast errors with 24 lags. For the other countries, there is serial correlation either in the standardized forecast errors, the squared standardized forecast errors, or in both.[67] In contrast, the residuals from Clark's model tend to be white noise more frequently. There is no serial correlation for Korea. For New Zealand and Singapore, there is some serial correlation with 24 lags of the level of the standardized forecast errors, and for Australia and France, there is some serial correlation for lags 8 and 24 of the squared standardized forecast errors, respectively. For Chile, there is serial correlation for lags 16 and 24 of the standardized forecast errors. For the other countries, there is serial correlation either in the standardized forecast errors, the squared standardized forecast errors, or in both. When the models are estimated up to 1990:4, serial correlation results are similar to the whole sample estimates.[68]

170. Tables 3.1 and 3.2 present the estimation results. A number of features are worth noticing. First, the likelihood ratio tests (LR) at the bottom of Table 3.2 for the hypotheses that $\pi = 0, \sigma_{v0}^2 = \sigma_{v1}^2$, and $\sigma_{u0}^2 = \sigma_{u1}^2$ rejects the hypotheses at the 97.5 percent confidence level for Australia, Japan, Korea, the Netherlands, Singapore, Sweden, the United Kingdom and the United States; and at the 95 percent confidence level for Canada and France. The restrictions taken together are not statistically significant only for Chile and New Zealand.

171. Second, with the exception of Canada, Korea, and New Zealand, the sum of the autoregressive coefficients for the transitory component of output falls when asymmetry is accounted for, i.e., the sum of the autoregressive coefficients θ_1 and θ_2 (see equation (10)) tends to be lower in the plucking model than in Clark's model (as Kim and Nelson, 1999, found for the United States). As a result, output shocks could be erroneously considered as permanent (or persistent) when estimated output behavior is restricted to be symmetric when in fact it is asymmetric.[69]

172. Third, the transitory cyclical component of the plucking model is affected by an asymmetric discrete shock π_{St} and a symmetric continuous shock u_t. The asymmetric shock is

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[67] Estimates of the plucking model with the restriction that $\sigma_{u0} = \sigma_{u1}$ did not reduced serial correlation. Results are available upon request.

[68] Results for the sample up to 1990:4 for both models are available upon request.

[69] This tends to validate Perron's (1990) claim that standard unit root tests are biased toward nonrejection of the null of a unit root when the data generating process is stationary with a switching mean.

significant for Canada, Chile, France, Korea, the United Kingdom, and the United States.[70] As expected, it is negative whenever it is significantly different from zero (except for France and the United Kingdom).[71] For those countries, the data seem to confirm Friedman's view that the economy is most of the time at potential, and it is plucked down from time to time. Note in particular the relative much higher π coefficient for Chile than for the United States, for example.[72] Except for Korea, the asymmetric discrete shock π_{St} to the transitory part of output seems to be far more significant than the symmetric shock u_t. The symmetric variance of the transitory component is significant except for the Netherlands, New Zealand, United Kingdom, and the United States. The asymmetric shock is by far the most economically significant shock that affected output in Chile during the sample period. Finally, with the exception of Canada, Korea, and Chile, the variance of the transitory component associated with recession times (σ^2_{u1}) tends to be larger than the variance of the transitory component associated with normal times (σ^2_{u0}).

173. Once a negative transitory shock hits the economy, its effects decay relatively fast with the exception of Canada, Korea, Singapore, and the United States. This is indicated by relatively low values for the sum of the estimated parameters θ_1 and θ_2 for all other countries.

174. Fourth, with the exception of Chile and Japan, all economies are affected by significant shocks to their trend components, either during normal times, σ^2_{v0}, or during recessions times, σ^2_{v1}. In contrast to the variance of shocks to the cyclical component of output, there is no obvious pattern in terms of the relative importance of the variance of shocks to output trend in normal times and in recession times.

175. Finally, there is no clear pattern of how accounting for asymmetry affects the significance of the variance of the shock to the trend growth component σ^2_w. The shock to the trend growth component becomes statistically significant when asymmetry is taken into account for France and the United States; in contrast, it becomes insignificant when asymmetry is taken into account for Canada. The variance of the shock to the trend growth component is significant in both models for Chile, Japan, the Netherlands, and the United

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[70] The Kalman filter estimates of potential output are available upon request.

[71] It is not immediately obvious how to interpret the results for France and the United Kingdom.

[72] The estimated coefficient for the United States is very similar to the result of Nelson and Kim (1999).

Kingdom. As Kim and Nelson (1999) found for the United States, however, the variance is always a small value.[73]

176. If these results are related to the serial correlation tests discussed above, they suggest that the plucking model is to be preferred to Clark's model for Canada. Clark's model is to be preferred to the plucking model clearly for Australia, France, Korea, New Zealand, and Singapore and less so for Chile.

177. Despite that the restrictions to the plucking model taken together are rejected only for Chile and New Zealand, the presence of serial correlation in the standardized forecast errors of the plucking model estimates for Japan, the Netherlands, Sweden, the United Kingdom, and the United States, may point to the need to modify the model specification somewhat. One hint on the direction to take may come from using the Kolmogorov-Smirnov test for white noise—a nonparametric test—for analyzing the residuals. The test may suggest the frequency at which serial correlation tends to be concentrated. This is, however, a topic for future research.

178. The comparison of output variance using the plucking model before and also during inflation targeting can be done using the results of Table 4. The table shows the estimates of the output variance associated with the *symmetric components* $\sigma_{u0}^2, \sigma_{u1}^2$ for the whole sample period and estimates for the sample period restricted up to 1990:4. The F tests indicate that the inclusion of the 1990s produces a significant fall in the estimated output variance for Australia, France, Korea, and Sweden. The F tests indicate that the inclusion of the 1990s produces a significant increase in the estimated output variance for Chile and Japan. The variance of the symmetric component becames significant in Canada when the 1990s are added to the sample while for the Netherlands, the inclusion of the 1990s produces a fall in variance to a value not statistically significant.[74] For Singapore, variance estimates are not statistically different in the whole sample and in the restricted sample, while for New Zealand and the United Kingdom the variance of the symmetric component is nul. Given that

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[73] Technically speaking, the plucking model and Clark's model require that real GDP be I(2). However, if the variance of the shock to the trend growth component is not statistically different from zero or it is very small, this should not pose a major misspecification problem. The models were not estimated restricting growth to have zero variance.

[74] Note that the increase in output variance in Canada is associated with normal times, and not with periods of recession induced, say, by the disinflation policy required to reach the inflation target. In Chile, instead, the increase in output variance is associated with recession times. The recession of 1999, the first recession suffered by the country in 15 years, played an important role in this result. The increase in output variance in Japan is associated with both normal and recession times. This is a manifestation of the stop-and-go path of Japanese output growth during the 1990s, the reason for which remains, at present, a contentious matter.

there are cases of reductions in inflation variance associated with increases and reductions in output variance, it is difficult to conclude that the reduction of inflation variance in the 1990s was associated with an increase in output variance.

179. Given the relatively better fit of Clark's model to most of the data, it is useful to compare estimates of output *constant* variance using Clark's model before and also during inflation targeting. The results are in Table 5. The table shows the estimates of the *constant output variance* for the whole sample period and the estimates for the sample restricted up to 1990:4. The F tests indicate that the inclusion of the 1990s produces a fall in the estimated variance that is significant in four countries, i.e., Australia, France, New Zealand, and Sweden. In all other countries, variance estimates are not statistically different in the whole sample and in the restricted sample. There is no case of significant increase in output variance. In general, it seems difficult to conclude that when inflation variance fell in the 1990s, there was an increase in output variance.

180. Moreover, given the good fit of Clark's model of output for Australia and New Zealand (also in terms of the absence of serial correlation), there is robust evidence that the reduction in inflation variance in both countries during the 1990s was not associated with an increase in output conditional variance.

181. Figures 3 and 4 summarize the results for output conditional standard deviation from the plucking model for noninflation targeters and for inflation targeters, respectively. These are Kalman filter estimates, rather than smooth estimates that use all the sample information. Obtaining smooth estimates is problematical due to the nonlinearities of the Markov-switching process (see Kim and Nelson, 1999, for a similar argument).[75]

182. A few preliminary observations follow. First, as indicated by Cecchetti and Ehrman (2000), it seems that the conditional standard deviation of output has indeed fallen in many countries in the 1990s when compared with the early 1980s or late 1970s. Among the noninflation targeting countries of Figure 3, the conditional standard deviation of output was similar in the 1990s to what it was in the past mainly in France and Japan and less so in Korea. The conditional standard deviation of output seems to have fallen in the 1990s in the Netherlands and in Singapore. It also seems to have declined in the United States after 1984.[76]

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[75] The Jarque-Bera test for normality cannot reject the null of normality for the estimated standard deviation of output of France and Singapore only.

[76] It is often argued that the reduction in output variance in the United States can explain the reduction in output variance in other (especially small open) economies. However, judging from the results of Figures 3 and 4, it is not clear that the behavior of output variance in the United States can explain what happened with output variance in inflation targeting countries.

183. Comparing the behavior of the conditional standard deviation of output before and after the adoption of inflation targeting, it seems difficult to argue that the adoption of inflation targeting was associated with a significant increase in conditional output variance. When Australia adopted formally its inflation-targeting framework in 1993, output standard deviation was already on a declining trend and, if anything, it has been lower than in the past. Similarly, after the formal adoption of inflation targeting in New Zealand in 1990, the standard deviation of output seems to have been lower than in the past. In Canada or the United Kingdom, there does not seem to be any significant change in the standard deviation of output before and after the introduction of inflation targeting.

184. The Chilean case is particularly interesting as the standard deviation of output seems to have remained constant (statistically speaking) along the sample period. Unfortunately, there is no reliable quarterly real GDP series available for earlier periods, which could perhaps show that output instability was a key feature associated by many observers with the macroeconomic instability that prevailed in the country until the reforms of the second half of the 1980s were undertaken. In any case, the significant reduction in annual average inflation from about 26 percent in 1990 to 3.8 percent in 2000 brought about by the gradual and steady adoption of an inflation targeting framework does not seem to have had any significant effect on output variance in Chile.

185. Finally, given the poor estimates of the cyclical component of the plucking model for Sweden, no inferences can be made about Swedish output variance.

D. Conclusions

186. The objective of this study is to investigate the behavior of the conditional variance of output fluctuations around its potential level. The sample of countries comprises six countries that do not do inflation targeting and six countries that introduced inflation targeting during the 1990s. The sample period varies across countries depending on data availability.

187. Two models of output behavior are estimated: (1) Friedman's plucking model, and (2) Clark's model. The plucking model assumes that output cannot exceed a ceiling level determined by the resources and the technology available to the economy but that occasionally output is plucked downward by a recession. The model allows for asymmetric shocks to the trend component and to the cyclical component of output. Clark's model is a restrictive version of the plucking model in which it is assumed that there is no asymmetry in output behavior either in its trend component or in its cyclical component. Both models of output are put in state-space form and are estimated using the Kalman filter.

188. The plucking model fits the data well for Canada. Clark's model is a good representation of the data for Australia, France, Korea, New Zealand, and Singapore and less so for Chile.

189. According to both models, it seems difficult in general to argue that when unconditional inflation variance fell in the 1990s, there was a corresponding significant increase in conditional output variance. The plucking model estimates a significant increase

in conditional output variance for Canada, Chile, and Japan. However, it also estimates a significant fall in conditional output variance for Australia, France, Korea, the Netherlands, Sweden and the United States. In all other countries the variances are not statistically different across sample periods. Therefore, using the plucking model, it is difficult to identify an inflation/output variance trade-off clearly.

190. According to Clark's model, there was a significant *fall* in the estimated conditional variance of output in four countries, i.e., Australia, France, New Zealand, and Sweden. In all other countries, the estimated variances were not statistically different in the whole sample and in the sample estimated up to 1990:4. Given the good fit of Clark's model of output for Australia and New Zealand, there is robust evidence that the reduction in inflation variance in both countries during the 1990s was not associated with an increase in output variance.

191. As suggested by Cecchetti and Ehrman (2000), it may very well be that a growing and widespread concern for price stability (within which to inscribe the adoption of inflation targeting frameworks by several countries) has moved economies to a combination of both lower inflation variance and lower, or similar, output variance than in the past. Alternatively, it is also possible that there has been less cost-push inflation during the late 1980s and the 1990s such that the reduction in inflation has not been in general accompanied by an increase in output variance.[77]

[77] Clarida et al. (1999) show that under discretionary monetary policy, there is a short-run trade-off between inflation and output variability to the extent that cost-push inflation is present. This result was originally emphasized by Taylor (1979).

Table 1. Elliot, Rothenberg, and Stock Test for Unit Roots for Real GDP [a]

Statistics for $\rho = 0$

Countries	Period	Levels		Change	
		Lags	DFGLS τ	Lags	DFGLS
Australia	70:1–00:3	4	-2.10	3	-5.38*
Canada	70:1–00:3	1	-1.23	1	-5.51*
Chile	80:1–00:3	1	-1.48	1	-4.93*
France	70:1–00:3	2	-1.38	1	-4.92*
Japan	80:1–00:3	3	-1.02	2	-3.53*
Korea	70:1–00:3	1	-1.79	1	-6.51*
Netherlands	77:1–00:3	1	-0.69	4	-2.61 [b]
New Zealand	77:2–00:3	1	-2.57	1	-3.60*
Singapore	75:1–00:4	3	-3.02*	3	-4.33* [c]
Sweden	70:1–99:4	1	-2.12	1	-9.21*
United Kingdom	70:1–00:2	3	-2.78	1	-6.60*
United States	70:1–00:2	1	-2.49	1	-5.05*

Source: Fund staff estimates.

[a]/ Real GDP is deseasonalized and measured in natural logarithms. Lags are determined according to Schwarz information criterion and checking that the residuals are white noise. The DFGLS τ has a null of unit root with a constant and a linear trend. The 5 percent critical value is -2.89.

[b]/ The statistic value was -4.08* for the change in GDP growth for the Netherlands rejecting the null of unit root at the 5 percent confidence level.

[c]/ The Phillips-Perron τ statistic with constant and trend was -2.08 which did not reject the null of unit root. The Phillips-Perron n $\left(\hat{\rho}-1\right)$ statistic with constant and trend was -8.54 which did not reject the null of a unit root. The value of the statistics for GDP growth were -7.93 and -82.54, respectively, rejecting the null of a unit root for Singapore real GDP growth in both cases.

Table 2.1. Plucking Model
Residual Analysis

Statistics	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
Standardized forecast errors DF = 10												
Q-Statistics												
Q (8)	25.35 *	8.95	24.54 *	12.85	15.96 *	9.50	30.52 *	13.01	14.84 *	22.22 *	16.78 *	79.82 *
Q (16)	32.56 *	15.57	72.71 *	21.85	27.17 *	20.58	40.59 *	16.41	22.39	40.91 *	35.43 *	113.90 *
Q (24)	43.81 *	30.01	84.81 *	44.33 *	32.98	26.56	50.99 *	40.32 *	39.07 *	54.13 *	39.48 *	122.64 *
Squared standardized forecast errors, DF=10												
Q-Statistics												
Q (8)	22.56 *	6.13	11.16	15.81	3.83	14.72 *	16.02 *	5.70	11.41	40.24 *	5.33	28.49 *
Q (16)	33.16 *	13.93	21.44	21.78	11.21	23.58 *	35.51 *	12.36	25.47 *	50.63 *	19.69	46.56 *
Q (24)	37.04 *	25.29	36.19 *	32.21	15.00	26.57	37.55 *	20.38	33.77 *	58.49 *	30.38	51.57 *

Source: Fund staff estimates

Table 2.2. Clark's Model
Residual Analysis - Whole Sample

Statistics	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
Standardized forecast errors DF = 10												
Q-Statistics												
Q (8)	9.35	10.24	7.14	8.91	19.99 *	6.51	8.61	12.37	11.91	24.03 *	10.25	14.19
Q (16)	16.30	17.12	25.31 *	13.67	43.56 *	11.80	24.67 *	16.71	19.56	40.15 *	27.30 *	37.37 *
Q (24)	23.81	28.62	47.08 *	21.01	47.67 *	18.12	34.07 *	34.82 *	45.17 *	55.00 *	32.14	51.32 *
Squared standardized forecast errors, DF=10												
Q-Statistics												
Q (8)	13.82 *	20.68 *	6.54	11.96	6.26	4.85	19.03 *	4.44	7.59	35.10 *	23.97 *	13.79
Q (16)	19.17	35.65 *	14.20	22.05	12.86	6.83	36.34 *	11.00	22.56	45.10 *	32.35 *	30.95 *
Q (24)	23.50	70.34 *	25.30	38.38 *	14.49	11.32	38.09 *	12.89	27.39	55.21 *	34.50 *	39.24 *

Source: Fund staff estimates.

Table 3.1: Plucking Model

Parameters	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
σ_{vo}	0.0068 * (0.0006)	0.0049 * (0.0009)	0.0037 (0.0113)	0.0060 * (0.0006)	0.0005 (0.0016)	0.0000 (0.0000)	0.0029 * (0.0008)	0.0111 * (0.0013)	0.0179 * (0.0022)	0.0099 * (0.0009)	0.0048 * (0.0004)	0.0076 * (0.0006)
σ_{v1}	0.00005 (0.0014)	0.0022 * (0.0009)	0.0000 (0.0010)	0.0000 (0.0000)	0.0000 (0.0010)	0.0350 * (0.0052)	0.0085 (0.0059)	0.0339 * (0.0160)	0.0001 (0.0017)	0.0073 * (0.0028)	0.0501 ** (0.0272)	0.0107 * (0.0013)
σ_{w}	0.0000 (0.0000)	0.0000 (0.0000)	0.0021 * (0.0009)	0.0009 * (0.0003)	0.0017 * (0.0006)	0.0000 (0.0000)	0.0014 * (0.0009)	0.0000 (0.0003)	0.0000 (0.0000)	0.0000 (0.0000)	0.0015 * (0.0005)	0.0011 * (0.0005)
θ_1	0.6597 * (0.1792)	1.5413 * (0.0864)	0.5311 * (0.1436)	1.0928 * (0.1960)	0.6740 * (0.2637)	1.0735 * (0.1343)	0.4745 ** (0.2692)	0.6585 * (0.1575)	1.4455 * (0.2399)	-0.2381 (0.3141)	1.2019 * (0.0748)	1.3589 * (0.1093)
θ_2	0.0274 (0.0587)	-0.5686 * (0.0867)	-0.0710 ** (0.0381)	-0.2986 * (0.1071)	0.1881 (0.1178)	-0.1644 (0.1301)	0.0752 (0.1848)	0.1412 ** (0.0811)	-0.5224 * (0.1734)	-0.0142 (0.0374)	-0.3611 * (0.0449)	-0.4616 * (0.0742)
π	-0.0111 (0.0112)	-0.0112 * (0.0015)	-0.0360 * (0.0059)	0.0046 * (0.0015)	0.0029 (0.0041)	-0.0074 * (0.0036)	0.0078 (0.0072)	0.0186 (0.0158)	0.0017 (0.0027)	0.0003 (0.0033)	0.0361* (0.009)	-0.0125 * (0.0032)
σ_{uo}	0.0000 (0.0002)	0.0033 * (0.0011)	0.0098 * (0.0046)	0.0000 (0.0005)	0.0042 * (0.0010)	0.0099 * (0.0009)	0.0000 (0.0006)	0.0000 (0.0000)	0.0000 (0.0001)	0.0000 (0.0011)	0.0000 (0.0002)	0.0011 (0.0022)
σ_{u1}	0.0181 * (0.0052)	0.0000 (0.0000)	0.0083 * (0.0019)	0.0020 * (0.0005)	0.0134 * (0.0039)	0.0000 (0.0000)	0.0056 (0.0065)	0.0000 (0.0002)	0.0053 * (0.0009)	0.0145 * (0.0031)	0.0000 (0.0065)	0.0000 (0.0003)
p	0.6244 * (0.2867)	0.6362 * (0.0683)	0.7557 * (0.1774)	0.8970 * (0.0738)	0.7476 * (0.1874)	0.8702 * (0.0693)	0.9204 * (0.0582)	0.6685** (0.3995)	0.8797 * (0.0837)	0.9553 * (0.0506)	0.5006 * (0.0079)	0.9613 * (0.0361)
q	0.9682 * (0.0248)	0.9715 * (0.0212)	0.9019 * (0.0498)	0.9391 * (0.0432)	0.9099 * (0.0592)	0.9513 * (0.0280)	0.9771 * (0.0253)	0.9670 * (0.0299)	0.8802 * (0.0811)	0.9808 * (0.0204)	0.9902 * (0.0101)	0.9875 * (0.0181)
log likelihood	333.2700	355.1822	155.5098	375.3219	213.0896	265.2629	278.9841	221.3986	249.6773	279.5374	357.0525	393.9784

Table 3.2: Clark's Model

Parameters	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
σ_{vo}	0.0076 * (0.0011)	0.0000 (0.0000)	0.0000 (0.000)	0.0046 * (0.0005)	0.0001 (0.0004)	0.0000 (0.0000)	0.0001 (0.0012)	0.0119 * (0.0035)	0.0101 * (0.0014)	0.0100 * (0.0014)	0.0000 (0.0000)	0.0050 * (0.0008)
σ_{v1}	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
σ_{w}	0.0001 (0.0002)	0.0068 * (0.0005)	0.0024 * (0.0007)	0.0000 (0.0000)	0.0015 * (0.0006)	0.0004 (0.0005)	0.0010 * (0.0005)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)	0.0025 * (0.0006)	0.0000 (0.0000)
θ_1	1.3666 * (0.1074)	1.4858 * (0.0359)	0.8613 * (0.1414)	1.6627 * (0.0217)	0.5482 * (0.1314)	0.9333 * (0.0359)	0.8381 * (0.1201)	1.0670 * (0.2749)	1.5786 * (0.0624)	-0.2085 (0.1957)	0.6101 * (0.1205)	1.5142 * (0.0174)
θ_2	-0.4669 * (0.0734)	-0.5289 * (0.0333)	-0.1615 (0.1328)	-0.6911 * (0.0180)	0.3103 * (0.1087)	-0.0073 * (0.0027)	-0.0119 (0.0206)	-0.2862 ** (0.1471)	-0.6230 * (0.0493)	-0.0109 (0.0204)	0.2582 * (0.0330)	-0.5732 * (0.0132)
π	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
σ_{uo}	0.0044 * (0.0015)	0.0068 * (0.0005)	0.0154 * (0.0015)	0.0025 * (0.0005)	0.0078 * (0.0008)	0.0200 * (0.0014)	0.0064 * (0.0006)	0.0069 (0.0051)	0.0074 * (0.0016)	0.0079 * (0.0015)	0.0063 * (0.0006)	0.0056 * (0.0008)
σ_{u1}	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
p	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
q	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
log likelihood	323.8562	350.8000	153.0536	371.6014	205.5587	252.5633	261.8020	215.3077	242.3261	266.7818	330.3255	374.2360
LR	19.73 *	8.76*	4.91	7.44*	15.06 *	25.40 *	34.18 *	6.09	14.70 *	25.51 *	26.73 *	39.48 *

Source: Fund staff estimates

Table 4. Variances of Output from Plucking Model

	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
Whole sample	0.0181	0.0033	0.0181	0.0020	0.0176	0.0099	0.0056[a]	0.0000	0.0053	0.0145	0.0000	0.0000[a]
Sample until 1990:4	0.0235	0.0000	0.0099	0.0049	0.0044	0.0347	0.0170	0.0001[a]	0.0050	0.0220	0.0000	0.0103
F[b]	1.30* (66,99)	n.a.	1.83* (59,24)	2.45* (60,90)	4.00* (63,24)	3.51* (64,99)	n.a.	n.a.	1.06 (84,44)	1.52* (60,96)	n.a.	n.a.

Source: Fund staff estimates.
[a]/ Not significantly different from zero.
[b]/ Degrees of freedom are in parentheses.

Table 5. Output Variance from Clark's Model

Parameters	Australia	Canada	Chile	France	Japan	Korea	Netherlands	New Zealand	Singapore	Sweden	United Kingdom	United States
Whole sample	0.0044	0.0068	0.0154	0.0025	0.0078	0.0200	0.0064	0.0069 [a]	0.0074	0.0079	0.0063	0.0056
Sample until 1990:4	0.0073	0.0065	0.0214	0.0053	0.0071	0.0203	0.0082	0.0156	0.0073	0.0160	0.0080	0.0069
F [b]	1.66 * (60,99)	1.05 (99,60)	1.39 (20,59)	2.12 * (60,99)	1.10 (63,24)	1.01 (64,99)	1.28 (75,36)	2.26 * (37,76)	1.01 (84,44)	2.03 * (96,60)	1.27 (98,60)	1.23 (72,110)

Source: Fund staff estimates.

[a] Significantly different from zero only at 81 percent.
[b] Degrees on freedom are in parentheses.

Figure 1. Standard Deviation of CPI Inflation, Four Year Moving Average, 1975-2000

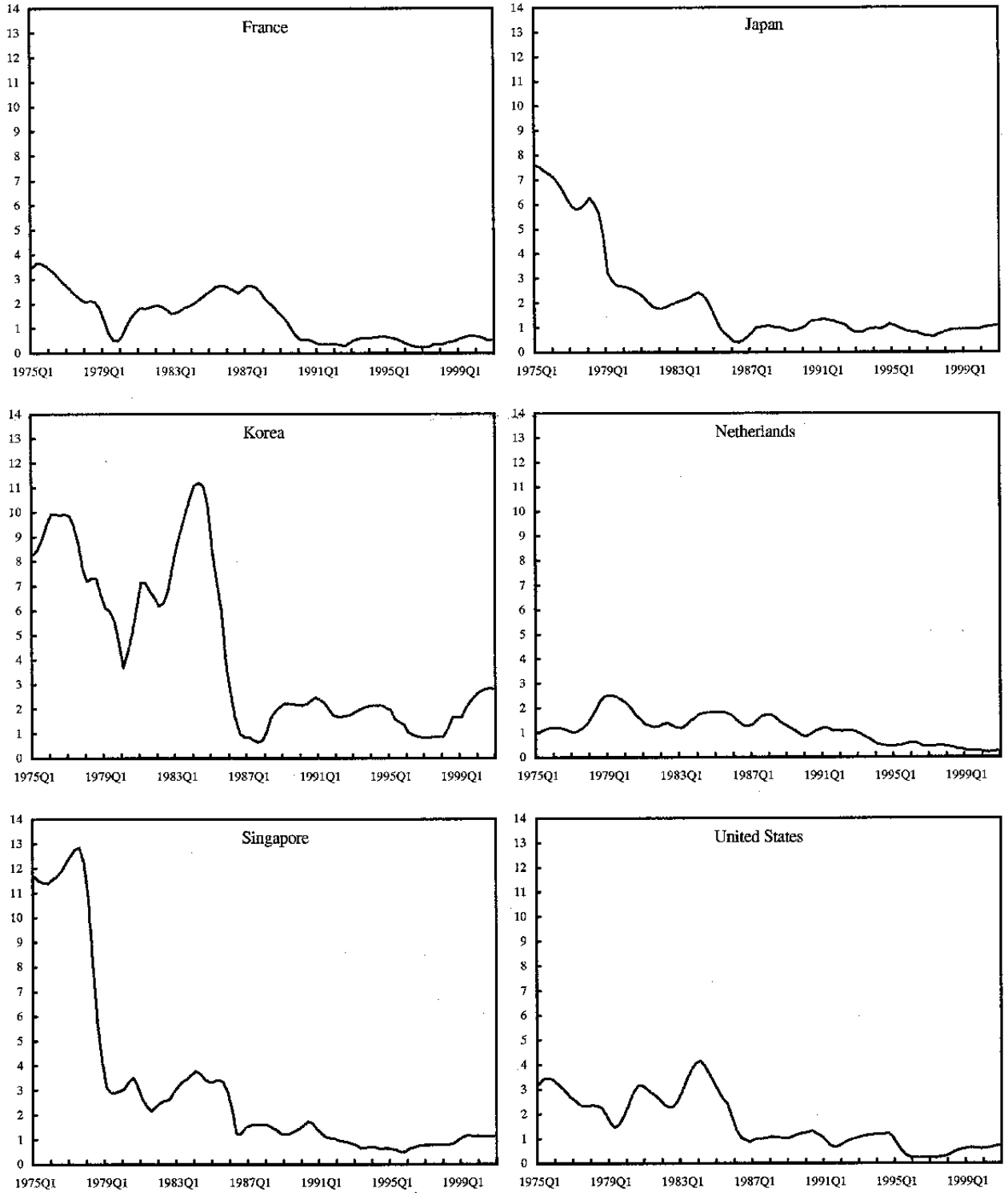


Figure 2. Standard Deviation of CPI Inflation, Four Year Moving Average, 1975-2000

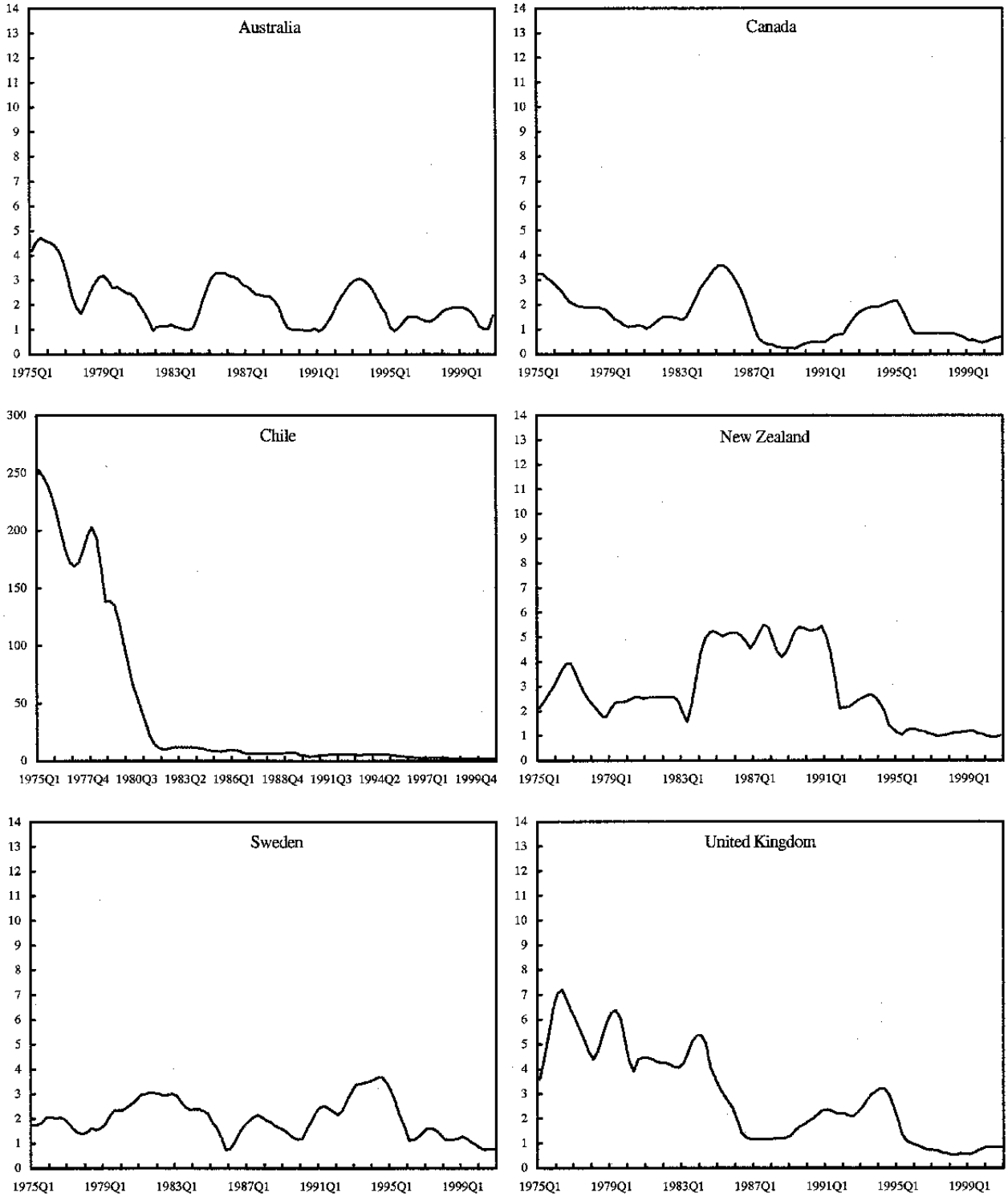


Figure 3. Output Conditional Standard Deviation
Noninflation Targeters

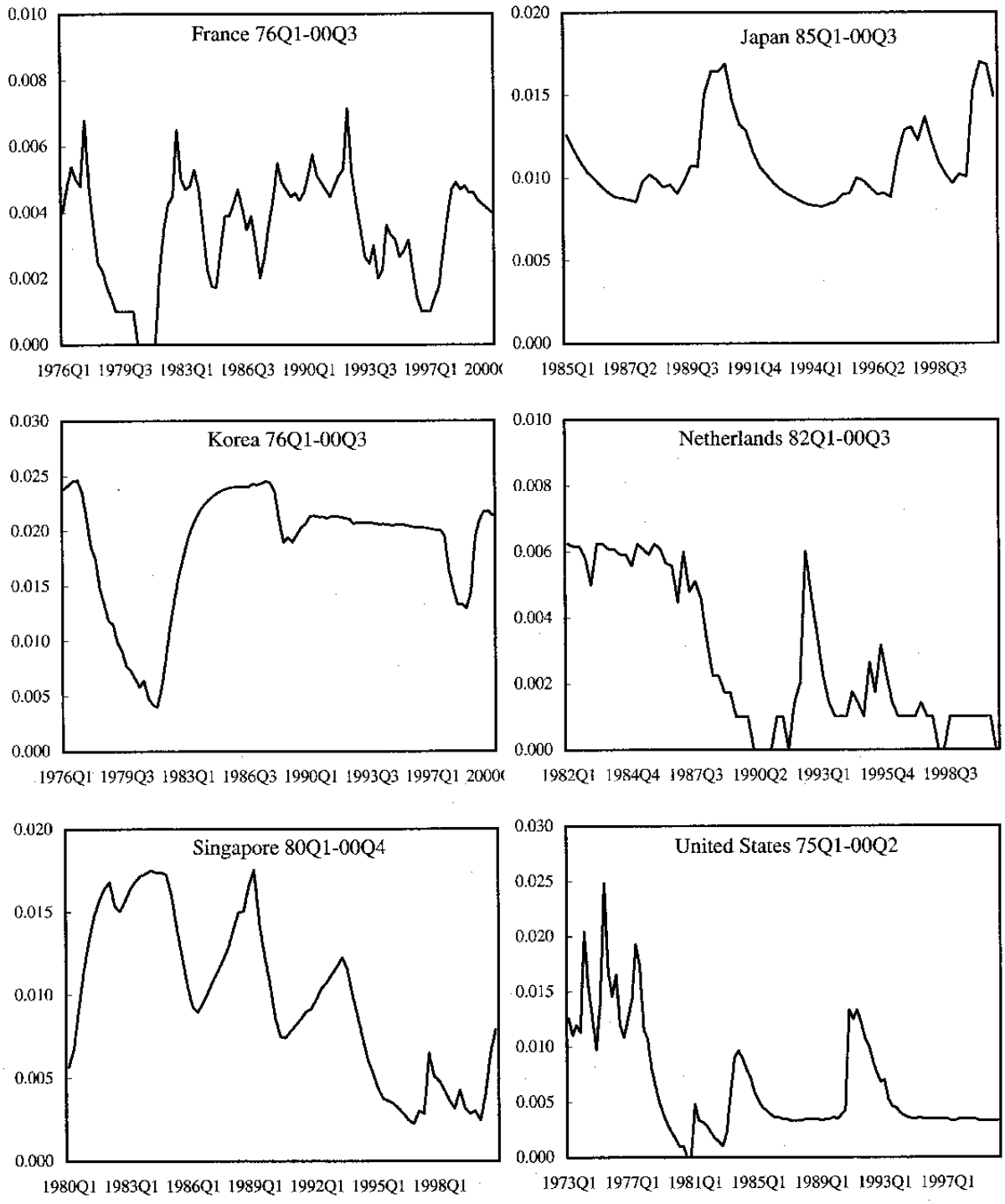
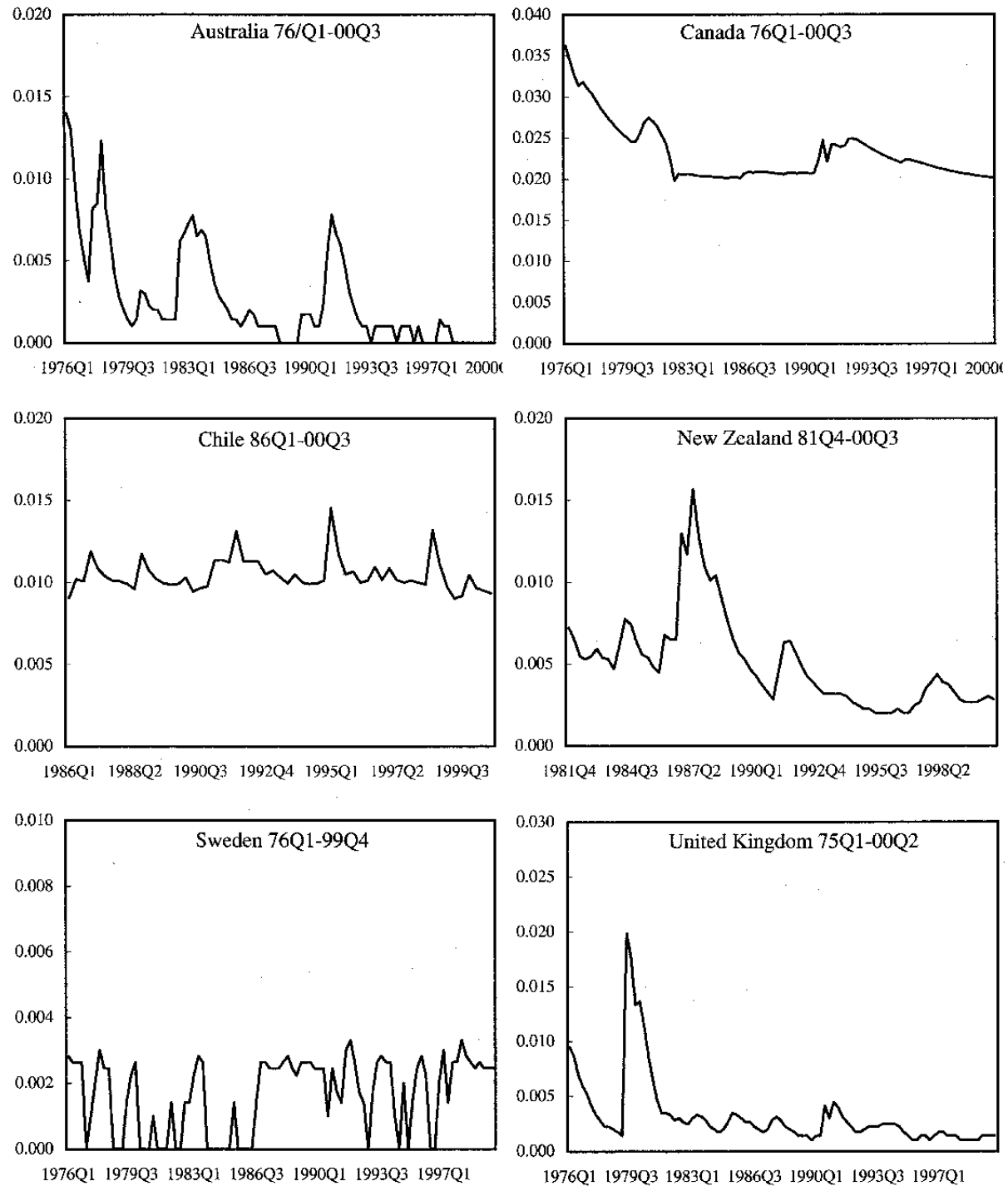


Figure 4. Output Conditional Standard Deviation
Inflation Targeters



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V. Potential Output Growth in Chile, during 1986–2000, and in the Future [78]

A. Introduction

192. Over the last 15 years, the Chilean economy has experienced an extraordinary expansion. During 1986–2000 the average per capita growth was close to 7 percent, a rate that is significantly higher than seen in any country in Latin America and most Asian economies. This growth "miracle" has been attributed to a number of factors: "right" policies, such as fiscal prudence, a monetary aimed at a low and stable inflation, market oriented structural policies aimed at maintaining property rights, or, in the case of the 1990s, the return of democratic institutions, and possibly a recovery of copper prices.[79]

193. The purpose of this chapter is to present alternative estimates of potential output growth over the last 15 years and to discuss different scenarios for future potential growth. Estimates of potential output growth are relevant for the formulation of monetary and fiscal policies as they provide an idea of the sustainable, noninflationary pace of output growth. The chapter applies various methods to estimate potential output: Hodrick-Prescott (H-P) filter, the production function method, and econometric methods using a state-space model (or, a "local linear trend" model). The special nature of the mining industry (based on the extraction of a nonrenewable resource) is recognized by splitting the output series in two components, and, in the production function approach, abstracting from the value of resource extraction (the "ground rent").

194. While average output growth differs little across methods, the profile of potential output growth differs, however, significantly: the production function approach finds nearly no slowdown in potential output growth, in contrast to the state-space model, which finds a marked slowdown, nearly in line with the reduction in actual output growth. Consequently, the estimates of output gaps for 1999 varies significantly, from about 2¾ percent of GDP (the local linear trend model) to a gap of about 5¾ percent of GDP (the production function

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[79] There are different views on the importance of copper prices and, more broadly, terms of trade for output growth in Chile. While Jadresic and Zahler (2000) find no cointegration relationship between terms of trade and productivity growth, Spilimbergo (1999), and Calvo and Mendoza (1999) argue that higher copper prices contributed importantly to the acceleration of output growth during 1990–98.

approach). The large variation in the output gap estimates suggests that the different methods should be applied with caution when used in policy formulation.

195. The chapter also attempts to look ahead and to shed some light on the question of potential output growth during the coming decade, presenting a growth accounting framework based on the production function approach. Two alternative scenarios for future output growth are also presented: one that assumes no increase in the participation rate and a deceleration in the growth of TFP and resulting in 5 percent potential growth rate per annum; and one more optimistic scenario, assuming growing participation rate and a small recovery in TFP growth, resulting in a growth rate of 6 percent per annum. In both scenarios, structural unemployment rate is assumed to remain unchanged and the capital-output ratio to gradually increase in the coming decade, reflecting the perception of above-average rate of return on investment in Chile.

B. Why do We Estimate "Potential Output"?

196. It has for very long been recognized that economic output is subject to temporary or cyclical variations, although explanations on why such variations exist differ from pure supply side theories to more traditional theories based on the stock adjustment or market imperfections. It is difficult, however, to determine the length or amplitude of the cycles. Long cyclical developments, particularly boom periods, are often mistaken for a permanent change in the potential growth rate or the level of output.

197. The distinction between cyclical or temporary effects and permanent effects on the level of economic activity has wide-reaching implications both for fiscal and monetary policies. The implications for fiscal policies are both **descriptive** and **normative**:

- The **descriptive** implications stem mainly from the cyclical sensitivity of tax revenue, but also reflect, to a lesser extent, the cyclical sensitivity of expenditure, primarily unemployment benefits. The extraction of the cyclical component of output thus provides an estimate of the fiscal balance in the medium term or, the so-called, "structural balance."

- The **normative** implications arise if there is a desire to conduct counter-cyclical fiscal policies as the structural fiscal balance provides—together with other corrections, such as the removal of "one-off" factors—a proxy for discretionary fiscal policy action. Similarly, the structural balance can provide a benchmark for the conduct of medium-term fiscal policies, as is the case in Chile where a structural surplus of 1 percent of GDP is targeted on the central government accounts, assuming among other things a copper price at a "reference level."

198. Monetary policy is less directly, but not less importantly, influenced by potential output estimates. Potential output estimates have descriptive implications as it provides an

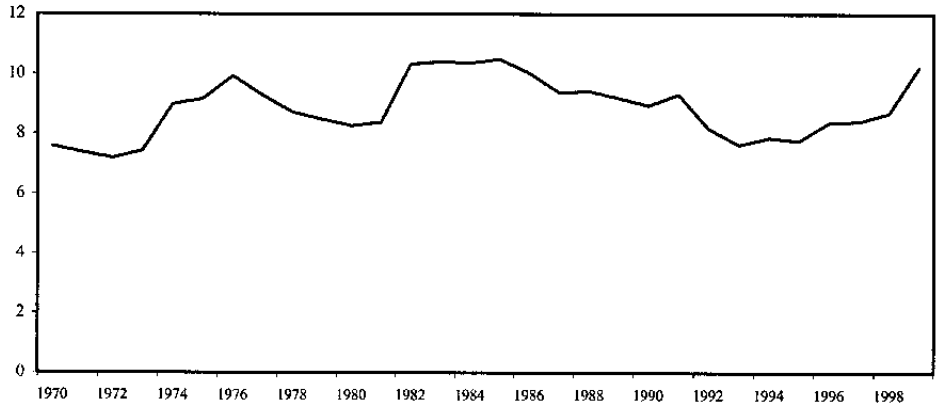
important element in the estimation of the "neutral" policy interest rate or, alternatively, the neutral rate of monetary expansion.[80] Normative implications follow from the desire to conduct an interest policy that does not have a procyclical impact, or—in the case of monetary targeting—setting a monetary growth rate consistent with low inflation.

C. What Is So Special About Mining?

199. There are good arguments in favor of treating nonrenewable resource extraction, such as mining, differently than other sources of production.

200. Firstly, value added in resource-dependent sectors tends to be less directly and less rapidly influenced by demand factors than other sectors, reflecting long production lags and, in the case of copper, the relatively large importance of a few large mines. Thus, the lumpiness of mining sector output likely reflects lags in the extraction process as well as speculative accumulation of extracted minerals to take advantage of expected price increases (estimates of mining production is based on actual sales of minerals). The cycle is likely to be nontypical and a model calibrated or developed in large countries with a relatively small mining sector (in relation to total GDP) such as the United States are not necessarily applicable to the Chilean case where mining is responsible for about 10 percent of the economy's value added (Figures 1 and 2).

Figure 1. Mining Value Added-Share of GDP (percent)



[80] According to standard growth theory such as the one presented in Ramsey (1928), the "neutral interest rate" (or the marginal real rate of return on capital) is equal to the growth rate of the economy plus a premium equal to consumers "time preference." In growth models with overlapping generations, the capital stock is typically lower (in the case the government is net debtor, including implicit liabilities of a pay-as-you-go pension system) and the neutral interest rate higher. See Blanchard and Fischer (1989).

201. Secondly, the fact that mining is based on the extraction of nonrenewable resource implies that its production will taper off at some time in the future as the resource depletes. Clearly; the speed of depletion is very uncertain as it depends on discoveries of new deposits and technological progress but the future reduction of the production has implications for the sustainability of today's output level and growth rate. Thus, sustainable national consumption is less than otherwise implied from GDP and its growth rate, a fact that may have implications for medium-term fiscal targets.

202. The nature of mining has therefore important implications for the estimate of potential output. While an increase in nonresource-based production in the current period has normally no implications for production in future periods, an increase in mining production in the current period reduces production in future periods, unless matched by new discoveries or a permanent reduction in extraction costs. Thus, potential output in the mining sector can only be defined over the whole economic life of the resource.

D. Estimating Mining and Nonmining Potential Output

203. This section presents various estimates of potential output based on an explicit recognition of the special nature of mining production. The estimates presented here can be broadly divided into two groups: univariate approaches and estimates based on the production function approach.[81]

Univariate methods

204. Univariate methods try to decompose the output series in a trend (or permanent) component and a cyclical (or transitory) component. The most popular method was proposed by Hodrick and Prescott in the early 1980s and generates a stochastic output trend (y*) by minimizing a combination of the gap between actual output (y) and trend output, subject to a penalty that constrains the rate of change in the stochastic trend output. The coefficient λ determines the degree of smoothness of the trend:

$$\underset{y^*}{Min} \sum_{t=-\infty}^{\infty}(y_t - y_t^*)^2 + \lambda \sum_{t=-\infty}^{\infty}[(y_{t+1}^* - 2y_t^* + y_{t-1}^*)]^2, \qquad (15)$$

[81] There exists also a literature on multivariate detrending techniques other than the production function approach.

205. The usefulness of the Hodrick-Prescott (HP) filter is, however, limited by the lack of a very good method in finding the appropriate smoothing parameter λ —the "standard" parameters values are based on U.S. experience and might not be appropriate for other economies—and the fact that the most recent data tend to influence the estimate of current trends disproportionally ("end-sample" bias). To deal with the former problem, an "optimal" λ can be calculated by conducting grid search in line with Coe and McDermott (1997).

206. The trend components of value added in mining and nonmining sectors was estimated both using the "standard" λ of 1600 for quarterly data and the "optimal" λ (Figures 3–7). It is interesting to note that the trend growth rate of value added of the mining and nonmining sectors has diverged in the 1990s: while nonmining growth seem to have moderated in the latter half of the 1990s, mining output has been accelerating over most of the decade (Figures 3, 4, and 6).

207. As can be seen in Figure 7, the trend was much more curved trend when the "optimal" λ was used, most likely reflecting the larger importance of supply side shocks (less of the movement in the series is considered as temporary or cyclical). The optimal λ was at 724, less than half the "standard" λ. While the parameter choice does not seem to matter a lot for the period up until the Asia crisis in 1997, the growth rate of the two series is significantly different in the recent years, when trend growth rate of nonmining value added differs by about 2 percentage points. Irrespectively of which of the two parameters is used in the estimation, the estimated trend growth rate falls quite dramatically, and much more than the common estimates of current potential growth rates (e.g., using the production function approach). This probably reflects the problems attached to the use of the H-P filters after a sharp recession as it is heavily influenced by the most recent observations, whether the standard parameters or "optimal" parameters are used.

208. An alternative approach to estimating trend output was provided by Clark (1987), proposing to estimate the following model in state-space format:

$$y_t = y_t^* + x_t \qquad (16)$$

$$y_t^* = y_{t-1}^* + g_{t-1} + \varepsilon_t, \qquad (17)$$

$$g_t = g_{t-1} + \gamma_t, \qquad (18)$$

$$x_t = a_1 x_{t-1} + a_2 x_{t-2} + \tau_t, \qquad (19)$$

209. Where y_t is real GDP, y^* is a trend, and x_t is the cyclical component of output. The error terms ε_t, γ_t, and τ_t are assumed to be mutually independent and normally distributed with zero mean. The stochastic trend is modeled as a random walk with a drift term g_t, which allows for permanent shocks to the rate of growth of potential output.

210. The two unobserved components y^* and x_t, the local linear trend, the coefficients in equation 5 (describing the cyclical developments), and the variance of the error terms can be estimated by using a "Kalman filter" technique, a recursive procedure computing mean squared error estimate of these parameters and unobserved components. Although, a discount factor is used to give recent observations a higher weight than distant observations, the Kalman filter technique does not suffer from end point bias, as is the case of the H-P filter. See, for example, Nadal-De Simone (2000) for a description of the Kalman filter technique and the local linear trend model by Clark (1987).

211. The results for the mining and nonmining sectors are very much as expected (Tables 1–2 and Figure 8): the mining sectors output does not seem to have a significant cyclical component, in contrast to the nonmining sector were there is a significant first order cyclical parameter (a_1). While mining sector output seem to be well described by a model close to a random walk, the nonmining sector seem to be dominated by the cyclical factor, with only small permanent shocks to the potential growth rate or potential output level (σ_ε and σ_γ are not significantly different from zero).

212. The state-space model suggests that the slowdown resulted in a much less dramatic increase in the output gap than found in the H-P filter estimates (and the production function estimates presented below) resulting in a "current" output gap of close to ½ percentage point of GDP (Figures 9–10). The state-space estimates of potential output growth are, however, highly volatile, particularly in the mining industry. Even in the case of the nonmining sector, where the process appears be dominated by cyclical developments, the estimated potential output growth estimate seems to closely follow actual output growth.

The production function approach

213. The production function approach is not readily applicable to a resource-based economy such as Chile. The existence of a significant mining industry poses problems of both analytical and empirical nature. The main analytical issue is linked to the nonrenewable nature of mining output. Thus, a significant share of total mining sector sales reflects a "ground rent" or the return on fixed capital invested in the mining sector, in excess of alternative investments with the same perceived risk. The main empirical problem is the lack

of long series on investment and employment in the mining industry (the data starts in 1986) and uncertainty attached to the size of the nonrenewable reserves and the cost of extraction.

214. One way to deal with this issue would be to take explicitly into account the potential output from mining over the expected economic life of the resource. As mentioned above, this would imply the estimate of a multiperiod production function where output in any given period would depend on extraction rates in other periods, the resource size and on the investment in the mining sector, which determines the maximum extraction potential in any given period. The estimation of such a multiperiod function goes beyond the scope of this chapter as it would require an in-depth study of the size of the different important nonrenewable resources, the link between capital investment and maximum extraction capacity, and the cost structure of different mines.

215. The alternative approach taken here is to focus on the potential for nonmining use of the input factors, and thus estimate a "normalized" potential output. It should be noted that this output series excludes the ground rent component of mining production; thus, in order to estimate the size of sustainable consumption, an estimate of the permanent income from the copper resource would have to be added to the "normalized" potential output. In practical terms, an estimate of "normalized" potential output, can be achieved by assuming that mining sector value added excluding the ground rent is generated by the same aggregate production function as the rest of the economy:

$$x_m = a + b\,(k - k_r) + c(l^* - l_r) + \varepsilon_1 \qquad (20)$$

$$y_r = a + b\,(k_r) + c\,(l_r) + \varepsilon_2 \qquad (21)$$

where x_m denotes "normalized" mining sector output; y_r is value added of the rest of the economy; l^* is "full-employment" labor input; and k capital is the economy's capital stock. Subscript m denotes the mining sector and r the rest of the economy (and no subscript the whole economy). All variables are in natural logarithms and vary over time (there are no constants apart from the parameters b and c). Potential output is here defined as the sum of "normalized" mining sector output and the value added of the rest of the economy.

216. Accordingly, potential output was estimated in two steps:

- In the first step, nonmining total factor productivity a was estimated by subtracting $b(k_r) + c\,(l_r)$—the weighted sum of capital (excluding residential capital) and actual

employment (adjusted for hours worked in Santiago[82]) in the nonmining sector—from total nonmining value added y_r (excluding rents and imputed services for owner-occupied housing). The weights used were the standard Cobb-Douglas coefficients ($^1/_3$ for capital and $^2/_3$ for employment), which are also in line with coefficients estimated by using error-correction methods on the input factors.[83] The resulting estimate of a was then smoothed by an H-P filter (Figure 11).[84]

- In the second step, an estimate of potential output was derived by substituting the total economy input factors into the common production function, using the total factor product estimate from the first step: the weighted sum of the total economy potential labor input l^* and capital stock k was added to the (smoothed) total factor productivity a. An estimate of rents and imputed services for owner-occupied housing was added separately.

217. The level of capital stock was calculated by using nonresidential capital stock data from Jadresic (1992) until 1986, and applying the perpetual inventory method with an annual depreciation rate of 5 percent for all the remaining years[85] (Figure 11). Due to the absence of reliable information, the share of the capital stock in the mining industry was assumed to be 2.5 percent of total capital stock in 1986, substantially higher than the ½ percent that has been invested in the sector during the last 15 years. Finally, potential labor input l^* was estimated using a "smoothed" participation rate and unemployment rate as depicted in Figure 12.[86]

218. The production function approach results in a quite large output gap for the recent years, reflecting a potential output series that grows steadily and does not appear to "suffer" from end-period bias. This may be a bit surprising since the production function approach is

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[82] An index of hours worked in Santiago (average=1) was multiplied with number of employed workers. Data on total hours worked are not available.

[83] See Jadresic (1992) and Rojas, et al. (1997). By contrast, Roldos (1997) estimates the output elasticity w.r.t. capital at 0.44 and w.r.t. labor at 0.56.

[84] The use of uncorrected capital stock figures may bias the TFP in economic booms or long and persistent slowdowns. Garcia (2001) adjusts the capital stock figures by using the ratio of observed unemployment to trend unemployment, and finds, inter alia, a less rapid TFP growth in the latter half of the 1980s.

[85] In with Jadresic (1992) investment in machinery and equipment investment was depreciated by 10 percent per annum.

[86] The observed participation rate, the ratio of employed plus registered unemployed to the population in age group 15–64, was detrended by an H-P filter with λ=100.

a combination of series that has been smoothed by an H-P filter (the participations rate, the unemployment rate, and total factor productivity) and an "unfiltered" capital stock series. This apparent lack of sensitivity to the recent slowdown stems mainly from the fact that potential employment was constructed using a relatively constant structural unemployment rate (the unemployment rate was smoothed by an H-P filter with lambda at 100), and participation rate (Figure 12); by contrast the application of the H-P filter directly on employment would have yielded very similar results to the H-P filter estimations described earlier.

E. How Fast Can Chile Grow in The Coming Decade?

219. The key for assessing the prospects for future output growth in Chile lies with the correct interpretation of the downturn in the late 1990s. Was it the result of a temporary contraction of demand or does it reflect more permanent factors, such as a change in foreign investors perception of the sustainable rate of return in Chile? The sharp drop in copper prices in 1996 represents a quasi-demand side factor as it can have lasting effects on domestic production, but it is unlikely to have reduced potential output for the nonmining sectors over and above the accelerated depreciation of physical and human capital that may happen in any demand induced slump.[87]

220. The methods employed above do not help much in distinguishing between the different explanations: while the H-P filter technique and the production function approaches tend to interpret most of the sharp fluctuations in output, such as the 1998–99 downturn, as temporary, the local linear trend seem to interpret such sharp movements as largely changes in the potential output level (as well as in its growth rate). A much more complete model of the economy is needed to distinguish between different factors driving the fluctuations in output. The simple production function approach has been extended to include factors such as the terms of trade (Rojas, et. al, 1997) and indicators of external finance (Coeymans, 1999). To some extent these models can be seen as complements to the simple production function approach as they can be interpreted as introducing factors that explains the cyclical developments (indicators of external finance, and to a lesser extent terms of trade) and adjusts the simple aggregate production function by introducing relative prices between sectors (terms of trade). The latter approach can be seen as an attempt to introduce elements of multisector approach to potential output, where the real value of combined output depends on the world prices of the goods from the different sectors.

221. By contrast Barro (1999) presents a set cross-country growth regressions based on: (i) the log-level of per capita GDP (and its squared value); (ii) the ratio of government consumption to GDP; (iii) an index of the rule of law; (iv) democracy index (and its squared

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[87] See, for example, Spilimbergo (1999) for an analysis of the impact of copper prices on cyclical developments in Chile.

value); (v) inflation rate; (vi) years of schooling; (vii) log of the fertility rate; (viii) the ratio of investment to GDP; (ix) growth rate of terms of trade; and (x) a country specific dummy. Reflecting Chile's high score on most of these indicators and a rapid per capita GDP rate in the past (a factor that weighs heavily in the estimations due to the country specific dummies) the projected per capita growth rate of 1996–2006 amounts to 3 percent, which with a population growth rate at about 1–2 percent would amount to a real GDP growth rate in the range of 4–5 percent per annum.

222. Although insufficient to determine the engine of growth, the production function approach provides elements of a growth accounting framework that proves very useful to organize a discussion about the prospects for potential output growth in the future. The production function approach basically decomposes output growth into two components: (i) the contributions from the input factors, which we can more or less confidently "explain," and (ii) total factor productivity which is the residual or "unexplained" component.

223. Table 3 presents a growth accounting framework based on the input factors used above in the "production function approach" suggesting a potential growth rate of 5–6 percent in the coming decade, depending on whether the assumptions on the participation rate and total factor productivity are rather pessimistic (no change in the participation rate, the structural unemployment rate, and a slowdown in total factor productivity growth to 2 percent per annum) or more optimistic (1 percent increase participation rate per annum and in the total factor productivity growth rate to 3 percent per annum). Population projections were taken from the World Bank and the participation rate and the trend unemployment rate were assumed unchanged in the next ten years. The investment growth was based on WEO projections up until 2006 and assumed to contribute to a moderate increase in the capital to GDP ratio thereafter.

224. The growth ranges presented in Table 3 should not be interpreted as projections, but as mere scenarios, illustrating different growth ranges given rather crude assumptions about the input factors. For example, the structural unemployment rate is assumed to remain constant in both the pessimistic and the optimistic scenarios; structural reform in the labor market could reduce this rate, or, on the contrary, the structural unemployment rate could increase if new rigidities are introduced or existing rigidities are intensified (e.g., sharp increase in the real minimum wage). Furthermore, capital accumulation is based on the assumption that investors (mainly foreign) consider the rate of return high enough to merit an increase in the capital-output ratio.

Table 1. Chile: Mining, Estimation Results: "Clark" Model

Likelihood value: 78.988717

σ_ε	σ_γ	a_1	a_2	σ_τ
0.020143*	0.027382*	0.10416	-0.00271	0.00166
(0.00813)	(0.00661)	(0.29376)	(0.0153)	(0.00142)

* Denotes 5 percent signficance level (at least).

Sources: Central Bank of Chile and Fund staff estimates.

Table 2. Nonmining, Estimation Results: "Clark" Model

Likelihood value: 78.988717

σ_ε	σ_γ	a_1	a_2	σ_τ
0.01056*	0.010399*	1.30560*	-0.42615	0.00189
(0.00661)	(0.00617)	(0.50179)	(0.32788)	(0.00129)

* Denotes 5 percent signficance level (at least).

Sources: Central Bank of Chile and Fund staff estimates.

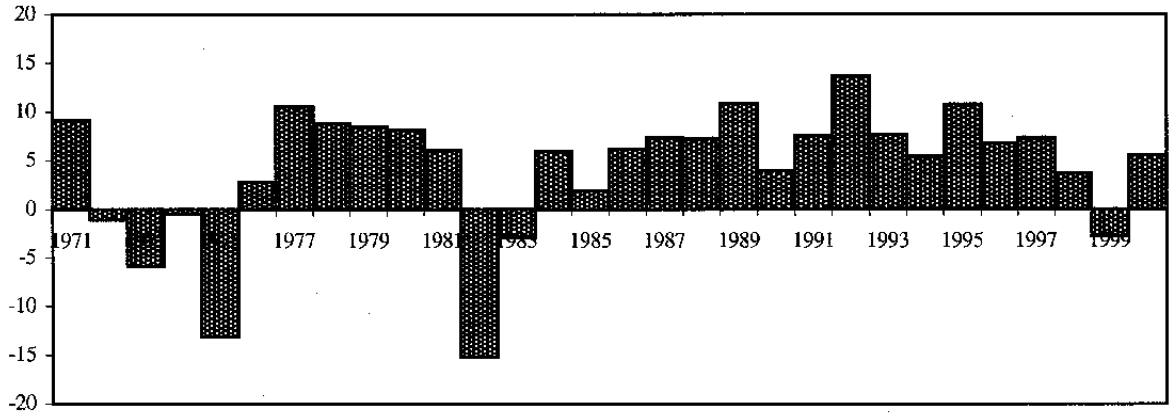
Table 3. Chile: Decomposition of Potential Output Growth: 1986-2010

	Working-age Population	Participation Rate	Capital Stock	TFP	Potential GDP	Memo: Nonmining GDP	Memo: Total GDP
1986-90	2.0	1.0	3.8	3.8	7.5	7.1	6.8
1991-95	1.7	1.0	6.6	3.5	7.5	9.0	8.7
1996-2000	1.6	0.8	8.6	2.5	6.5	5.2	5.6
2000-05	1.7	0-1	6.3	2-3	5.3-6.0	...	...
2005-10	1.4	0-1	6.5	2-3	5.1-5.8	...	...

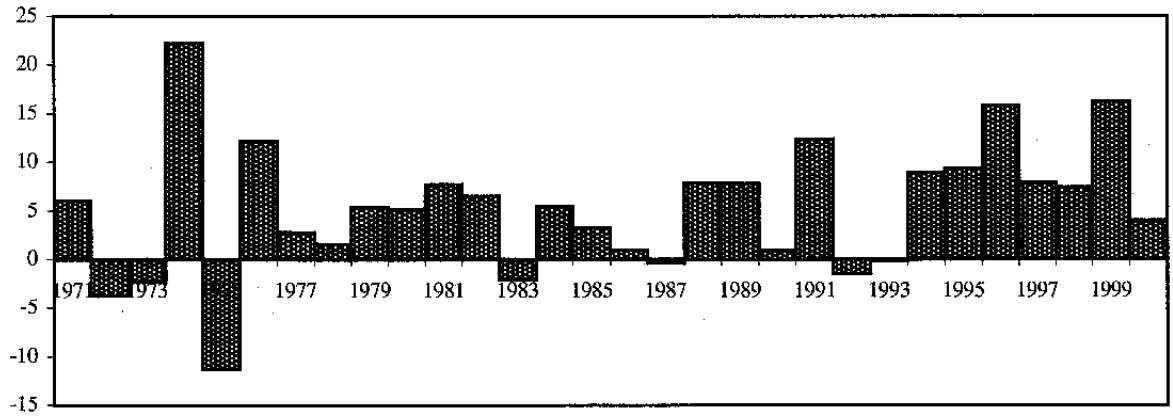
Source: Central Bank of Chile and Fund staff estimates.

Figure 2. Chile: Annual Growth in MiningValue Added, Other Sectors and GDP, 1986-2000

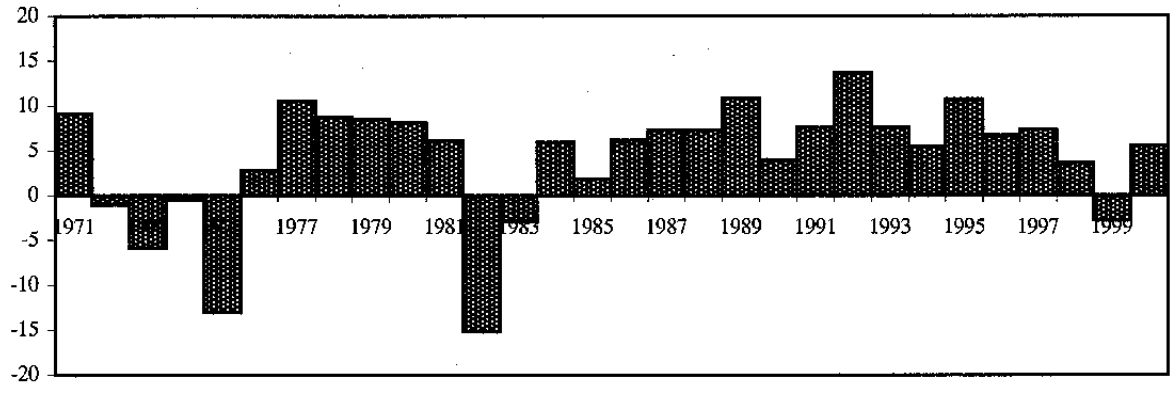
Nonmining Value Added: Annual Growth (constant prices)



Mining Value Added: Annual Growth (constant prices)



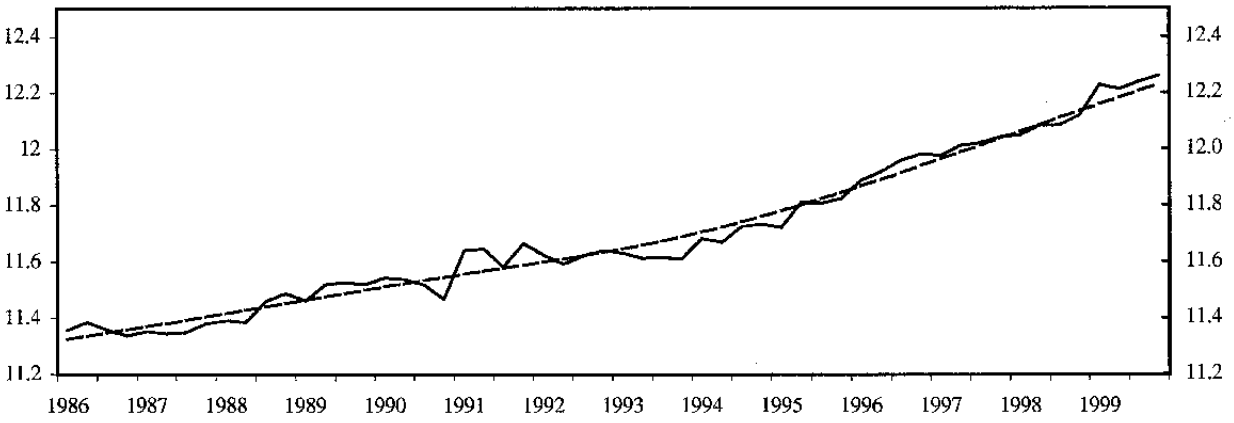
Total GDP: Annual Growth (constant prices)



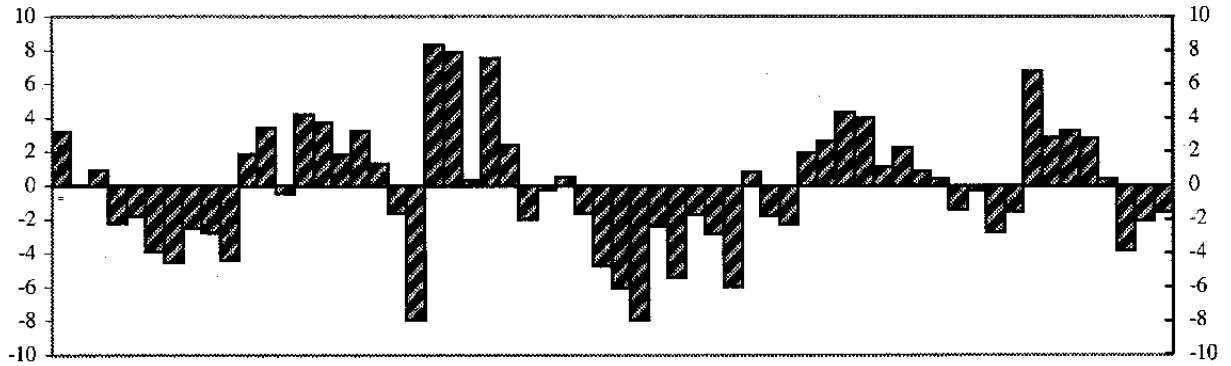
Source: Central Bank of Chile and Fund staff estimates.

Figure 3. Chile: Mining Value Added and H-P Trend (λ=1600), 1986-2000

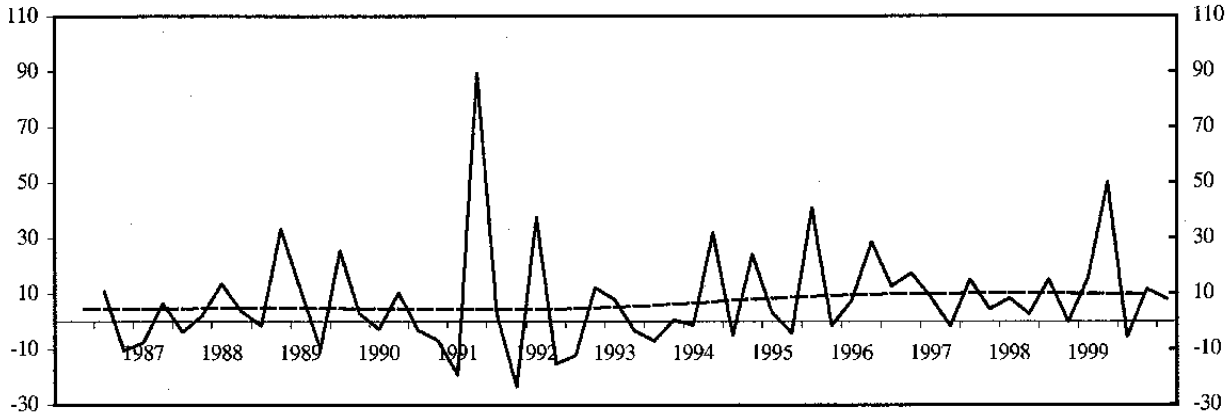
Panel A. Value added, levels (natual logaritms)



Panel B. Gap (percent of trend)



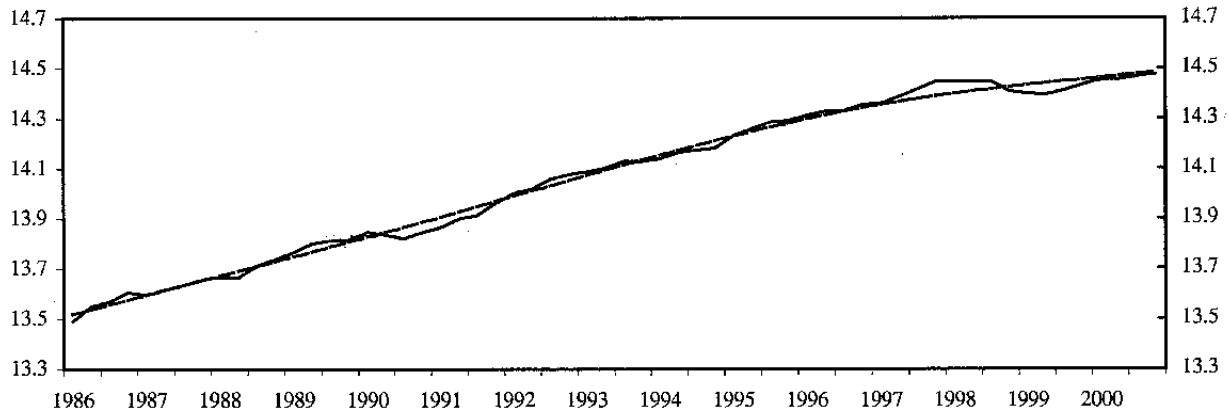
Panel C. Annual growth rate



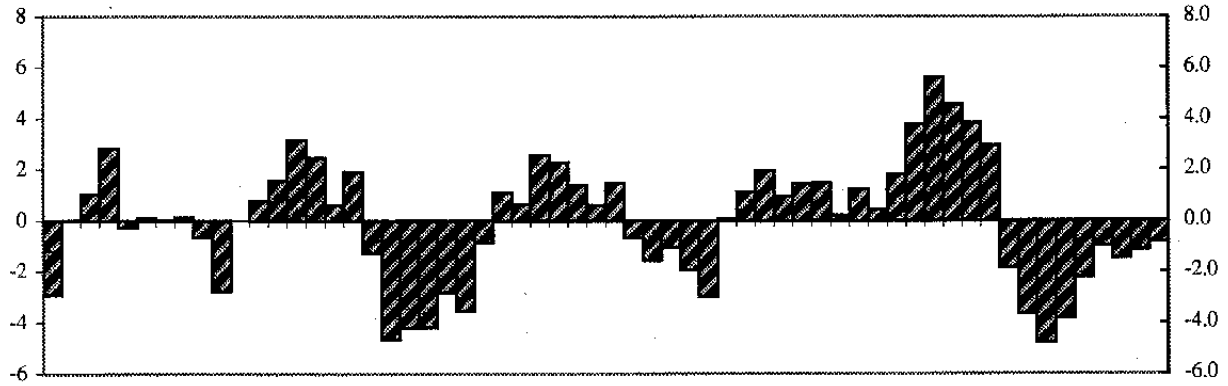
Source: Central Bank of Chile and Fund staff estimates.

Figure 4. Chile: Nonmining Value Added and H-P filter Trend (λ=1600), 1986-2000

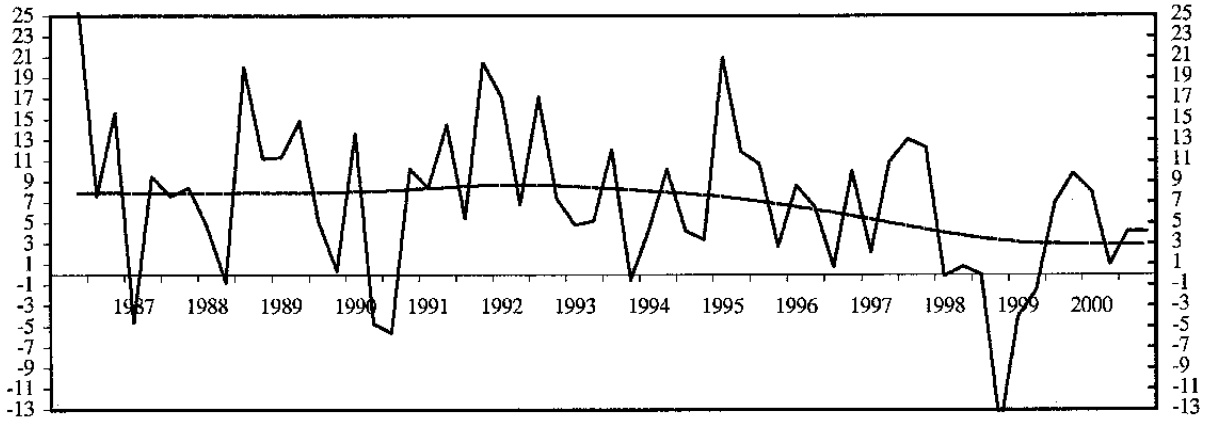
Panel A. Value added, levels (natural logaritms)



Panel B. Gap (percent of trend output)



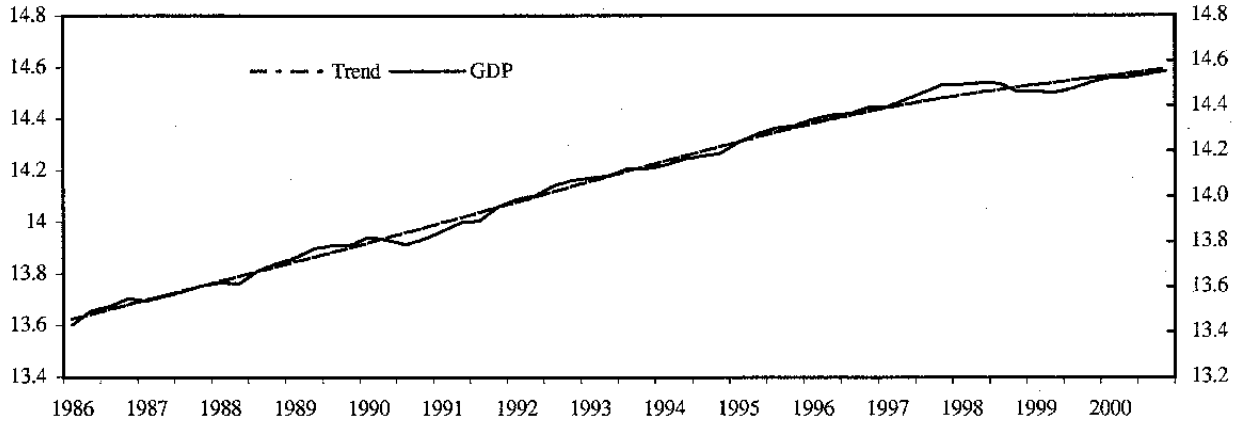
Panel C. Annual growth rate



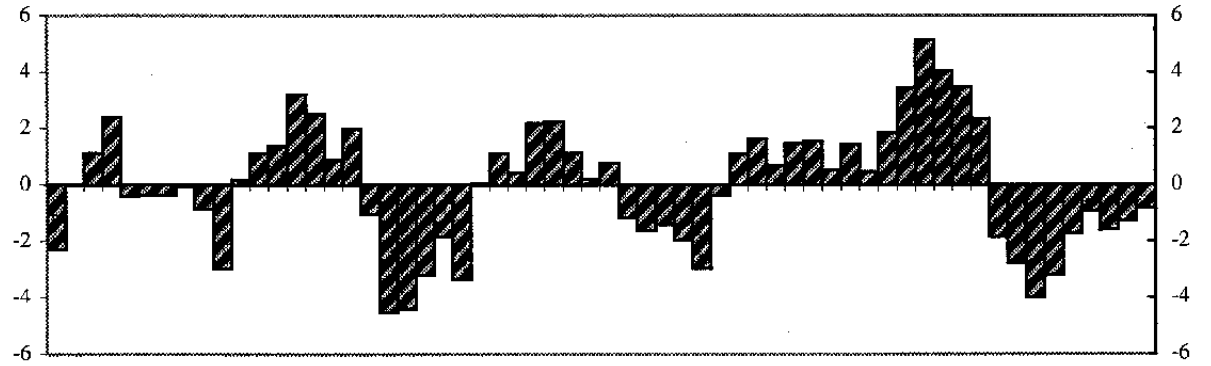
Source: Central Bank of Chile and Fund staff estimates.

Figure 5. Chile: GDP and H-P Trend ((λ=1600), 1986-2000

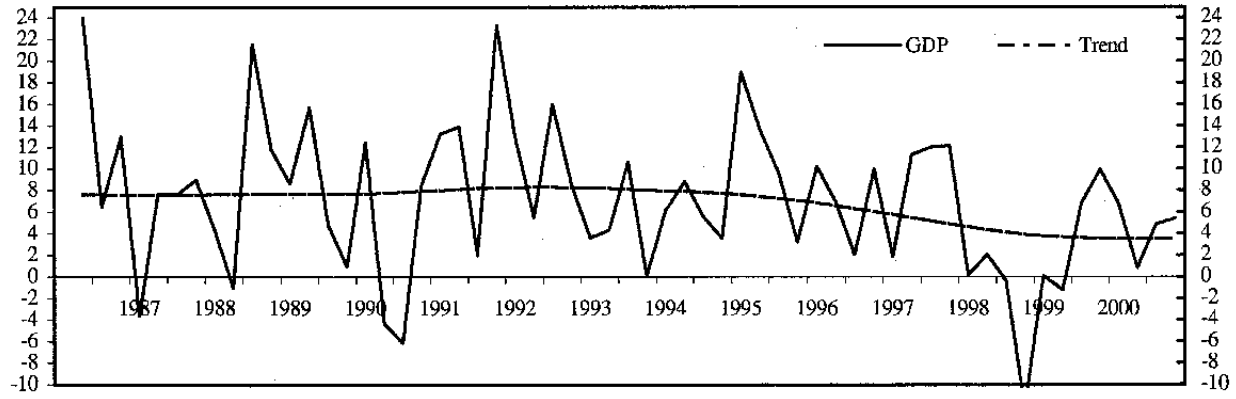
Panel A. GDP, levels (natual logaritms)



Panel B. Gap (percent of trend)



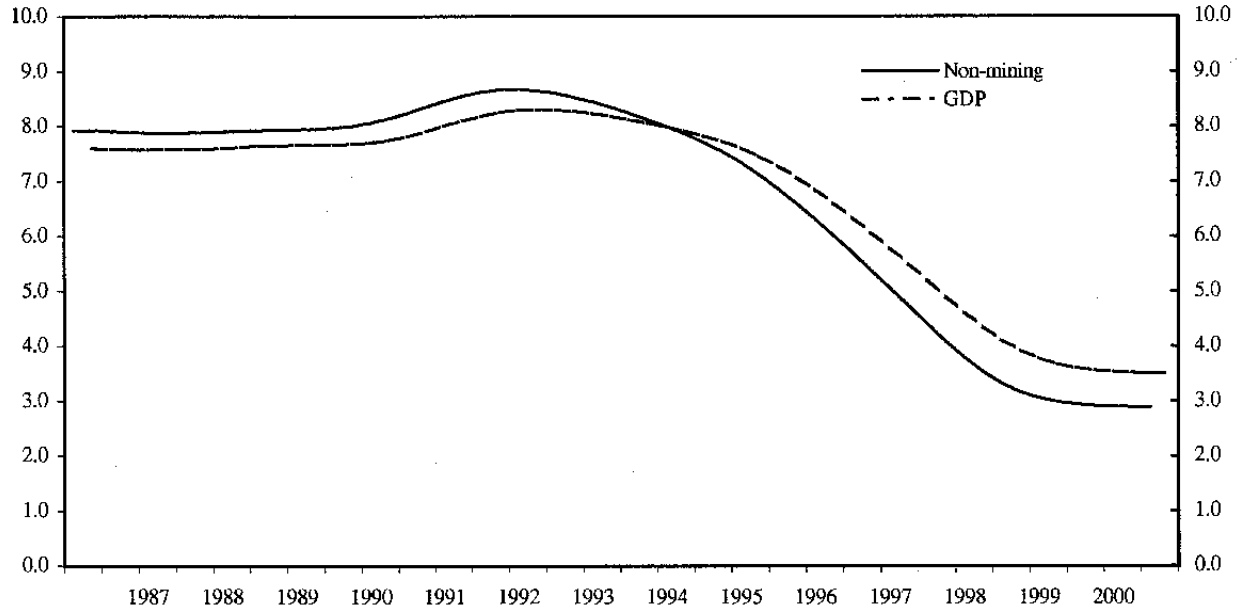
Panel C. Annual growth rate



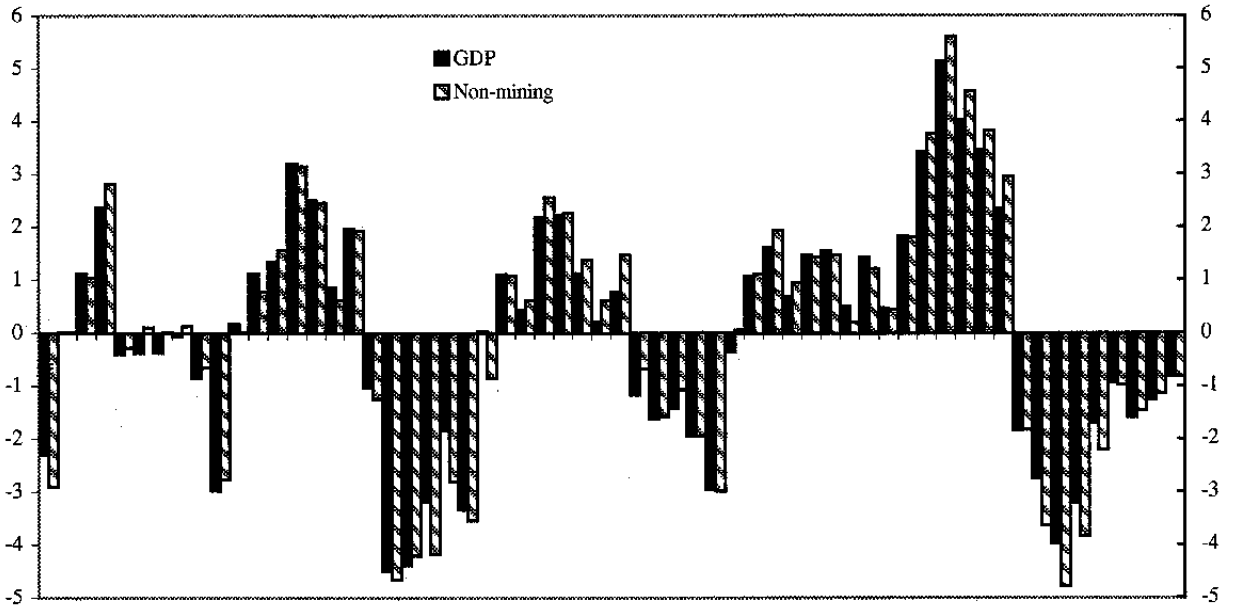
Source: Central Bank of Chile and Fund staff estimates.

Figure 6. Chile: GDP and Nonmining Value Added
(Trend Growth and Gap), 1986-2000

Panel A. Annual growth rate



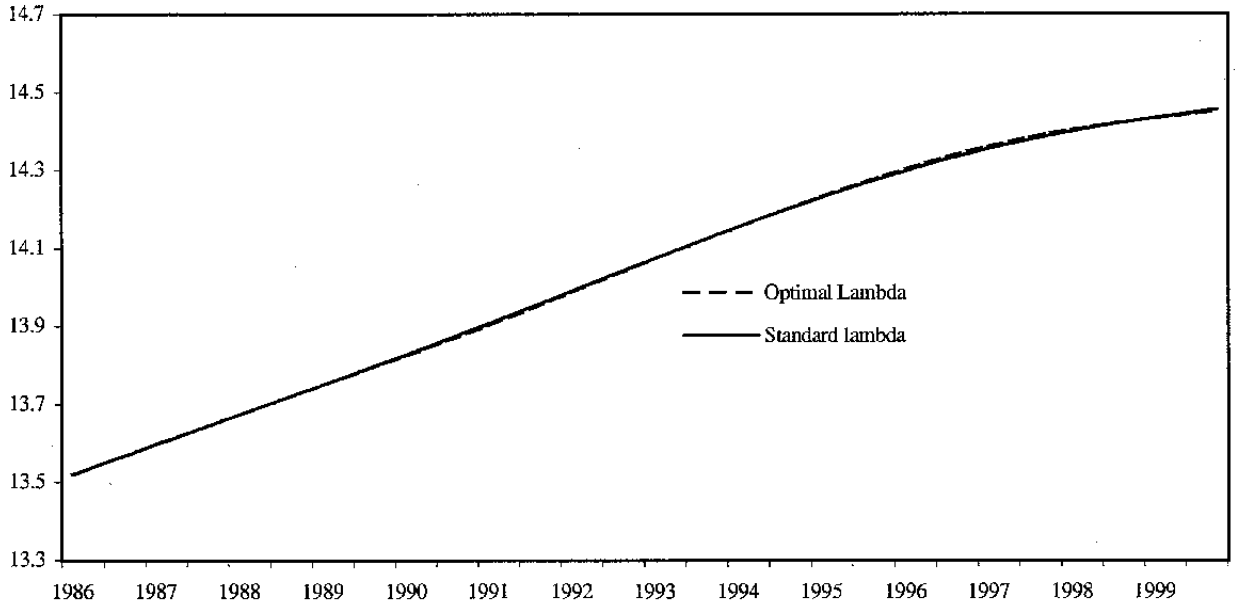
Panel B. Output Gap



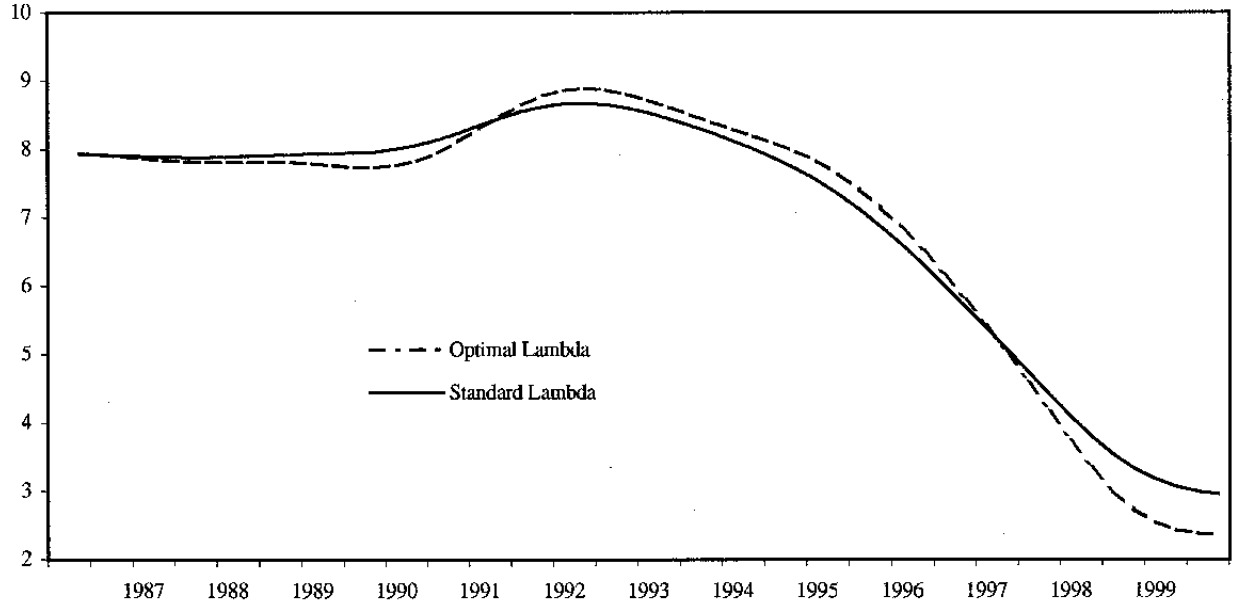
Source: Central Bank of Chile and Fund staff estimates.

Figure 7. Chile: Nonmining Value Added, λ = Optimal versus 1600

Panel A. Trend value added, levels (natural logaritms)



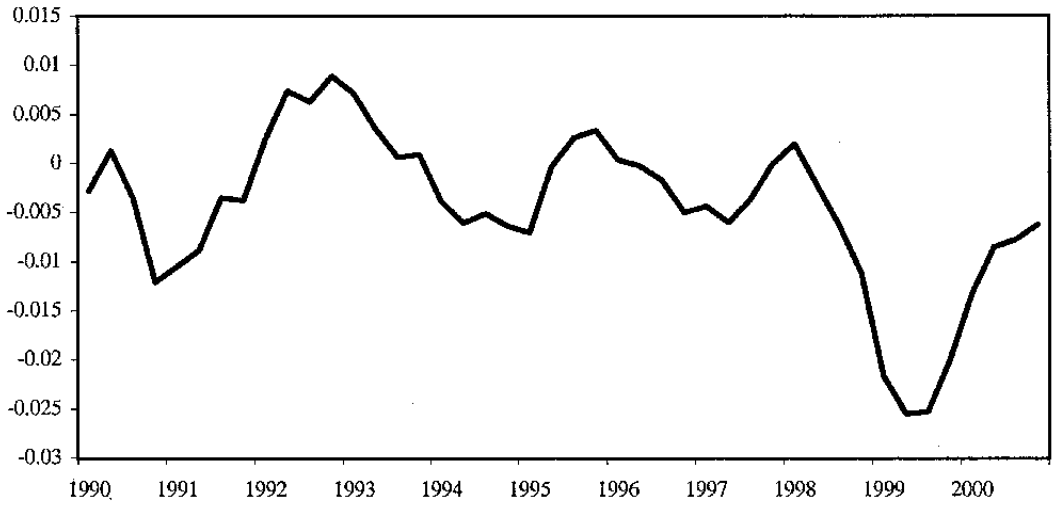
Panel B. Trend annual growth rate



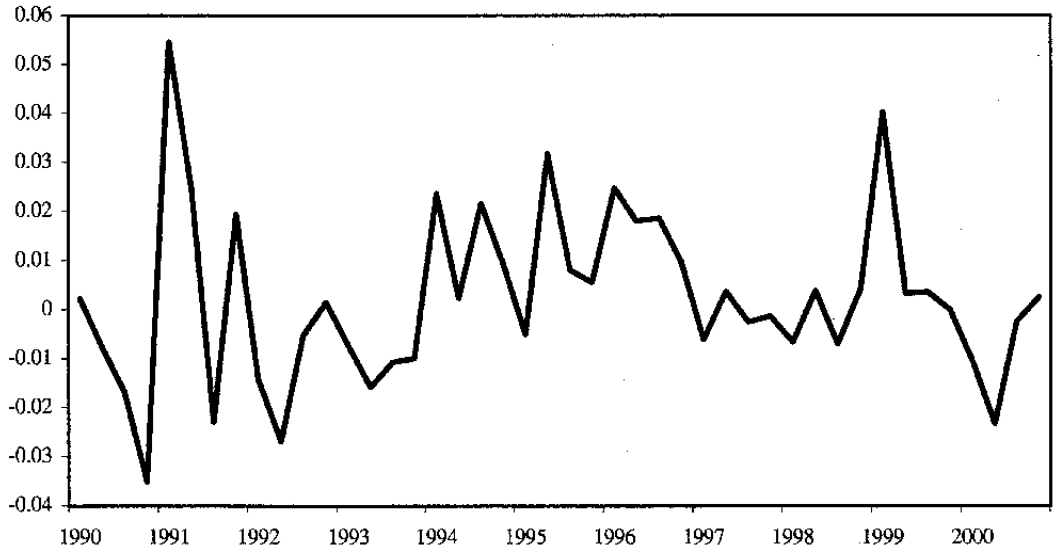
Source: Benco Central de Chile and staff estimates.

Figure 8. Chile: Local Linear Trend Model:
Cyclical Components, 1990-2000

Panel A. Nonmining output (natural logarithm)



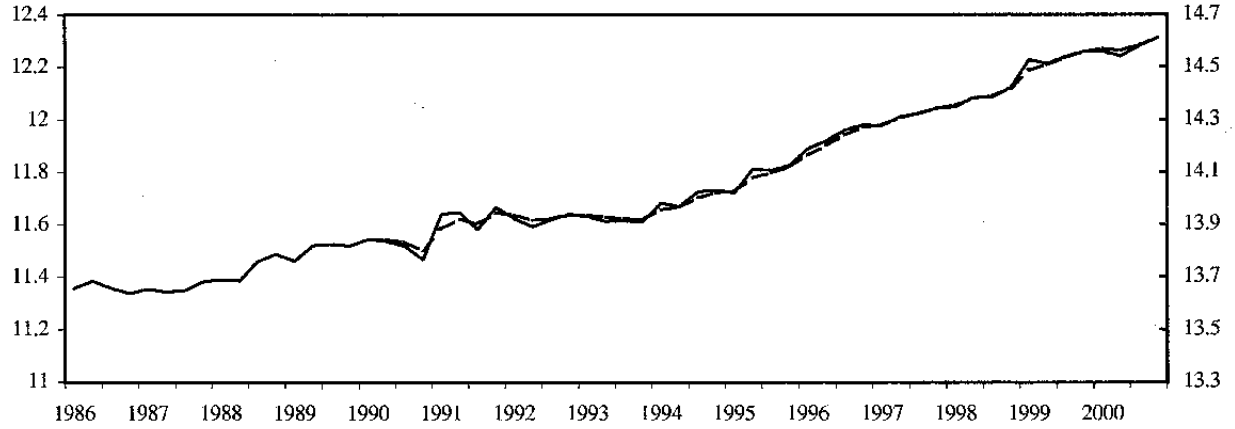
Panel B. Mining sector output (natural logarithm)



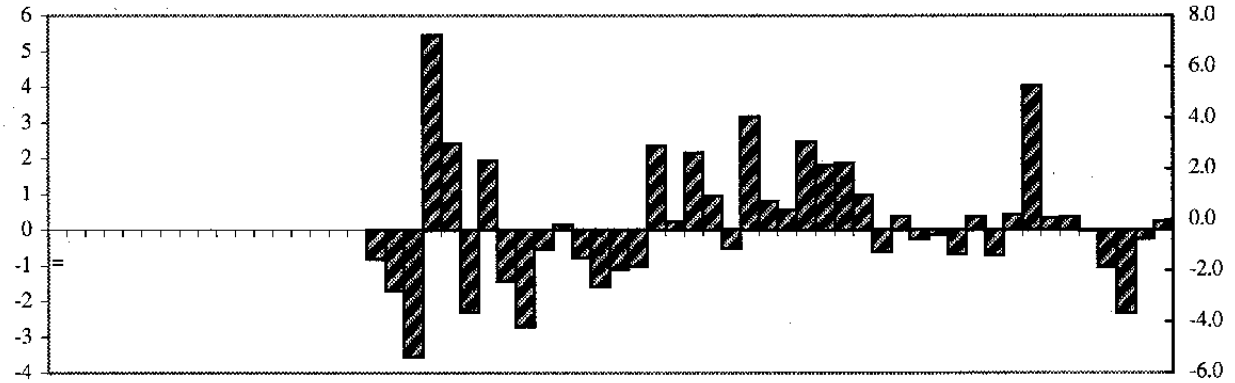
Source: Central Bank of Chile and Fund staff estimates.

Figure 9. Chile: Nonmining Value Added and Local Linear Trend, 1986-2000

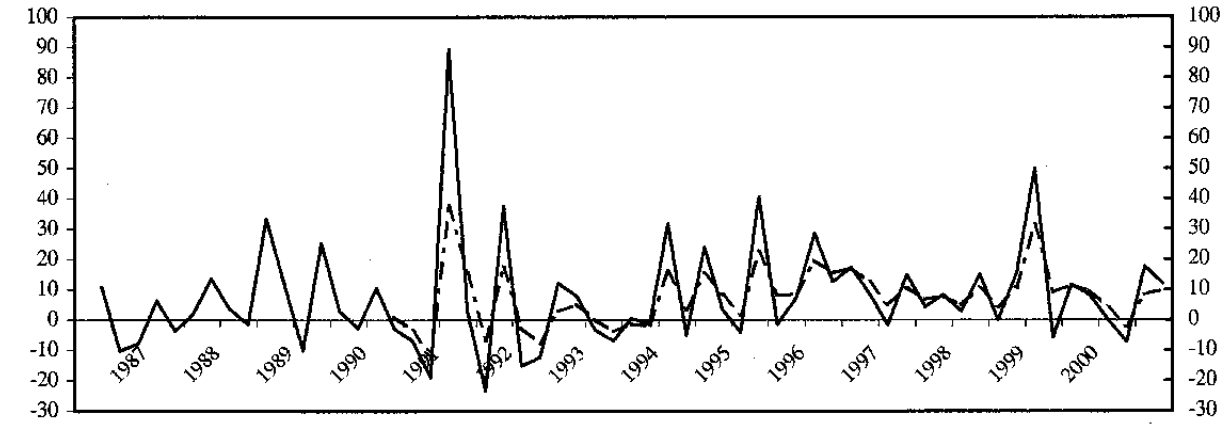
Panel A. Value added, levels (nat. logaritms, potential ouput: broken line)



Panel B. Output gap (percent of trend output)



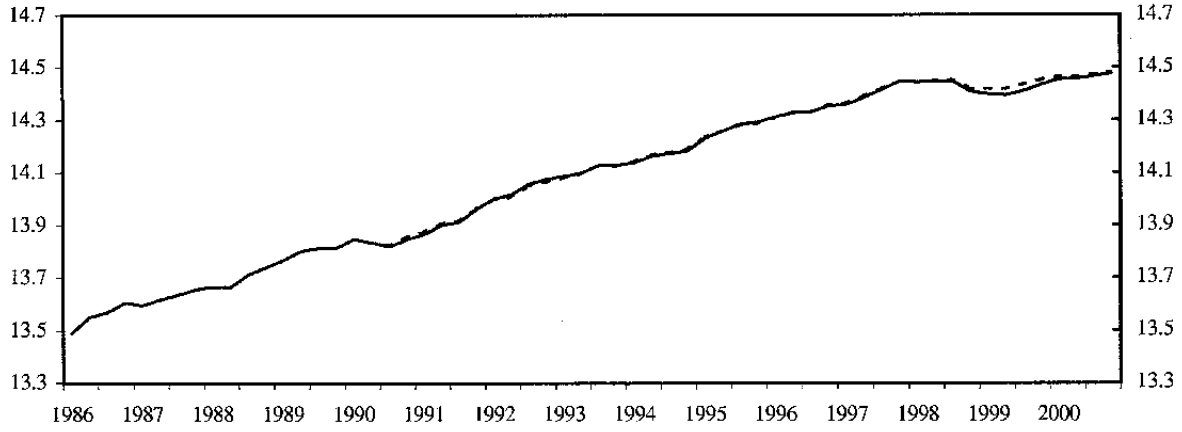
Panel C. Annual growth rate, potential output growth: broken line



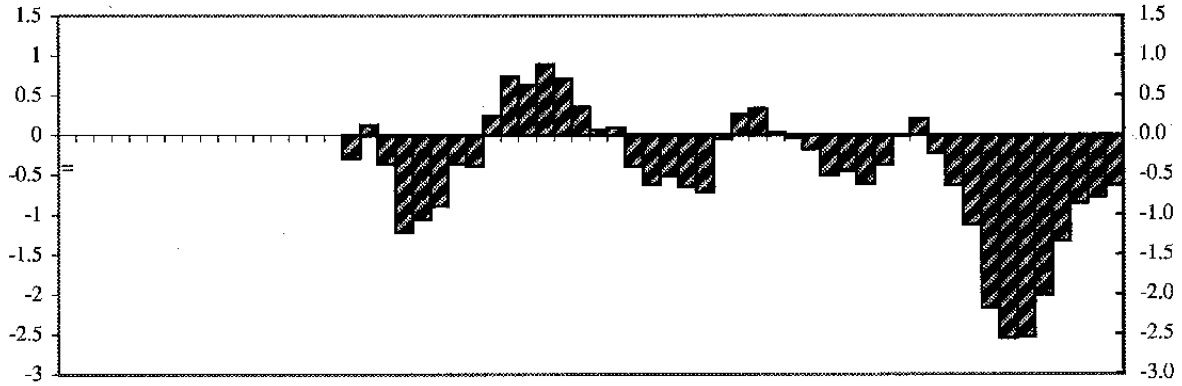
Source: Central Bank of Chile and Fund staff estimates.

Figure 10. Chile: Nonmining Value Added and Local Linear Trend , 1986-2000

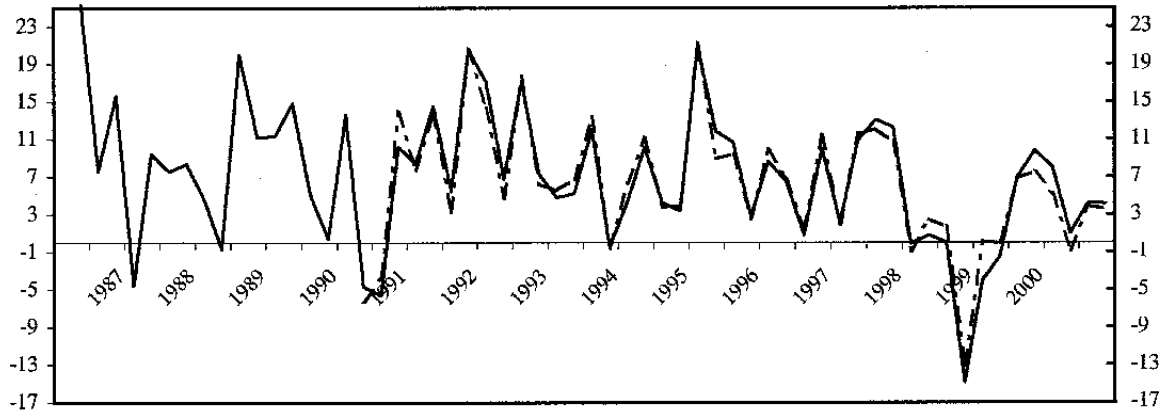
Panel A. Value added, levels (nat. logaritms, potential output: broken line)



Panel B. Output gap (percent of trend output)



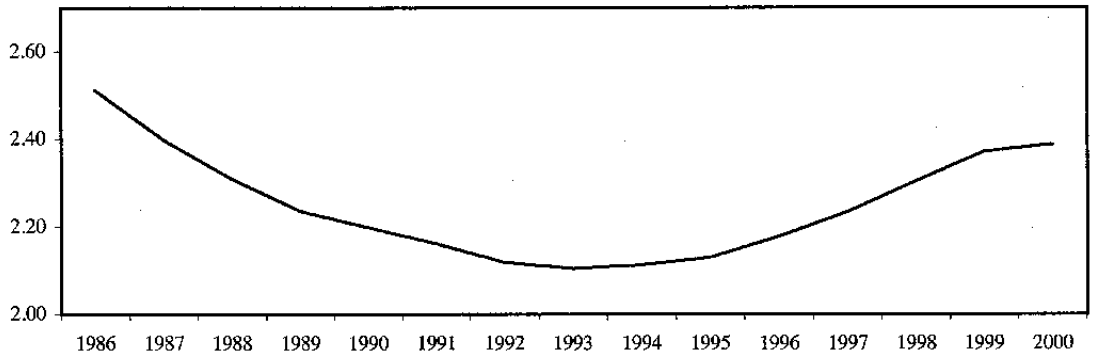
Panel C. Annual growth rate; (potential output growth: broken line)



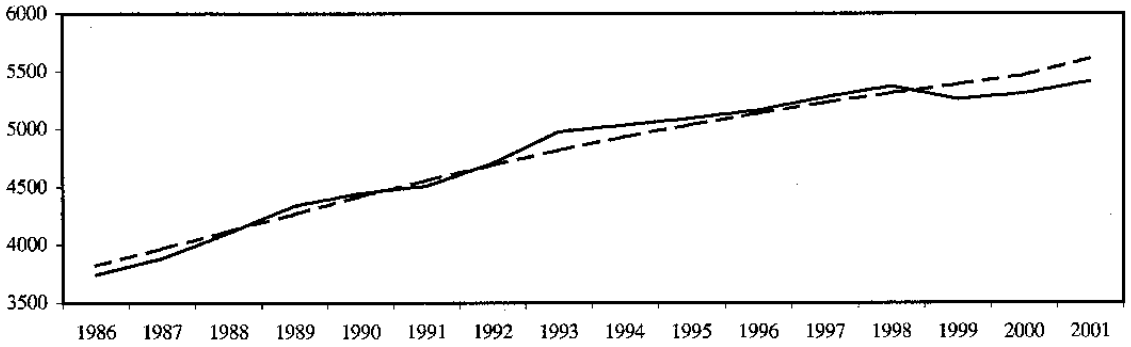
Source: Central Bank of Chile and Fund staff estimates.

Figure 11. Chile: Factor Inputs and Total Factor Productivity, 1986-2000

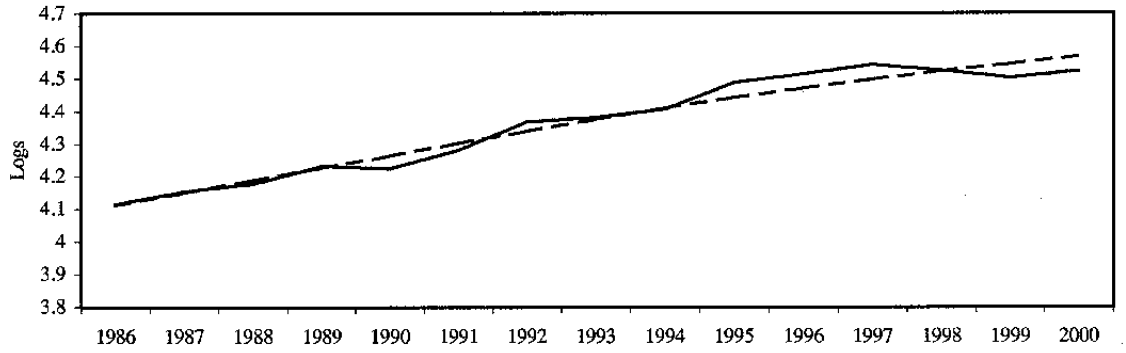
Panel A. Capital-output ratio



Panel B. Potential and actual employment



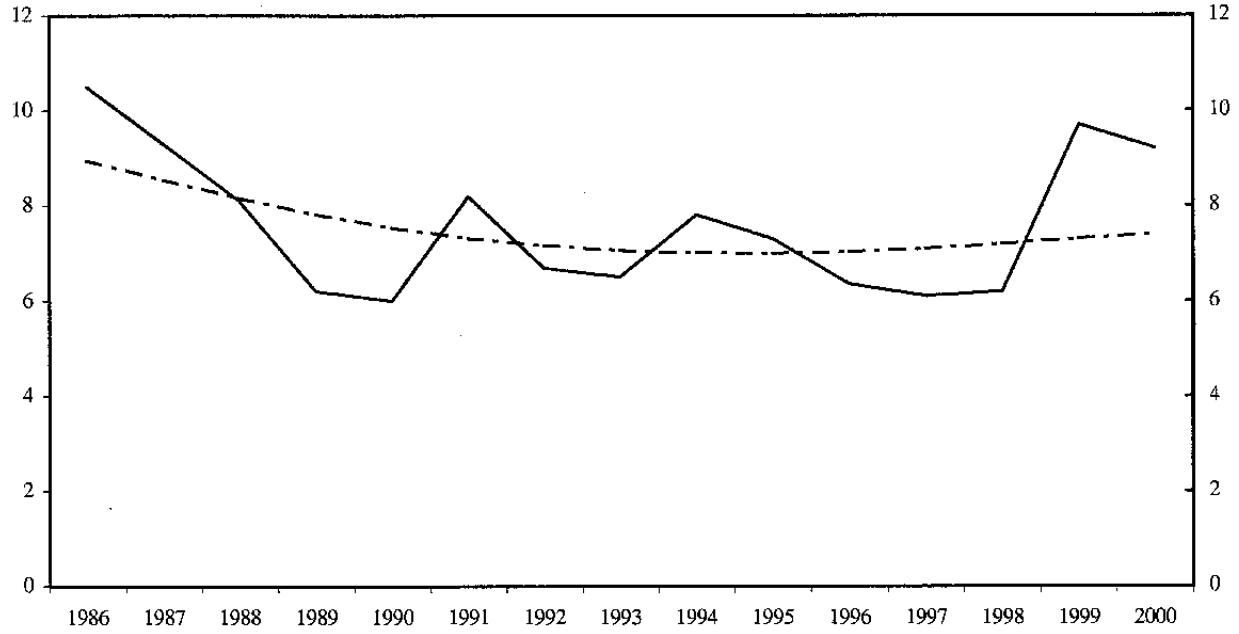
Panel C. Total factor productivity and H-P trend (lambda=100)



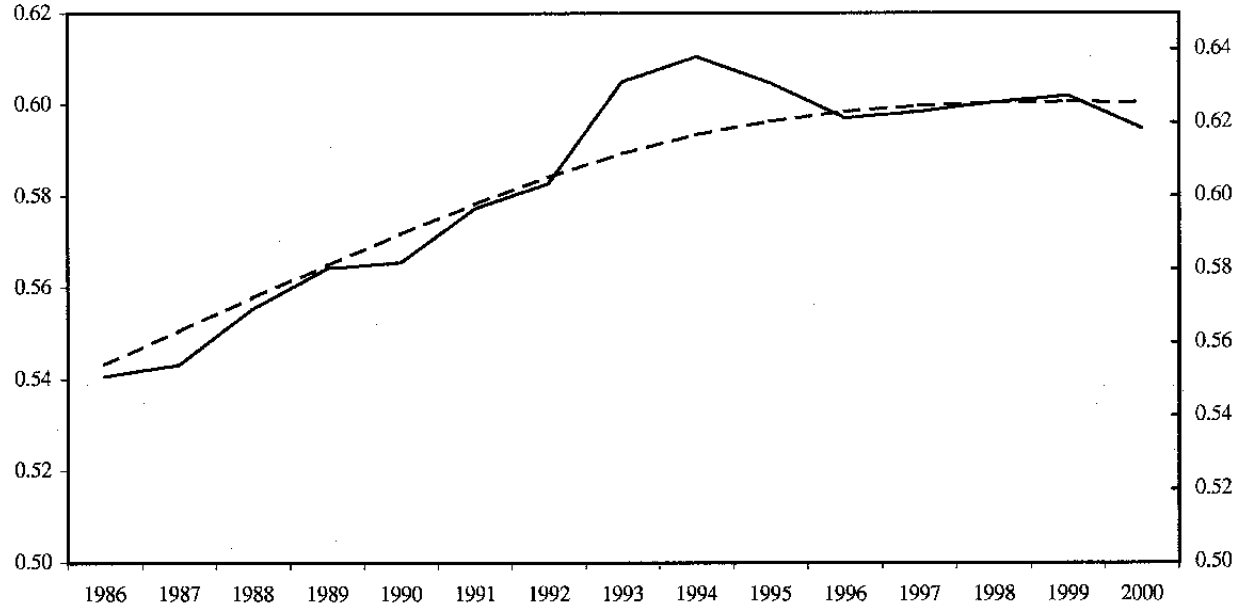
Source: Central Bank of Chile and Fund staff estimates.

Figure 12. Chile: Trend Unemployment and Participation Rate, 1986-2000

Panel A. Unemployment rate and smoothed NAWRU indicator (lambda=100)



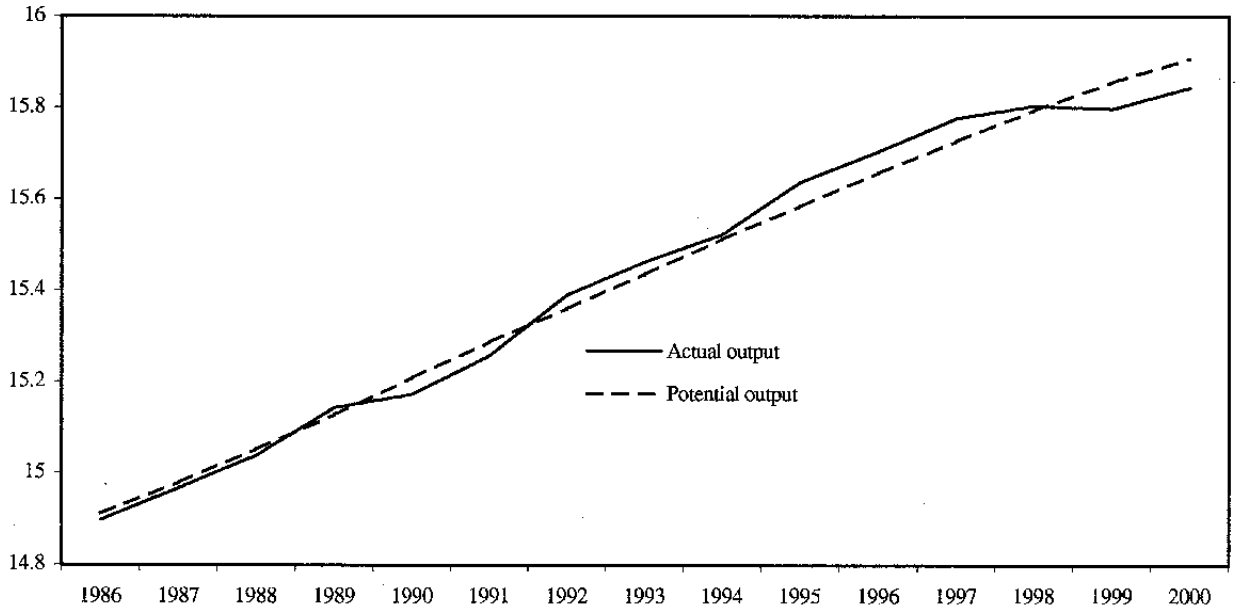
Panel B Labor Market Participation Rate and H-P trend (lambda=100)



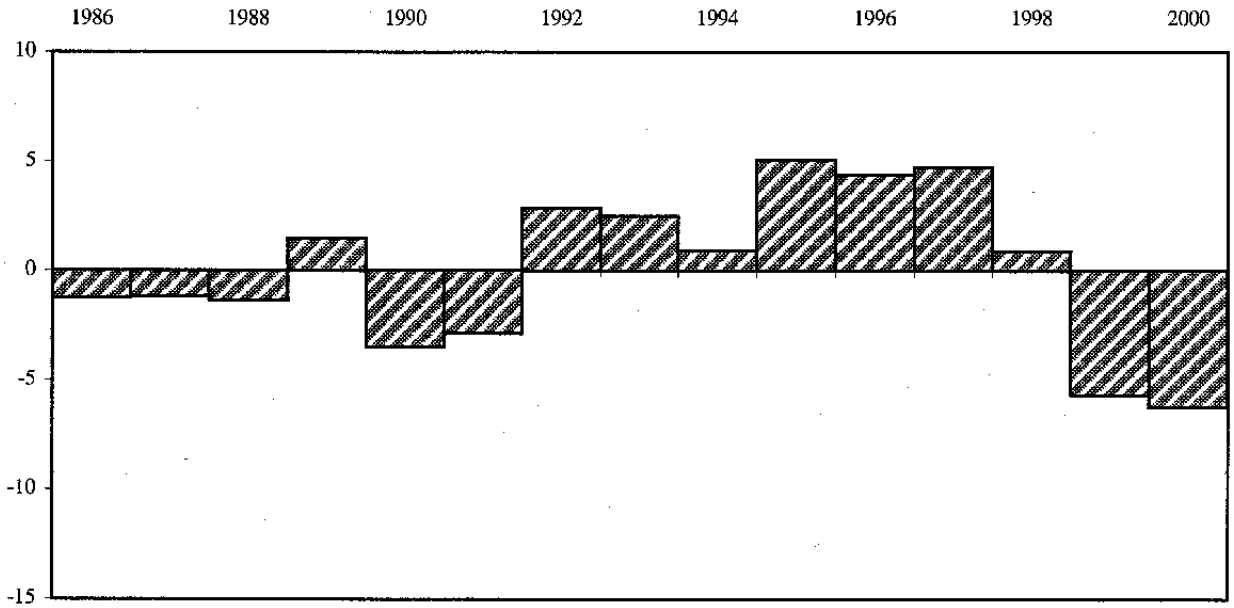
Source: Central Bank of Chile and Fund staff estimates.

Figure 13. Chile: Normalized Potential Output—"Production Function Approach," 1986-2000

Panel A. Log levels



Panel B Output gap (percent of potential output)



Source: Central Bank of Chile and Fund staff estimates.

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(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
I. Central Government			
1. Taxes on net income and profits			
1.1 Tax on corporations			
1.1.1 Corporate income tax	A tax on earned income by corporations called First Category Tax. Paid on income from manufacturing, commerce, mining and other extractive activities, real estate, services and activity of agricultural enterprises. In agriculture, income of farmers whose annual sales do not exceed 8,000 UTM and who own the land they work, is presumed to be 10 percent of the value of fixed capital. For those farming land that they do not own, income is presumed to be 4 percent of the fixed capital. Income from nonagricultural real estate is presumed to be 7 percent of its value. Companies whose average monthly income over the latest three years was less than 250 UTM can opt for a simplified system according to which they pay the tax on the sum of distributed profits and the differences in company's own capital between the beginning and the end of the year.	Companies that declare this tax on the basis of detailed accounts can take credit of 4 percent on investment in fixed capital, up to a total of 500 UTM. 1/ **Exempt:** General government, municipalities, savings, social security and mutual-assistance associations, central bank, charitable institutions. Companies in Region 12—Magellan and Antarctic, and companies in Duty Free Zones.	15 percent.
1.1.2 Tax on indirect distributions (Article 21 DL 824)	A tax on cash payments by corporations and payers of the tax referred to in (1.5) for expenses not considered necessary. Also taxable are loans made by partnerships to their individual partners.		35 percent.
1.2 Tax on financial income (Article 20, No. 2, DL 824)	A tax on resident individuals, applicable to income generated by the ownership of shares of foreign corporations.	None.	15 percent.
1.3 Special taxes on small business			
1.3.1 Tax on small artisan miners	A tax on miners who have at most five employees, and on partnerships or cooperatives of at most six miners. The base is the net sales of minerals.	None.	A variable rate between 1 percent and 4 percent which depends on the world price of minerals.
1.3.2 Tax on street vendors	A fixed tax on street vendors	None.	Market vendors, half UTM per year. Stationed vendors, half UTM per year.
1.3.3 Tax on newsstands	A tax on vendors of newspapers, magazines, and related printed material.	None.	0.5 percent of the value of the sales. If also selling cigarettes, lotteries, etc., add 1/4 UTM per year.

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
1.3.4 Tax on small workshops	A tax on sole proprietors of small workshops.	None.	3 percent of gross revenue (1.5 percent if predominant source of income is production of goods), due monthly. Annual make-up payment required if sum of inflation-adjusted payments fall short of two December UTMs.
1.3.5 Tax on small fishing enterprises	A tax on small fishing enterprises operating one or two boats.	None.	0.5 UTM if gross tare is under 4 tons; 1 UTM if gross tare is between 4 and 8 tons; 2 UTM if gross tare is between 8 and 15 tons.
1.4 Taxes on income of mining and transportation companies			
1.4.1 Tax on income of miners	When not determined according to (1.1.1) or (1.3.1), for miners with annual sales not exceeding 36,000 tons of nonferrous minerals and/or 6,000 UTA (2,000 UTA beginning with the 2003 tax year) the income is imputed by applying a factor on net sales. For copper, gold and silver the factor varies between 4 percent and 20 percent, depending on the world price of these metals. For other minerals the factor is 6 percent. The scheme includes the sales of processed minerals, provided they are mostly of own extraction.	None.	15 percent of net income.
1.4.2 Tax on income of transportation companies	Net income of city or road transportation companies (either passengers or cargo) whose annual sales do not exceed 3,000 UTM is imputed as 10 percent of the value of the vehicle.	None.	15 percent of net income.
1.5 Additional tax on foreign residents	A tax on the income from Chilean sources made available to nonresidents. Tax base includes royalties, technical assistance, interest paid by nonfinancial entities, insurance premia, earnings of Chileans living abroad, and remittances of foreign investors under the Foreign Investment Statute (DL 600).	**Exempt:** new equity originated from taxed profits; return of capital; interest on debt of government, central bank, CODELCO, and on Latin American Banking Acceptances; payments abroad for freight insurance services (not premia), telecommunications, and processing of Chilean products.	35 percent general. 30 percent on amounts paid to nonresidents for the use of trademarks, patents, formulas and advisory services. 20 percent on personal work in scientific, cultural and sport activities; on engineering services performed abroad; and on movie and television rights. 5 percent on gross value of foreign participation on ship freights, to and from Chile, granted exemption on the basis of reciprocity. 4 percent on interest earned on deposits in authorized financial institutions, loans granted by foreign banks, bonds and debentures denominated in foreign currency, and bonds, debentures and other paper denominated in foreign currency issued by the Government of Chile or the Central Bank of Chile. Foreign investors under the Foreign Investment Statute (DL 600) may opt, when signing the initial investment contract, for a 42 percent tax rate that is guaranteed for a period of 10 years. **Tax credit** of 0, 10 or 15 percent of the amount remitted,

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
			according to the rate at which it was taxed.
1.6 Tax on state-owned enterprises (Decree-law 2,398)	A surtax applies to state enterprises	**Exempt:** the central bank, enterprises organized as stock corporations, and enterprises belonging in part to the private sector.	40 percent on the share of the state in profits.
1.7 Taxes on individuals			
1.7.1 Personal income tax (Decree-law 824)	The personal income tax, called Second Category Tax, paid on income from wages, salaries, bonuses, and all other revenue ratios for personal services, pensions, and income obtained through representation expenditures. For farm workers, income base is the same as that used for Social Security Contributions. All income earned by individuals is subject to a Global Complementary Tax at the same rates as the Second Category Tax. All taxes paid before on the same income (First Category, fees, etc.) and a tax credit of 10 percent of one UTA are netted out to determine the Net Complementary Tax due.	**Exemptions:** Income up to 10 UTM. **Deductibles:** 20 percent of investment in shares if by December 31, the investment took place more than 360 days ago; up to 50 UTA, 50 percent, and then 20 percent, of dividends from corporations and capital gains or losses from sale of equity; for taxpayers covered by Art. 57 bis b), average effective rate applied to the year's net savings; if net savings is less than zero, tax must be paid.	**Income Classes 2/** **Percent Rate** 10–30 UTM 5 30–50 UTM 10 50–70 UTM 15 70–90 UTM 25 90–120 UTM 35 Over 120 UTM 45 Income of farm workers in excess of 10 UTM 3.5
1.7.2 Tax on taxi-drivers	Instead of the tax referred in (1.7.1) taxi drivers who do not own the car pay a fixed monthly tax.	None.	3.5 percent on the value of two UTMs.
2. Social security contributions	Private social security system is funded by a levy on all civilian wages and salaries. Additional levy required to purchase invalidity and survival insurance. There are various differentiated rates for persons still in the public security system. There is no tax on employers.	**Exempt:** military personnel; remuneration in excess of 60 UF. 3/	10 percent for pensions and 3.5 percent for insurance.
	Health insurance	**Exempt:** remuneration in excess of 60 UF.	7 percent.
3. Property taxes			
3.1 Net wealth tax	None.		
3.2 Additional real estate tax	A surtax to the municipal real estate tax (II.1) is imposed by the General Government. The surtax applies to nonfarm real estate. It is collected together with the municipal tax.		
	(i) For municipalities that have agreed to the reappraisal of real estate:	**Exempt:** houses valued at less than Ch$33.6 million (1999 prices).	0.025 percent of municipal real estate tax.
	(ii) For other municipalities, until December 31, 1999 or the date municipal authorities agree to the reappraisal of real estate, whichever is earlier:	**Exempt:** houses valued at less than Ch$18.8 million (1999 prices).	30 percent of municipal real estate tax.

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
3.3 Tax on gifts and inheritance (Law 16,271)	A progressive tax on net wealth obtained through gift or rights of inheritance. The tax is to be paid within two years from the date the transfer was effective.	**Excluded from the base:** low-valued houses and forests. **Exemptions:** spouses, parents, children up to 50 UTA for inheritance, up to 5 UTA for gifts; relatives up to fourth degree up to 5 UTA for gift and inheritance.	**Value of Inheritance of Gift** / **Percent Rate** Up to 80 UTA 1.0 From 80 to 160 UTA 2.5 From 160 to 320 UTA 5.0 From 320 to 480 UTA 7.5 From 480 to 640 UTA 10.0 From 640 to 800 UTA 15.0 From 800 to 1,200 UTA 20.0 More than 1,200 UTA 25.0 **Surcharge:** spouses, parents, children exempt; relative up to fourth degree, 20 percent; other relatives, 40 percent.
4. Taxes on goods and services			
4.1 Value-added tax (Tit. II of DL 825)			
4.1.1 General value-added tax	A comprehensive and uniform tax on sales of goods and services. Includes construction industry (Law 18,630), sales to government, and importation.	**Exempt sales:** in-kind payments to employees, food provided on premises to employees and students, nonadvertisement income of television and radio stations, news services, mass transportation, schooling, charges by state hospitals and health institutions, sales by Casa de Moneda, state lottery, used cars (see 4.1.3). **Exempt imports:** defense and police weaponry and supplies, effects belonging to diplomats and employees of international organizations, donations to qualified institutions, tourists effects, in-transit items, inputs to be used in production for exportation, capital goods for qualified projects, artistic, cultural and sport performances and awards, international freight and travel, some international insurance premia, receipts subject to the income tax (such as interest, rents, personal services). **Deductions from the base:** rebates granted to buyers after sale, and refunds, net of canceled purchases. Tax credit granted for the tax paid on purchases of goods and services. **Exports not taxed;** reimbursement still granted for tax paid on purchases of inputs for exports. Advance tax credits can be granted on purchases related to qualified export-oriented projects, deductible from VAT credits on actual exports when the project comes on stream.	
4.1.2 Additional value-added tax on luxuries	Besides being subject to the general VAT tax, some goods are subject to an additional tax with a structure similar to the general VAT.	Tax credit granted for the additional tax paid on purchases of goods subject to the additional tax.	15 percent for jewelry, precious stones, fine furs, and tapestry, trailers, caviar, fireworks, airguns. 15 percent on wine, and 13 percent on nonalcoholic

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
			beverages. Liquors, pisco, raw brandy, and distillates as follows: **Alcohol Grade Scale** — **Percent Rate** Less than or equal to 35° — 27 More than 35° and less than 36° — 31 More than 36° and less than 37° — 35 More than 37° and less than 38° — 39 More than 38° and less than 39° — 43 More than 39° — 47
4.1.3 Tax on sales of used automobiles	A tax on the sales of used motor vehicles, which excludes the VAT (but VAT is due if vehicle is bought abroad).	**Exempt**: mass transportation vehicles, trucks, vans, and pickups (provided driver and cargo compartments are not the same).	0.5 percent of the transaction price. Starting on January 1999 this tax started to be levied by municipalities.
4.1.4 Tax on imported cars (I)	The importation of motor vehicles, assembled or not, is subject to this addition to VAT. The base of the tax is the import value.	**Exempt**: passenger vehicles with 15 or more seats, tractors, trailers, other classified in position 87.03 of tariff, automobiles of less than 1,500 cc. Tax rate is lower for small pickup trucks.	Rate = (cc x 0.03 - 45), where cc stands for number of cubic cm of piston displacement. The rate is then lowered by a percentage (equivalent to 80 percent in 1997) that has been increased by 10 percent yearly since 1990. Small trucks and buses with 500–2,000 kg payload capacity are subject to a 75 percent rebate on the tax rate with a maximum effective rate of 15 percent. Maximum tax in 1999: US$7,503.55 per vehicle.
4.1.5 Tax on imported cars (II)	In addition to the tax (4.1.4), the importation of motor vehicles, assembled or not, for passengers or cargo, which can carry up to 2,000 kg is subject to this addition to VAT. The base is the import value in excess of US$15,000.00	The exemption list is the same as for (4.1.4).	85 percent.
4.2 Selective excises			
4.2.1 Tax on tobacco	A tax on sales of cigarettes, cigars and processed tobacco. The tax base is the consumer price (with the inclusion of the tax itself).	**Exempt**: small amounts brought by passengers for self-consumption; exports.	45.4 percent on cigarettes, 42.9 percent on tobacco products, 46 percent on cigars. Starting in January 1999 these rates changed respectively to 50.4 percent, 47.9 percent and 51 percent.
4.2.2 Surcharge on tobacco	A surcharge on sales of tobacco.	**Exempt**: small amounts brought by passengers for self-consumption; exports.	10 percent.
4.2.3 Tax on gasoline and diesel	A tax on the first sale or importation of gasoline and diesel oil.	In the case of diesel oil, a tax credit is given against the VAT if the vehicle is not used for transportation.	4.4084 UTM per cubic meter of gasoline. 1.5 UTM per m3 of diesel oil. The rate on gasoline increased to 5.2 on January 2000 and will increase to 6 on January 2001.
5. Taxes on international transactions			
5.1 Import duties			
5.1.1 General tariff	A general and uniform tariff. The base is the customs value; if unknown, the c.i.f. value. The tax is assessed in U.S.	**Exempt**: boat engines and worktools for small fishery and imports for use in Region XII (for South) enjoying	9 percent normal, 5 percent on imports to free zone (rate valid from April 1, 1999 to March 31, 2000). Starting in

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
	dollars.	preferential treatment. **Reduced rate**: special vehicles for the handicapped pay half the normal rate.	January 2001 the rate will be reduced to 8 percent, in January 2002 to 7 percent and in 2003 to 6 percent. Surtaxes ranging from 5 percent to 24 percent and countervailing duties can be imposed on import prices intended to seriously harm domestic industry. If imported goods are used as input of export goods, the exporter can claim return of the tax paid. The tax on the import of capital goods can be deferred up to seven years.
5.1.2 Fee on exempt imports (Article 221 Law 16,840)	A charge ("tasa de despacho") imposed on all goods exempt of custom duties.	None.	5 percent on c.i.f. value.
5.1.3 Equalization duties (Article 12 Law 18,525)	Duties on the importation of certain commodities adjusted so as to keep the domestic prices of wheat, oilseeds, cooking oil and sugar within a band related to past world prices. These price bands are revised annually.	None.	Rates fluctuate in response to the changing prices of each commodity in world markets.
5.2 Export duties	None.		
5.3 Other customs duties	Chile also has the following customs revenues, not detailed here: extension of provisional admissions of foreigners (DEC.Hac.175/74), charge for storage in private warehouses prior to payment of duties (Article 140 ss. Ord), consular rights on ships and airplanes, balance of insurance policies, outturn of customs actions.		
6. Other taxes			
6.1 Stamp duties (see also 5.1.2)			
6.1.1 Tax on credit instruments	A tax on financial papers. The specific amounts, expressed in Chilean pesos, are revised twice a year according to inflation.	None.	Per check drawn on domestic banks Ch$127. Per check issued without enough provision, or per unpaid draft of promissory note: 1 percent of value, minimum Ch$2,128. For checks only, a maximum of one UTM. Credit instruments: 0.1 percent of value, per month, maximum 1.2 percent. Starting on January 2002 these rates will change respectively to 0.134 percent and 1.608 percent. Contracts at call: 0.5 percent. Starting on January 2002 this rate will increase to 0.67 percent.
6.2 Fee on mining licenses (Law 18,248)	A tax on rights of exploration and mining concessions.	None.	Rights of exploration: one-time payment of 2 percent of one UTM depending on extension of land. Mining concessions: 10 percent of one UTM per hectare per year.
6.3 Taxes on gambling	Three taxes are imposed on games of chance: (i) a tax on the selling price of the sport lottery (Sistema de Pronosticos Deportivos), not including the tax itself; and on		15 percent on lotteries. 0.07 x 1 UTM per casino admissions. 3 percent on horse racing bets.

(All amounts in Chilean pesos)

Tax	Nature of Tax	Exemptions and Deductions	Rates
	the tickets of the national lottery system (Polla Chilena de Beneficiencia and the Concepcion lottery). (ii) a specific tax on each individual admission at casinos; (iii) an ad-valorem tax on horse racing bets.		
6.4 Taxes on civil registration	A tax on the issuance of certificates of birth, marriage, residence of aliens, criminal records, police ID, family data, passports-- details not available.		
II. Municipalities			
1. Real estate tax	Annual tax on value of real estate land. 40 percent of the proceeds is distributed to the municipality of origin and 60 percent goes to a common fund, which in turn is distributed according to social criteria.	**Exempt:** houses valued at less than Ch$9.9 million (2001 prices).	Once reappraised, 1.4 percent if value exceeds Ch$35.5 million; and 1.2 percent if value is below Ch$35.5 million.
2. Motor vehicle duties	Two fees are imposed on motor vehicles: (i) a fee on motor vehicle permits, paid annually. (50 percent of proceeds goes to the municipalities' common fund.)	None.	On a progressive scale according to the vehicle's value.
	(ii) a fee on motor vehicles transactions (50 percent of proceeds goes to the municipalities' common fund.)		1 percent of the vehicle's value.
3. Business duties	A fee charged for vehicle permits, paid annually. (100 percent of proceeds goes to the municipalities' common funds).	None.	

Sources: Ministry of finance, *Dirección de Presupuestos, Cálculo de Ingresos Generales de la Nación Correspondiente al Año 2000*, Santiago: November 1999 and information provided by the Chilean authorities.

1/ UTA stands for *Unidad Tributaria Anual* (annual tax unit), and corresponds to 12 times the value of a December's UTM (*Unidad Tributaria Mensual*) or monthly tax unit. The UTM is adjusted each month according to the change in average price level in the second-past month. In December 2000 one UTM was worth Ch$27,600 and reflected changes in the price level as per December 31, 1999.

2/ The monthly withheld tax on labor income is computed using the same progressive schedule, but using UTM instead of UTA.

3/ UF stands for *Unidad de Fomento*, a price reference unit widely used in financial contracts which is adjusted daily. A schedule from the 10th of each month to the 9th of the subsequent month reflects changes in the price level in the previous month. On December 31, 2000, one UF was worth Ch$15,769.92 and reflected changes in the price level as per December 31, 1999.

CHILE: MAJOR MONETARY AND BANKING MEASURES IN 2000–01

February 2000

3

Banks were allowed to issue Deposit Certificates abroad, under the same conditions as those needed to issue bonds.

April 2000

17

The exchange regulations in the CIER were renewed for a period of one year.

20

Chilean companies were authorized to also list their shares in foreign markets in which American Depository Receipts (ADRs) are not traded, as long as they comply with the same conditions that apply for issuing ADRs. At the same time, investment funds for development of companies and real estate investment were authorized to subscribe their quotas in foreign markets.

May 2000

10

Chilean banks were authorized to provide guarantees or finance to foreign financial institutions, but only in operations related to the financing of international trade between third countries.

11

The one-year withholding requirement for foreign investments covered by Chapter XIV of the CIER was eliminated. Along with this measure, it was announced that:

- Banks and third parties were authorized to trade forward contracts with foreign counterparts involving Chilean currency (either the peso or the inflation-indexed UF).

- Banks were allowed to hedge credit risk associated with their fixed-income portfolio and commercial loans with residents, using financial derivatives, for both local and foreign currency.

- The regulation authorizing the issuance abroad of peso- or UF-denominated bonds was revised so that such instruments would be treated, for regulatory purposes, as obligations payable in foreign currency. (One immediate implication was that the tax applied to interest payments on UF-denominated bonds issued abroad was reduced from 35 percent to 4 percent.)

25

Credit unions supervised by the Superintendency of Banks and Financial Institutions were authorized to opt for compliance with the Basle criteria in respect of required capital as an alternative to observing the applicable maximum ratio between their current liabilities and respective paid-in capital and reserves. Thus, credit unions choosing this new alternative must: (i) establish legal reserves of UF 400,000 or more; (ii) have real net worth of not less than 10 percent of their risk-weighted assets and not less than 5 percent of their total assets; (iii) comply with the Central Bank of Chile's rules on matching; and (iv) obtain the authorization of the Superintendency of Banks and Financial Institutions, which will approve the request if the credit union meets the above requirements and it finds the quality of management and the technical capabilities to be satisfactory overall.

Credit unions that opt for the Basle criteria, comply with the above requirements, establish the required technical reserve, and have due authorization from the Central Bank of Chile were also authorized to issue credit cards and carry out credit card transactions.

August 2000

3

The Clearing House Regulation on checks and other instruments in local currency was amended so that, effective September 13, 2000, the time required to clear checks from other financial centers will be reduced by one day; the funds will therefore be available to users on the fourth day after the check is deposited.

3

Banks were authorized to approve the opening of demand accounts in foreign currency. These accounts will earn no interest and will be nonadjustable.

To reduce the costs of issuing and processing letters of credit and contribute to the current trend toward paperless issues of all types of financial instruments, banks and finance companies were authorized to issue letters of credit in book-entry form, in accordance with the provisions of Law 18.876 on the Organization and Operation of Private Deposit and Securities Custody Institutions. It was specified that if the book entry is made before the letters of credit are placed in circulation, temporary certificates must be issued in physical form, containing the same terms as the letters of credit that would have had to be issued for purposes of the respective mortgage loan.

10

The ceiling on the overdrafts that banks can allow on bank current accounts was eliminated. This could not exceed the equivalent of UF 30 for each customer and was applicable to banking institutions which, in the process of classification of their loan portfolios, had not been rated one or more times in succession in category I by the Superintendency of Banks and Financial Institutions, and for as long as they retain that status.

28

It was decided to reduce the monetary policy rate by 50 basis points, from UF+5.5 percent to of UF+5.0 percent annually. In addition, the liquidity line of credit tranches were adjusted by the same amount, setting the first tranche at the key rate while the second and third tranches were set at UF+7.00 percent and UF+9.00 percent, respectively. The liquidity deposit rate was set at UF+4.00 percent.

September 2000

14

To maximize development of the financial market and continue completing the market, the Board of the Central Bank of Chile made the following changes in the regulations governing savings, deposit-taking and intermediation, and financial supervision, contained in the Compendium of Financial Regulations:

- Banks and finance companies were authorized to debit—at the request of the holders of term savings accounts, deferred-withdrawal term savings accounts, and demand savings accounts—said holders' respective accounts with the amounts of life insurance and/or disability premiums they owe an insurance company. These debits will not be considered withdrawals for purposes of determining whether the holder is entitled to adjustments.

- Banks and finance companies established in Chile were authorized to carry out—among themselves or with any other person domiciled and resident in the country—short sales operations, i.e., operations in which instruments with a restitution obligation are bought or sold, it being further established that the instruments involved in short sales must be instruments issued by the Central Bank of Chile in the context of short sales operations and bonds and letters of credit issued by banks or finance companies, payable in local currency.

- It was established that the liabilities contracted by banks and finance companies in short sales of the above-mentioned Central Bank of Chile instruments will be exempt from the monetary reserve requirement (*encaje monetario*).

- The regulations on interest rate matching, allowing financial institutions to offset their asset positions in financial investments not included in the "permanent portfolio"("trading" investments) with the corresponding liabilities, were eased.

- Banks and finance companies were authorized to engage in derivatives operations involving fixed-income instruments issued by the Central Bank of Chile in the context of open market operations as well as bonds and letters of credit issued by banks and finance companies established in Chile, payable in local currency.

14

In addition to the assets in their portfolio of loans or previously authorized investments, banks and finance companies were authorized to sell or transfer the following to securitization companies and securitized credit investment funds:

- Nonendorsable mortgage loans, issued by themselves or by other financial institutions, with the exception of mortgage loans granted through the issuance of letters of credit as mentioned in Title XIII of the General Banking Law;

- Loans in their commercial loan portfolio;

- Outstanding balances resulting from the sale of real property received in payment of past-due debts or acquired in a judicial auction in the same circumstances, in accordance with the provisions of Article 84(5) of the General Banking Law.

It was further established that as in the case of investments in securities issued by the Central Bank of Chile, the requirement of at least one annual sale or transfer will not apply to loans in the commercial loan portfolio or to the above-mentioned outstanding balances.

To promote modernization of the country's payment systems, the Board of the Central Bank of Chile decided to adopt a plan of action to bring the country's payment systems into conformity with the highest international standards in this area.

The Board of the Central Bank of Chile agreed the following:

- To approve a work program designed to promote rapid modernization of the payment systems. To that end, the central bank will work closely and will form one or more working groups with the authorities of the Superintendency of Banks and Financial Institutions and other official entities, as well as with the Association of Banks and Financial Institutions.

- To define, with advisory assistance from the above-mentioned working groups, the minimum security, transparency, competency, risk-management, and other requirements that large-value payment mechanisms should satisfy. In addition, to

ensure that these systems meet the standards of the "Committee on Payment and Settlement Systems" of the Bank for International Settlements (BIS) in Basle.

- To place in operation in the central bank, beginning in March 2001, an electronic system for bidding on notes and other open market operations;

- In the short term, to amend the Clearing House Regulation on checks and other instruments in local currency, so as to expedite the process and announce clearing balances on the same day that the central bank makes the final settlement.

- In the short term, to make progress in creating a system of financial institution current accounts with the central bank, to facilitate direct access to book balances during banking hours.

- In the future, to adopt the measures, actions, and regulations necessary for a real-time, online interbank payment system known internationally as the RTGS (Real-Time Gross Settlement System), in which payments can be settled on a gross basis and in real time, in current accounts with the central bank.

October 2000

5

The Central Bank of Chile issued a favorable prior opinion on the regulations proposed by the Superintendency of Banks and Financial Institutions, which amend the rules on investments and credit operations carried out by banks abroad or across borders, with a view to facilitating the process of bank internationalization.

For purposes of assigning country risk to credit guarantors, the risk rating that the guarantor bank must have is reduced from risk category one to investment grade. In turn, sureties, guarantors, joint and several debtors, and issuers of stand-by letters of credit are considered credit guarantors. This rule also applies to operations backed by insurance or credit derivatives.

- Securities quoted on official stock exchanges of countries rated at least in category BB- or its equivalent are exempt from the obligation of establishing country risk provisions. Previously, category AA was required as a minimum.

- No country-risk provision is required for loans granted to banks with a residual term to maturity of up to 180 days, nor for operations conforming to certain established definitions, provided that the Board of the respective financial institution has approved the specific types or groups of operations as well as the countries involved.

- Operations subject to the ceiling of 70 percent of real net worth include loans in foreign currency to enterprises listed on exchanges in countries with a risk rating of at

least BB- or its equivalent. These operations are exempt from the 20 percent or 30 percent margin of real net worth.

- Short-term investment instruments without a risk rating may be given the rating of the long-term instruments of the same issuer, with some additional safeguards.

- The risk-rating requirement for short-term investment instruments is lowered by one grade to bring the risk of these instruments into line with long-term instruments.

- Investment alternatives are expanded to include financial investments with no short- or long-term risk rating and whose issuers are located in countries rated at least in category 4 according to the provisions established by the Superintendency of Banks and Financial Institutions. Banks with a Basle indicator of less than 10 percent can make such investments up to an amount equivalent to 10 percent of their real net worth, while for those with a higher indicator this limit is 15 percent of their real net worth.

- Investment alternatives are expanded to include investments in securities issued or guaranteed by international organizations of which Chile is a member.

- Financial investments in securities with no risk rating, issued or guaranteed by governments or central banks, will be given the international risk rating of the country in which the issuer is located.

- Financial investments in structured notes must be issued by investment banks with an international risk rating of AA- or better, and the return on such notes must be pegged to a fixed-income sovereign or corporate instrument with a rating of BB- or better.

January 2001

18

AFPs were authorized to invest up to 5 percent of the type 1 fund in mutual fund shares.

The divisions between the various types of investment fund shares were eliminated, and AFPs were authorized to invest up to 25 percent of the type 1 fund in shares of investment funds and mutual funds.

In addition, the investment ceilings were increased for said type 1 fund, from 37 percent to 40 percent for shares of open corporations and from 10 percent to 40 percent for shares of open real estate corporations.

18

At its monthly monetary policy meeting, the central bank board voted to lower the policy-related interest rate by 25 basis points, from UF+5.00 percent to UF+4.75 percent. The liquidity line of credit tranches were also adjusted by 25 basis points, to UF+4.75 percent, UF+6.75 percent, and UF+8.75 percent. The liquidity deposit rate was reduced to UF+3.75 percent.
25

As part of payment systems modernization, clearing house regulations on checks, operations between finance companies, and payment obligations resulting from ATM transactions were included in the Compendium of Financial Regulations. The regulations of these clearing houses govern the exchange, clearing, and collection of the respective operations.

February 2001

12

Financial institutions were authorized to make unrestricted transfers (by endorsement) of Adjustable-Rate Notes of the General Treasury of the Republic issued pursuant to Law 19.568 and its Regulations, contained in Supreme Decree 946 of the Ministry of Finance, published in the Official Gazette of September 28, 2000.

20

Institutions showing a current account deficit are authorized, pursuant to Chapter III.H.2, Title II, No. 8 of the Compendium of Financial Regulations, to request funds from the Monetary Operations Office between 4:50 p.m. and 5:10 p.m. to cover said deficit, chargeable to the liquidity line of credit, the cost of which will be the third tranche rate. Alternatively, institutions showing a current account deficit may apply to the same office during the same hours to make counter purchases of Central Bank of Chile notes with repurchase agreement to cover said deficit, the rate of interest for these operations being the rate of the second liquidity line of credit tranche.

20

At its monthly monetary policy meeting, the central bank board voted to lower the policy-related interest rate by 25 basis points, from UF+4.75 percent to UF+4.50 percent. The liquidity line of credit tranches were also adjusted by 25 basis points, to UF+4.50 percent, UF+6.50 percent, and UF+8.50 percent. The liquidity deposit rate was reduced to UF+3.50 percent.

March 2001

02

Meeting in special session, the central bank board voted to lower the policy-related interest rate by 50 basis points, from UF+4.50 percent to UF+4.00 percent. The liquidity line of credit tranches were also adjusted by 50 basis points, to UF+4.00 percent, UF+6.00 percent, and UF+8.00 percent. The liquidity deposit rate was reduced to UF+3.00 percent.

15

Credit unions having opted for the capital and other requirements set forth in Chapter III.C.2, numeral 2.1, of the Compendium of Financial Regulations and, in addition, having obtained the requisite approval of the Superintendency of Banks and Financial Institutions, are authorized to open and maintain the housing savings accounts referred to in Chapter III.E.3 of said Compendium.

April 2001

10

At its monthly monetary policy meeting, the central bank board voted to lower the policy-related interest rate by 25 basis points, from UF+4.00 percent to UF+3.75 percent. The liquidity line of credit tranches were also adjusted by 25 basis points, to UF+3.75 percent, UF+5.75 percent, and UF+7.75 percent. The liquidity deposit rate was reduced to UF+2.75 percent.

June 2001

12

At its monthly monetary policy meeting, the central bank board voted to lower the policy-related interest rate by 25 basis points, from UF+3.75 percent to UF+3.50 percent. The liquidity line of credit tranches were also adjusted by 25 basis points, to UF+3.50 percent, UF+5.50 percent, and UF+7.50 percent. The liquidity deposit rate was reduced to UF+2.50 percent.

13

Credits that result from repo sales of financial instruments expressed in, indexed to, or payable in foreign currency, among banks registered in the country do not need to have the same currency denomination than the original instrument any more.

CHILE: MAJOR EXCHANGE AND FOREIGN TRADE MEASURES IN 2000–20001

February 2000

3

Banks were allowed to issue Deposit Certificates abroad, under the same conditions as those needed to issue bonds.

April 2000

17

The exchange regulations in the CIER were renewed for a period of one year.

20

Chilean companies were authorized to also list their shares in foreign markets in which American Depository Receipts (ADRs) are not traded, as long as they comply with the same conditions that apply for issuing ADRs. At the same time, investment funds for development of companies and real estate investment were authorized to subscribe their quotas in foreign markets.

May 2000

10

Chilean banks were authorized to provide guarantees or finance to foreign financial institutions, but only in operations related to the financing of international trade between third countries.

11

The one-year withholding requirement for foreign investments covered by Chapter XIV of the CIER was eliminated. Along with this measure, it was announced that:

- Banks and third parties were authorized to trade forward contracts with foreign counterparts involving Chilean currency (either the peso or the inflation-indexed UF).

- Banks were allowed to hedge credit risk associated with their fixed-income portfolio and commercial loans with residents, using financial derivatives, for both local and foreign currency.

- The regulation authorizing the issuance abroad of peso- or UF-denominated bonds was revised so that such instruments would be treated, for regulatory purposes, as obligations payable in foreign currency. (One immediate implication was that the tax applied to interest payments on UF-denominated bonds issued abroad was reduced from 35 percent to 4 percent.)

June 2000

1

It was determined that enterprises that have issued ADRs need not increase their capital in order for their securities to be traded and listed on the various exchanges on which they were issued.

October 2000

12

To promote the development of financial intermediation in foreign currency by banking institutions with persons domiciled or resident in Chile, the Central Bank of Chile voted to modify and supplement the regulation on deposits and loans in foreign currency set forth in various chapters of the Compendium of Financial Regulations and the Compendium of International Exchange Regulations, thus taking an import step forward in the process of liberalizing the exchange regulations applicable to banking enterprises established in Chile.

Progress was deemed possible in this area, seeing that banks, in accordance with the regulations established by the Superintendency of Banks and Financial Institutions, must consider the foreign exchange mismatches of their customers as part of credit risk. The experience of working with a floating exchange rate for more than a year has helped banking institutions better understand the effects of exchange rate volatility on their customers' financial position and solvency.

As a result of these modifications, banking institutions may also engage in the following operations in foreign currency:

1. Take any foreign currency deposits authorized by the regulation in force, including through savings accounts, whether the latter are demand or term accounts with unrestricted or deferred withdrawals.

2. Extend credit in connection with current accounts and authorize overdrafts on such accounts, in foreign currency.

3. Make commercial and mortgage loans in foreign currency by issuing general-purpose letters of credit to persons domiciled and resident in Chile.

4. Participate in syndicated loans in foreign currency, granted to persons domiciled and resident in Chile, with the exception of banking institutions established in the country, as well as purchase them in whole or in part.
5. Purchase loans granted abroad to persons domiciled and resident in Chile, including loans to finance foreign trade and excluding those granted to banking institutions established in the country.

6. Purchase bonds in foreign currency issued by persons domiciled and resident in Chile, including investment (but only for purposes of intermediation) in bonds issued by the State or by State institutions.

7. Issue certificates of deposits, notes, and bonds in foreign currency, as well as in local currency, adjustable based on changes in the UF, to be placed abroad and traded in Chile and/or abroad.

8. Sell or assign certain assets in their foreign currency portfolio to other banking institutions or to persons domiciled or resident abroad.

The central bank board authorized banks to carry out these new operations in foreign currency insofar as their boards have established policies on assessing their debtors' exchange risk and have notified the Superintendency of Banks and Financial Institutions of the adoption of such policies in advance.

Moreover, as part of the same objective of the Resolution, it was decided to ease the risk rating requirement for overseas issues of banking institutions' bonds, convertible bonds, junior bonds, and ADRs.

April 2001

16

The Board of Directors of the Central Bank of Chile decided not to renew the country's exchange restrictions and approved a new Compendium of International Exchange Regulations, totally replacing the previous version. At the same time, it approved a series of amendments to bring the Compendium of Financial Regulations into line with the new Compendium of International Exchange Regulations. With these new regulations, the central bank culminated a gradual process of deregulating the exchange market, providing individuals and businesses with smoother and more efficient access to the benefits of Chile's financial and commercial integration with the rest of the world. The new exchange regulations enter into force on April 19, 2001.

In essence, the amendments provide that:

- Foreign exchange operations of a financial nature continue to be channeled through the formal exchange market, the obligation of settling and/or purchasing foreign exchange on the formal exchange market having been eliminated.
- Prior authorization is no longer required for capital inflows related to foreign loans, investments, capital contributions, bonds, and ADRs, as is true for capital outflows associated with capital returns, dividends, and other earnings related to capital contributions and investments and the prepayment of external loans.
- Prior authorization is no longer required for the remittance of capital, profits, and other earnings associated with investments of residents abroad.
- The limits on special external credit prepayment and acceleration clauses were lifted.
- The minimum risk rating and minimum weighted maturities restrictions applicable to bond issues were abolished.
- The limits on the currency in which external debt can be issued or contracted were eliminated.
- The restrictions on ADR issues were lifted.
- The required reserve for capital from abroad (which had been set at zero) was eliminated.
- Foreign trade operations can be carried out on the formal or informal exchange market. In the latter case, such operations must be reported directly to the central bank.

The Board also approved a procedures manual and reporting forms to go with the new Compendium of International Exchange Regulations, some of the provisions of which will enter into force on July 1, 2001.

Table 1. Chile: Aggregate Demand and Supply

	1995	1996	1997	1998	1999	2000
	I. Annual Percentage Change					
	(At current prices)					
Aggregate demand	21.6	11.1	11.6	6.6	-0.5	12.8
Domestic expenditure	20.3	13.7	12.3	8.0	-3.5	10.6
Private sector	19.6	12.4	12.4	8.2	-3.1	9.8
Consumption	17.1	13.4	11.7	7.7	0.2	8.1
Investment	28.5	9.2	14.5	9.8	-13.5	16.2
Public sector	15.3	21.2	13.6	9.2	1.3	8.4
Consumption 1/	19.5	14.7	13.8	11.7	9.5	13.3
Investment	6.6	36.5	13.4	4.4	-16.0	-5.1
Change in inventories 2/	1.5	0.2	0.0	-0.2	-1.1	1.0
Exports 3/	26.1	2.8	9.3	1.2	11.2	20.4
Aggregate supply	21.6	11.1	11.6	6.6	-0.5	12.8
Gross domestic product	20.9	9.2	11.7	6.5	2.4	9.7
Imports 3/	24.1	17.5	11.5	6.6	-9.8	24.2
Memorandum items:						
GNP at market prices	21.9	9.5	12.2	7.5	2.3	9.0
GDP deflator	9.3	1.7	4.0	2.5	3.5	4.1
	(At constant 1986 prices)					
Aggregate demand	14.9	8.8	9.2	4.4	-5.7	6.9
Domestic expenditure	16.2	7.9	9.1	3.9	-10.0	6.6
Private sector	14.2	8.0	9.1	4.6	-6.8	5.1
Consumption	9.8	9.4	8.2	4.3	-3.1	4.1
Investment	28.0	4.3	11.7	5.2	-16.9	8.1
Public sector	4.9	14.5	7.6	2.0	-7.5	-2.6
Consumption 1/	4.2	4.0	5.0	3.8	2.5	3.5
Investment	6.1	30.4	10.7	0.0	-19.3	-11.7
Change in inventories 2/	3.5	-0.6	0.6	-0.1	-3.3	2.5
Exports 3/	11.0	11.8	9.4	5.9	6.9	7.5
Aggregate supply	14.9	8.8	9.2	4.4	-5.7	6.9
Gross domestic product	10.6	7.4	7.4	3.9	-1.1	5.4
Imports 3/	25.0	11.8	12.9	5.4	-14.3	10.1
Memorandum items:						
GNP at market prices	10.8	8.4	7.7	5.5	-1.0	4.5
GNP adjusted for terms of trade effects	16.9	3.5	8.3	2.9	-1.3	4.7
	II. Percent of Nominal GDP					
Aggregate demand and supply	128.7	130.9	130.9	130.9	127.2	130.8
Domestic expenditure	98.2	102.2	102.7	104.2	98.2	98.9
Consumption	72.4	75.3	75.5	76.7	76.1	75.5
Private sector	62.6	65.0	65.0	65.7	64.3	63.3
General government	9.8	10.3	10.5	11.0	11.8	12.2
Fixed capital formation	23.9	24.9	25.5	26.0	21.9	22.3
Private sector	19.7	19.7	20.2	20.8	17.6	18.6
Public sector	4.2	5.2	5.3	5.2	4.3	3.7
Change in inventories	1.9	2.0	1.7	1.4	0.2	1.1
Exports 3/	30.5	28.7	28.1	26.7	29.0	31.8
Imports 3/	28.7	30.9	30.9	30.9	27.2	30.8
External resource gap (-)	1.8	-2.2	-2.7	-4.2	1.8	1.1

Sources: Central Bank of Chile; and Fund staff estimates.

1/ General government.

2/ Weighted by the contribution to domestic expenditure in the previous year.

3/ Goods and nonfactor services.

Table 2. Chile: Savings and Investment

(As percent of nominal GDP)

	1995	1996	1997	1998	1999	2000
Gross domestic investment	25.8	26.9	27.2	27.4	22.1	23.4
Private investment 1/	21.6	21.6	21.9	22.2	17.8	19.7
Public investment	4.2	5.2	5.3	5.2	4.3	3.7
External savings	2.1	5.1	5.0	5.7	0.1	4.1
Gross national savings	23.7	21.8	22.3	21.8	22.0	22.0
Private savings	16.8	15.3	17.0	18.4	20.5	19.8
Public savings 2/	7.0	6.5	5.3	3.3	1.5	2.3
Memorandum items:						
Gross domestic savings	27.6	24.7	24.5	23.3	23.9	24.5
Net transfers from abroad	0.5	0.7	0.7	0.6	0.7	0.8

Source: Central Bank of Chile, and Fund staff estimates.

1/ Includes changes in stocks.

2/ Includes central bank losses.

Table 3. Chile: Sectoral Origin of GDP

(At constant 1986 market prices)

	1995	1996	1997	1998	1999	2000
	(Billions of Chilean pesos)					
GDP at market prices	6,801.0	7,305.1	7,845.1	8,153.0	8,059.8	8,493.4
Agriculture and forestry	464.3	470.4	452.1	481.4	475.2	500.0
Fishing	100.0	109.8	120.0	122.9	125.0	146.2
Mining	527.8	611.0	659.3	708.1	822.9	855.4
Manufacturing	1,104.8	1,140.3	1,203.6	1,185.4	1,176.9	1,227.9
Electricity, gas, and water	166.9	160.7	177.6	185.5	188.6	221.2
Construction	356.2	386.9	416.9	419.9	378.1	378.0
Commerce	1,133.1	1,241.0	1,356.4	1,412.3	1,362.3	1,426.1
Transport, storage, and communications	518.3	571.0	644.5	703.7	723.0	791.8
Financial services	915.1	977.7	1,053.6	1,113.1	1,101.6	1,154.8
Other services 1/	1,514.5	1,636.4	1,761.0	1,820.7	1,706.0	1,792.1
	(Annual percentage change)					
GDP at market prices	10.6	7.4	7.4	3.9	-1.1	5.4
Agriculture and forestry	5.2	1.3	-3.9	6.5	-1.3	5.2
Fishing	15.9	9.7	9.3	2.4	1.7	16.9
Mining	9.3	15.8	7.9	7.4	16.2	4.0
Manufacturing	7.5	3.2	5.6	-1.5	-0.7	4.3
Electricity, gas, and water	7.6	-3.8	10.5	4.4	1.7	17.3
Construction	9.9	8.6	7.8	0.7	-10.0	0.0
Commerce	14.2	9.5	9.3	4.1	-3.5	4.7
Transport, storage, and communications	14.7	10.2	12.9	9.2	2.7	9.5
Financial services	9.8	6.8	7.8	5.6	-1.0	4.8
Other services 1/	12.0	8.1	7.6	3.4	-6.3	5.0
	(As percent of total)					
GDP at market prices	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture and forestry	6.8	6.4	5.8	5.9	5.9	5.9
Fishing	1.5	1.5	1.5	1.5	1.6	1.7
Mining	7.8	8.4	8.4	8.7	10.2	10.1
Manufacturing	16.2	15.6	15.3	14.5	14.6	14.5
Electricity, gas, and water	2.5	2.2	2.3	2.3	2.3	2.6
Construction	5.2	5.3	5.3	5.2	4.7	4.5
Commerce	16.7	17.0	17.3	17.3	16.9	16.8
Transport, storage, and communications	7.6	7.8	8.2	8.6	9.0	9.3
Financial services	13.5	13.4	13.4	13.7	13.7	13.6
Other services 1/	22.3	22.4	22.4	22.3	21.2	21.1

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Includes imputed banking charges, import duties, and value-added tax on imports.

Table 4. Chile: National Accounts at Current Prices

	1995	1996	1997	1998	1999	2000
Consumption expenditure	18,730.5	21,279.8	23,834.5	25,802.2	26,193.9	28,519.1
General government	2,543.4	2,918.1	3,319.8	3,708.3	4,060.4	4,601.9
Private sector	16,187.1	18,361.7	20,514.8	22,093.8	22,133.5	23,917.2
Gross domestic investment	6,673.8	7,598.3	8,594.4	9,224.6	7,600.1	8,854.1
Fixed capital formation	6,177.1	7,039.8	8,044.0	8,744.1	7,521.7	8,429.9
Public sector	1,083.3	1,478.4	1,676.5	1,750.1	1,470.1	1,395.1
Private sector	5,093.8	5,561.4	6,367.4	6,994.0	6,051.5	7,034.8
Change in stocks	496.7	558.5	550.5	480.5	78.4	424.2
Domestic expenditure	25,404.3	28,878.2	32,429.0	35,026.8	33,794.0	37,373.1
External sector 1/	471.4	-609.8	-861.7	-1,396.5	628.8	401.6
Exports	7,904.9	8,125.5	8,878.2	8,986.4	9,989.3	12,031.0
Imports	-7,433.5	-8,735.3	-9,739.9	-10,382.9	-9,360.5	-11,629.4
GDP at market prices	25,875.7	28,268.4	31,567.3	33,630.4	34,422.8	37,774.7
Less: Net factor payments abroad	-1,106.4	-1,153.5	-1,141.7	-910.1	-957.6	-1,296.9
GNP at market prices	24,769.3	27,114.9	30,425.6	32,720.2	33,465.2	36,477.9
Less: Indirect taxes net of subsidies	-3,488.2	-4,025.3	-4,398.9	-4,457.0	-4,825.2	-5,278.3
GNP at factor cost	21,281.1	23,089.6	26,026.6	28,263.2	28,640.0	31,199.6
Less: Provision for consumption of fixed capital	-2,269.8	-2,618.1	-2,889.2	-4,825.2	-3,208.9	-3,530.9
NNP at factor cost = national income	19,011.3	20,471.5	23,137.4	23,438.0	25,431.1	27,668.7

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Goods and nonfactor services.

Table 5. Chile: National Accounts at Constant (1986) Prices

	1995	1996	1997	1998	1999	2000
Consumption expenditure	5,122.5	5,575.7	6,015.6	6,274.0	6,114.1	6,363.6
General government	550.3	572.2	601.0	624.1	639.6	662.0
Private sector	4,572.3	5,003.5	5,414.6	5,649.9	5,474.5	5,701.6
Gross domestic investment	2,449.4	2,592.9	2,898.9	2,990.3	2,226.6	2,530.9
Fixed capital formation	2,078.1	2,263.4	2,523.8	2,627.1	2,170.3	2,262.8
Public sector	364.4	475.3	526.0	525.8	424.2	374.5
Private sector	1,713.6	1,788.1	1,997.8	2,101.3	1,746.1	1,888.3
Changes in inventories	371.4	329.5	375.1	363.2	56.3	268.1
Domestic expenditure	7,572.0	8,168.6	8,914.6	9,264.3	8,340.7	8,894.4
External sector 1/	-771.0	-863.4	-1,069.4	-1,111.3	-281.0	-401.0
Exports	2,454.1	2,743.3	3,001.8	3,180.3	3,398.6	3,651.8
Imports	-3,225.1	-3,606.7	-4,071.2	-4,291.6	-3,679.5	-4,052.9
GDP at market prices	6,801.0	7,305.1	7,845.1	8,153.0	8,059.8	8,493.4
Less: Net factor payments abroad	-522.8	-501.6	-516.4	-417.6	-400.8	-486.2
GNP at market prices	6,278.1	6,803.5	7,328.8	7,735.4	7,659.0	8,007.2
Less: Indirect taxes net of subsidies	-916.8	-1,040.2	-1,093.2	-1,080.5	-1,129.8	-1,186.8
GNP at factor cost	5,361.3	5,763.3	6,235.5	6,654.9	6,529.2	6,820.4
Less: Provision for consumption of fixed capital	-763.6	-841.8	-906.5	-910.3	-925.9	-947.8
Plus: Terms of trade effect	917.3	611.7	709.2	534.1	500.5	529.2
NNP at factor cost = national income	5,515.1	5,533.2	6,038.2	6,278.7	6,103.8	6,401.8

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Goods and nonfactor services.

Table 6. Chile: Indicators of Mining Output

	1995	1996	1997	1998	1999	2000
(Index, 1990 = 100)						
Total	146.2	177.6	193.3	206.1	241.5	250.5
Metallic minerals	153.9	189.8	205.0	219.9	259.8	270.4
Copper	155.3	194.5	212.6	229.3	274.4	285.3
Molybdenum	129.4	125.9	154.8	184.5	197.2	237.8
Lead	84.3	122.7	71.8	29.9	15.2	17.0
Zinc	140.8	143.2	136.6	64.3	128.3	124.9
Gold	162.1	193.1	173.9	159.3	166	180.2
Silver	159.1	175.2	166.2	204.2	210.8	186.5
Iron	102.2	110.1	105.9	110.5	103.5	105.8
Manganese	177.5	158.4	158.1	121.3	102.2	105.1
Nonmetallic minerals 1/	83.7	78.9	97.9	94.2	93.8	89.6
Limestone	164.1	170.7	160.4	175.1	150.0	154.6
Coal	54.1	52.6	50.2	11.6	17.1	15.9
Petroleum	53.2	46.8	43.0	41.2	39.2	34.5
	(Thousands of metric tons)					
Copper	2,488.6	3,115.8	3392.0	3686.9	4382.6	4603.3
CODELCO	1,164.7	1,246.7	1326.3	1501.0	1615.0	1613.0
Private sector	1,323.4	1,869.1	2065.7	2185.9	2767.6	2990.3
By product						
Refined copper	1,491.5	1,748.2	2116.6	2334.9	2665.7	2669.6
Blister	174.7	243.1	154.0	176.3	169.6	164.4
Other	822.4	1,124.5	1121.4	1175.7	1547.3	1769.3
	(Annual percentage changes)					
Total	11.3	21.5	8.8	6.6	17.2	3.7
Metallic minerals	12.1	23.3	8.0	7.3	18.1	4.1
Copper	14.6	25.2	9.3	7.9	19.7	4.0
Molybdenum	12.2	-2.7	23.0	19.2	6.9	20.6
Lead	103.1	45.6	-41.5	-58.4	-49.2	11.8
Zinc	17.3	1.7	-4.6	-52.9	99.5	-2.7
Gold	20.8	19.1	-9.9	-8.4	4.2	8.6
Silver	8.6	10.1	-5.1	22.9	3.2	-11.5
Iron	-2.5	7.7	-3.8	4.3	-6.3	2.2
Manganese	11.9	-10.8	-0.2	-23.3	-15.7	2.8
Nonmetallic minerals 1/	-0.4	-5.7	24.1	-3.8	-0.4	-4.5
Limestone	-6.0	4.0	-6.0	9.2	-14.3	3.1
Coal	-2.5	-2.8	-4.6	-76.9	47.4	-7.0
Petroleum	-15.3	-12.0	-8.1	-4.2	-4.9	-12.0

Source: National Bureau of Statistics, as reported in the Monthly Bulletin of the Central Bank of Chile

1/ Includes iodine and nitrate.

Table 7. Chile: Indicators of the Manufacturing Sector

(Annual percentage changes)

	1995	1996	1997	1998	1999	2000
Production						
Consumer goods						
Nondurables	6.3	5.6	0.1	6.7	-5.1	5.9
Durables	7.4	-1.7	0.0	-16.0	-20.2	7.3
Transport equipment	-2.2	-0.6	19.9	-17.0	-14.4	29.7
Capital goods	8.1	7.0	18.1	4.0	-18.0	-18.0
Intermediate goods						
For industry	4.5	3.1	8.0	3.3	9.9	4.3
For construction	5.9	8.3	6.6	2.1	-10.1	6.1
For mining	15.7	10.4	8.9	1.8	9.6	44.2
For agriculture	-4.7	-18.8	-1.0	-48.8	47.8	-1.7
Packaging and accessories	15.3	12.8	0.3	2.6	3.7	6.3
Energy, fuels, and lubricants	7.4	1.0	4.4	6.3	4.7	0.1
Office furniture	9.6	2.5	9.0	-0.3	-7.8	1.1
Sales						
Consumer goods						
Nondurables	6.7	3.9	3.5	2.9	-2.2	2.7
Durables	4.8	0.5	-2.7	-12.6	-18.1	2.7
Transport equipment	-2.3	-2.7	32.2	-15.4	-12.1	14.8
Capital goods	14.5	4.1	24.8	1.1	-16.6	-7.3
Intermediate goods						
For industry	2.9	4.9	10.0	1.8	1.8	3.2
For construction	6.8	9.9	5.6	1.1	-7.8	0.4
For mining	17.4	8.8	9.9	7.9	8.7	19.0
For agriculture	8.0	-22.6	5.3	-44.5	27.2	6.4
Packaging and accessories	18.3	6.7	-1.0	5.5	4.1	2.9
Energy, fuels, and lubricants	8.8	4.9	0.2	5.9	8.6	0.4
Office furniture	8.4	5.6	3.8	1.2	-3.2	-7.3

Source: Chilean Association of Manufacturers (SOFOFA).

Table 8. Chile: Population, Labor Force, and Employment

	1995	1996	1997	1998	1999	2000
	(In thousands of persons)					
Total population 1/	14,210.4	14,418.9	14,622.4	14,821.7	15,017.8	15211.3
Population 15 years and older 1/	10,052.3	10,199.7	10,375.7	10,564.8	10,728.1	10898.0
Labor force 2/	5,497.1	5,521.9	5,618.4	5,721.9	5,822.7	5851.3
Employed 2/	5,092.3	5,164.0	5,274.6	5,369.3	5,258.1	5311.9
Unemployed 2/	405.2	357.9	343.8	352.5	564.6	539.4
	(In percent)					
Unemployed (as percentage of the labor force)						
Total	7.4	6.5	6.1	6.2	9.7	9.2
Metropolitan Santiago Region	7.5	7.1	7.1	6.7	10.5	10
Participation rates						
Labor force as percentage of total population	38.8	38.4	38.5	38.3	38.6	38.5
Labor force as percentage of population over 15 years of age	54.9	54.2	54.2	53.8	54.0	53.7
	(Annual percentage change)					
Total population	1.5	1.5	1.4	1.4	1.3	1.3
Labor force	0.7	0.5	1.7	1.8	1.8	0.5
Employment	1.2	1.4	2.1	1.8	-2.1	1
Unemployment	-4.7	-11.7	-3.9	2.5	60.1	-4.5

Source: National Bureau of Statistics (INE), and Fund staff estimates.

1/ Estimated level on June 30 of each year
2/ Annual averages

Table 9. Chile: Index of Nominal Wages

	1995	1996	1997	1998	1999	2000
	(Annual averages)					
Overall	136.3	156.3	169.9	183.3	194.0	204.2
Mining	121.9	135.7	146.5	155.7	166.9	174.5
Manufacturing	140.9	156.6	170.1	180.9	187.5	195.6
Electricity, gas, and water	128.4	145.7	155.5	166.2	176.5	182.0
Construction	138.2	148.0	150.3	156.7	150.9	160.6
Trade, restaurants, and hotels	143.0	157.9	171.5	185.9	195.5	203.6
Transportation and communications	145.9	157.6	171.8	189.1	207.1	218.8
Financial services and insurance	129.4	142.1	152.8	166.5	183.9	194.7
Social services	146.4	166.9	184.4	202.2	217.4	231.6
	(Annual percentage changes)					
Overall	13.6	11.3	8.7	7.9	5.8	5.3
Mining	7.3	11.3	8.0	6.3	7.2	4.6
Manufacturing	12.6	11.1	8.6	6.4	3.7	4.3
Electricity, gas, and water	12.0	13.5	6.7	6.9	6.2	3.1
Construction	14.6	7.1	1.6	4.2	-3.6	6.4
Trade, restaurants and hotels	13.6	10.4	8.6	8.4	5.1	4.2
Transportation and communications	16.4	8.0	9.0	10.1	9.5	5.7
Financial services and insurance	10.0	9.8	7.5	9.0	10.4	5.9
Social services	16.5	14.0	10.4	9.7	7.5	6.5
Memorandum items:						
Consumer price inflation (annual average)	8.2	7.4	6.1	5.1	3.3	3.8
Minimum wage	13.1	11.9	11.2	12.7	12.4	11.2
Real wages	4.8	4.1	2.4	2.7	2.4	1.4

Source: National Bureau of Statistics (INE).

Table 10. Chile: Consumer Price Index

(Base: Dec 1998 = 100)

		All items	Food	Housing	Housing equipment	Clothing	Trans-portation	Health	Education and recreation	Others	Underlying inflation index 1/
					(Period averages, annual percentage change)						
1999		3.3	0.3	2.5	1.0	-3.2	9.0	6.1	5.7	13.7	4.0
2000		3.8	1.4	6.2	-2.4	-6.7	16.2	4.9	4.4	-2.9	2.9
					(End of period, annual percentage change)						
1995	December	8.2	9.0	7.5	5.2	-5.5	12.1	10.8	10.0	9.2	7.5
1996	December	6.6	4.1	8.6	4.6	-4.7	9.6	9.5	13.1	7.2	7.4
1997	December	6.0	9.2	4.6	4.7	-8.4	2.3	8.8	12.8	1.9	5.4
1998	December	4.7	0.6	4.4	4.0	-0.1	7.7	8.1	7.8	21.8	6.3
1999	March	4.1	-0.3	3.4	2.5	-1.8	9.9	8.0	6.2	18.6	5.5
	June	3.8	1.2	2.5	1.0	-3.5	7.4	6.8	5.7	15.6	4.2
	September	2.9	0.2	1.5	0.1	-0.9	9.6	5.1	4.6	11.9	3.2
	December	2.3	1.0	1.5	-1.1	-4.0	9.8	4.9	4.3	0.6	2.1
2000	March	3.4	1.5	3.5	-2.0	-4.4	16.0	4.7	4.3	-3.1	2.9
	June	3.7	1.8	6.1	-2.6	-8.5	15.7	4.9	4.5	-1.7	2.7
	September	4.2	1.1	7.8	-2.7	-7.7	17.3	4.8	4.7	-1.4	3.0
	December	4.5	-0.1	9.9	-2.6	-8.3	19.5	5.1	4.3	-4.6	3.4
2001	March	3.5	0.2	7.4	-1.7	-6.5	12.1	3.8	4.4	0.5	2.5

Source: National Bureau of Statistics (INE).

1/ Excludes fuel and fresh fruits and vegetables.

Table 11. Chile: Social Indicators

	1987	1990	1992	1994	1996	1998
Incidence of poverty 1/						
Indigent						
Total	17.4	12.9	8.8	7.6	5.8	5.6
Urban	16.7	12.4	8.6	7.1	5.0	5.1
Rural	20.6	15.2	9.8	9.8	9.4	8.7
Poor, but not indigent						
Total	27.7	25.7	23.8	19.9	17.4	16.1
Urban	26.9	26.0	23.8	19.8	16.8	15.6
Rural	30.9	24.3	23.6	21.1	21.2	18.9
Total poor						
Total	45.1	38.6	32.6	27.5	23.2	21.7
Urban	43.6	38.4	32.4	26.9	21.8	20.7
Rural	51.5	39.5	33.4	30.9	30.6	27.6
Income distribution 2/						
First quintile	4.3	4.4	4.6	4.5	4.2	4.1
Fifth quintile	57.2	56.9	56.3	55.5	56.6	56.9
Ratio of income of fifth quintile to income of first quintile	13.3	12.9	12.2	13.2	13.8	13.9
Other indicators of social welfare						
Illiteracy 3/	6.1	6.3	5.7	4.9	4.8	4.6
School enrollment 4/						
Elementary school (6-13 years of age)	96.4	96.8	97.4	97.6	98.2	98.3
Secondary school (14-17 years of age)	80.9	80.5	82.2	83.9	85.9	86.9
Post secondary (18-24 years of age)	...	24.7	26.5	29.6	33.8	...
Life expectancy at birth 5/	71.7	72.0	74.3	74.6	75.2	75.2
Infant mortality rate 6/	18.5	16.0	14.3	12.0	11.1	10.3

Source: Ministry of Cooperation and Planning (MIDEPLAN).

1/ Percent of population.
2/ Distribution of national income by quintiles of households.
3/ Percent of population over 15 years of age.
4/ Percent of the age group enrolled.
5/ Years.
6/ Per 1,000 live births.

Table 12. Chile: Summary Operations of the Combined Public Sector

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
Nonfinancial public sector						
Total revenue	8,465.3	9,452.5	10,179.5	10,325.1	10,434.8	12,372.3
Current revenue	8,394.3	9,174.0	10,058.9	10,255.1	10,384.7	12,336.3
General government 1/	6,152.2	6,812.2	7,504.1	7,650.9	7,549.5	8,703.4
Public enterprises	3,598.2	3,571.7	3,791.0	3,508.0	3,789.5	5,023.8
Net transfers from public enterprises	-1,356.1	-1,209.8	-1,236.2	-903.8	-954.3	-1,390.9
Capital revenue	71.0	278.4	120.6	70.0	50.2	35.9
General government	59.1	23.6	37.7	45.2	26.9	28.3
Public enterprises	11.8	254.8	82.9	24.9	23.2	7.6
Total expenditure	7,536.1	8,865.3	9,876.0	10,719.9	11,301.7	13,028.6
Current expenditures	6,435.4	7,144.5	8,050.4	8,776.7	9,505.6	11,155.8
General government 2/	4,472.8	5,087.5	5,696.8	6,429.0	7,002.4	7,721.6
Public enterprises	1,962.6	2,057.1	2,353.6	2,347.7	2,503.1	3,434.2
Capital expenditures 3/	1,100.7	1,720.8	1,825.6	1,943.2	1,796.1	1,872.8
General government 4/	798.8	1,018.4	1,181.5	1,303.1	1,390.3	1,385.4
Public enterprises	301.9	702.4	644.1	640.1	405.8	487.4
Overall surplus or deficit	929.2	587.1	303.5	-394.7	-866.9	-656.3
Deposited to the Copper Stabilization Fund	-278.7	-78.0	-43.8	161.6	233.8	63.5
Central bank cash result	-157.6	-196.3	-331.7	-372.8	-373.4	-329.5
Combined public sector overall balance	771.6	390.8	-28.2	-767.5	-1,240.3	-985.8
Privatization receipts	11.0	2.8	74.1	20.5	158.3	495.5
Financing needs	-782.5	-393.6	-45.9	747.1	1,082.0	490.3
Foreign	-633.0	-32.5	-62.0	183.5	158.8	-41.2
Domestic (including statistical discrepancies)	-149.5	-361.1	16.0	563.6	923.2	531.5
	(In percent of GDP)					
Nonfinancial public sector						
Total revenue	32.7	33.4	32.2	30.7	30.3	32.8
Current revenue	32.4	32.5	31.9	30.5	30.2	32.7
General government 1/	23.8	24.1	23.8	22.7	21.9	23.0
Public enterprises	13.9	12.6	12.0	10.4	11.0	13.3
Net transfers from public enterprises	-5.2	-4.3	-3.9	-2.7	-2.8	-3.7
Capital revenue	0.3	1.0	0.4	0.2	0.1	0.1
General government	0.2	0.1	0.1	0.1	0.1	0.1
Public enterprises	0.0	0.9	0.3	0.1	0.1	0.0
Total expenditure	29.1	31.4	31.3	31.9	32.8	34.5
Current expenditures	24.9	25.3	25.5	26.1	27.6	29.5
General government 2/	17.3	18.0	18.0	19.1	20.3	20.4
Public enterprises	7.6	7.3	7.5	7.0	7.3	9.1
Capital expenditures 3/	4.3	6.1	5.8	5.8	5.2	5.0
General government 4/	3.1	3.6	3.7	3.9	4.0	3.7
Public enterprises	1.2	2.5	2.0	1.9	1.2	1.3
Overall surplus or deficit	3.6	2.1	1.0	-1.2	-2.5	-1.7
Deposited to the Copper Stabilization Fund	-1.1	-0.3	-0.1	0.5	0.7	0.2
Central bank cash result	-0.6	-0.7	-1.1	-1.1	-1.1	-0.9
Combined public sector overall balance	3.0	1.4	-0.1	-2.3	-3.6	-2.6
Privatization receipts	0.0	0.0	0.2	0.1	0.5	1.3
Financing	-3.0	-1.4	-0.1	2.2	3.1	1.3
Foreign	-2.4	-0.1	-0.2	0.5	0.5	-0.1
Domestic (including statistical discrepancies)	-0.6	-1.3	0.1	1.7	2.7	1.4
Memorandum items:						
Nonfinancial public sector current account balance	7.6	7.2	6.4	4.4	2.6	3.1
Military expenditure 5/	3.1	3.2	3.1	3.4	3.1	...
Nominal GDP (in billions of Chilean pesos)	25,876	28,268	31,567	33,630	34,423	37,775

Sources: Ministry of Finance; Central Bank of Chile; and Fund staff estimates.

1/ Excludes taxes paid and transfers made by the public enterprises.
2/ Includes amount transferred directly by CODELCO for military purchases.
3/ Includes net-lending.
4/ Includes capital transfers to the private sector.
5/ Includes military pensions and amounts transferred directly by CODELCO for military purchases assuming that these transfers are spent in the same year.

Table 13. Chile: Summary Operations of the Central Government

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
Total revenue	6,211.3	6,835.8	7,541.8	7,696.0	7,576.4	8,731.8
Current revenue	6,152.2	6,812.2	7,504.1	7,650.9	7,549.5	8,703.4
Tax	5,455.7	6,010.4	6,565.4	6,581.3	6,464.0	7,571.5
Nontax	696.5	801.8	938.7	1,069.6	1,085.5	1,131.9
Capital revenue	59.1	23.6	37.7	45.2	26.9	28.3
Total expenditure	5,271.6	6,105.9	6,878.3	7,732.1	8,392.8	9,106.9
Current expenditure	4,472.8	5,087.5	5,696.8	6,429.0	7,002.4	7,721.6
Wages	1,000.3	1,159.3	1,325.1	1,491.1	1,645.7	1,778.5
Pensions	1,465.0	1,698.3	1,897.7	2,144.7	2,442.0	2,684.0
Interest	198.9	171.7	143.4	238.6	123.0	184.6
Other	1,808.7	2,058.2	2,330.6	2,554.5	2,791.8	3,074.5
Capital expenditure	798.8	1,018.4	1,181.5	1,303.1	1,390.3	1,385.4
Overall surplus or deficit (-)	939.7	729.9	663.5	-36.0	-816.4	-375.2
Current account	1,679.4	1,724.7	1,807.3	1,221.9	547.0	981.9
Capital account	-739.7	-994.8	-1,143.8	-1,257.9	-1,363.4	-1,357.0
Privatization receipts	11.0	2.8	74.1	20.5	158.3	495.5
Financing needs	-950.7	-732.7	-737.7	15.6	658.1	-120.3
Foreign	-606.2	-281.9	-184.2	-93.9	147.8	-104.6
Domestic (including statistical discrepancies)	-344.4	-450.8	-553.4	109.5	510.3	-15.7
Of which : deposited in the Copper Stabilization Fund (deposit -)	-278.7	-78.0	-43.8	161.6	233.8	63.5
	(In percent of GDP)					
Total revenue	24.0	24.2	23.9	22.9	22.0	23.1
Current revenue	23.8	24.1	23.8	22.7	21.9	23.0
Tax	21.1	21.3	20.8	19.6	18.8	20.0
Nontax	2.7	2.8	3.0	3.2	3.2	3.0
Capital revenue	0.2	0.1	0.1	0.1	0.1	0.1
Total expenditure	20.4	21.6	21.8	23.0	24.4	24.1
Current expenditure	17.3	18.0	18.0	19.1	20.3	20.4
Wages	3.9	4.1	4.2	4.4	4.8	4.7
Pensions	5.7	6.0	6.0	6.4	7.1	7.1
Interest	0.8	0.6	0.5	0.7	0.4	0.5
Other	7.0	7.3	7.4	7.6	8.1	8.1
Fixed investment	3.1	3.6	3.7	3.9	4.0	3.7
Overall surplus or deficit(-)	3.6	2.6	2.1	-0.1	-2.4	-1.0
Current account	6.5	6.1	5.7	3.6	1.6	2.6
Capital account	-2.9	-3.5	-3.6	-3.7	-4.0	-3.6
Privatization receipts	0.0	0.0	0.2	0.1	0.5	1.3
Financing needs	-3.7	-2.6	-2.3	0.0	1.9	-0.3
Foreign	-2.3	-1.0	-0.6	-0.3	0.4	-0.3
Domestic (including statistical discrepancies)	-1.3	-1.6	-1.8	0.3	1.5	0.0
Of which: deposited in the Copper Stabilization Fund (deposit -)	-1.1	-0.3	-0.1	0.5	0.7	0.2

Sources: Ministry of Finance; and Fund staff estimates.

Table 14. Chile: Central Government Revenue

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
Total revenue	6,211.3	6,835.8	7,541.8	7,696.0	7,576.4	8,731.8
Current revenue	6,152.2	6,812.2	7,504.1	7,650.9	7,549.5	8,703.4
Taxes	5,455.7	6,010.4	6,565.4	6,581.3	6,464.0	7,571.5
Taxes on income and property	1,667.8	1,555.6	1,691.2	1,457.3	1,365.1	1,932.0
Personal and business income tax	939.1	1,135.9	1,231.2	1,308.1	1,217.1	1,515.4
Net taxes of CODELCO 1/	706.0	404.7	443.0	132.1	131.1	378.3
Property tax	22.7	15.0	16.9	17.1	16.8	38.3
Real estate	13.0	3.9	3.4	3.1	3.4	3.6
Other	9.7	11.1	13.5	13.9	13.4	34.7
Taxes on goods and services	2,870.8	3,390.0	3,768.9	3,958.5	3,989.6	4,452.1
Value-added tax (net) 2/	2,218.1	2,597.0	2,844.0	2,969.0	2,909.0	3,290.0
Excise tax	476.5	574.1	669.1	740.1	817.8	907.8
Stamp tax	155.1	197.7	234.3	229.4	245.4	240.9
Other	21.1	21.2	21.6	20.0	17.4	13.4
Taxes on international trade	532.0	613.0	612.0	604.3	524.7	549.5
Pension contributions	349.1	403.1	449.5	496.8	527.0	576.8
Other taxes	36.0	48.8	43.8	64.3	57.6	61.1
Nontax revenue	696.5	801.8	938.7	1,069.6	1,085.5	1,131.9
Sales of goods and services	276.1	342.0	358.0	403.2	451.1	558.5
Transfers from public enterprises	141.3	149.9	197.1	236.1	200.0	66.8
Other revenue	279.1	309.9	383.6	430.3	434.4	506.6
Capital revenue	59.1	23.6	37.7	45.2	26.9	28.3
Sale of assets	59.1	23.6	37.7	45.2	26.9	28.3
Loan recovery	135.1	147.5	153.2	154.2	152.4	126.2
	(In percent of GDP)					
Total revenue	24.0	24.2	23.9	22.9	22.0	23.1
Current revenue	23.8	24.1	23.8	22.7	21.9	23.0
Taxes	21.1	21.3	20.8	19.6	18.8	20.0
Taxes on income and property	6.4	5.5	5.4	4.3	4.0	5.1
Personal and business income tax	3.6	4.0	3.9	3.9	3.5	4.0
Net taxes of CODELCO 1/	2.7	1.4	1.4	0.4	0.4	1.0
Property tax	0.1	0.1	0.1	0.1	0.0	0.1
Real estate	0.1	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	0.0	0.1
Taxes on goods and services	11.1	12.0	11.9	11.8	11.6	11.8
Value-added tax (net) 2/	8.6	9.2	9.0	8.8	8.5	8.7
Excise tax	1.8	2.0	2.1	2.2	2.4	2.4
Stamp tax	0.6	0.7	0.7	0.7	0.7	0.6
Other	0.1	0.1	0.1	0.1	0.1	0.0
Taxes on international trade	2.1	2.2	1.9	1.8	1.5	1.5
Pension contributions	1.3	1.4	1.4	1.5	1.5	1.5
Other taxes	0.1	0.2	0.1	0.2	0.2	0.2
Nontax revenue	2.7	2.8	3.0	3.2	3.2	3.0
Sales of goods and services	1.1	1.2	1.1	1.2	1.3	1.5
Transfers from public enterprises	0.5	0.5	0.6	0.7	0.6	0.2
Other revenue	1.1	1.1	1.2	1.3	1.3	1.3
Capital revenue	0.2	0.1	0.1	0.1	0.1	0.1

Sources: Ministry of Finance; and Fund staff estimates.

1/ Including deposits by CODELCO for military purchases under Law 13,196.
2/ Net of rebates.

Table 15. Chile: Central Government Expenditure

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
Total expenditure	5,271.6	6,105.9	6,878.3	7,732.1	8,392.8	9,106.9
Current expenditure	4,472.8	5,087.5	5,696.8	6,429.0	7,002.4	7,721.6
Wages and salaries 1/	1,000.3	1,159.3	1,325.1	1,491.1	1,645.7	1,778.5
Purchases of goods and services 2/	589.8	625.4	687.1	731.7	695.3	795.7
Pension payments 3/	1,465.0	1,698.3	1,897.7	2,144.7	2,442.0	2,684.0
Other transfers and subsidies to private recipients	1,191.6	1,390.3	1,593.8	1,757.1	2,039.8	2,210.5
Interest on public debt	198.9	171.7	143.4	238.6	123.0	184.6
Other 4/	27.2	42.4	49.6	65.8	56.7	68.3
Capital expenditure	798.8	1,018.4	1,181.5	1,303.1	1,390.3	1,385.4
Fixed investment	729.6	884.5	992.7	1,074.9	1,039.7	907.5
Capital transfers and net lending	69.1	133.9	188.8	228.2	350.6	477.8
Memorandum items:						
Current expenditure excluding interest and Law 13,196	4,138.8	4,806.1	5,435.5	6,091.7	6,762.0	7,376.9
Transfers under Law 13,196	135.1	109.7	117.9	98.6	117.5	160.1
On-lending to private sector	89.0	110.6	125.8	136.0	153.6	...
	(In percent of GDP)					
Total expenditure	20.4	21.6	21.8	23.0	24.4	24.1
Current expenditure	17.3	18.0	18.0	19.1	20.3	20.4
Wages and salaries 1/	3.9	4.1	4.2	4.4	4.8	4.7
Purchases of goods and services 2/	2.3	2.2	2.2	2.2	2.0	2.1
Pension payments 3/	5.7	6.0	6.0	6.4	7.1	7.1
Other transfers and subsidies to private recipients	4.6	4.9	5.0	5.2	5.9	5.9
Interest on public debt	0.8	0.6	0.5	0.7	0.4	0.5
Other 4/	0.1	0.2	0.2	0.2	0.2	0.2
Capital expenditure	3.1	3.6	3.7	3.9	4.0	3.7
Fixed investment	2.8	3.1	3.1	3.2	3.0	2.4
Capital transfers and net lending	0.3	0.5	0.6	0.7	1.0	1.3
Memorandum items:						
Current expenditure excluding interest and Law 13,196	16.0	17.0	17.2	18.1	19.6	19.5
Transfers under Law 13,196	0.5	0.4	0.4	0.3	0.3	0.4
Military expenditure 5/	3.1	3.2	3.1	3.4	3.1	...
Social spending	10.8	11.8	11.9	12.4	13.9	14.0
On-lending to private sector	0.3	0.4	0.4	0.4	0.4	...

Sources: Ministry of Finance; and Fund staff estimates.

1/ Includes employer contributions to the social security system.
2/ Assumes that funds transferred under Law 13,196 by CODELCO to an account for military purchases are spent in the same year.
3/ Includes cash transfers of accumulated contributions of currently retired persons who in the past had moved to a private system.
4/ Includes net expenditure of the Petroleum Stabilization Fund.
5/ Includes military pensions and amounts transferred directly by CODELCO for military purchases assuming that these transfers are spent in the same year.

Table 16. Chile: Operations of the Public Enterprises

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
	I. All Public Enterprises					
Operating surplus before taxes and transfers	1,635.7	1,514.6	1,437.4	1,160.3	1,286.4	1,589.6
Taxes and transfers	1,356.1	1,209.8	1,236.2	903.8	954.3	1,390.9
Current account surplus	279.5	304.8	201.2	256.5	332.1	198.7
Capital revenue	11.8	254.8	82.9	24.9	23.2	7.6
Capital expenditure	301.9	702.4	644.1	640.1	405.8	487.4
Overall surplus or deficit (-)	-10.5	-142.8	-360.0	-358.7	-50.5	-281.1
	II. CODELCO					
Operating surplus before taxes and transfers	881.1	568.2	585.0	313.7	384.5	649.9
Taxes and transfers	706.0	404.7	443.0	132.1	131.1	378.3
Current account surplus	175.1	163.4	141.9	181.6	253.4	271.5
Capital revenue	3.2	239.6	72.5	10.7	2.1	2.0
Capital expenditure	140.6	455.2	416.2	359.6	233.9	316.4
Overall surplus or deficit (-)	37.7	-52.2	-201.8	-167.3	21.6	-42.9
	III. Other Public Enterprises					
Operating surplus before taxes and transfers	754.6	946.4	852.5	846.6	901.9	939.8
Taxes and transfers	650.1	805.1	793.2	771.7	823.2	1,012.6
Current account surplus	104.5	141.3	59.3	74.9	78.7	-72.8
Capital revenue	8.6	15.2	10.4	14.2	21.1	5.6
Capital expenditure	161.3	247.2	227.9	280.5	171.9	171.0
Overall surplus or deficit (-)	-56.9	-105.9	-168.6	-205.6	-93.2	-243.8
	(In percent of GDP)					
	I. All Public Enterprises					
Operating surplus before taxes and transfers	6.3	5.4	4.6	3.5	3.7	4.2
Taxes and transfers	5.2	4.3	3.9	2.7	2.8	3.7
Current account surplus	1.1	1.1	0.6	0.8	1.0	0.5
Capital revenues	0.0	0.9	0.3	0.1	0.1	0.0
Capital expenditure	1.2	2.5	2.0	1.9	1.2	1.3
Overall surplus or deficit (-)	0.0	-0.5	-1.1	-1.1	-0.1	-0.7
	II. CODELCO					
Operating surplus before taxes and transfers	3.4	2.0	1.9	0.9	1.1	1.7
Taxes and transfers	2.7	1.4	1.4	0.4	0.4	1.0
Current account surplus	0.7	0.6	0.4	0.5	0.7	0.7
Capital revenues	0.0	0.8	0.2	0.0	0.0	0.0
Capital expenditure	0.5	1.6	1.3	1.1	0.7	0.8
Overall surplus or deficit (-)	0.1	-0.2	-0.6	-0.5	0.1	-0.1
	III. Other Public Enterprises					
Operating surplus before taxes and transfers	2.9	3.3	2.7	2.5	2.6	2.5
Taxes and transfers	2.5	2.8	2.5	2.3	2.4	2.7
Current account surplus	0.4	0.5	0.2	0.2	0.2	-0.2
Capital revenues	0.0	0.1	0.0	0.0	0.1	0.0
Capital expenditure	0.6	0.9	0.7	0.8	0.5	0.5
Overall surplus or deficit (-)	-0.2	-0.4	-0.5	-0.6	-0.3	-0.6

Source: Ministry of Finance.

Table 17. Chile: Summary Operations of CODELCO

	1995	1996	1997	1998	1999	2000
	(In billions of Chilean pesos)					
Current revenue	1,665.5	1,354.7	1,540.2	1,333.6	1,520.0	1,982.6
Sales of goods and services	1,580.9	1,289.8	1,470.2	1,296.4	1,463.7	1,928.7
Other	84.6	64.9	70.0	37.3	56.2	53.9
Current expenditure	784.4	786.6	955.2	1,019.9	1,135.4	1,332.7
Wages and salaries 1/	248.1	269.1	282.1	274.9	298.5	289.8
Purchases of goods and services	518.8	493.9	642.8	708.3	789.5	990.2
Interest payments	17.6	23.5	30.2	36.6	47.5	52.8
Operating surplus	881.1	568.2	585.0	313.7	384.5	649.9
Less: taxes and transfer payments	-760.4	-492.1	-590.9	-278.8	-255.3	-550.0
Plus: transfer receipts	54.4	87.4	147.8	146.7	124.2	171.7
Current account surplus or deficit (-)	175.1	163.4	141.9	181.6	253.4	271.5
Capital revenue	3.2	239.6	72.5	10.7	2.1	2.0
Capital expenditure	140.6	455.2	416.2	359.6	233.9	316.4
Overall surplus or deficit (-)	37.7	-52.2	-201.8	-167.3	21.6	-42.9
Financing	-37.7	52.2	201.8	167.3	-21.6	42.9
Foreign	17.2	4.7	92.2	228.2	-43.2	-27.0
Domestic	-54.9	47.4	109.5	-60.9	21.7	69.8
Memorandum items:						
CODELCO average export price 2/	133.2	97.6	100.0	72.3	69.2	79.4
Average price of copper at the London Metal Exchange 2/	133.2	103.2	103.2	75.0	71.3	82.3
Copper Stabilization Fund: deposits(+)/withdrawals(-) 3/	1.1	0.3	0.1	-0.5	-0.7	-0.2
Transfers to the military under Law 13,196 3/	0.5	0.4	0.4	0.3	0.3	0.4

Sources: Ministry of Finance; and Fund staff estimates.

1/ Includes employer contributions to the social security system.
2/ U.S. cents per pound.
3/ In percent of GDP.

Table 18. Chile: Central Government Fiscal Impulse Derivation

(Following Authorities' Structural Balance Measure)1/

	1996	1997	1998	1999	2000	Proj. 2001
	(In percent of nominal GDP)					
Actual						
Revenue 2/	22.3	22.0	22.1	21.2	21.8	21.5
Expenditure 3/	21.6	21.5	22.5	24.0	23.7	22.8
Trend						
Revenue 4/	19.3	19.3	19.3	19.3	19.3	19.3
Expenditure 5/	22.1	21.8	22.0	23.2	23.1	23.3
Actual less trend						
Revenue	3.0	2.8	2.8	1.9	2.5	2.2
Expenditure	-0.5	-0.3	0.5	0.7	0.6	-0.5
	(In percent)					
Total impulse 6/	-0.3	0.4	0.7	1.1	-0.8	-0.8
Revenue impulse 7/	-1.7	0.2	-0.1	0.9	-0.6	0.3
Expenditure impulse 8/	1.4	0.2	0.8	0.2	-0.2	-1.1

Sources: Fund staff calculations, based on data and estimates provided by the Ministry of Finance.

1/ Operations of the central government, modified to include also the quasi-fiscal operation of the Petroleum Price Stabilization Fund (normally reflected only in the accounts of the state-owned oil company). Calculations are in general consistent with the definition of government and accounting treatments used in the Chilean authorities' "structural balance" measure.

2/ Excludes proceeds from privatization, sale of financial assets, recovery of loans, and withdrawals from (deposits in) the Copper Stabilization Fund. Also excludes all taxes and transfers from CODELCO.

3/ Excludes extension of loans, purchases of financial assets, transfers to private pension funds related to balances accumulated under the previous public pension scheme, and military purchases outside the central government budget. Adjusted to include quasi-fiscal expenditure (revenue) arising from operation of the Petroleum Price Stabilization Fund.

4/ "Trend" revenue refers simply to ratio of actual revenue to GDP in a base year.

5/ "Trend" expenditure refers to level of expenditure that would have prevailed if actual expenditure had grown in line with potential nominal GDP (subsequent to a base year), as a ratio to actual GDP. Potential GDP is calculated using Ministry of Finance estimates of real potential growth and actual (GDP deflator) inflation.

6/ Sum of the revenue and expenditure impulses.

7/ Change in the gap between actual and trend revenue in relation to the preceding year; equivalent to simple change in ratio of actual revenue to GDP (with opposite sign).

8/ Change in the gap between actual and trend expenditure in relation to the preceding year (reflects difference between rates of growth of actual expenditure and potential GDP).

Table 19. Chile: Real Interest Rates on Central Bank Notes and Operations of the Financial System

(In percent per annum)

	Central Bank Notes			Financial System Operations 90 to 365 Days	
	Interbank 1/	90 Days	8 Years	Loans	Deposits
1995	6.1	6.1	6.2	8.5	5.9
1996	7.3	7.3	6.3	9.3	6.9
1997	6.9	6.8	6.5	8.8	6.4
1998	12.8	9.6	7.5	11.9	9.5
1999	5.8	6.0	6.5	8.2	5.9
January	7.6	7.3	6.8	9.8	7.4
February	7.2	7.2	6.6	9.3	6.9
March	7.0	7.2	-	9.2	6.9
April	6.5	6.9	6.4	9.2	6.9
May	6.1	6.1	6.3	8.2	6.1
June	5.5	5.4	6.1	7.8	5.3
July	4.9	5.2	6.4	7.2	5.0
August	4.9	5.1	6.5	7.3	5.0
September	5.0	5.0	6.5	7.5	5.0
October	5.0	5.1	6.6	7.3	5.1
November	5.0	5.7	6.7	7.7	5.4
December	4.8	5.7	6.7	7.9	5.5
2000	5.2	5.4	6.4	7.5	5.2
January	5.0	5.3	6.6	7.3	5.1
February	5.3	5.7	6.7	7.6	5.2
March	5.4	5.6	6.7	7.9	5.4
April	5.5	5.6	6.5	7.6	5.4
May	5.5	5.8	6.7	7.7	5.4
June	5.5	5.8	6.6	7.6	5.5
July	5.5	5.6	6.3	7.5	5.4
August	5.4	5.4	6.2	7.4	5.2
September	5.0	5.0	6.2	7.6	4.9
October	5.0	5.0	6.1	7.4	4.9
November	5.0	5.0	6.0	7.2	4.8
December	5.0	4.9	5.9	7.0	4.8
2001	4.3	4.2	5.2	6.5	4.2
January	4.8	4.7	5.6	6.9	4.5
February	4.6	4.4	5.2	6.8	4.2
March	4.1	3.8	4.9	6.2	4.0
April	3.9	3.8	4.9	6.2	3.9

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Since May 29, 1995 the interest rate on overnight operations between the central bank and commercial banks has been the main operating target of monetary policy. The values reported here are the equivalent real rate in annual terms. The central bank targets this rate.

Table 20. Chile: Private Sector Holdings of Financial Assets

	1995	1996	1997	1998	1999	2000
I. Annual Rates of Growth in Percent						
(In nominal terms)						
Total liabilities (private sector) 1/	21.0	16.9	16.3	9.7	15.7	9.5
Currency	17.7	9.5	14.6	-0.9	21.7	-4.9
Demand and sight deposits	26.2	10.9	17.4	-7.5	19.8	13.7
Narrow money (M1A)	23.5	10.5	16.6	-5.5	20.4	7.9
Savings and time deposits	28.9	26.2	11.9	13.1	0.9	4.2
Broad money (M3)	27.4	22.0	13.0	8.5	5.1	5.1
Pension fund liabilities	15.0	13.0	15.9	8.6	24.3	12.5
Letters of credit	54.7	29.0	62.3	1.8	15.0	7.3
Foreign currency deposits 2/	-1.8	-16.1	1.5	86.4	38.5	18.2
(In real terms) 3/						
Total liabilities (private sector) 1/	11.8	9.6	9.7	4.8	13.1	4.8
Currency	8.8	2.7	8.0	-5.3	18.9	-9.0
Demand and sight deposits	16.6	4.0	10.7	-11.6	17.1	8.7
Narrow money (M1A)	14.1	3.6	9.9	-9.7	17.7	3.2
Savings and time deposits	19.1	18.4	5.5	8.0	-1.4	-0.3
Broad money (M3)	17.8	14.5	6.6	3.6	2.7	0.6
Pension fund liabilities	6.3	6.0	9.3	3.7	21.5	7.7
Letters of credit	43.0	20.9	53.0	-2.7	12.4	2.7
Foreign currency deposits 2/	-9.3	-21.3	-4.3	78.1	35.4	13.1
II. Distribution						
By issuer	100.0	100.0	100.0	100.0	100.0	100.0
Central bank 4/	3.6	3.4	3.3	3.0	3.2	2.7
Bank and nonbank	48.4	50.3	50.5	51.4	48.0	47.3
Pension funds	48.0	46.3	46.1	45.6	48.8	50.0
By asset	100.0	100.0	100.0	100.0	100.0	100.0
Currency	3.6	3.4	3.3	3.0	3.2	2.7
Demand and sight deposits	8.4	7.9	8.0	6.7	7.0	7.2
Narrow money (M1A)	12.0	11.3	11.3	9.8	10.1	9.9
Savings and time deposits	33.2	35.8	34.4	35.5	30.8	29.2
Broad money (M3)	45.2	47.1	45.8	45.2	40.9	39.1
Pension fund liabilities	48.0	46.3	46.1	45.6	48.8	50.0
Letters of credit	4.0	4.4	6.1	5.7	5.6	5.5
Foreign currency deposits 2/	2.8	2.1	1.9	3.5	4.6	5.4

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Includes liabilities of pension funds to the private sector, but excludes intrafinancial flows as well as central bank notes and treasury notes in hands of the private sector.
2/ Foreign deposits are valued at end-of-period exchange rates.
3/ Nominal changes deflated by changes in the consumer price index.
4/ Excludes central bank promissory notes.

Table 21. Chile: Operations of the Financial System

(Percentage change with respect to liabilities to the private sector at the beginning of the period) 1/

	1995	1996	1997	1998	1999	2000
Net international reserves	7.0	6.6	16.6	-6.2	2.8	-0.9
Central bank	5.9	5.5	12.7	-7.0	-2.1	0.5
Rest of the financial system	1.1	1.1	3.9	0.8	4.9	-1.5
Net domestic assets	13.8	7.4	-0.5	13.0	7.0	10.8
Nonfinancial public sector (net)	-1.9	-0.2	-2.0	2.1	2.6	1.5
Private sector	18.0	12.6	11.7	4.1	2.0	6.5
Central bank promissory notes	-1.1	-2.3	-3.7	2.5	0.2	-0.7
Other assets (net)	-1.2	-2.7	-6.6	4.3	2.2	3.5
Net medium- and long-term foreign liabilities	-0.2	-2.9	-0.3	-2.9	-5.9	0.3
Central bank	-1.0	-2.9	0.0	0.0	0.0	0.0
Rest of the financial system	0.9	0.0	-0.3	-2.9	-5.9	0.3
Liabilities to the private sector	21.0	16.9	16.3	9.7	15.7	9.5
Narrow money	2.8	1.3	1.9	-0.6	2.0	0.8
Savings and time deposits	9.0	8.7	4.3	4.5	0.3	1.3
Other liabilities 2/	9.2	6.9	10.1	5.8	13.4	7.4
Memorandum items:						
Growth of banking system credit to private sector 3	27.5	20.8	18.0	11.2	3.0	10.7
Medium- and long-term foreign liabilities of the central bank (in millions of U.S. dollars)	1,491.6	3.4	3.1	2.9	2.4	2.1
Medium- and long-term foreign liabilities of commercial banks (in millions of U.S. dollars)	1,108.0	1,215.3	1,257.3	868.7	73.4	-445.6
Narrow money/GDP ratio	10.0	10.1	10.6	9.4	11.0	10.8
Broad money/GDP ratio 4/	37.7	42.1	42.6	43.4	44.5	42.7
Total liabilities to private sector/GDP ratio	83.4	89.3	93.0	96.0	108.9	109.1
Inflation rate (CPI; 12-month percentage change, end-of-period)	8.2	6.6	6.0	4.7	2.3	4.5

Sources: Central Bank of Chile; Superintendency of Pension Funds Administrators; and Fund staff estimates.

1/ Flows measured at constant end-of-period exchange rates.
2/ Includes dollar deposits, mortgage bonds, and deposits with pension funds.
3/ Annual percentage change. Excludes pension funds.
4/ Broad money includes narrow money (M1A) plus savings and time deposits.

Table 22. Chile: Operations of the Central Bank

(Percentage change with respect to liabilities to the private sector at the beginning of the period) 1/

	1995	1996	1997	1998	1999	2000
Net international reserves	159.3	150.8	374.3	-210.3	-70.2	16.7
Net domestic credit	-168.7	-222.1	-359.8	209.4	91.9	-21.6
Net credit to the nonfinancial public sector 2/	-19.1	-24.1	-40.7	30.6	82.2	20.1
Net credit to financial intermediaries	-164.9	-67.0	-116.5	-29.7	-66.0	-90.3
Central bank promissory notes	-29.5	-62.9	-108.5	73.7	5.2	-23.7
Credit to the private sector	-4.1	-5.6	-30.6	29.1	13.6	0.0
Capital and reserves	7.2	52.0	64.9	36.2	-5.8	-26.2
Other	41.8	-114.6	-128.4	69.5	62.5	98.6
Net medium- and long-term foreign liabilities	-66.4	-190.1	0.0	0.0	-0.1	0.0
Liabilities to the private sector	17.7	9.5	14.6	-0.9	21.7	-4.9
Currency	17.7	9.5	14.6	-0.9	21.7	-4.9
Memorandum items:						
Annual flows of net international reserves (in millions of U.S. dollars)	1,059.9	1,180.8	3,209.0	-2,066.1	-683.3	197.9
Change in medium- and long-term foreign liabilities (in millions of U.S. dollars)	-441.5	-1,488.2	-0.3	-0.2	-0.5	-0.3
Inflation rate (CPI; 12-month percentage change, end-of-period)	8.2	6.6	6.0	4.7	2.3	4.5

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Flows measured at constant end-of-period exchange rates.

2/ Excludes holdings of treasury notes on account of the 1983-86 capitalization of the central bank, which are included in other net domestic assets.

Table 23. Chile: Operations of Banks, Nonbanks, and Pension Funds

(Percentage change with respect to liabilities to the private sector at the beginning of the period) 1/

	1995	1996	1997	1998	1999	2000
I. Bank and Nonbank Financial Intermediaries						
Net international reserves	2.3	2.2	7.7	1.6	9.5	-3.1
Net domestic assets	26.7	19.4	9.2	8.6	-4.3	8.8
Nonfinancial public sector	-3.6	-0.4	-1.6	1.5	-0.7	1.1
Net credit to financial intermediaries	1.6	-6.4	-7.4	-5.0	-4.2	-6.0
Credit to the private sector	35.8	26.5	24.7	11.7	1.7	12.0
Capital and reserves	-3.0	-2.4	-2.7	-2.3	-1.5	-1.6
Other	-4.1	2.1	-3.7	2.7	0.5	3.3
Net medium- and long-term foreign liabilities	1.1	0.4	0.1	-1.2	-2.5	-1.6
Liabilities to the private sector 2/	27.9	21.2	16.7	11.4	7.7	-0.2
II. Pension Funds 3/						
Net international reserves	0.0	0.0	0.0	0.0	0.0	0.0
Net domestic assets	15.7	12.6	15.1	3.6	14.1	14.8
Nonfinancial public sector	1.0	1.8	0.4	0.6	1.0	0.7
Net credit to financial intermediaries 4/	10.3	10.8	13.8	9.0	10.8	11.5
Credit to the private sector	3.5	-0.2	0.8	-6.0	1.5	1.5
Capital, reserves, and other	1.0	0.0	0.2	0.0	-0.1	0.2
Net medium- and long-term foreign liabilities	0.7	-0.4	-0.8	-5.0	-10.2	2.2
Liabilities to the private sector	15.0	13.0	15.9	8.6	24.3	12.5

Sources: Central Bank of Chile; Superintendency of Pension Funds Administrators; and Fund staff estimates.

1/ Flows measured at constant end-of-period exchange rates.
2/ Excludes deposits of pension funds.
3/ Since June 2000, figures include the Pension Fund Type 2 which had 65 affiliates at end-December 2000.
4/ Consists mostly of holdings of central bank promissory notes, commercial bank letters of credit, and time and savings deposits.

Table 24. Chile: Summary Accounts of the Financial System

(End-of-period stocks; in billions of Chilean pesos)

	1995	1996	1996	1997	1997	1998	1998	1999	1999	2000
	(Ch$424.97=US$1)		(Ch$439.81=US$1)		(Ch$473.8=US$1)		(Ch$527.7=US$1)		(Ch$572.68=US$1)	
Net international reserves	5,276.2	5,804.7	5,999.1	8,021.1	8,625.5	8,003.9	8,899.8	9,819.6	10,644.7	10,120.4
Central bank	6,281.6	6,576.0	6,797.3	7,846.6	8,437.6	7,576.9	8,424.3	7,762.6	8,412.3	8,442.1
Rest of the financial system 1/	-1,005.5	-771.3	-798.3	174.5	188.0	427.0	475.5	2,057.1	2,232.4	1,678.3
Net domestic assets	17,874.8	20,368.3	20,208.4	22,162.4	21,632.2	24,105.1	23,288.4	25,537.1	24,655.4	28,643.1
Nonfinancial public sector (net) 2/	-1,907.1	-1,945.0	-2,003.4	-2,513.2	-2,675.3	-2,068.3	-2,290.3	-1,458.2	-1,573.0	-1,011.7
Private sector	17,406.8	20,119.0	20,179.5	23,144.6	23,267.2	24,484.2	24,705.5	25,350.0	25,511.2	27,974.2
Central bank promissory notes	-1,752.9	-2,245.0	-2,245.0	-3,174.9	-3,174.9	-2,451.0	-2,451.0	-2,400.1	-2,400.1	-2,680.7
Other assets (net)	4,128.0	4,439.3	4,277.3	4,705.8	4,215.1	4,140.2	3,324.3	4,045.4	3,117.3	4,361.3
Net medium- and long-term foreign liabilities	1,104.7	517.9	536.0	554.3	597.2	413.0	459.9	40.0	43.4	-254.0
Central bank	633.9	1.4	1.5	1.3	1.4	1.4	1.5	1.3	1.4	1.2
Rest of the financial system	470.9	516.5	534.5	553.0	595.7	411.6	458.4	38.7	42.0	-255.2
Liabilities to the private sector	21,599.1	25,240.4	25,259.1	29,373.0	29,416.3	32,270.1	32,398.3	37,473.8	37,622.0	41,201.6
Narrow money	2,588.7	2,859.6	2,859.6	3,333.6	3,333.6	3,149.0	3,149.0	3,791.9	3,791.9	4,090.3
Savings and time deposits	7,161.8	9,040.3	9,040.3	10,118.7	10,118.7	11,442.3	11,442.3	11,540.5	11,540.5	12,030.9
Other liabilities 3/	11,848.6	13,340.5	13,359.2	15,920.7	15,964.1	17,678.8	17,807.0	22,141.5	22,289.7	25,080.4

Sources: Central Bank of Chile; Superintendency of Pension Funds Administrators; and Fund staff estimates.

1/ Consists of commercial banks, including the *Banco del Estado*, insurance companies, and the pension funds.
2/ Excludes holdings of treasury notes on account of the 1983-85 capitalization of the central bank. These notes are included in other assets.
3/ Includes mortgage bonds, U.S. dollar deposits, and deposits with pension funds.

Table 25. Chile: Summary Accounts of the Central Bank

(End-of-period stocks; in billions of Chilean pesos)

	1995	1996	1996	1997	1997	1998	1998	1999	1999	2000
	(Ch$424.97=US$1)		(Ch$439.81=US$1)		(Ch$473.8=US$1)		(Ch$527.7=US$1)		(Ch$572.68=US$1)	
Net international reserves	6,281.6	6,576.0	6,797.3	7,846.6	8,437.6	7,576.9	8,424.3	7,762.6	8,412.3	8,442.1
In millions of U.S. dollars	14,805.0	15,474.0	15,474.0	17,840.9	17,840.9	15,991.8	15,991.8	14,710.2	14,710.2	14,741.4
Net domestic assets	-4,405.5	-5,242.3	-5,463.5	-6,463.2	-7,054.1	-6,346.1	-7,193.3	-6,296.8	-6,946.4	-7,297.2
Net credit to the nonfinancial public sector 1/	-1,368.5	-1,556.9	-1,615.0	-1,964.3	-2,125.3	-1,825.0	-2,045.5	-1,245.1	-1,363.4	-1,125.6
Net credit to financial intermediaries	-6,673.2	-7,198.0	-7,198.0	-8,196.9	-8,196.9	-8,488.8	-8,488.8	-9,130.7	-9,130.7	-10,200.9
Central bank promissory notes	-1,752.9	-2,245.0	-2,245.0	-3,174.9	-3,174.9	-2,451.0	-2,451.0	-2,400.1	-2,400.1	-2,680.7
Credit to the private sector	-66.2	-110.0	-113.9	-376.1	-405.1	-118.9	-132.5	0.0	0.0	0.0
Capital and reserves	-266.2	141.3	127.1	683.8	646.7	1,002.6	943.4	886.9	854.4	544.1
Other	5,721.6	5,726.4	5,581.2	6,565.1	6,201.4	5,535.0	4,981.1	5,592.2	5,093.4	6,165.9
Net medium- and long-term foreign liabilities	633.9	1.4	1.5	1.3	1.4	1.4	1.5	1.3	1.4	1.2
In millions of U.S. dollars	1,491.6	3.4	3.4	3.1	3.1	2.9	2.9	2.4	2.4	2.1
Liabilities to the private sector	782.9	857.3	857.3	982.2	982.2	973.3	973.3	1,184.5	1,184.5	1,126.7
Currency in circulation	782.9	857.3	857.3	982.2	982.2	973.3	973.3	1,184.5	1,184.5	1,126.7

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Excludes holdings of treasury notes on account of the 1983-86 capitalization of the central bank, which are included in other net domestic assets.

Table 26. Chile: Summary Accounts of Banks and Nonbanks Financial Intermediaries 1/

(End-of-period stocks; in billions of Chilean pesos)

	1995	1996	1996	1997	1997	1998	1998	1999	1999	2000
	(Ch$424.97=US$1)		(Ch$439.81=US$1)		(Ch$473.8=US$1)		(Ch$527.7=US$1)		(Ch$572.68=US$1)	
Net international reserves	-1,005.5	-771.3	-798.3	174.5	188.0	427.0	475.5	2,057.1	2,232.4	1,678.3
In millions of U.S. dollars	-2,365.9	-1,815.0	-1,815.0	396.7	396.7	901.1	901.1	3,898.1	3,898.1	2,930.7
Net domestic assets	11,943.6	13,977.1	14,040.8	15,214.9	15,287.5	16,567.9	16,694.4	15,983.2	15,959.3	17,560.8
Nonfinancial public sector	-734.3	-772.7	-772.9	-977.6	-978.6	-748.5	-750.0	-869.0	-865.5	-674.4
Net credit to financial intermediaries	437.0	-233.2	-233.2	-1,175.0	-1,175.0	-1,921.4	-1,921.4	-2,627.8	-2,627.8	-3,710.8
Credit to the private sector	13,624.9	16,396.6	16,460.9	19,596.0	19,747.6	21,488.6	21,723.3	22,010.9	22,172.2	24,357.5
Capital and reserves	-1,612.7	-1,863.2	-1,863.2	-2,204.7	-2,204.7	-2,551.6	-2,551.6	-2,808.5	-2,808.5	-3,094.0
Other	228.7	449.6	449.2	-23.7	-101.7	300.8	194.1	277.5	88.9	682.4
Net medium- and long-term foreign liabilities	470.9	516.5	534.5	553.0	595.7	411.6	458.4	38.7	42.0	-255.2
In millions of U.S. dollars	1,108.0	1,215.3	1,215.3	1,257.3	1,257.3	868.7	868.7	73.4	73.4	-445.6
Liabilities to the private sector	10,467.3	12,689.4	12,708.0	14,836.4	14,879.7	16,583.3	16,711.5	18,001.5	18,149.7	19,494.3

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Excludes the pension funds.

Table 27. Chile: Summary Accounts of Pension Funds 1/

(End-of-period stocks; in billions of Chilean pesos)

	1995	1996	1996	1997	1997	1998	1998	1999	1999	2000
	(Ch$424.97=US$1)		(Ch$439.81=US$1)		(Ch$473.8=US$1)		(Ch$527.7=US$1)		(Ch$572.68=US$1)	
Net international reserves	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
In millions of U.S. dollars	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net domestic assets	10,327.1	11,630.7	11,628.5	13,399.9	13,387.9	13,870.3	13,774.4	15,845.4	15,637.2	18,340.2
Nonfinancial public sector	195.7	384.5	384.5	428.7	428.7	505.2	505.2	655.9	655.9	788.2
Net credit to financial intermediaries	6,291.6	7,413.7	7,413.7	9,031.7	9,031.7	10,250.6	10,250.6	11,839.5	11,839.5	13,935.2
Credit to the private sector	3,848.1	3,832.4	3,832.4	3,924.8	3,924.8	3,114.6	3,114.6	3,339.1	3,339.1	3,616.7
Capital and reserves	9.6	2.7	2.7	10.8	10.8	12.9	12.9	5.2	5.2	39.3
Other	-8.3	0.0	-2.2	14.7	2.7	-0.1	-96.0	11.0	-197.2	0.0
Net medium- and long-term foreign liabilities	-22.0	-63.1	-65.3	-154.5	-166.5	-843.2	-939.1	-2,442.5	-2,650.7	-2,240.3
Liabilities to the private sector	10,349.0	11,693.8	11,693.8	13,554.4	13,554.4	14,713.5	14,713.5	18,287.9	18,287.9	20,580.5

Sources: Central Bank of Chile; Superintendency of Pension Funds Administrators; and Fund staff estimates.

1/ Since June 2000, figures include the Pension Fund Type 2 which had 65 affiliates at end-December 2000.

Table 28. Chile: Pension Funds—Selected Indicators 1/

(End-of-period values; unless otherwise indicated)

	1995	1996	1997	1998	1999	2000
	(In thousands of persons)					
Number of affiliates	5,320.9	5,571.5	5,780.4	5,966.1	6,105.7	6,280.2
Contributors (*cotizantes*) 2/	2,961.9	3,121.1	3,296.4	3,149.8	3,262.3	3,197.0
	(In percent per annum)					
Real rate of return of pension funds	-2.5	3.5	4.7	-1.1	16.3	4.4
	(As a percentage of annual GDP)					
Total assets of pension funds	40.0	41.4	42.9	43.8	53.1	54.5
	(As a percentage of total assets)					
Pension funds portfolio composition						
Total assets	100.1	100.0	100.0	100.0	100.0	100.0
Government securities	39.5	42.1	39.6	41.0	34.6	35.7
Financial institutions instruments	23.1	24.6	30.1	32.1	33.7	35.6
Firms shares and debentures	37.2	32.8	29.0	21.2	18.3	17.6
Foreign assets 3/	0.2	0.5	1.2	5.7	13.4	10.9
Other	0.1	0.0	0.1	0.1	0.0	0.2

Sources: Central Bank of Chile; Superintendency of the AFPs; and Fund staff estimates.

1/ Since June 2000, figures include the Pension Fund Type 2 which had 65 affiliates at end-December 2000.

2/ Includes all workers affiliated to an AFP that during the specified month pay, or declare and do not pay, the contributions to the pension fund.

3/ Until May 1993 pension funds were not allowed to invest in foreign assets. Currently, they can invest up to 16 percent of the value of the fund.

Table 29. Chile: Export and Import Values, Volumes, and Prices and Terms of Trade

	1995	1996	1997	1998	1999	2000
	(Annual percentage changes)					
Export values (f.o.b.)	38.1	-3.9	8.2	-11.0	5.3	16.3
Volumes	11.5	13.4	10.4	7.3	8.1	5.9
Prices	23.8	-15.2	-2.0	-17.1	-2.6	9.8
Import values (c.i.f.)	34.5	12.7	10.3	-4.5	-19.4	-19.5
Volumes	24.4	11.8	15.6	0.8	-16.5	9.0
Prices	8.1	0.3	-4.5	-5.2	-3.5	9.8
Terms of trade	14.5	-15.5	2.6	-12.5	0.9	0.1
Memorandum items:						
Noncopper exports	29.5	-1.7	4.8	-3.3	2.4	11.2
Volumes	9.5	7.3	4.7	7.4	4.9	6.5
Prices	18.3	-8.4	0.0	-10.0	-2.4	4.4
	(In thousands of metric tons)					
Export volumes						
Copper	2,347	2,885	3,432	3,651	4,215	4,443
Fishmeal	1,325	1,053	927	496	589	532
Whitened wood pulp	1,353	1,382	1,333	1,434	1,546	1,529
Fresh fruit (grapes)	443	513	471	490	474	596
Fresh fish	188	217	244	278	254	327
	(U.S. dollars per metric ton)					
Export prices						
Copper 1/	1.25	0.95	0.90	0.66	0.64	0.75
Fishmeal	474	578	594	697	473	437
Whitened wood pulp	826	449	441	407	422	625
Fresh fruit (grapes)	1,200	1,079	1,331	1,245	1,150	1,096
Fresh fish	4,117	3,589	3,731	3,425	4,163	3,939

Sources: Central Bank of Chile; and Fund staff estimates.

1/ U.S. dollars per pound.

Table 30. Chile: Exports (f.o.b.) by Main Categories

	1995	1996	1997	1998	1999	2000
	(In millions of U.S. dollars)					
Total	16,024	15,405	16,663	14,830	15,616	18,158
Mining products	7,850	7,324	8,132	6,505	6,934	8,430
Copper	6,487	6,029	6,841	5,332	5,889	7,347
CODELCO	3,116	2,391	2,942	2,273	2,332	2,784
Other	3,371	3,638	3,899	3,059	3,557	4,563
Other	1,363	1,295	1,291	1,173	1,045	1,083
Agricultural and fishery products	2,398	2,442	2,566	2,560	2,666	2,819
Fresh fruit	1,117	1,205	1,194	1,180	1,121	1,122
Fresh fish and mollusks 1/	858	878	966	1,014	1,166	1,290
Other	423	360	405	366	378	408
Semi-industrial and industrial prodt	5,776	5,639	5,965	5,765	6,016	6,909
Fishmeal	628	608	550	346	278	233
Woodchips	233	171	147	131	133	134
Woodpulp	1,229	725	680	689	773	1,111
Other	3,687	4,134	4,589	4,599	4,833	5,432
	(In percent of total exports)					
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mining products	49.0	47.5	48.8	43.9	44.4	46.4
Copper	40.5	39.1	41.1	36.0	37.7	40.5
Agricultural and fishery products	15.0	15.9	15.4	17.3	17.1	15.5
Fresh fruit	7.0	7.8	7.2	8.0	7.2	6.2
Fresh fish and mollusks 1/	5.4	5.7	5.8	6.8	7.5	7.1
Other	2.6	2.3	2.4	2.5	2.4	2.2
Semi-industrial and industrial prodt	36.0	36.6	35.8	38.9	38.5	38.0
Fishmeal	3.9	3.9	3.3	2.3	1.8	1.3
Woodchips	1.5	1.1	0.9	0.9	0.9	0.7
Woodpulp	7.7	4.7	4.1	4.6	4.9	6.1
Other	23.0	26.8	27.5	31.0	30.9	29.9
	(In percent of GDP)					
Total	24.6	22.5	22.2	20.3	23.1	26.9
Copper	9.9	8.8	9.1	7.3	8.7	10.5

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Includes frozen and semi-processed fish and mollusks.

Table 31. Chile: Imports (c.i.f.) by Type of Goods 1/

	1995	1996	1997	1998	1999	2000
	(In millions of U. S. dollars)					
Total imports	15,900	17,823	19,662	18,779	15,137	18,089
Consumer goods	2,850	3,346	3,616	3,463	2,833	3,381
Intermediate goods	8,864	9,703	10,557	10,205	9,008	11,007
Crude oil	925	1,190	1,242	897	1,100	1,994
Petroleum products	495	671	650	595	699	896
Other	7,443	7,842	8,665	8,713	7,209	8,117
Capital goods	4,187	4,774	5,490	5,112	3,297	3,702
Memorandum item:						
Imports of automobiles	687	799	839	636	400	603
	(In percent of total imports)					
Total imports	100.0	100.0	100.0	100.0	100.0	100.0
Consumer goods	17.9	18.8	18.4	18.4	18.7	18.7
Intermediate goods	55.7	54.4	53.7	54.3	59.5	60.8
Crude oil	5.8	6.7	6.3	4.8	7.3	11.0
Petroleum products	3.1	3.8	3.3	3.2	4.6	5.0
Other	46.8	44.0	44.1	46.4	47.6	44.9
Capital goods	26.3	26.8	27.9	27.2	21.8	20.5
Memorandum item:						
Imports of automobiles	4.3	4.5	4.3	3.4	2.6	3.3
	(In percent of GDP)					
Total imports	24.4	26.0	26.2	25.7	22.4	25.8
Consumer goods	4.4	4.9	4.8	4.7	4.2	4.8
Intermediate goods	13.6	14.2	14.1	14.0	13.3	15.7
Crude oil	1.4	2.8	1.7	1.2	1.6	2.8
Petroleum products	0.8	1.0	0.9	0.8	1.0	1.3
Other	11.4	11.4	11.5	11.9	10.7	11.6
Capital goods	6.4	7.0	7.3	7.0	4.9	5.3
Memorandum item:						
Imports of automobiles	1.1	1.2	1.1	0.9	0.6	0.9

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Excludes imports through free trade zones.

Table 32. Chile: Capital Goods Imports (f.o.b.) by Type of Goods

(In millions of U.S. dollars)

	1995	1996	1997	1998	1999	2000
Total	4,088	4,646	5,176	4,787	3,135	3,532
Machinery and equipment	2,986	3,415	3,910	3,743	2,624	2,719
Textiles industry	39	26	27	25	19	23
Mechanical industry	34	37	36	31	26	20
Wood and furniture industry	35	40	28	26	22	40
Telecommunications	86	123	179	323	332	363
Loading-unloading	247	192	254	192	101	117
Earth moving	271	350	323	268	102	200
Generators, motors, and transformers	163	159	209	189	139	92
Computers	320	369	451	408	436	470
Pumps and compressors	74	71	91	79	45	58
Others	1,717	2,048	2,312	2,202	1,402	1,336
Transportation	1,102	1,231	1,266	1,044	511	813
Goods	336	334	357	232	87	157
Automobiles	133	142	175	129	66	86
Tractors	32	40	32	33	20	22
Ships	101	130	57	46	31	31
Other	501	585	645	604	307	517

Source: Central Bank of Chile.

Table 33. Chile: Direction of Trade

(In percent)

	1995	1996	1997	1998	1999	2000
Exports	100.0	100.0	100.0	100.0	100.0	100.0
Europe	29.4	25.9	25.6	29.0	27.5	26.5
European Union	27.1	23.9	24.2	27.9	26.0	24.6
Belgium and Luxembourg	2.4	1.6	1.6	2.3	1.9	2.0
France	3.1	2.6	2.7	3.0	3.1	3.4
Germany	5.1	4.8	4.3	3.7	3.6	2.5
Italy	3.7	3.1	3.0	4.5	4.0	4.5
Netherlands	2.7	2.6	2.5	2.8	3.2	2.5
Spain	1.9	1.8	2.0	1.9	2.1	2.1
Sweden	0.5	0.5	0.6	0.7	0.4	0.7
United Kingdom	6.5	5.8	6.3	7.8	6.7	5.8
Other 1/	1.1	1.2	1.4	1.2	1.0	1.1
Other	1.8	1.5	0.7	0.4	1.0	1.2
Western Hemisphere	33.8	37.3	37.7	41.8	41.7	40.3
Canada	0.6	0.9	0.8	1.0	1.2	1.3
LAIA countries	18.2	18.9	19.8	22.3	19.9	20.4
Andean Pact countries 2/	6.6	6.6	6.7	7.9	6.5	6.7
Argentina	3.6	4.6	4.7	4.9	4.5	3.5
Brazil	6.4	6.1	5.6	5.4	4.3	5.2
Mexico	0.8	1.0	2.1	3.3	3.9	4.4
Other	0.8	0.8	0.8	0.8	0.6	0.6
United States	14.4	16.6	16.2	17.4	19.3	17.3
Other	0.6	0.9	0.9	1.1	1.3	1.3
Rest of the world	36.7	36.8	36.7	29.2	30.9	33.2
China, People's Republic of	2.3	3.0	3.5	3.9	3.5	5.3
Japan	17.7	16.2	15.5	13.7	14.5	13.8
South Korea	5.5	5.6	5.8	2.7	4.3	4.4
Taiwan, Province of China	4.3	4.1	4.6	3.6	3.2	3.3
Other	7.0	7.8	7.4	5.3	5.3	6.4
Imports 3/	100.0	100.0	100.0	100.0	100.0	100.0
Europe	22.3	22.4	22.6	23.7	22.0	18.7
European Union	20.6	20.4	21.2	21.9	19.9	16.9
Belgium and Luxembourg	0.8	0.8	0.7	0.6	0.7	0.6
France	2.9	3.4	2.7	3.9	2.9	2.6
Germany	5.1	4.2	4.5	4.6	4.4	3.6
Italy	3.3	3.2	3.7	3.9	3.6	2.5
Spain	2.9	3.1	3.3	3.7	2.8	2.5
Sweden	1.3	1.6	1.9	1.4	1.9	1.7
United Kingdom	1.6	1.6	1.7	1.5	1.3	1.0
Other 1/	2.6	2.6	2.6	2.3	2.3	2.3
Switzerland	0.8	0.7	0.6	0.7	1.1	0.7
Other	0.9	1.4	0.8	1.1	1.0	1.1
Western Hemisphere	53.9	53.8	54.0	53.1	55.6	57.9
Canada	2.1	2.4	2.3	2.8	2.9	3.0
LAIA countries	26.3	26.8	27.7	26.8	31.2	34.9
Andean Pact countries 2/	4.9	5.3	4.9	4.1	5.6	5.8
Argentina	9.0	9.4	9.8	10.8	14.1	16.9
Brazil	7.8	6.1	6.7	6.2	6.8	7.8
Mexico	3.9	5.3	5.8	4.8	4.0	3.6
Other	0.6	0.7	0.6	0.8	0.7	0.7
United States	24.7	23.7	23.2	22.9	21.1	19.6
Other	0.8	0.9	0.8	0.6	0.4	0.5
Rest of the world	23.9	23.8	23.4	23.2	22.3	23.3
China, People's Republic of	3.2	3.7	3.9	4.3	5.0	5.9
Japan	6.6	5.5	5.6	5.7	4.4	4.2
South Korea	3.4	3.2	3.2	3.1	2.8	3.1
Taiwan, Province of China	1.3	1.3	1.2	1.1	1.1	1.1
Other	9.3	10.1	9.5	9.0	9.0	9.1

Source: Central Bank of Chile.

1/ Austria, Denmark, Finland, Greece, Ireland, and Portugal as of 1995.
2/ Bolivia, Colombia, Ecuador, Peru, and Venezuela.
3/ Excludes imports through Free Trade Zones.

Table 34. Chile: Net International Reserves of the Financial System

(In millions of U.S. dollars)

	1995	1996	1997	1998	1999	2000
Central bank	14,805	15,474	17,841	15,992	14,710	14,741
Assets	14,805	15,474	17,841	15,992	14,710	14,741
Gold 1/	643	637	533	322	317	18
SDRs 2/	3	2	1	8	19	25
Reserve position at the Fund	0	50	313	602	403	318
Foreign exchange	14,137	14,781	16,991	15,049	13,977	14,381
Payment agreements (net)	22	4	2	11	-5	0
Liabilities (-)	0	0	0	0	0	0
Short-term liabilities	0	0	0	0	0	0
Liabilities to the IMF	0	0	0	0	0	0
Commercial banks 3/	-2,364	-1,814	398	902	3,899	2,932
Assets	474	587	1,153	1,783	4,172	3,372
Gold 1/	2	2	1	1	2	2
Foreign exchange	472	585	1,152	1,781	4,170	3,371
Liabilities (-)	-2,838	-2,400	-755	-880	-273	-440
Short-term loans	-2,823	-2,384	-747	-870	-260	-428
Foreign bank deposits	-15	-16	-9	-11	-13	-12
Financial system	12,441	13,660	18,239	16,894	18,610	17,673
Assets	15,279	16,061	18,994	17,774	18,882	18,114
Liabilities	-2,838	-2,400	-755	-880	-273	-440
Memorandum item:						
Medium- and long-term financial system liabilities (-)	-2,548	-1,070	-909	908	4,553	4,540
Central bank	-1,492	-3	-3	-3	-2	-2
Assets	0	0	0	0	0	0
Liabilities	1,492	3	3	3	2	2
Commercial banks	-1,108	-1,215	-1,257	-869	-73	-55
Assets	16	19	104	444	1,103	1,099
Liabilities	1,124	1,234	1,361	1,313	1,176	1,154
Pension funds	52	148	351	1,780	4,629	4,597
Assets	52	148	351	1,780	4,629	4,597

Sources: Central Bank of Chile; and Fund staff estimates.

1/ Valued at end-of-period market price
2/ SDRs are valued at end-of-period rates with respect to the U.S. dollar.
3/ Includes Banco del Estado.