May 2000

IMF Staff Country Report No. 00/67

Luxembourg: Selected Issues and Statistical Appendix

This Selected Issues and Statistical Appendix report on Luxembourg was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with this member country. As such, the views expressed in this document are those of the staff team and do not necessarily reflect the views of the Government of Luxembourg or the Executive Board of the IMF.

Copies of this report are available to the public from

International Monetary Fund • Publication Services
700 19th Street, N.W. • Washington, D.C. 20431

Telephone: (202) 623-7430 • Telefax: (202) 623-7201
Telex (RCA): 248331 IMF UR
E-mail: publications@imf.org
Internet: http://www.imf.org

Price: $15.00 a copy

International Monetary Fund
Washington, D.C.

INTERNATIONAL MONETARY FUND

LUXEMBOURG

Selected Issues and Statistical Appendix

Prepared by Albert Jaeger, Angel Ubide-Querol, and Caroline Kollau (all EU1)

Approved by the European I Department

May 15, 2000

Contents Page

Figures

Statistical Appendix

Tables

Luxembourg: Basic Data

Land area	2,586 square kilometers
Population (1998)	426,500
GDP per capita (1998)	US$40,308

	1996	1997	1998	1999
	(Volume changes, in percent)			
Demand and supply 1/				
Private consumption	4.4	3.8	2.3	3.0
Public consumption	2.7	2.7	2.7	3.3
Gross fixed investment	-3.5	10.5	1.5	7.1
Inventory accumulation 2/	0.2	0.4	0.0	0.1
Total domestic demand	2.7	5.5	2.2	4.2
Exports of goods and nonfactor services	4.0	10.5	9.9	5.2
Imports of goods and nonfactor services	4.0	9.3	8.3	4.9
Foreign balance 2/	0.5	2.5	3.0	2.3
Gross domestic product	2.9	7.3	5.0	5.2
	(In thousands, unless otherwise indicated)			
Employment and unemployment				
Resident labor force	174.0	176.5	179.6	183.1
Unemployed	5.7	5.8	6.0	5.4
(As a percent of total labor force)	3.3	3.3	3.3	2.9
Resident employment	168.3	170.7	173.6	177.8
Cross-border workers (net)	51.5	56.4	63.4	70.2
Domestic employment	219.8	227.1	237.0	248.0
(Change in percent)	2.7	3.3	4.4	4.6
Of which: Employment in international organizations 3/	7.8	7.7	7.7	7.7
	(Annual changes, in percent)			
Prices and costs				
GDP deflator	1.7	3.3	1.5	1.2
Harmonized consumer price index	1.4	1.4	1.0	1.0
Average nominal wage growth 4/	2.3	3.1	0.9	1.3
Nominal unit labor costs 4/	2.1	-0.7	0.3	0.7
	(In billions of francs)			
Current account				
Trade balance	-53.7	-71.4	-71.9	-105.8
Nonfactor service balance	77.7	100.2	112.3	129.3
Factor income balance	77.3	75.3	57.6	49.9
Employees' compensation	-49.2	-56.2	-65.2	-76.7
Net investment income	126.5	131.5	122.7	126.6
Transfer balance	-20.4	-18.2	-12.8	-14.6
Current account balance	80.9	85.9	83.7	58.9
(As a percent of GDP)	14.4	13.8	12.6	8.3
	(In percent of GDP)			
Public finance				
Central government balance	1.0	2.1	1.4	0.9
General government balance	2.7	3.6	3.2	2.4
Revenues	48.1	46.8	46.5	47.8
Expenditures	45.4	43.3	43.2	45.4
General government gross debt	6.2	6.0	6.4	6.1
Net financial assets 5/	27.6	28.1	28.8	30.9

Luxembourg: Basic Data (concluded)

	1996	1997	1998	1999
	(Annual changes, in percent)			
Exchange rates (averages)				
Luxembourg franc per U.S. dollar	5.0	15.5	1.5	4.2
U.S. dollar per euro	-2.6	-12.3	-1.6	-4.2
Nominal effective rate	-1.2	-1.9	-0.3	-0.2
Real effective rate (CPI based)	-1.8	-2.2	-0.4	-0.3
Monetary data 6/				
Money (M1)	8.5	2.2	14.4	...
Broad money (M2)	-2.0	18.9	6.6	...
	(Period averages, in percent)			
Interest rates				
Three-month interbank money rate	3.2	3.5	3.6	3.0
Differential with Germany	-0.1	0.2	0.1	0.0
Government bond yield	6.3	5.6	4.7	4.7
Differential with Germany	0.1	0.0	0.2	0.2
	(In percent)			
Financial sector indicators				
Solvency indicators of the banking sector				
Solvency ratio 7/	12.5	12.4	12.7	13.5
Banks with ratio below 8 percent	0.0	0.0	0.0	0.0
Banks with ratio below 10 percent	17.0	16.8	14.1	13.5
Profitability of the banking sector				
Return on assets 8/	0.6	0.5	0.5	...
Return on equity 9/	15.4	17.1	21.5	...
Interest margin as a percent of gross revenue	61.9	55.4	45.2	...
Commissions as a percent of gross revenue	26.3	29.7	28.6	...
Liquidity indicators (ratios)				
Loans over deposits	0.9	0.9	0.9	0.8
Loans over total assets	0.7	0.7	0.7	0.7
Securities holdings over total assets	0.2	0.2	0.2	0.2
Asset quality				
Exposure to emerging markets 10/	10.7	11.2	11.0	...

Sources: Statec; Central Bank of Luxembourg; Bank for International Settlements; and staff estimates.
1/ 1999 figures are staff estimates.
2/ Contribution to GDP growth.
3/ Including Statistical Office of the European Communities (Eurostat) and European Investment Bank (EIB).
4/ Overall economy.
5/ Staff estimates.
6/ Monetary aggregates are no longer published for Luxembourg following its joining the European Economic and Monetary Union in 1999.
7/ Own funds as a percent of risk-weighted assets.
8/ Profits before provisioning as a percent of average assets.
9/ Profits before provisioning as a percent of average equity.
10/ Loan exposures to Asia, Eastern Europe, and Latin America as a percent of total capital.

INTRODUCTION

1. Luxembourg's recent macroeconomic performance has been impressive: economic activity has expanded vigorously, with both real GDP and employment growth exceeding the respective EU averages by large margins; unemployment and inflation have remained low and stable; and Luxembourg's fiscal performance is virtually unmatched among industrial countries.

2. The following four chapters examine the sources of Luxembourg's excellent macroeconomic performance and provide background analysis on three policy challenges: (i) diversification of the financing risks of the pension system; (ii) labor market reforms to mitigate rigidities; and (iii) effective supervision of the large and mainly foreign-owned financial sector.

3. Chapter I traces Luxembourg's fast-paced growth over the last 20 years to a virtuous growth circle driven by external economies of regional specialization and sound economic policies, with high labor and capital mobility providing the factor inputs needed to accommodate rapid growth. The chapter concludes that Luxembourg's present boom is likely to persist during the next few years, but mechanical extrapolations of Luxembourg's fast-paced growth to the longer term would be fraught with considerable downside risks.

4. Luxembourg's present overall pension system—the combination of public and private pension arrangements—relies heavily on a large-scale, pay-as-you-go (PAYG) public pension scheme. Chapter II uses stress testing exercises to examine the robustness of the public pension system to large economic shocks or reversals. These exercises suggest a wide range of possible future paths for the public pension system's dependency ratio (number of pensioners per contributor) in response to large and persistent shifts in labor demand. The chapter concludes that these results argue for diversifying the pension system to hedge against the risks of longer-term growth reversals.

5. Chapter III focuses on Luxembourg's seeming labor market paradox—rigid labor market institutions combined with vibrant labor market outcomes. The chapter uses a cross-country framework that emphasizes the interplay of labor market institutions and economic environments in determining unemployment rates. The empirical results from this exercise suggest that if Luxembourg had (counterfactually) experienced the economic environment common to the EU, its unemployment rate would also have increased sharply over time. The chapter concludes that reforms would be needed to bolster the labor market's resilience to a less favorable economic environment.

6. The financial sector is Luxembourg's uncontested growth engine. As a consequence, ensuring a sound and stable regulatory environment for the mainly foreign-owned financial sector is a prime concern of public policy. Chapter IV reviews how standards and best practices on cross-border supervision have evolved since the early 1970s, describes Luxembourg's current approach to supervision, and discusses the merits of alternative supervision arrangements.

I. Why is Luxembourg Growing So Fast?[1]

A. The Issues

7. Luxembourg's growth performance during the 1980s and 1990s was impressive. GDP and employment growth almost consistently exceeded by large margins the respective growth rates in the EU—the cumulative GDP growth differential in favor of Luxembourg has mushroomed to some 50 percentage points since 1980 (Figure I-1). This chapter takes up two issues: First, what are the sources of Luxembourg's fast-paced growth since the early 1980s? And second, what are the prospects for longer-run growth to continue at status quo rates?

B. Stylized Facts

8. Luxembourg's impressive growth performance has been accompanied by four stylized facts:

- **A shift in specialization to services production:** Rapid economic growth was accompanied by a massive shift in specialization away from traditional manufacturing (steel)—Luxembourg formed part of Europe's "rust belt zone"— to services production, particularly financial services (Figure I-2). Thus, the weight of the steel industry in value added declined from almost 30 percent in 1970 to some 5 percent in 1998.[2]

- **High labor mobility:** Rapid growth has been accommodated by accelerating inflows of foreign and, in particular, cross-border workers (Figure I-2). In 1999, foreign residents represented about 37 percent of resident employment (compared with 25 percent in 1980), while the share of cross-border workers in total employment has risen to 30 percent (compared with 7 percent in 1980).[3]

- **Export-driven GDP growth:** According to Luxembourg's national account statistics, more than one-third of cumulated real GDP growth during 1981-99 (some 27 percentage points) was contributed by net exports of goods and services, reflecting the export-oriented nature of the nascent financial sector (Figure I-2). This contrasts with the experience in large integrated economic areas (such as the EU) or even smaller open economies that have been growing at a relatively fast pace during the

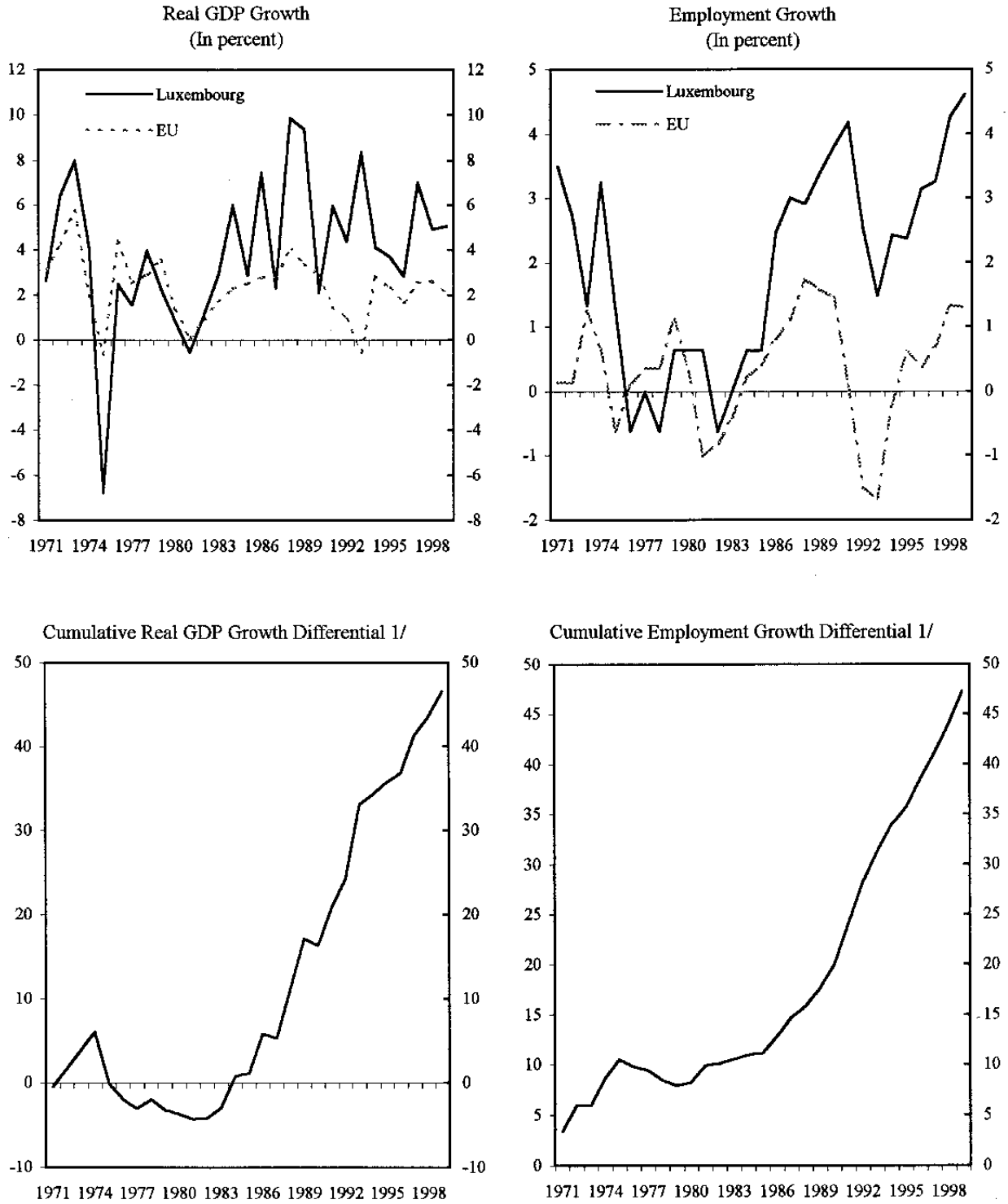
---

[1] Prepared by Angel Ubide.

[2] Luxembourg's main steel producer, ARBED, remains one of the largest steel companies in the world, although most steel production now takes place outside Luxembourg.

[3] Some 20 percent of all cross-border workers in the EU work in Luxembourg.

Figure I-1. Luxembourg's Fast-Paced Growth Experience

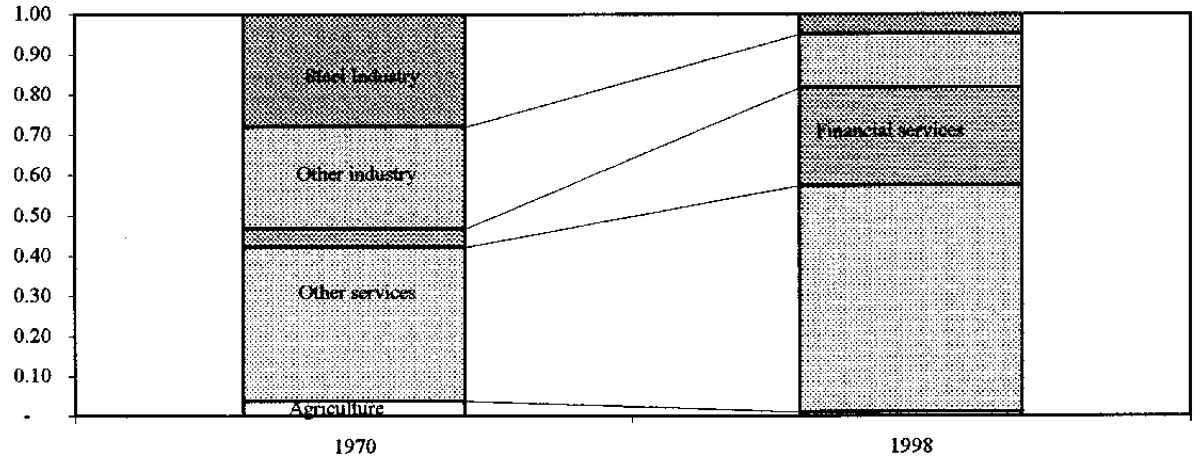


Sources: OECD; Eurostat database.

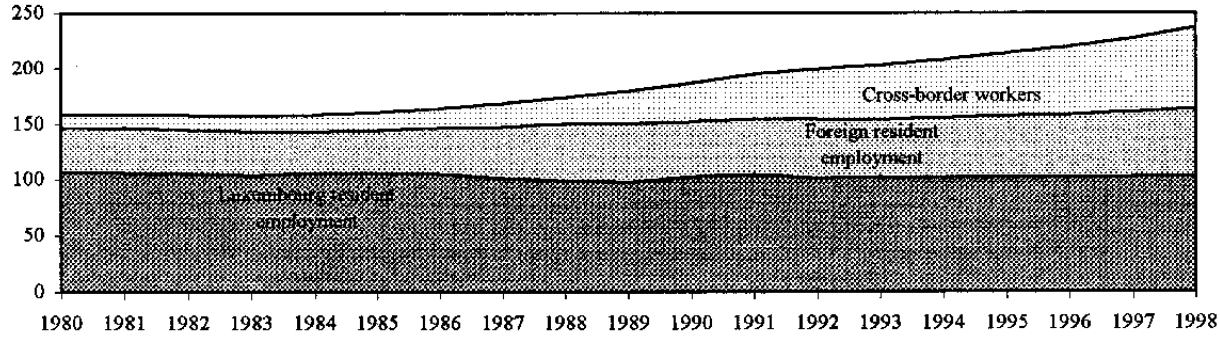
1/ Luxembourg minus EU growth rates accumulated over time (in percentage points).

Figure I-2. Luxembourg: Stylized Facts of Fast-Paced Growth

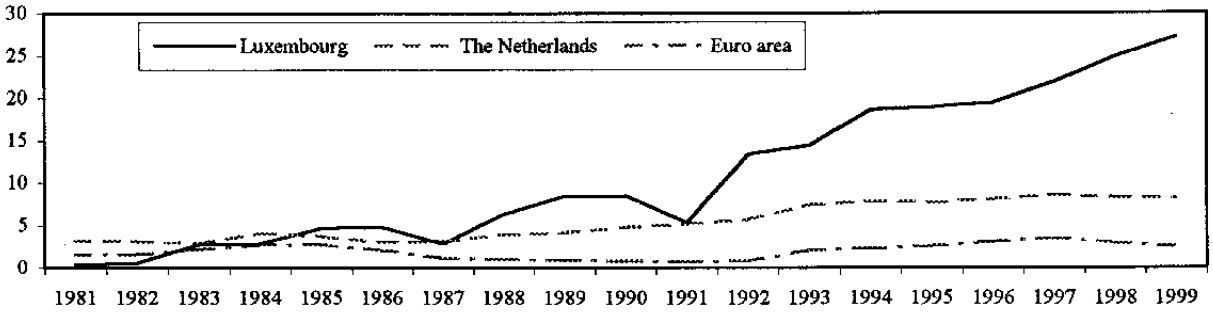
Luxembourg: The Shifting Sectoral Composition of Value Added
(In shares of total value added)



Luxembourg: Composition of Employment
(In thousands)



Cumulative Contribution to GDP Growth by Net Exports
(In percentage points)



Sources: Statec; and International Monetary Fund, WEO Database.

same time period (such as the Netherlands), where the growth contribution of net exports was small (Figure I-2).

- **Delinked GDP growth fluctuations:** Since the early 1980s, Luxembourg not only grew at a much faster average rate than the EU, but its real GDP fluctuations also became delinked from the EU's growth cycle (Figure I-1). This stylized fact stands in marked contrast with Luxembourg's business cycle experience in the 1960s and 1970s—in those periods Luxembourg's growth cycle was highly correlated with EU growth. But since the early 1980s, Luxembourg's growth has been largely acyclical, following an elevated growth trend with short-term fluctuations (cycles taking only 1–3 years to complete) around it.[4]

9. These stylized facts—regional specialization of production, high labor mobility, export-propelled growth, and the dominance of regional growth fluctuations—appear to be the hallmarks of other regional "success stories" within industrial countries:

- U.S. states and regions during the post-war period have experienced large and persistent growth differentials.[5] For example, using employment data for the 1980s and 1990s, the cumulative employment growth differentials (relative to U.S. average employment growth) for selected U.S. states are of a magnitude similar to that observed for Luxembourg (Figure I-3).

- Employment data for regions within European countries suggest persistent divergences in cumulative employment growth paths, although on a lower scale than in the United States. For example, employment growth of selected Spanish regions since the early 1980s also diverged from the national average in a highly persistent fashion (Figure I-3).

C. Regional Specialization and Growth

10. Regional booms appear to involve two broad phases of development: first, a growth take-off phase, usually spurred by singular historical events or coincidences; and second, a self-reinforcing growth phase fueled by Marshallian locational external economies[6] and sustained by a sound policy environment. After an initial agglomeration of production in a

---

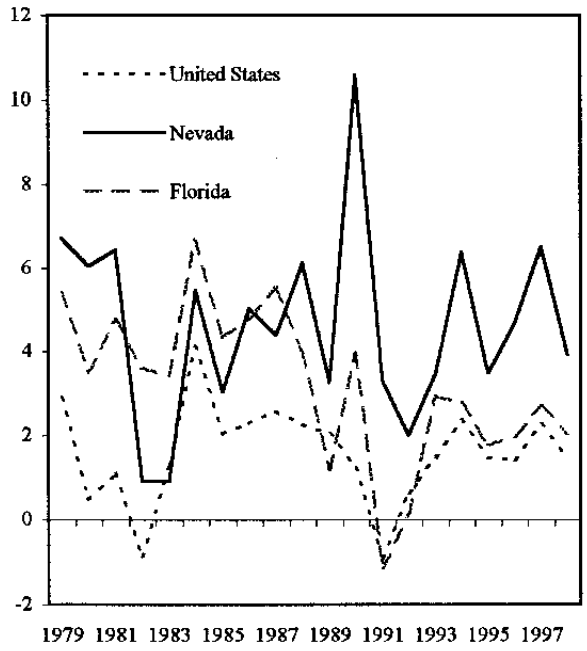
[4] In contrast to real GDP growth, the cyclical coherence between Luxembourg's and the EU's employment growth series remained strong during the 1980s and 1990s (Figure I-1).

[5] See Blanchard and Katz (1992).

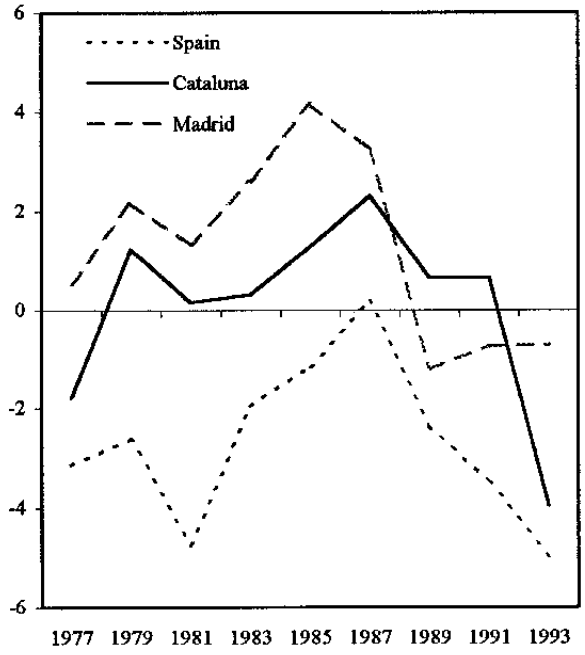
[6] Marshall (1890) first described these externalities based on his observation of the concentration of the metallurgical industry in various British cities. These external economies are economies of scale that occur at the level of the industry instead of the firm. They can arise from locational advantages (static external economies) or from knowledge advantages following a learning process (dynamic external economies).

Figure I-3 . Regional Employment Growth in Spain and the United States

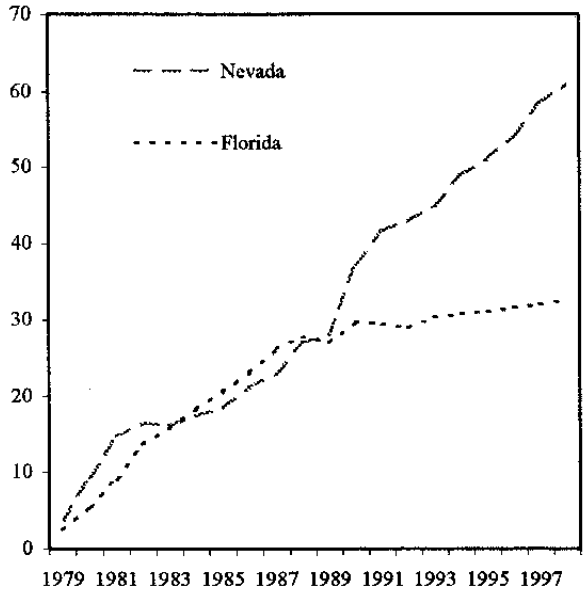
Selected U.S. States: Employment Growth.
(In percent)



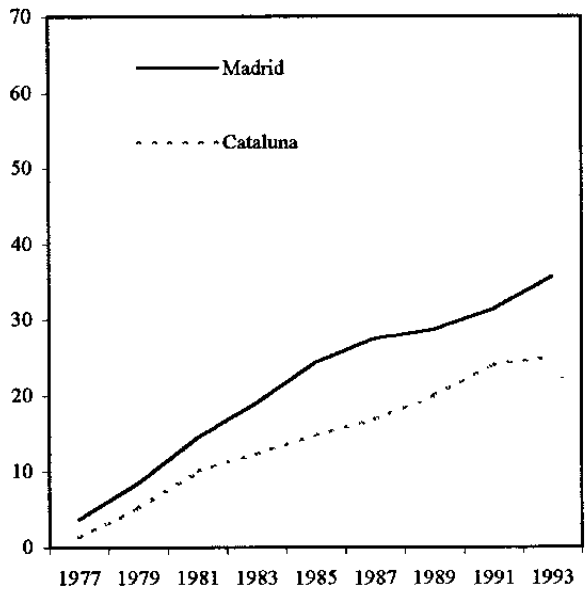
Selected Spanish Regions: Employment Growth
(In percent)



Cumulative Employment Growth
Differential 1/
(In percentage points)



Cumulative Employment Growth
Differential 1/
(In percentage points)



Sources: Bureau of Labor Statistics; and BBVA Spanish Regional National Accounts.
1/ Relative to national average.

particular geographic area—in many cases the result of historical accidents—static external economies underpinned by labor and capital mobility unleash a self-reinforcing process of cumulative causation that leads to the specialization of the area in particular activities.[7] Once a critical mass has been achieved, dynamic external economies arising from knowledge spillovers between related activities, thick labor markets in specialized skills, and backward and forward linkages among producers, tend to lock in fast-paced growth.

11. Turning to Luxembourg's particular experience, the growth take-off phase was, ironically, initiated by a severe crisis of its steel industry in the early 1970s, when the demand for steel products declined significantly owing to a generalized crisis in heavy industries and increased competition from the newly industrialized economies. Alongside a swift restructuring of the steel industry, Luxembourg transformed itself into a specialized service economy concentrating on financial services targeted mainly to the European market. Several factors helped foster an auspicious setting for the initial agglomeration of a financial service industry in Luxembourg:

- Luxembourg had two natural advantages for the development of an international financial service center: a skilled, multilingual workforce, and a geographical position in the center of Europe.

- Tax and regulatory advantages helped create a favorable environment for the development of a financial service industry, including: (i) early capital account liberalization, which significantly expanded the potential market for financial institutions; (ii) legislation ensuring bank secrecy, which helped develop the profitable private banking niche; (iii) lenient reserve requirements, which attracted foreign banks, particularly from Germany, and led to the growth of the off shore banking sector; (iv) a favorable income tax environment, including the absence of a withholding tax on interest income; (v) the quick adoption of European Union directives (such as a directive for investment funds and the single passport), which made Luxembourg an early gateway for the marketing of financial services in Europe; and (vi) the favorable legislation for investment funds, such as low subscription fees, which allowed for the development of niche funds.

- Cooperative social partnership arrangements whereby tripartite agreements based on social consensus between labor unions, employers' associations, and the government provide stability and predictability in the area of labor relations.

- And a fiscal policy strategy that largely resisted the temptations to profligacy—despite a rapidly growing tax and contribution base—and provided financial stability, a favorable tax system, and a first-rate public infrastructure.

---

[7] An extreme example is the northern Italian town of Sassuolo which, with some 100 small firms, accounts for 60 percent of the world market in ceramic tiles.

12. Once locational external economies interacted with the initial agglomeration of resources, a highly mobile supply of labor from neighboring regions provided the necessary factor input to sustain Luxembourg's regional boom. As the financial sector expanded, dynamic external economies arising from the accumulation of specialized knowledge also entered the picture, supporting continued fast-paced growth even as regulatory and tax advantages—such as the absence of reserve requirements—were being trimmed as a consequence of ongoing European integration.

13. At the same time, Luxembourg has persevered in its efforts to provide a favorable regulatory environment for specialized financial services. Recent measures include (i) legislation for mortgage banking that is more flexible than that in Germany (the Luxembourg legislation allows for the securitization of mortgages from all OECD countries); (ii) a flexible regulatory system for international pension funds that can accommodate funded pension schemes based on defined-contribution or defined-benefit principles; and (iii) a (pending) framework law for E-commerce and Internet banking.

D. Looking Ahead

14. Ongoing economic integration in the EU following the advent of Stage 3 of EMU is likely to further reinforce specialization. In addition, economic theory suggests that the removal of tax and regulatory advantages and competition from nascent financial centers are unlikely to dent Luxembourg's growth performance, at least in the short run.

15. The longer-term outlook for continued fast-paced growth is less assured, however, as technological innovations and sudden changes in preferences can undermine patterns of regional specialization. Moreover, a regional crisis can be reinforcing: in the same way that labor moves to a region experiencing a boom, labor can move away from a region experiencing a slump—particularly so if, as in Luxembourg's case, the regional boom was accommodated by large inflows of cross-border workers.

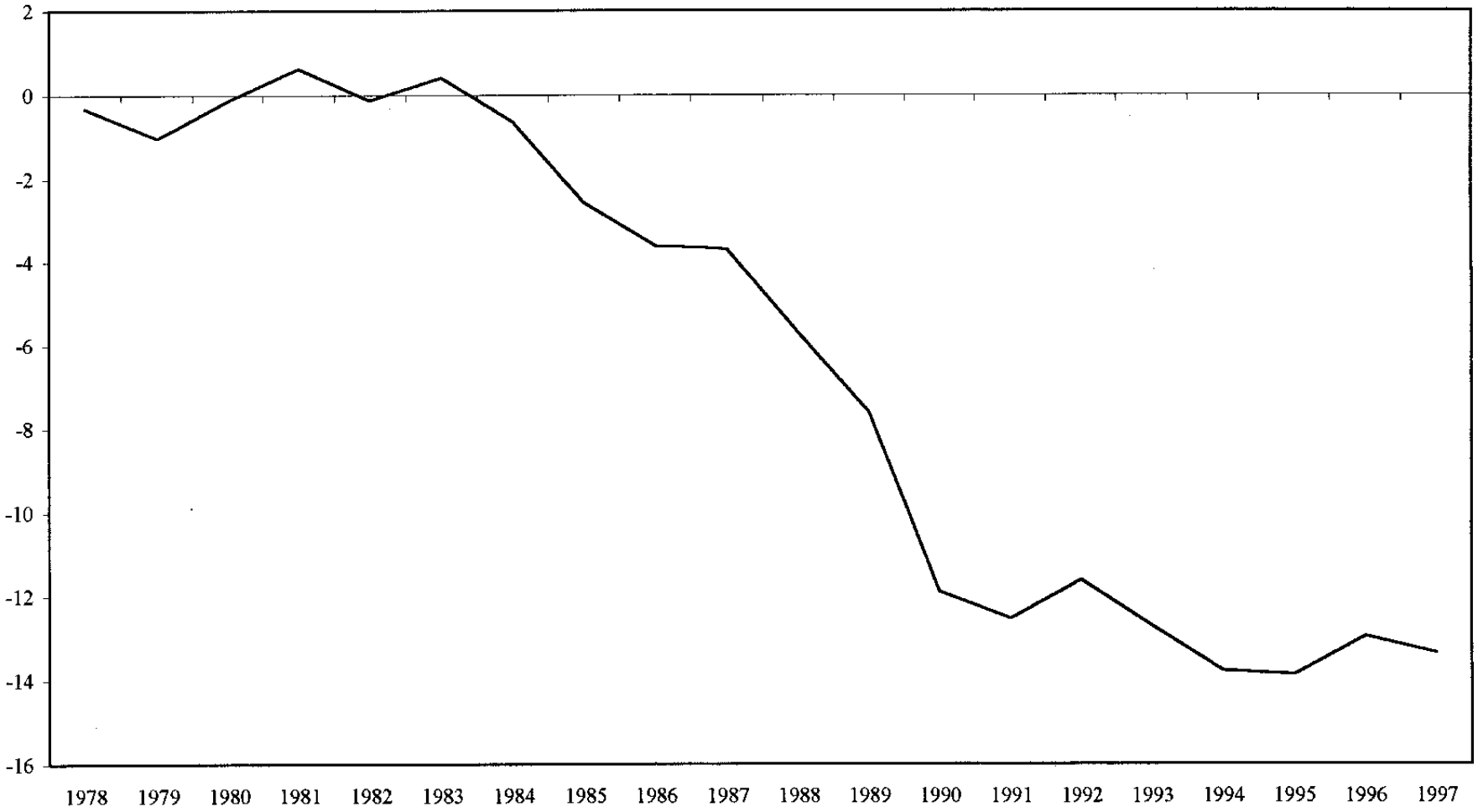
16. In this respect, the case of the U.S. state of Massachusetts has often been cited as a vivid example of a sudden reversal of a region's economic growth fortunes.[8] With production highly concentrated in high technology sectors, such as mini-computers and precision military hardware, the region enjoyed a period of rapid expansion in the 1980s. However, toward the end of the 1990s, demand shifted away from products produced in Massachusetts, and employment plummeted (Figure I-4). Within three years almost 20,000 jobs were lost (about 6 percent of the 1988 level) and the unemployment rate quadrupled, and it was not until 1996 that Massachusetts recovered to its 1988 level of employment.

17. Against this background, the main policy challenge for Luxembourg is to devise institutions that help bolster the robustness of the economy and the public finances to prolonged economic downturns that may involve massive reversals of employment growth. In this context, two institutional arrangements in Luxembourg warrant particular attention:

---

[8] See Krugman (1992).

Figure I-4: Massachusetts: Cumulative Employment Growth Differential 1/
(In percentage points)



Source: Bureau of Labor Statistics.
1/ Relative to the U.S. average.

(i) the large-scale pay-as-you-go (PAYG) social insurance system, which is largely undiversified and, as a consequence, sensitive to economic reversals—this issue is taken up in Chapter II; and (ii) the labor market institutions, which are relatively rigid but have performed well in an environment of buoyant growth—this issue is taken up in Chapter III.

18. Luxembourg's growth experience during the last 20 years may also shed light on the possible evolution and policy issues for EU regions. Luxembourg appears to represent an early example (within the EU) of regional specialization of production in an environment of high labor mobility. As EU countries integrate further, such regional specialization patterns will likely become more widespread, and large and persistent growth rate disparities among regions could become more common. At least for the smaller EU countries, this could raise labor market and social insurance design issues that broadly echo the ones faced by Luxembourg.

References

Blanchard, Olivier and Lawrence Katz, 1992, "Regional Evolutions," *Brookings Papers on Economic Activity*, 1992, pp.1-75.

Krugman, Paul, 1992, "Lessons from Massachusetts for EMU," in *The Transition to Economic and Monetary Union in Europe*, edited by Francesco Giavazzi and Francisco Torres. Cambridge: Cambridge University Press.

Marshall, Alfred, 1890, *Principles of Economics*. London: Macmillan.

II. Stress Testing Luxembourg's Public Pension System[9]

A. The Issues

19. Luxembourg's public pension system—and the social insurance system at large—face two policy challenges. First, as in other industrial countries, projected population aging will, all other things equal, put stress on public pension finances. And second, reflecting Luxembourg's small, open, and highly specialized economy, the public pension system's contribution base can be subject to possibly large and persistent shocks.

20. The premise of this chapter is that the design of Luxembourg's overall pension system—i.e., the combination of public (first pillar) and private pension arrangements (second and third pillars)—should aim at providing a stable and sustainable source of retirement income. Given this premise, the two challenges raise different design issues. Population aging—by its nature a slow and largely predictable process—raises the issue of longer-run sustainability of the public pension system. What are the policy options that would help bridge the projected long-run financing gap in the public pension system? By contrast, the possibility of large and persistent shifts in the public pension system's contribution base—by its nature a rapidly-evolving and largely unpredictable process—raises the issue of robustness of overall retirement income provision. What are the policy options that would help increase the stability of overall pension provision?

21. Restoring sustainability to a pay-as-you-go (PAYG) public pension system has been the subject of a large literature.[10] Policy options include parametric adjustments in the basic PAYG policy levers (contribution rate, budget transfers, pension replacement rate, retirement age), administrative reforms, the building up of public pension reserves, and shifting part of pension provision to a funded second pillar. In the context of Luxembourg, the issue of sustainability of the public pension system was addressed extensively in previous staff publications.[11] The present chapter focuses on the issue of robustness of Luxembourg's pension system design in an economic environment of largely unpredictable and persistent shocks. The chapter's main focus will be on illustrating a range of plausible longer-term scenarios for the public system's finances.

22. Section B briefly reviews key characteristics of Luxembourg's overall pension system. Section C lays out a simple analytic framework. Section D reports the results of stress testing exercises to illustrate the range of possible evolutions for the pension system's dependency ratio. Section E briefly summarizes the main policy options.

---

[9] Prepared by Albert Jaeger and Caroline Kollau.

[10] See Disney (1999) for a review of reform options focusing on OECD countries.

[11] See IMF Country Reports No. 96/47 and 98/67.

B. A Sketch of Luxembourg's Pension System

23. The provision of retirement income in Luxembourg is dominated by a mandatory pay-as-you-go (PAYG) public pension pillar.[12] The two main reasons for the dominance of public pension provision are its wide coverage and high pension replacement rates. Almost all private sector workers (including cross-border workers) and the self-employed are enrolled in the public pension scheme. An average wage earner with a contribution record of 40 years is promised a pension benefit equivalent to some 70 percent of averaged lifetime earnings—one of the highest public pension replacement rates in the OECD.[13] Civil servants are covered by separate pension plans.[14] While the statutory retirement age in Luxembourg stands at 65, generous early retirement provisions are reflected in some of the lowest estimated transition ages to retirement in the OECD—58 years for men, and 55 years for women.[15] Owing to the wide coverage of the public pension system, high replacement rates, and low effective retirement ages, total public pension spending (including civil service pensions) amounted to about 12 percent of GDP in 1999, one of the highest public pension spending ratios in the OECD.

24. The revenue side of Luxembourg's first-pillar system relies on pension contributions (for private sector workers) and direct budget financing (for civil servants). The contribution rate for the private sector schemes—shared equally among employers, employees, and the state budget—has been stable at 24 percent of gross earnings since the mid-1980s. An earnings floor equivalent to the minimum wage is exempted from contributions, while the earnings ceiling for contributions is equivalent to five times the minimum wage. Luxembourg's rapid employment growth since the early 1980s not only allowed to keep the level of the contribution rate constant, but it also underpinned the accumulation of a sizable pension reserve (some 21 percent of GDP at end-1999).[16]

---

[12] U.S. Social Security Administration (1999, pp. 225-27) provides a concise overview of Luxembourg's social security system. A study published by the Economist Club Luxembourg (2000) summarizes the history of Luxembourg's public pension system in an annex.

[13] An OECD cross-country study of standardized gross pension replacement rates estimated a replacement rate for Luxembourg of 93.2 percent compared to an OECD average of 59.3 percent (1995 data). See Blöndal and Scarpetta (1998, Table II-3).

[14] A civil service pension reform adopted in 1998 will—subject to a long transition period—reduce the more generous civil service pension benefits to the present levels of the private sector schemes.

[15] See Blöndal and Scarpetta (1998, Table II-1).

[16] The pension schemes for private sector workers are required to hold a contingency reserve equivalent to at least 1.5 to 2.5 years of benefits.

25. The second or occupational pension pillar of Luxembourg's pension system comprises voluntary supplementary company pension plans. Data on the significance of voluntary pension plans are scarce, but these plans are likely to have remained small in view of the dominant first-pillar scheme. A new law on supplementary pension schemes adopted in 1999 provides a flexible legal framework for the establishment of voluntary supplementary pension plans at the company level. The third pension pillar, voluntary individual income provisions for retirement, is likely to play a substantial role, particularly for persons with higher incomes.

C. A Framework

26. The main parameters affecting the financial condition of a stylized PAYG system can be brought out by considering the system's basic budget constraint:

$$(1) \qquad N(t)[\alpha(t)W(t)] = M(t)[\beta(t)W(t)],$$

where N(t) denotes the number of contributors to the system in period t, $\alpha(t)$ is the effective pension contribution rate, W(t) denotes average gross earnings subject to contributions, M(t) is the number of pensioners, and $\beta(t)$ denotes the effective pension replacement rate. Equation (1) says that revenue and expenditure of a PAYG system have to match in each period.[17] Accordingly, the equilibrium contribution rate is defined as:

$$(2) \qquad \alpha(t) = \beta(t)[M(t)/N(t)],$$

where [M(t)/N(t)] is the pension system's dependency ratio, and its inverse [N(t)/M(t)] is the pension system's support ratio.

27. It is useful to extend the basic budget constraint (2) to allow for the analytical distinction between the two policy challenges discussed at the beginning of this chapter—population aging and variability in the public pension system's contribution base due to regional shocks.[18] Assume that the number of contributors amounts to a proportion $\gamma(t)$ of the number of resident persons of working age N*. This proportion $\gamma(t)$—termed in the following the contributor coverage ratio—will depend on labor force participation, unemployment, and the number of cross-border workers. In large integrated economic areas with broad-based PAYG systems, the contributor coverage ratio will typically be close to the economy's resident employment ratio (resident employment as a percent of resident working age population) and, apart from cyclical variations, it can be assumed to evolve rather smoothly. In Luxembourg's particular case, the contributor coverage ratio exceeds the resident employment ratio by a large margin—about one-third of employment is accounted for by cross-border workers—and can also undergo potentially large variations in response to regional shocks to labor demand.

---

[17] For simplicity, the contingency reserve is not incorporated in the budget constraint.

[18] This follows Chand and Jaeger (2000).

28. Similarly, assume that the number of pensioners corresponds to a proportion $\delta(t)$ of the number of resident elderly persons M^*. In the case of Luxembourg, and again reflecting the possibility of large-scale inflows of cross-border workers, the proportion $\delta(t)$—termed in the following the pensioner coverage ratio—can differ markedly from the proportion of resident pensioners as a percent of resident elderly persons.

29. Under these assumptions, the effective equilibrium contribution rate of a PAYG system can be re-written as:

$$(3) \qquad \alpha(t) = \beta(t)[\delta(t)/\gamma(t)][M^*(t)/N^*(t)],$$

where $[M^*(t)/N^*(t)]$ is the system's elderly dependency ratio for residents. Thus, equation (3) allows to separate analytically the issue of population aging, represented by the system's elderly dependency ratio $[M^*(t)/N^*(t)]$, from the issue of regional variability of employment flows—represented by the contributor and pensioner coverage ratios $\delta(t)$ and $\gamma(t)$.

30. Figure II-1 illustrates the evolution of the public pension system's dependency ratio and the underlying movements of the elderly dependency ratio and the two coverage ratios during 1980–99.

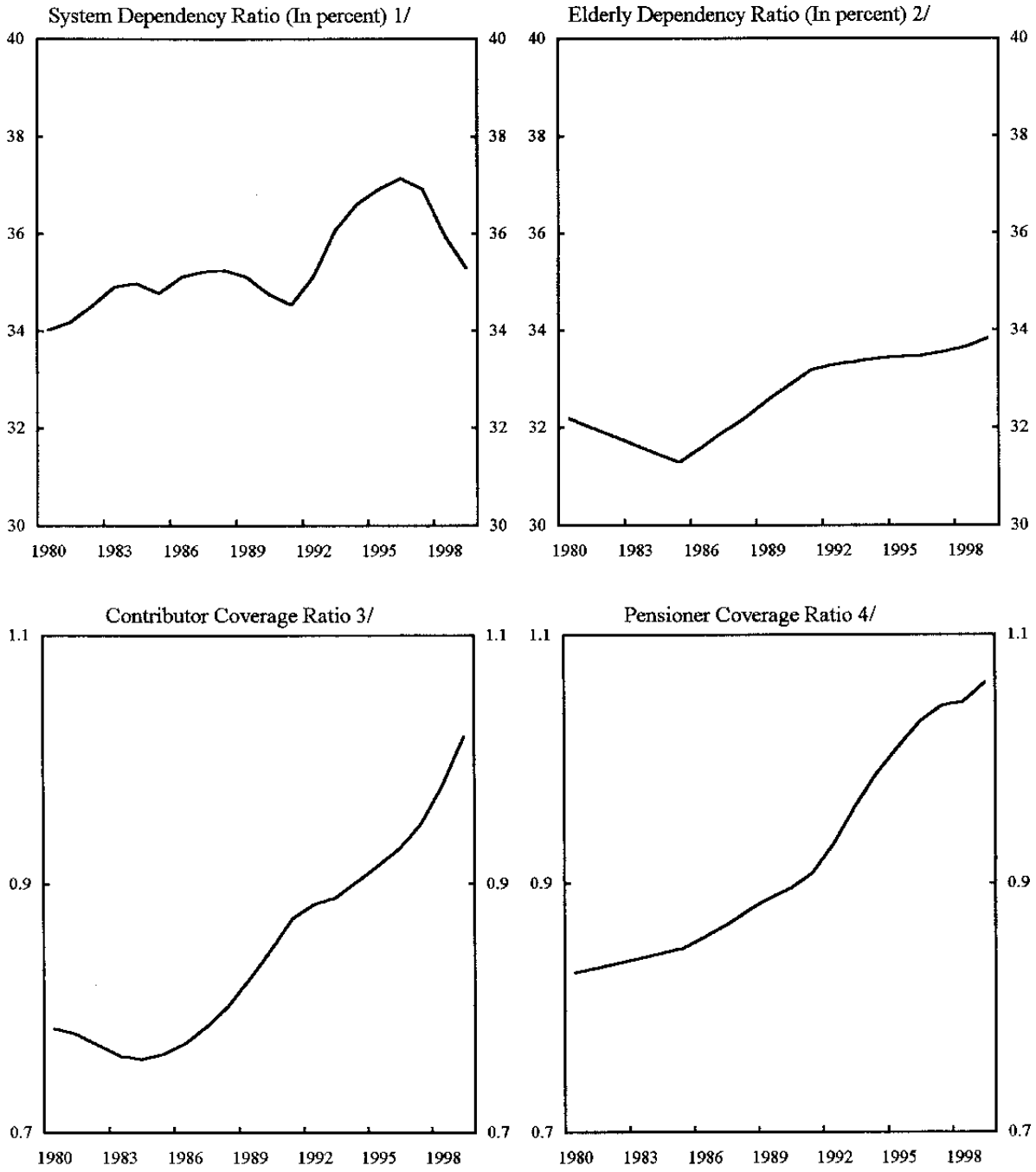
D. Empirical Results

31. The model used for tracking a range of scenarios for the public pension finances over the period 2000–50 follows broadly the generic projection model structure outlined in Chand and Jaeger (1996, pp. 34–36). These exercises are illustrative and based on broad-brush assumptions that neglect many of the institutional details that characterize Luxembourg's public pension system.[19] The projection model's key assumptions and underlying data sources include:

- The demographic projection that underlies all stress testing exercises is based on an official population scenario for the period 1995–2050 (medium variant), which was developed by the Luxembourg Statistical Office (Statec). This demographic scenario assumes that persistent immigration inflows will mitigate the impact of population aging. As a consequence, the implied longer-term profile for Luxembourg's elderly dependency ratio indicates less rapid population aging than in France and Germany, particularly toward the end of the projection horizon (Figure II-2).

[19] For an actuarial study covering the period 1995-2015 that includes a wealth of institutional detail, see Ministère de la Sécurité Sociale (1995).

Figure II-1. Luxembourg: Public Pension System Dependency Ratio, 1980-99



Sources: United Nations, World Population Prospects (1998); Statec; and staff calculations.

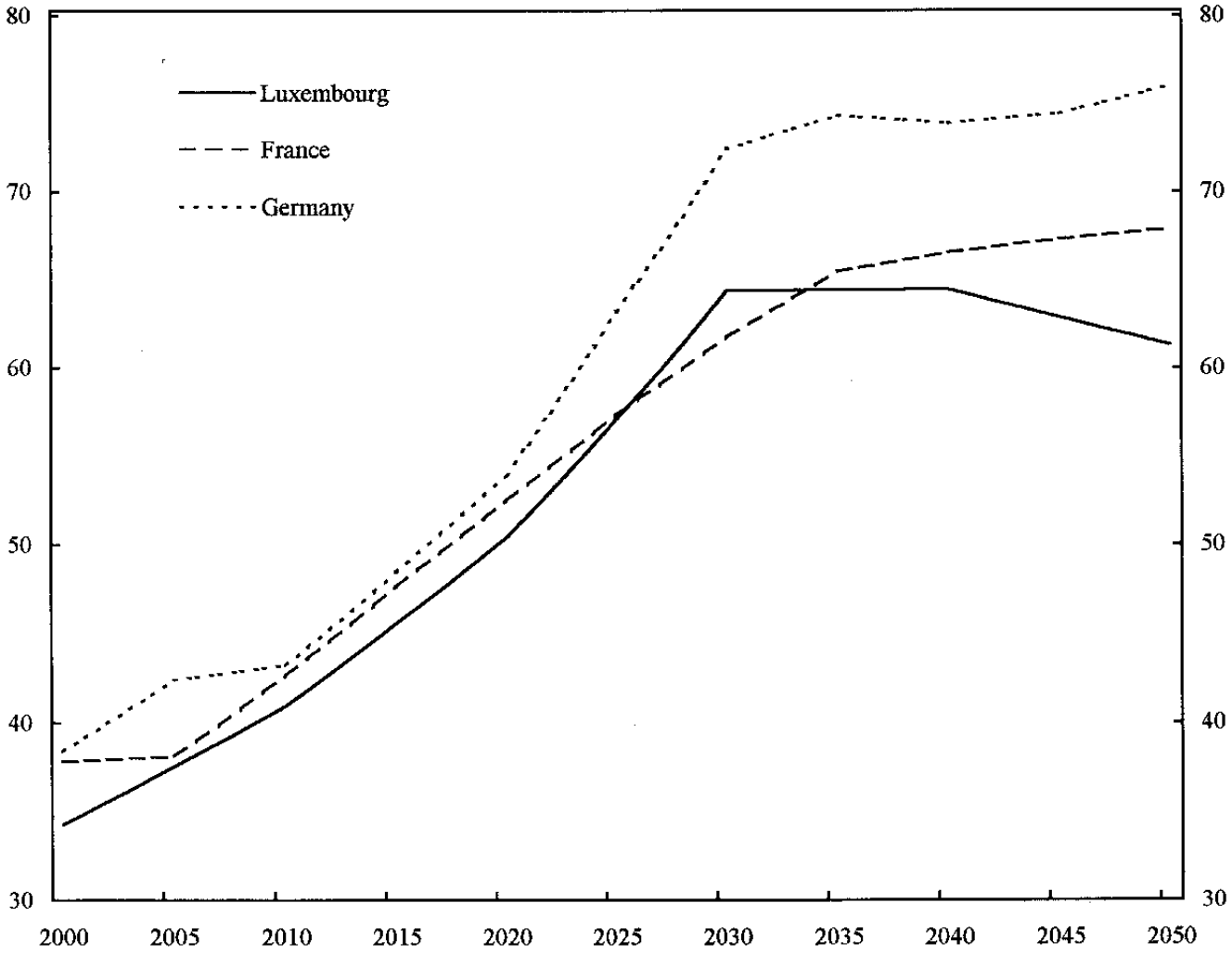
1/ Number of pensioners as a percent of the number of contributors.

2/ Resident population aged 60 and over as a percent of the resident population aged 20-59.

3/ Ratio of total number of contributors to resident population aged 20-59.

4/ Ratio of total number of pensioners to resident population aged 60 and over.

Figure II-2. Projections of Elderly Dependency Ratios in Luxembourg, France, and Germany, 2000-50 1/
(In percent)



Sources: United Nations, World Population Prospects (1998); Statec; and staff calculations.
1/ Resident population aged 60 and over as a percent of the resident population aged 20-59.

- Throughout the projection period 2000–50, labor force participation and unemployment rates are kept constant at their present levels.

- Labor-augmenting technical progress is assumed to occur at a constant rate of 2 percent. Assuming balanced growth of the capital stock and effective labor input, real GDP grows at this constant rate plus the endogenously determined rate of growth of employment.

- The projection model only simulates the evolution of the number of contributors and pensioners in the pension schemes for private sector workers (accounting for about 90 percent of all contributors). The share of elderly resident persons receiving a pension is kept constant at their present level. Cross-border workers are assumed to become eligible for a (reduced) pension after an average of 20 years of contributions. The number of civil service pensioners is assumed to grow by 1 percent a year.

32. Three long-run scenarios for the period 2000–50 are used to study the range of possible pressures on Luxembourg's public pension system:

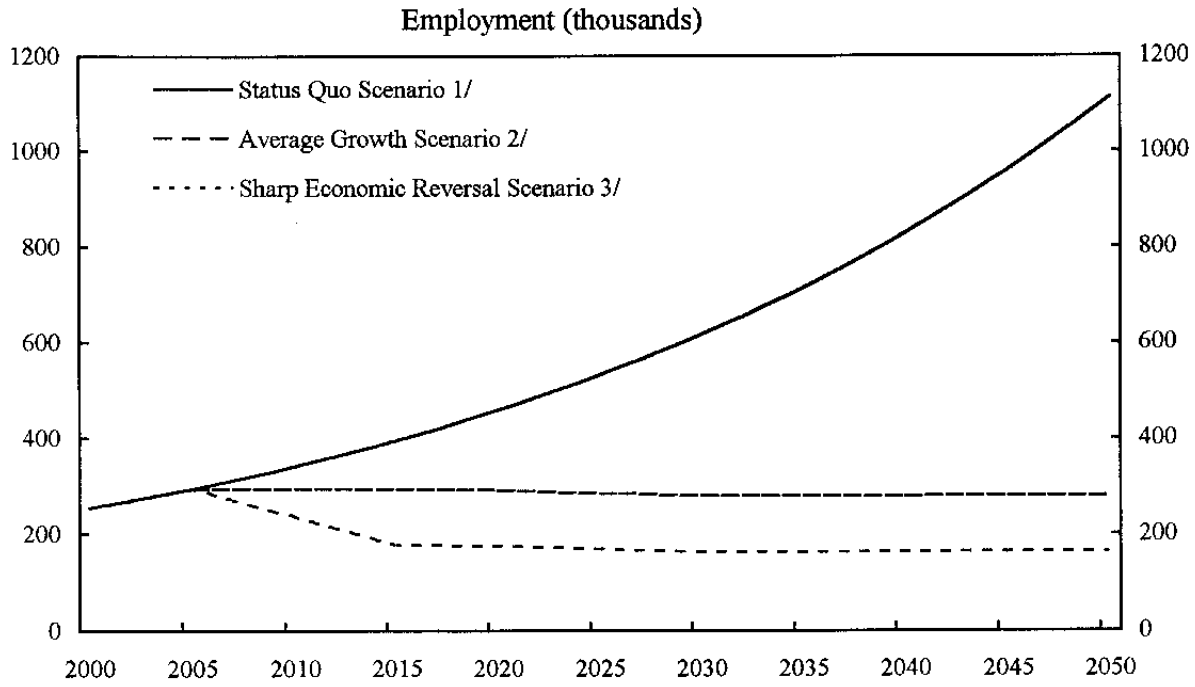
- The **status quo scenario** assumes that Luxembourg's regional economic boom will persist in the longer run at the average growth rates observed over the last 20 years. Thus, real GDP growth is exogenously fixed at 5 percent a year during 2000–50, requiring employment (and therefore the number of contributors to the public pension system) to grow by 3 percent a year (Figure II-3). As the number of available resident workers is constrained by the demographic scenario and the assumptions of constant labor force and unemployment rates, this scenario implies massive inflows of cross-border workers—in this scenario, the ratio of cross-border to resident workers in 2050 would rise to about 6.

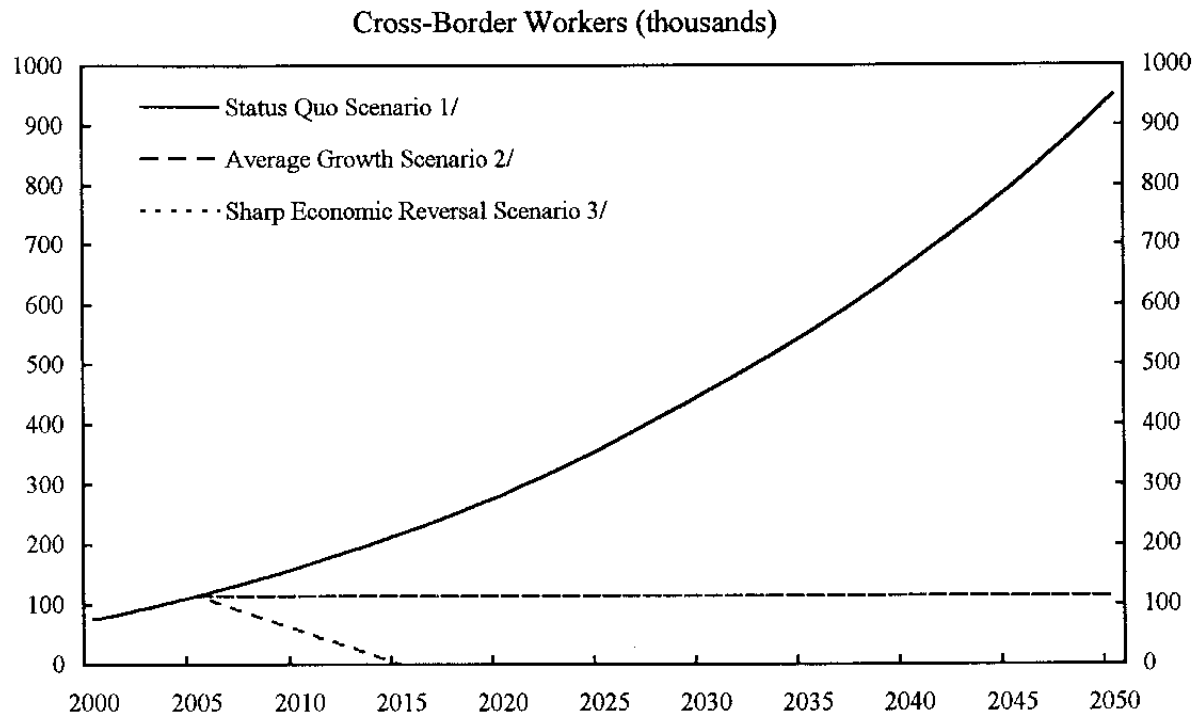
- The **average growth scenario** assumes that the status quo persists only until 2005. In that year, the net inflow of cross-border workers is assumed to stop (with cross-border workers accounting for some 40 percent of total employment) and employment growth during the remainder of the projection period 2006-50 is driven by the demographic characteristics of the resident population and other model assumptions (Figure II-3).

- Finally, the **sharp economic reversal scenario** also assumes that the status quo persists until 2005, but that the cross-border work force will afterwards linearly decline to zero during 2006–15, and remain at zero throughout the rest of the projection period (Figure II-3).

33. Turning to the implications of these scenarios for the public pension system, in the status quo scenario the pension system dependency ratio remains roughly stable throughout the projection period (Figure II-4). Thus, the financing pressures on the system due to population aging are fully offset by the rapid rise in the contributor coverage ratio owing to massive inflows of cross-border workers. The implied pension cost as a percentage of GDP remains roughly constant over the projection horizon (Figure II-5).

Figure II-3. Luxembourg: Alternative Labor Market Scenarios, 2000-50





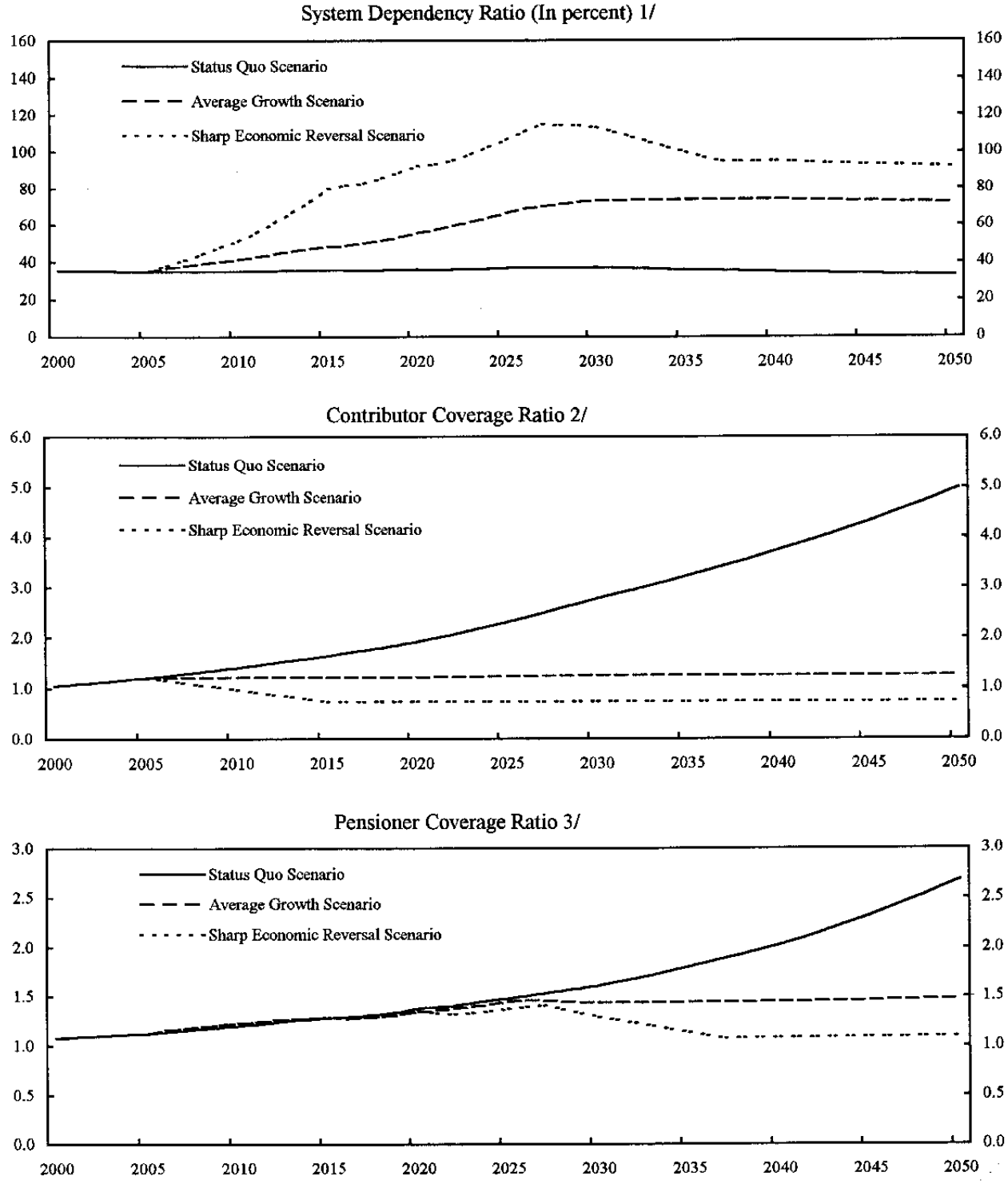
Source: Staff calculations.

1/ Constant annual real GDP growth of 5 percent during 2000-50.

2/ Average annual real GDP growth of 2.2 percent during 2000-50.

3/ Average annual real GDP growth of 1.2 percent during 2000-50.

Figure II-4. Luxembourg: Stress Testing Scenarios for the Public Pension System, 2000-50



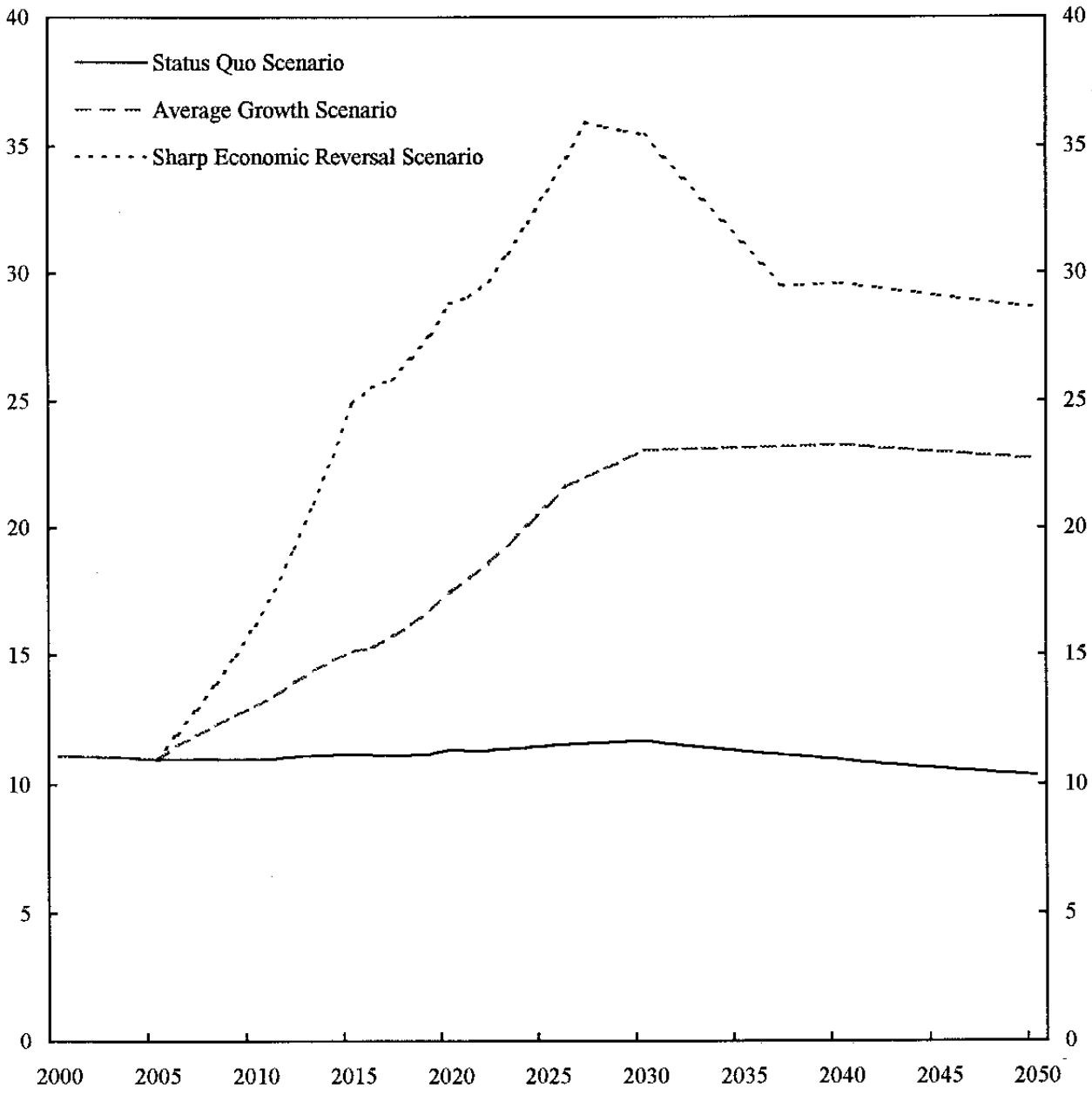
Source: Staff estimates.

1/ Number of pensioners as a percent of the number of contributors.

2/ Ratio of total number of contributors to resident population aged 20-59.

3/ Ratio of total number of pensioners to resident population aged 60 and over.

Figure II-5. Luxembourg: Stress Testing Scenarios for Pension Expenditures, 2000-50
(In percent of GDP)



Source: Staff estimates.

34. In the average growth scenario, the pension system's dependency ratio and pension cost rise sharply as growth slows below the status quo path after 2005. With net inflows of cross-border workers assumed to come to an abrupt stop in 2005, the contributor coverage ratio is projected to stabilize over the remainder of the projection horizon. The projected run-up in the dependency ratio and pension cost—relative to the favorable status quo scenario—reflects two factors. First, population aging in the form of the projected rise in the elderly dependency ratio of the resident population feeds fully through to the system dependency ratio and pension cost. And second, the pensioner coverage ratio continues to rise after 2005 as cross-border workers continue to reach the retirement age.

35. In the sharp economic reversal scenario, the pension system dependency ratio rises even more sharply than in the average growth scenario. This reflects mainly a sharply declining contributor coverage ratio as the stock of cross-border workers is assumed to decline to zero during 2006-15.

E. Policy Options

36. There are two main generic parametric PAYG policy levers to offset increases in the system dependency ratio—increases in the contribution rate or decreases in the pension replacement rate. However, both policy levers are likely to raise concerns if used to offset significant increases in the system dependency ratio. Sharp increases in contribution rates in response to an adverse economic shock or reversal could lead to a further deterioration in what would already be a difficult labor market situation. And the option of deep cuts in pension replacement rates would conflict with the objective of stable retirement income provision.

37. A second generic set of policy options would comprise raising the contributor coverage ratio or decreasing the pensioner coverage ratio, e.g., through increases in effective retirement ages or by providing new incentives to increase labor force participation rates. However, the effectiveness of these particular options in response to large adverse shocks or economic reversals may also be limited: (i) the measures may need to be phased in gradually, in particular in the case of increases of retirement ages; (ii) the economic environment may not be favorable for the required increases in labor force participation rates; and (iii) higher labor force participation rates, while helpful in providing additional resources in the short run, would further increase unfunded pension liabilities of the PAYG system.

38. More diversification of the financing of overall pension provision by moving to a diversified multipillar structure, perhaps benchmarked on Switzerland's long-standing multipillar approach, would allow Luxembourg to make a significant portion of pension provision independent of local economic booms and busts. While the transition to a multipillar structure would likely involve significant transition costs, an exceptionally favorable fiscal outlook for the next few years should provide ample budgetary scope for far-reaching reforms.

39. Apart from spreading financing risks, moving to a more balanced multipillar structure would likely have further advantages: (i) the impact of shocks on public finances would be mitigated; (ii) future required social contribution rates could be lower than otherwise; (iii) the

higher rates of return of funded schemes (relative to rates of return in PAYG schemes) would add to Luxembourg's locational advantages in terms of labor mobility; and (iv) Luxembourg could draw on extensive local financial expertise to develop funded pension schemes. In this context, the recently adopted laws on international pension funds and supplementary pension schemes appear to have prepared the legal ground for a proactive pension policy.

References

Blöndal, Sveinbjörn, and Stefano Scarpetta, 1998, "The Retirement Decision in OECD Countries," *OECD Working Paper* AWP 1.4.

Chand, Sheetal K., and Albert Jaeger, 1996, *Aging Populations and Public Pension Schemes*, IMF Occasional Paper No. 147.

Chand, Sheetal K., and Albert Jaeger, 2000, "Reforming the PAYG System," in: *World Bank Primer on Pension Reform*. (at: http://www.worldbank.org/pensions).

Disney, Richard, 1999, "OECD Public Pension Programs in Crisis: An Evaluation of the Reform Options," in: *World Bank Primer on Pension Reform* (at: http://www.worldbank.org/pensions).

Economist Club Luxembourg, 2000, "L'avenir de nos pensions," (manuscript).

IMF Country Report No. 98/67, 1996, *Luxembourg—Selected Issues.*

IMF Country Report No. 96/47, 1998, *Luxembourg—Selected Issues.*

Ministère de la Sécurité Sociale, 1995, *Etude actuarielle des régimes de pension.*

United Nations, 1999, *World Population Prospects. The 1998 Revision. Volume II: The Sex and Age Distribution of the World Population.*

U.S. Social Security Administration, 1999, *Social Security Programs throughout the World –1999.*

III. Luxembourg's Labor Market Paradox[20]

A. The Issues

40. Luxembourg's labor market performance holds a seeming paradox—favorable labor market outcomes are coupled with rigid labor market institutions. On the one hand, Luxembourg's labor market performs well, in terms of both unemployment levels and employment growth. On the other hand, Luxembourg's labor market institutions incorporate many of the rigidities that have been widely associated with poor labor market performance, particularly in a number of continental European countries. To shed some light on Luxembourg's labor market paradox, this chapter uses a quantitative cross-country framework that emphasizes the interplay of labor market institutions and economic environments.[21]

B. Stylized Facts

41. Since the 1960s, Luxembourg's unemployment rate has been the lowest among the EU countries (Figure III-1). Unemployment in Luxembourg was virtually nil until the steel crisis occurred in the mid-1970s. Over the last two decades, the unemployment rate rose to about 3 percent, still the lowest rate in the EU. Apart from the influences discussed in this chapter—labor market institutions and the economic environment— the gradual increase in unemployment may also reflect a subtle measurement issue: until the mid-1970s, unemployment had been a virtually unknown phenomenon,[22] and labor market institutions that addressed the unemployment problem had therefore been largely unnecessary. Thus, when these institutions were gradually put in place in the aftermath of the steel crisis, they may also have promoted a more accurate count of the unemployed.

42. Luxembourg's cumulative employment growth since the early 1980s has been the fastest among the EU countries (Figure III-2). Employment growth stagnated in the 1970s, but has picked up since then, averaging more than 3 percent a year over the last 10 years.

C. An Analytical Framework

43. Recent empirical work on understanding European unemployment has stressed the interaction between labor market institutions and the economic environment. For example, Blanchard and Wolfers (1999) use a panel data set of selected countries and show that the

---

[20] Prepared by Caroline Kollau.

[21] This approach to analyzing labor market performance and institutions is based on Nickell (1997) and Blanchard and Wolfers (1999).

[22] Official statistics show a zero unemployment rate until the mid-1970s.

Figure III-1. Unemployment Rates in the EU, 1960-2000 1/
(In percent)

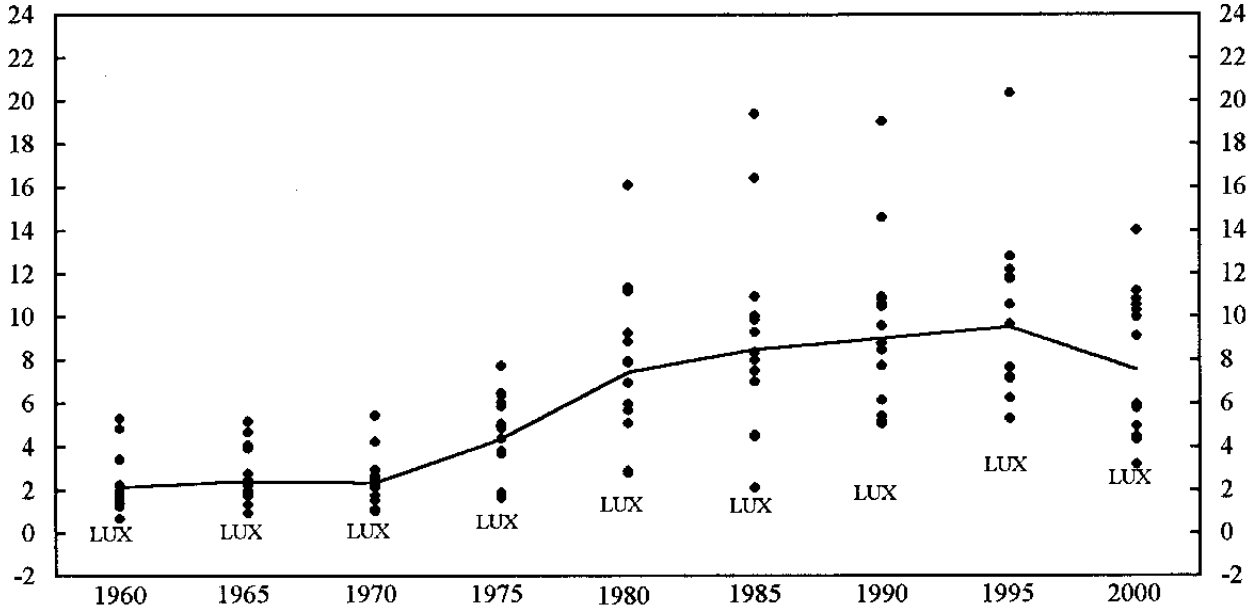
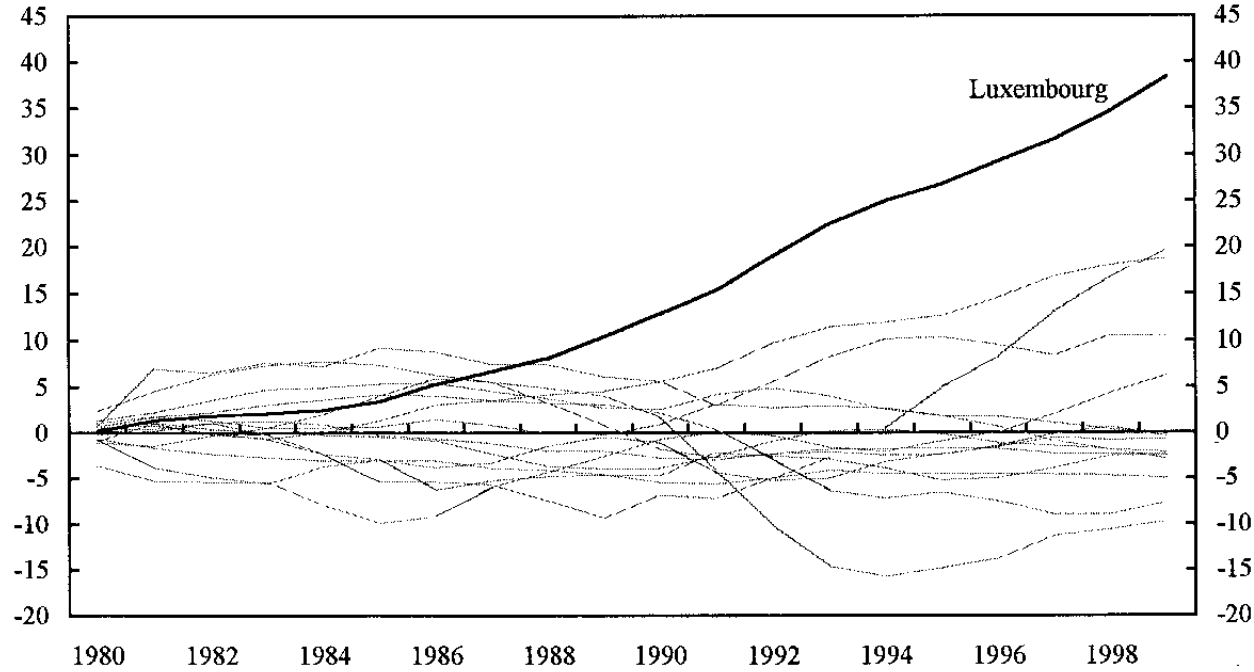


Figure III-2. Cumulative Employment Growth Differentials, 1981-99 2/
(In percent)



Sources: OECD; Statec; and staff calculations.

1/ Diamonds represent unemployment rates in the other 14 EU countries. Data shown are five-year averages (1960-64 to 1995-99), and a projection for 2000.

2/ Data describe cumulative employment growth differentials relative to the EU's average.

interaction between the economic environment and the countries' labor market institutions can account for much of the rise and heterogeneity in levels of unemployment rates across Europe.[23] Assuming, for simplicity, that the economic environment is represented by one explanatory variable (E) and that there are two variables describing labor market institutions (I1 and I2), the representative equation for country i's unemployment rate at time t ($U_{i,t}$) is:

$$(1) \qquad U_{i,t} = \beta_{0,i} + \beta_1 E_{i,t} + \beta_1\beta_2 E_{i,t} I1_i + \beta_1\beta_3 E_{i,t} I2_i + \varepsilon_{i,t},$$

where $\beta_{0,i}$ is a country-specific effect, β_1 describes the impact of country i's economic environment at time t on its unemployment rate in t, $\beta_1\beta_2$ represents the combined impact on the unemployment rate of the economic environment and the first labor market institution, and $\beta_1\beta_3$ does the same for the economic environment combined with the second labor market institution. The error term ($\varepsilon_{i,t}$) reflects the part of the unemployment rate that is left unexplained by the variables in the equation. The time index, t, stands for periods of five years at a time; 1960–64 to 1990–1994, and 1995+ (usually 1995/96). The unemployment rate and the economic environment variable are entered as five-year averages, while the values for the labor market institutions do not change over time.

44. The framework has one major shortcoming: some labor market institutions are affected by the level of unemployment and are thus endogenous.[24] This problem is most obvious for the average tax rate on labor income (or tax wedge). A pay-as-you-go (PAYG) system—common to many countries in the sample—requires that the social contribution rates are set to meet the costs of unemployment benefits, health benefits, and pensions. All else being equal, this implies that countries with higher unemployment rates tend to have a bigger tax wedge. In the empirical section, therefore, the framework is reestimated without the variable representing the tax wedge.

D. A Description of Luxembourg's Labor Market Institutions

45. The flexibility of Luxembourg's relative labor costs is limited by automatic wage indexation, a high legal minimum wage, and collective bargaining agreements that stipulate across-the-board improvements in wages and nonwage work conditions.

- Wages, pensions, and other benefits are indexed to CPI inflation.[25] Indexation takes place automatically if, over the previous six months, the average cost-of-living index rose by 2.5 percent or more. Since the beginning of 2000, indexation has been tied to

[23] Apart from most countries in the EU, the set also includes a number of non-European countries as controls.

[24] Blanchard and Wolfers also highlight the endogeneity problem.

[25] This indexation scheme was originally introduced in 1921.

a newly constructed and somewhat less volatile CPI that excludes spending by nonresidents in Luxembourg. Automatic indexation can be suspended under difficult economic circumstances, as laid down in the wage indexation law of 1975.

- A legal minimum wage applies to all employees who are under a contract of employment on Luxembourg territory. The statutory minimum wage is probably the highest in the OECD area and, on top of automatic indexation, can be revised every two years if called for by developments in the economy.[26]

- Collective bargaining between trade unions and employers is embedded in Luxembourg's long-standing social partnership model.[27] Union coverage is relatively widespread (some 50 percent of all wage and salary earners are trade union members), but the collective agreements cover an even larger share of employment: they can be declared generally binding throughout the occupation for which they were concluded with an administrative extension to those not included in the agreements.

46. A large-scale social insurance system adds to the cost of labor and reduces take-home pay. Luxembourg has a generous and large-scale social insurance system. The state covers some 50 percent of all social insurance costs, while the remaining costs are financed through a PAYG structure. Social insurance payments are dispersed over a large and increasing base of contributors, including cross-border workers. Large budget transfers to the social insurance fund, together with a rapidly growing contribution base, have kept contribution rates low. When one further takes account of an income tax system that provides for a large basic deduction and a low entry rate of 6 percent, Luxembourg's average labor tax wedge compares favorably with those in surrounding countries.

47. Employment protection rules are strict on dismissal procedures and the use of fixed-term contracts and part-time appointments. Legislation on working time dates from the early 1970s, and is similarly strict. Statutory working hours are 8 hours per day and 40 hours per week, with a maximum daily working time of 10 hours. While collective agreements can be made on a working time pattern below these norms, other types of derogations (like overtime) are strictly regulated by law and limited to exceptional cases. Recently, the *National Action Plan for Employment* (1998/99) initiated greater flexibility in working time and introduced a reference period of four weeks over which the average working time should be measured. Shorter or longer reference periods (with a maximum of 12 months) can be agreed upon by way of collective bargaining.

---

[26] Every two years the government submits to the Chambre Parliament a report on developments in the economy and incomes. If necessary this report is accompanied by draft legislation to raise the level of the minimum wage.

[27] Two trade unions have the nationally representative status required to establish collective agreements.

48. Reservation wages are high because of generous unemployment insurance and subsequent benefits. The standard payment rate of unemployment insurance is 80 percent of gross earnings. This amounts to a net replacement rate of more than 80 percent when including family and housing benefits. Although unemployment insurance is limited to 12 months, it is followed by a generous social assistance scheme with unlimited duration. The provisions stipulate that after five years of unemployment, the net replacement rate for a low-paid worker at two-thirds of the average production worker's wage would continue to exceed 80 percent. Social assistance recipients are discouraged from taking small-time jobs, moreover, as the benefit withdrawal rate for additional earnings is close to 100 percent.

E. Empirical Results

49. The empirical framework described in Section C can be applied to simulate the evolution of the unemployment rate in Luxembourg.[28] Given that endogeneity problems may occur in particular for the overall tax rate on labor income, the model is reestimated without the tax wedge. The Luxembourg economic environment is represented (counterfactually) by the EU average, while the scores of its labor market institutions (to the extent that they are part of the framework) are estimated conforming to information that is available on them. The estimated scores are provided in Table III-1 and compared with the EU averages.[29] While high scores on the first five institutions are likely to have an adverse effect on labor market outcomes, high values on the coordination in wage bargaining and active labor market policies should improve employment and unemployment performance.

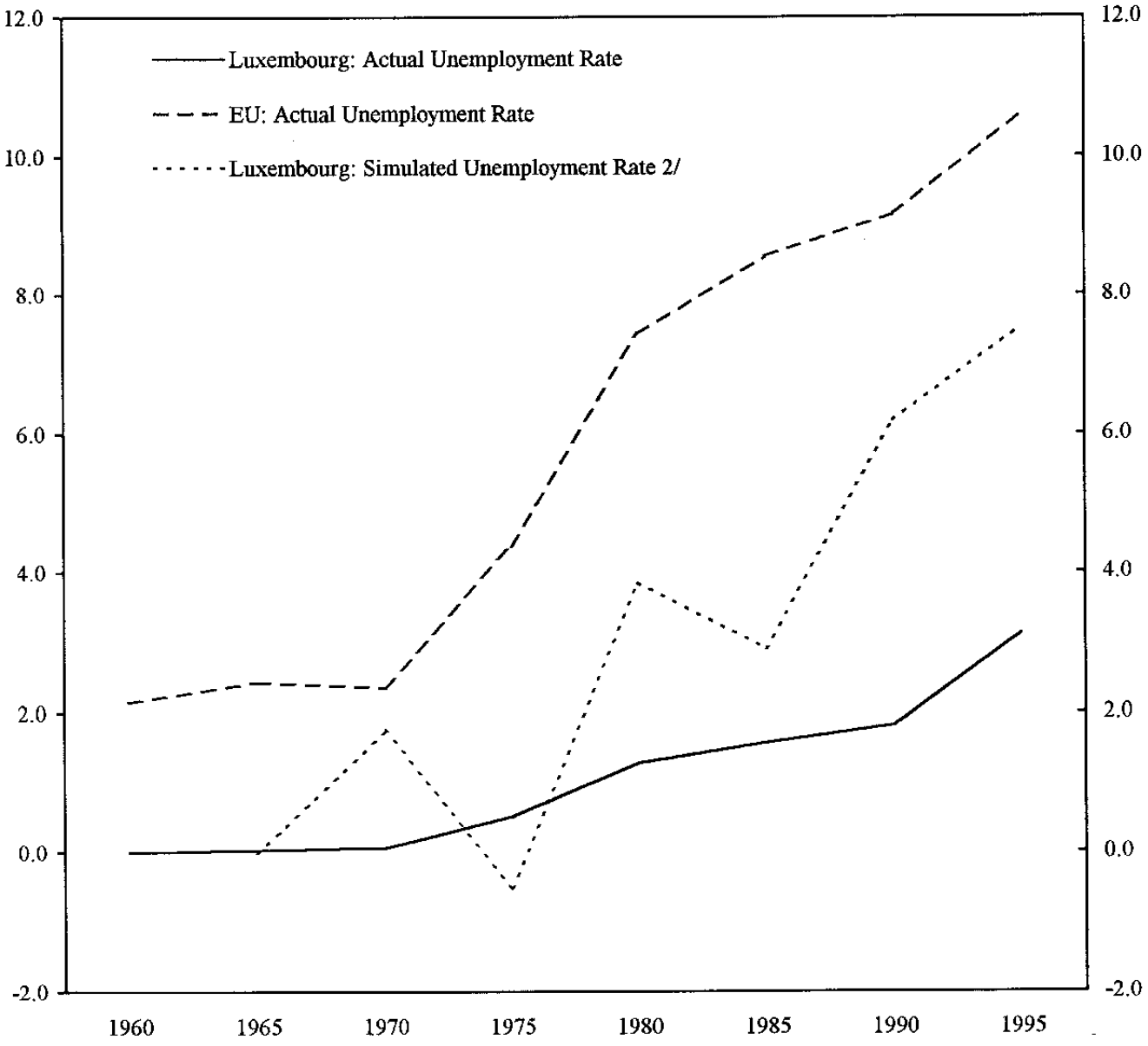
50. Under the counterfactual assumption that Luxembourg shared entirely the economic environment of the EU, and with labor market institutions scored as in Table III-1, a simulation of Luxembourg's unemployment rate yields an increase in the unemployment rate that is well above actual developments (Figure III-3): Between 1965 and 1995 Luxembourg's unemployment rate rises by an estimated 7½ percentage points, which is more than double the actual increase. The estimated increase can be ascribed to the impact of the counterfactual economic environment (at the EU average) reinforced by the existing rigidities in the labor market.

---

[28] Luxembourg is not part of the original panel study by Blanchard and Wolfers.

[29] The EU averages are calculated using Nickell (1997) and Blanchard and Wolfers (1999).

Figure III-3. Luxembourg: Actual and Simulated Unemployment Rates, 1960-1995 1/
(In percent)



Sources: Blanchard and Wolfers (1999); OECD; Statec; and staff calculations.
1/ Data represent five-year averages (1960-64 to 1995-96/97)
2/ Result of a simulation of Luxembourg's unemployment rate, using the average economic environment of the EU and Luxembourg's labor market institutions as explanatory variables.

Table III-1. Luxembourg: Scores for Labor Market Institutions

	Luxembourg	EU average
Unemployment benefit; basic payment rate [1/]	80	59
Duration of unemployment benefits [2/]	1	3
Employment protection legislation [3/]	17.5	13
Union density [4/]	51	45
Union coverage [5/]	3	3
Coordination in wage bargaining [6/]	5	4
Active labor market policies [7/]	17	14

Sources: Nickell (1997); OECD; U.S. Department of Health and Human Services (1994); and staff estimates.
1/ Basic payment rate as a percent of gross earnings.
2/ In years.
3/ Index (maximum = 20).
4/ Union members as a percent of all wage and salary earners.
5/ Index indicating the share of total workers covered under bargaining agreements (maximum = 3).
6/ Index indicating the degree of coordination on the part of both unions and employers (maximum = 6).
7/ Measured as spending per unemployed person as a percentage of labor productivity.

F. Some Qualifications

51. Some qualifications must be made to the empirical results on the evolution of the unemployment rate in Luxembourg. On the one hand, the framework ignores the presence of a few other labor market institutions in Luxembourg: the legal minimum wage, the automatic wage indexation, and the social assistance payments succeeding unemployment insurance. The first two of these institutions are rather specific to Luxembourg, as few countries still have a legal minimum wage, and only one other country (Belgium) appears to apply a similar wage indexation. On the other hand, the framework may exaggerate actual labor market rigidities. Labor market institutions may not be as rigid as the formal description suggests, and there are indeed indications that some of the Luxembourg institutions have been quite flexible under duress.

- Luxembourg's cooperative social partnership model has brought about an aggregate wage moderation that prevented wage increases at or beyond the rate of labor productivity growth. During most of the 1990s (with the exception of 1995 and 1996), for instance, increases in labor productivity exceeded increases in effective average pay by between 1 percent and 3.4 percent.[30]

[30] National Action Plan for Employment (1998), page 4.

- As many of Luxembourg's industrial sectors include only a few firms, moreover, sectoral bargaining agreements can be tailored to a firm's needs, taking account of its specific economic circumstances.

- The small size of the Luxembourg economy obviates the need for regional wage differentiation.

Finally, discretionary adaptations to labor market institutions have generated flexible labor market solutions in times of crisis:

- During the steel crisis of the mid-1970s, unemployment was largely prevented through measures of early retirement, subsidized short-time working, employment in public service projects, and retraining of surplus steelworkers.

- Similarly, at the time of the devaluation of the Luxembourg franc against the Belgian franc in the early 1980s, the economic impact was partly absorbed by a temporary suspension of the automatic wage indexation.

References

Blanchard, Olivier J., and Justin Wolfers, J., 1999, "The Role of Shocks and Institutions in the Rise of European Unemployment: The Aggregate Evidence," *NBER Working Paper No. 7282.*

European Industrial Relations Observatory, 1998/99, *Eironline at www.eiro.eurofound.ei*, several years.

Grand Duchy of Luxembourg, 1998, *Mobilisation Founded on Continuity. National Action Plan for Employment.*

Nickell, S., 1997, "Unemployment and Labor Market Rigidities: Europe versus North America," *Journal of Economic Perspectives* 11 (3), pp. 55–74.

OECD, 1999; *OECD Economic Surveys, 1998–1999. Belgium/Luxembourg.*

Statec, 1999, *L'économie Luxembourgeoise au 20e siècle*. Editpress Luxembourg S.A.

U.S. Department of Health and Human Services, 1994, *Social Security Programs throughout the World–1993.*

IV. Supervising a Largely Foreign-Owned Financial Sector: A Sketch of Luxembourg's Approach and Alternative Arrangements[31]

A. Introduction

52. Luxembourg's financial sector is large relative to the size of the economy—it accounts for more than 20 percent of GDP and 10 percent of employment—and is the undisputed growth engine of the economy, with important backward and forward linkages to other service sectors. Moreover, the financial sector is largely foreign owned—of the 211 banks established in 1999, only some 10 percent had owners located in Luxembourg or Belgium; the remaining banks' owners were located in 23 different countries, with a majority from Germany, Italy, and France (Figure IV-1).

53. With the advent of Stage 3 of EMU at the beginning of 1999, supervision of Luxembourg's financial sector (excluding insurance) was separated from the central bank and consolidated within the *Financial Sector Surveillance Commission* (FSSC). Ensuring a stable and sound environment for financial activities has long been a prime concern of Luxembourg's public policy—reflecting not only the financial sector's importance for the Luxembourg economy but also the possible cross-border externalities arising from the international nature of its ownership and operations.

54. This chapter reviews selected issues pertaining to the supervision of a largely foreign-owned banking system. The first section reviews briefly the evolution of cross-border supervision practices and standards since the 1970s; it highlights the interplay of widely publicized instances of cross-border supervision failures and the adoption of new rules for cross-border supervision. The next section describes how practices and standards are applied in Luxembourg's particular case. The following section discusses two alternative supervision arrangements for banking systems with extensive cross-border ownership structures: delegation of supervision to a supranational supervisory agency ("pan-European approach") and a shift toward market-based supervision ("New Zealand approach").

---

[31] Prepared by Angel Ubide.

B. The Accident-Prone History of Cross-Border Supervision[32]

55. **Following the large cross-border spillovers from the closure of Bank Herstatt[33] in 1974, the Group of Ten established the Basle Committee[34] to define broad principles for international coordination of supervision.** The Basle Committee agreed on a Concordat in 1975, with the broad objective of ensuring that no banking establishment escaped adequate supervision. While recognizing the joint responsibility of both home and host country supervisors, the Concordat made the parent supervisory authority primarily responsible for solvency oversight (*home country supervision principle*). Moreover, in 1978, the Basle Committee recommended the adoption of consolidated supervision to improve the quality of information of international bank activities (*consolidated supervision principle*). However, it immediately became evident that consolidated cross-border supervision is subject to difficulties. First, supervision problems may arise when the parent owns only part of a foreign entity, or if the entity engages in additional, non-banking business. Second, differences in national accounting standards may impede meaningful consolidation. Third, claims on affiliated banks may not legally bind the parent company, and therefore the host supervisor should be concerned about the solvency of resident foreign banking entities. And fourth, local bankruptcy laws often discriminate in favor of local creditors, even if the entity in question is a foreign branch.

56. **Another banking failure, the collapse of Banco Ambrosiano[35] in 1982, led to a revision of the 1975 Concordat**. The revision reaffirmed the principle of consolidated supervision and adopted several new principles: (i) if the host authority does not classify the entity as a bank, then the home country supervisor should either supervise it or demand that it

---

[32] See also Chapter VIII in International Monetary Fund, 1998, "Toward a Framework for Financial Stability," Washington D.C., for a discussion of risks and best practices in cross-border supervision.

[33] Bank Herstatt was a small, privately held German bank that, as a result of insolvency, defaulted on some foreign exchange transactions.

[34] The Basle Committee on Banking Supervision comprises banking supervisory authorities from Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Sweden, Switzerland, the United Kingdom, and the United States. Its permanent secretariat is located at the Bank for International Settlements in Basle.

[35] Banco Ambrosiano SpA, at the time the largest privately owned bank in Italy, channeled a large number of operations through its subsidiary Banco Ambrosiano Holding, a nonbank, Luxembourg-registered company. This subsidiary was not a bank, and therefore it was not supervised by either the Luxembourg or the Italian authorities. As a consequence, supervisors were unable to detect the large volume of exposures that finally led to the failure of the Italian bank in 1982.

be closed; (ii) if the host supervisory authority considers that the home country's supervision is inadequate, the host supervisor should either prohibit or restrict the local entity operations; (iii) if the parent is a holding company, supervisors of the separate subsidiaries should cooperate to supervise it; and (iv) if the holding company is a subsidiary, the home country supervisor should supervise it.

57. **A further spectacular bank failure, the collapse of Bank of Credit and Commerce International (BCCI)[36] in 1991, revealed remaining loopholes in cross-border supervisory arrangements.** The response of the international community to the BCCI case was the Basle Committee's *Minimum Standards* for the supervision of international banking groups and cross-border activities in 1992. The new feature of these minimum standards was the host country's authority to impose restrictive measures lest it be uncomfortable with the home country's supervision of the local banking establishment. Such measures include: (i) setting a deadline for the bank and its home supervisory authority to meet acceptable standards; (ii) obliging the banking establishment to restructure as a separately capitalized subsidiary; or (iii) closing the banking establishment. To implement these standards, countries conclude bilateral agreements and sign *memoranda of understanding* (MOU) describing their cooperation arrangements.

58. **The recent global financial crisis in 1997-98 highlighted new areas where coordination and information exchanges among supervisory authorities could be improved.** The G-7 established the Financial Stability Forum, which encompasses both national authorities and international institutions, to promote international financial stability.[37] At this point, three working groups have issued recommendations to address concerns relative to highly leveraged institutions, capital flows, and offshore financial centers. In addition, a compendium of international standards for the strengthening of financial systems will become the reference point for best practices, seeking to ensure sound and stable financial systems.

---

[36] BCCI was an international banking group with a corporate structure skillfully designed to evade consolidated supervision: (i) in a dual banking structure, a Luxembourg nonbank holding company owned two separate banks that were licensed and supervised in two separate jurisdictions, and which had more than 100 branches operating in more than 40 countries; (ii) the legal structure did not match the economic structure, and the management of the group was located in London; and (iii) two different audit firms certified the accounts of the two banks. This allowed the bank to escape consolidated supervisory control and engage in fraudulent activities that ended, after a consolidated auditing and cooperation between the supervisory authorities, with its closing and liquidation by the Luxembourg and UK authorities in 1991.

[37] Further information can be found at *www.fsforum.org*.

C. Luxembourg's Present Supervisory Arrangements

59. **Luxembourg's present supervisory structure is based on the EU's *Second Banking Directive*, which builds on the principles of mutual recognition and home country control.** Under these principles, domestic banks, subsidiaries of foreign banks, and branches of non-EU banks are supervised by the domestic authorities, whereas branches of EU banks are supervised by the home country authorities.

60. In light of the difficulties inherent in the supervision of an international financial center, the current supervisory model raises four closely related issues:

- First, the effectiveness of the home country principle requires a clear **definition of the lead supervisor of each financial institution**. This is especially relevant in the case of foreign branches, where supervision is delegated to the home supervisor. Furthermore, the law requires any bank registered in Luxembourg to have a transparent shareholding structure and to clearly indicate who the bank's ultimate supervisory authority is. Banks whose home supervisor does not apply the *Basle Core Principles for Effective Supervision*[38] may not be granted a license.

- Second, the supervision of subsidiaries encounters the problem of **achieving a consolidated view of the group to which the subsidiary belongs**. This raises the need to exchange information with home country supervisors. The practice in Luxembourg varies depending on whether banks are from inside or outside the EU. Inside the EU, memoranda of understanding have been signed with all supervisory authorities, and exchanges of information take place at annual bilateral meetings; in addition, the *Groupe de Contact*[39] provides a forum for institutionalized cooperation and exchange of information. Partial on-site inspection of subsidiaries in Luxembourg is allowed to home supervisors for their consolidated assessments. With countries outside the EU, bilateral memoranda of understanding are signed that describe in detail the specific supervisory arrangements.

- Third, the supervision of nonbank holding companies must carefully **determine who is the ultimate authority responsible for the solvency of their affiliated banks**. The basic principle is that if a holding company owns banks elsewhere, the Luxembourg authority will expect the host country to carry on adequate supervision, and will not itself supervise the holding company. The Luxembourg authority would

---

[38] The *Basle Core Principles* were released by the Basle Committee in 1997 and comprise 25 core principles, where principles 23–25 deal with obligations of home and host country supervisors.

[39] The *Groupe de Contact* is a group of European supervisors that meets three times a year to discuss supervisory practices and individual banks' cases.

involve itself in the supervision of holding companies owning banks in Luxembourg, but only on a consolidated basis.

- The final issue is **which type of indicators is best suited to evaluate the soundness and vulnerabilities of a largely foreign-owned banking sector**, and to what extent these indicators are different from those applied to a locally owned banking sector. In principle, and because the majority of the institutions are branches and subsidiaries of other banks, indicators for the Luxembourg aggregated banking sector may at best convey a blurred picture of the soundness of the system, as they are uninformative about the consolidated position of the banks. Thus, the information provided by standard indicators, such as the capital adequacy ratio, the level of provisioning, or the amount of nonperforming loans of the banking sector, could be very misleading: banks may have an incentive to temporarily transfer capital and assets internationally for tax purposes, and sudden reversals would always be a potential source of risk. In this respect, the Luxembourg authorities require subsidiaries to comply with all solvency indicators on a stand-alone basis, and have the understanding that the parent company will assist in case of duress.

D. Alternative Supervisory Arrangements

61. **Luxembourg's current model of financial oversight is based on a combination of direct inspection of banks' accounts and exchanges of information, and hinges crucially on bilateral arrangements for the supervision of cross-border banking groups.**[40] Theoretically, this is just one of the possible options available for the supervision of an international banking center. Alternative arrangements could range from the delegation of supervision to a supranational agency ("pan-European approach") to the shift toward market-based supervision ("New Zealand approach"), where the emphasis is put on transparency and enhanced disclosure of public information rather than on on-site inspections and exchanges of confidential information. These two possible alternatives are discussed in turn.

62. The launching of the euro and the resulting push toward the integration of European financial markets raise the issue of the adequacy of current supervisory arrangements, especially in countries such as Luxembourg, where there is a significant amount of cross-border activity and ownership. Because of the increased need to exchange information at the

[40] In this respect, it is interesting to note that, although under the home country rule, memoranda of understanding are unnecessary within the EU to determine the lead supervisor who is always the home country supervisor, the Luxembourg authorities have signed memoranda of understanding with all EU countries to set out the practical supervisory arrangements. MOUs thus usefully supplement the second banking coordination directive.

European level, one possible alternative would be the delegation of supervision to a supranational **EU-wide supervisory agency.**[41] Such an arrangement would have several advantages:

- It would facilitate the consolidated supervision of European financial institutions, especially for small countries, which may lack the necessary resources for the efficient consolidated supervision of cross-border operations.

- It would eliminate the need for ad hoc arrangements, especially as the current European banking consolidation trend proceeds to cross-border mergers and acquisitions. For example, the Franco-Belgian banking group Dexia is currently supervised on the basis of an ad-hoc tripartite memorandum of understanding between Luxembourg, Belgium, and France. A European agency would act as a clearinghouse of information that could automatically accommodate any type of cross-border ownership structure.

- It would lower the risk of regulatory capture and supervisory forbearance that may delay decisive regulatory action, especially as European banking consolidation leads to the creation of "national champions" that may become "too big to fail" when evaluated at the national level.

An EU-wide supervisory arrangement would, however, eliminate the potential benefits of regulatory competition,[42] and would need to rely on the superior information of the domestic authorities about their markets. A practical obstacle for such an arrangement would be the selection of the agency to which supervision would be delegated. A first candidate could be the European Central Bank, which, under the provisions of Article 105 (6) of the Maastricht Treaty, could receive supervisory responsibilities by decision of the European Council. This arrangement would, however, entail a potential conflict of interests between the conduct of monetary policy and the efficient supervision of the banking system. As an alternative, EU-wide supervision could be best allocated to a separate independent agency created ex novo.[43]

---

[41] On the prospects for a European supervisory authority, see also Annex I in International Monetary Fund, "International Capital Markets," September 1999.

[42] However, these benefits are potentially slim, as harmonization of regulation proceeds at the EU level.

[43] An alternative view of this issue is that conferring supervisory responsibilities on the ECB would enhance its capacity to act as a lender of last resort, as it would be better suited to distinguish between liquidity and solvency problems and to choose the best type of intervention in each case. This issue, however, enters the debate of whether the ECB should be a lender of last resort, which is beyond the scope of this paper.

63. The opposite extreme to the establishment of a supranational supervisory agency would be to shift the emphasis towards **market-based supervision**. Because of the difficulties of carrying out consolidated supervision of subsidiaries, some countries with a foreign-owned banking sector, such as New Zealand, have moved to a system of financial oversight based on enhanced public disclosure. The New Zealand supervisory approach encompasses the following main elements:

- Conditions for licensing are some minimum prudential requirements—including quantitative restrictions related to constraints on connected exposure and minimum capital adequacy requirements—and the requirement that the home supervisor applies the Basle Minimum Standards and carries on consolidated supervision.

- The Reserve Bank of New Zealand (RBNZ) monitors each bank's financial condition and compliance with the conditions of registration through quarterly, off-site exams based on publicly disclosed information. On-site monitoring is not conducted. The RBNZ also formally consults with the senior management of banks on an annual basis, to be informed about each bank's strategic direction.

- The RBNZ maintains close working relationships with parent bank supervisors on bank-specific issues and policy issues related to the countries where parent banks are domiciled.

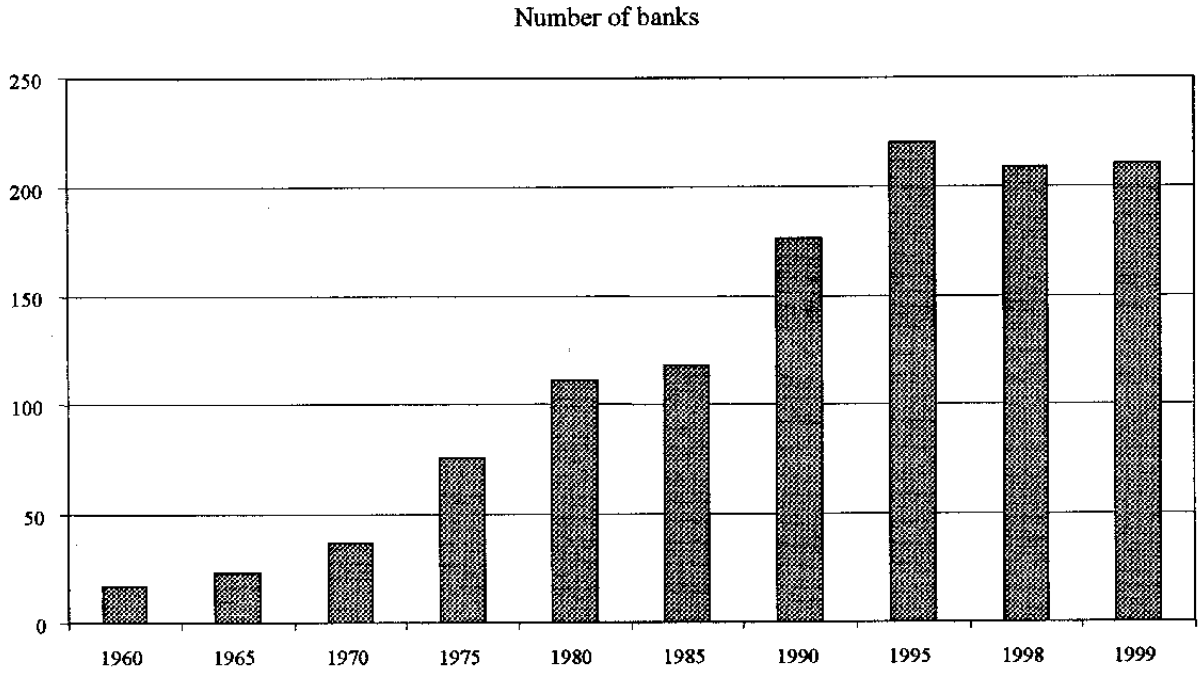
E. Conclusions

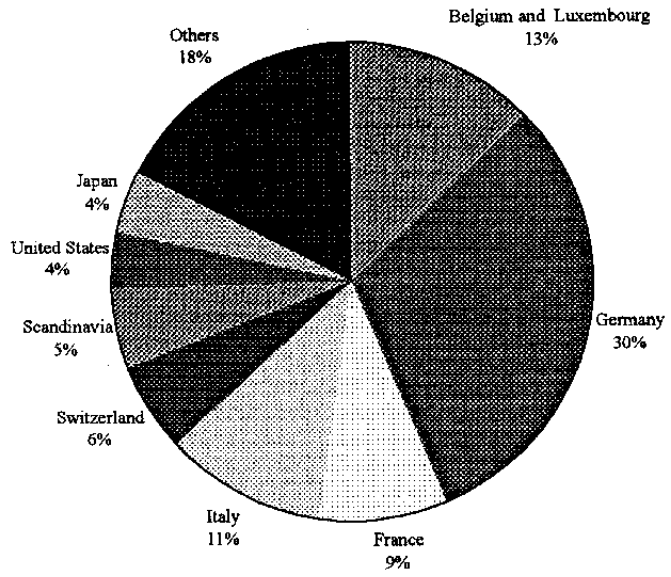
64. The supervision of cross-border financial activities raises the difficult challenge of obtaining a complete, consolidated view of the operations of international banking institutions. Over time, these difficulties have manifested themselves in some major international banking failures, which in turn led to breakthroughs in regulation and supervisory practices: the 1975 Concordat, its revision, and the 1992 Basle Minimum Standards. As a result, the principles of consolidated supervision and home country control form the building block of current cross-border supervisory practices in Luxembourg.

65. Luxembourg's supervision experience provides a case study with possible lessons for the EU: the ongoing trend toward European banking consolidation suggests that cross-border operations among financial institutions may soon become more widespread. At the same time, the present supervision approach appears to be working well in Luxembourg.

66. However, cross-border operations in Luxembourg are limited to relatively small branches and subsidiaries. Thus, when extending Luxembourg's experience to the EU level, a question of scale arises: would the "Luxembourg model" be flexible enough to effectively supervise the operations of major pan-European banking groups that may emerge in the future? This chapter discussed two alternative supervision arrangements, namely the delegation of supervision to a pan-European agency, or the shift to market-based supervision, which may avoid the need to rely on ad hoc bilateral or multilateral arrangements.

Figure IV-1. Luxembourg: Number and Origin of Banks





Source: Financial Sector Surveillance Commission

Table A1. Luxembourg: Expenditure Components of GDP in Constant Prices

	1995	1996	1997	1998	1999 1/
	(In billions of Lux F)				
Private consumption	258	269.1	279.4	285.8	294.4
Public consumption	95	99.4	101.4	104.2	107.7
Gross capital formation	117	112.6	124.4	126.3	135.3
Stockbuilding and statistical adjustment	-2	-0.7	1.4	1.4	2.0
Total domestic demand	468	480.4	506.6	517.8	539.3
Exports	572	594.4	656.8	721.8	766.4
Goods (fob)	256	253.1	281.1	320.7	334.2
Services	315	341.3	375.7	402.1	432.2
Imports	501	520.8	569.5	616.7	647.0
Goods (cif)	308	318.9	360.6	407.6	429.6
Services	193	201.9	209.6	212.1	217.4
Foreign balance	71	73.6	87.3	105.1	119.4
Gross Domestic Product	538	554.0	594.2	624.0	656.7
	(Annual percentage change)				
Private consumption	2.4	4.4	3.8	2.3	3.0
Public consumption	2.7	2.7	2.1	2.8	3.3
Gross capital formation	3.5	-3.5	10.5	1.5	7.1
Stock building and statistical adjustment 2/	-3.0	0.2	0.4	0.0	0.1
Total domestic demand	3.7	2.7	5.5	2.2	4.2
Exports	4.9	4.0	10.5	9.9	5.2
Goods (fob)	12.4	-1.3	11.1	14.1	4.2
Services	5.1	8.3	10.1	7.0	7.5
Imports	5.3	4.0	9.3	8.3	4.9
Goods (cif)	2.0	4.5	13.0	13.0	5.4
Services	5.2	4.5	3.9	1.2	2.5
Foreign balance 2/	0.3	0.5	2.5	3.0	2.3
Gross Domestic Product	3.5	2.9	7.3	5.0	5.2

Source: Statec.

1/ Staff estimates.

2/ Contribution to growth.

Table A2. Luxembourg: Distribution of Gross Value Added in Constant Prices

	1995	1996	1997	1998	1999 1/
	(In billions of Lux F)				
Gross Value Added	479.2	490.3	521.4	548.4	578.1
Agriculture	5.9	4.3	4.1	5.0	5.5
Industry	85.9	87.2	95.6	100.8	104.5
Mining	0.9	0.8	0.8	0.9	0.9
Manufacturing	77.0	78.5	87.1	91.9	95.1
Energy and water	8.0	8.0	7.7	8.1	8.4
Construction	35.6	34.8	35.0	37.1	39.4
Services	351.7	364.0	387.2	406.4	428.7
Commerce	119.8	120.9	124.7	129.2	134.4
Financial services	205.4	214.5	236.9	246.3	256.2
Other services	98.2	101.9	102.9	106.6	114.2
Inputed financial services	-71.7	-73.2	-77.3	-75.8	-76.0
	(In percent of total value added)				
Gross Value Added	100.0	100.0	100.0	100.0	100.0
Agriculture	1.2	0.9	0.8	0.9	1.0
Industry	17.9	17.8	18.3	18.4	18.1
Mining	0.2	0.2	0.2	0.2	0.2
Manufacturing	16.1	16.0	16.7	16.8	16.5
Energy and water	1.7	1.6	1.5	1.5	1.5
Construction	7.4	7.1	6.7	6.8	6.8
Services	73.4	74.2	74.3	74.1	74.2
Commerce	25.0	24.7	23.9	23.6	23.2
Financial services	42.9	43.7	45.4	44.9	44.3
Other services	20.5	20.8	19.7	19.4	19.7
Inputed financial services	-15.0	-14.9	-14.8	-13.8	-13.1

Source: Statec.

1/ Staff estimates.

Table A3. Luxembourg: Indicators of Economic Activity

(Indices; 1995=100)

	1995	1996	1997	1998	1999
Activity in industry 1/					
Total industry	100.0	100.6	106.1	114.8	118.4
Industry except steel	100.0	102.2	107.5	117.5	120.4
Steel	100.0	91.6	97.9	99.0	105.9
Energy	100.0	99.5	98.2	102.1	99.7
Intermediate goods	100.0	98.0	104.0	106.5	111.7
Equipment	100.0	111.0	109.9	126.8	140.2
Consumption goods (durable and non durable)	100.0	99.9	109.3	126.1	121.8
Order books	100.0	99.1	111.9	117.3	117.8
Number of employees	100.0	99.7	99.4	100.6	102.2
Number of hours worked	100.0	97.7	98.0	97.4	98.3
Activity in construction 2/	100.0	92.8	95.0	95.6	99.2
Activity in commerce 3/	100.0	103.0	108.2	114.2	118.1
Wholesale	100.0	103.3	107.5	112.7	115.5
Retail	100.0	100.0	106.1	113.4	117.8

Source: Statec.

1/ Production per month.
2/ Production per working day.
3/ Sales volume.

Table A4. Luxembourg: Consumer Prices

	Consumer Price Index (1996=100) 1/			
	General index	Excluding Energy	Energy	Underlying inflation 2/
1996	100.0	100.0	100.0	100.0
1997	101.4	101.2	104.8	101.2
1998	102.3	102.6	97.3	102.5
1999	103.4	103.5	101.6	103.5
	(Annual percentage change)			
1996	1.2	0.9	7.0	0.9
1997	1.4	1.2	4.8	1.2
1998	1.0	1.5	-7.2	1.3
1999	1.0	0.9	4.4	0.9
January	-1.4	-0.7	-12.0	-0.8
February	0.5	1.1	-10.7	1.1
March	0.6	1.1	-9.4	1.1
April	1.3	1.2	2.1	1.2
May	1.2	1.3	1.0	1.3
June	1.2	1.2	2.2	1.2
July	-0.2	-0.4	3.6	-0.3
August	1.3	0.9	10.0	1.0
September	1.6	1.1	13.6	1.2
October	1.9	1.3	15.1	1.3
November	1.9	1.2	16.7	1.3.
December	2.4	1.3	24.4	1.4
2000				
January	3.2	2.0	29.5	2.1
February	2.7	1.5	29.7	1.5
March	2.8	1.5	33.7	1.4

Source: Statec.

1/ Harmonized index.

2/ Defined as the general index minus energy and selected food items.

Table A5. Luxembourg: Employment and Unemployment

(In thousands, unless otherwise stated)

	1995	1996	1997	1998	1999 1/
Resident labor force	171.6	174.0	176.5	179.6	183.1
Unemployed 2/	5.1	5.7	5.8	6.0	5.4
(As a percent of total labor force)	3.0	3.3	3.3	3.3	2.9
Resident employment	167.1	168.3	170.7	173.6	177.8
(change in percent)	2.8	2.7	3.3	4.4	4.6
Cross-border workers (net)	47.0	51.5	56.4	63.4	70.2
Domestic employment	214.1	219.8	227.1	237.0	248.0
(Change in percent)	2.8	2.7	3.3	4.4	4.6
Of which: Employment in international organizations	7.8	7.8	7.7	7.7	7.7

Source: Statec.

1/ Preliminary.

2/ In percent of the labor force; harmonized definition.

Table A6. Luxembourg: Structure of Salaried Employment by Industry
(In percent of total, unless otherwise stated)

	1990	1995	1996	1997	1998
Total (thousands)	170.4	197.5	203.3	209.9	219.7
Agriculture	0.9	0.8	0.8	0.8	0.8
Energy and water	0.9	0.9	0.5	0.9	0.6
Mining and manufacturing	21.1	16.5	15.9	15.2	14.5
Mineral and metals	7.2	4.5	4.1	3.6	3.1
Others	13.9	11.9	11.8	11.6	11.4
Construction	10.7	11.2	11.0	10.8	11.0
Market services	50.4	54.4	55	56	55.8
Commerce	15.1	14.9	14.7	14.7	14.5
Banking and insurance	9.9	9.5	9.4	9.1	9.4
Others	25.4	29.9	30.9	32.2	32.0
Non-market services	15.9	16.3	16.4	16.4	17.2

Source: Statec, Luxembourg en chiffres.

Table A7. Luxembourg: Current Account Developments

(In billions of Lux F, unless otherwise stated)

	1996	1997	1998	1999
Trade balance	-53.7	-71.4	-71.9	-105.8
(in percent of GDP)	-9.5	11.4	10.8	14.9
Exports of goods	262.5	303.2	326.7	336.6
Imports of goods	316.2	374.6	398.6	442.4
Services balance	77.7	100.2	112.3	129.3
Exports of services	285.8	349.3	402.5	471.4
Imports of services	208.2	249.1	290.3	342.1
Factor income balance	-49.2	-56.2	-65.2	-76.7
Factor income, credit	22.1	23.2	23.8	24.5
Factor income, debit	71.4	79.4	89.0	101.2
Investment income balance	126.5	131.5	121.3	126.6
Investment income, credit	1,219.2	1,340.1	1,519.3	1,579.9
Investment income, debit	1,092.7	1,208.6	1,397.9	1,453.3
Transfer balance	-15.5	-18.2	-12.8	-14.6
Transfers, private	-17.9	-17.6	-11.0	-12.0
Transfers, official	2.4	-0.6	-1.8	-2.5
Current balance	80.9	85.9	83.7	58.9
(in percent of GDP)	14.4	13.8	12.6	8.3

Source: Statec.

Table A8. Luxembourg: Direction of Trade

(In percent of total)

	1992	1993	1994	1995	1996	1997	1998	1999
Exports	100	100	100	100	100	100	100	100
European Union (11)	79.2	77.0	76.7	77.9	78.4	75.1	73.9	74.7
France	16.8	17.2	19.7	22.2	22.0	23.5	20.5	20.8
Belgium	16.1	15.4	13.6	13.1	13.3	13.4	13.1	13.1
Netherlands	5.1	5.6	5.3	5.3	5.3	5.1	5.2	5.0
Germany	29.2	28.2	28.2	28.3	27.8	26.3	24.4	24.8
Italy	5.6	4.6	5.0	4.9	5.1	5.5	5.6	5.6
United Kingdom	5.7	6.1	6.0	6.3	6.5	6.8	6.4	8.3
United States	3.7	4.4	4.4	3.1	2.7	3.5	5.4	3.9
Others	11.4	12.4	12.8	12.7	12.3	14.6	14.3	13.0
Imports	100	100	100	100	100	100	100	100
European Union (11)	89.9	86.6	90.5	88.4	90.1	86.6	86.4	80.8
France	11.5	11.4	13.1	12.1	11.9	11.9	12.7	12.0
Belgium	38.8	38.6	39.6	38.2	39.7	38.0	37.5	34.5
Netherlands	4.4	4.3	4.4	4.5	5.2	4.5	4.7	4.9
Germany	31.5	28.4	29.3	29.8	29.3	28.2	27.7	25.4
Italy	2.0	2.0	2.2	2.0	2.3	2.2	2.0	2.0
United Kingdom	1.7	1.6	1.6	1.7	1.5	1.6	2.1	2.9
United States	2.1	6.4	2.1	2.5	2.1	5.8	4.3	9.0
Others	6.3	5.4	5.8	7.4	6.4	5.9	7.2	7.3

Source: Statec.

Table A9. Luxembourg: Representative Interest Rates

(Period averages; in percent)

	Short-Term Rate 1/	Long-Term Government Bond Rate 2/	Deposit Money Banks	
			Saving deposits	Mortgages
1990	8.29	8.51	6.00	8.20
1991	9.38	8.15	6.00	8.20
1992	9.38	7.90	6.00	8.80
1993	8.21	6.92	5.33	7.60
1994	5.72	6.38	5.00	6.60
1995	4.80	6.05	5.00	6.50
1996	3.24	5.21	3.54	5.50
1997	3.46	5.39	3.46	5.50
1998	3.58	5.29	3.31	5.25
1999	2.93	4.68	2.75	4.58
Q1	3.09	4.00	3.00	4.83
Q2	2.59	4.20	2.66	4.50
Q3	2.70	5.10	2.66	4.50
Q4	3.36	5.40	2.66	4.50

Sources: Central Bank of Luxembourg; and IMF, International Financial Statistics.

1/ Money market rate in Belgium. Since 1999, 3-month Euribor.

2/ Weighted average of yield-to-maturity of all bonds with a date to maturity over 5 years.

Table A10. Luxembourg: Exchange Rates and Competitiveness

	Lux F/US $ 1/	Nominal Effective 2/ Exchange Rate	Real Effective 2/ Exchange Rate
1990	33.42	96.1	96.3
1991	34.15	96.4	96.7
1992	32.15	97.1	97.1
1993	34.60	97.0	97.3
1994	33.46	98.2	98.2
1995	29.48	100.0	100.0
1996	30.96	98.8	98.2
1997	35.77	97.0	96.1
1998	36.30	96.7	95.7
1999	...	96.5	95.5
Q1	...	96.9	95.2
Q2	...	96.4	95.6
Q3	...	96.4	95.4
Q4	...	96.2	95.7

Source: IMF, International Financial Statistics.

1/ Although since January 1, 1999 the Luxembourg franc is irrevocably fixed to the euro at a rate of 1 euro=40.3399 Lux F, the external exchange rate of the euro is market determined.

2/ Index, 1995=100.

Table A11. Luxembourg: General Government Finances

	1992	1993	1994	1995	1996	1997	1998 1/	1999 1/
				(In billions of Lux F)				
General Government Revenues 2/	206.2	241.5	250.3	254.8	271.1	292.5	309.5	338.6
Direct Taxes	70.5	91.2	93.6	94.2	103.7	108.6	113.5	119.9
Indirect Taxes	51.9	64.0	67.5	67.4	72.4	82.6	89.2	103.1
Social Security Contributions	56.2	61.0	63.9	67.0	69.1	73.4	77.5	86.4
Interest Revenue	9.6	9.0	8.3	7.8	7.2	7.2	8.8	8.1
Other Revenues	18.0	16.3	17.0	18.4	18.7	20.6	20.5	21.0
General Government Expenditures 2/	196.6	217.5	229.1	242.7	256.0	270.2	287.9	321.7
Intermediate Input	13.0	14.1	14.5	19.3	20.8	21.5	22.5	25.2
Wages and Salaries	43.2	46.6	48.9	51.3	54.0	57.4	60.9	63.6
Social Transfers	85.6	97.0	104.1	111.8	118.8	125.7	130.0	146.3
Subsidies	11.8	11.7	13.6	9.4	11.3	11.3	11.9	12.6
Public Investment	22.7	25.3	22.2	24.7	26.5	26.5	30.5	34.9
Other Expenditures	20.3	22.9	25.8	26.3	24.7	27.8	32.1	39.0
General Government Balance 2/	9.6	24.0	21.2	12.1	15.1	22.3	21.6	16.9
Consolidated State Government	-0.1	14.1	9.3	1.5	5.8	13.3	9.3	6.6
Local Governments	-1.1	1.7	3.7	2.7	3.7	2.9	2.3	0.5
Social Security Funds	10.8	8.2	8.1	7.9	5.6	6.1	10.0	9.8
Gross Debt (Maastricht definition) 3/	20.5	27.1	27.6	30.4	34.7	37.5	42.8	43.6
State	7.1	10.4	11.2	13.9	19.0	22.0	28.5	28.1
Local	13.4	16.7	16.5	16.4	15.6	15.8	14.0	15.3
Social Insurance Fund	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				(In percent of GDP)				
General Government Revenues	49.4	52.9	50.2	47.3	48.1	46.8	46.5	47.8
General Government Expenditures	47.1	47.6	46.0	45.1	45.4	43.3	43.2	45.4
General Government Balance	2.3	5.2	4.2	2.2	2.7	3.6	3.2	2.4
Consolidated State Government	0.0	3.1	1.9	0.3	1.0	2.1	1.4	0.9
Local Governments	-0.3	0.4	0.7	0.5	0.7	0.5	0.3	0.1
Social Security Funds	2.6	1.8	1.6	1.5	1.0	1.0	1.5	1.4
Gross Debt (Maastricht definition)	4.9	5.9	5.5	5.7	6.2	6.0	6.4	6.1
State	1.7	2.3	2.3	2.6	3.4	3.5	4.3	4.0
Local	3.2	3.7	3.3	3.0	2.8	2.5	2.1	2.2
Social Insurance Fund	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
				(In billions of Lux F)				
Memorandum items:								
Nominal GDP 4/	417.8	456.8	498.6	538.4	563.5	624.6	665.7	708.7
Military expenditure	2.8	3.1	3.4	3.7	4.0	4.4	4.6	4.9

Sources: Statec; and staff calculations.

1/ Provisional outcome data.

2/ Data according to the European System of Accounts 1995 (ESA95).

3/ Gross debt is consolidated and does not necessarily equal the sum of debt issued at different levels of government

4/ On the basis of ESA95. Data for 1999 represent staff estimate.

Table A12. Luxembourg: National Presentation of State Budget and Outturns 1/

	1996		1997		1998		1999		2000
	Budget 2/	Outturn	Budget 2/	Outturn	Budget 2/	Outturn	Budget 2/	Outturn 3/	Budget 2/
					(In billions of LuxF)				
State budget									
Expenditures	156.6	161.4	163.5	176.9	170.4	189.3	180.4	191.0	194.1
Receipts	155.8	164.3	163.9	182.1	170.3	190.2	180.0	191.7	194.2
Taxes	146.1	152.2	139.6	162.6	155.5	167.2	167.8	179.2	183.8
Indirect taxes	...	65.9	53.0	69.6	65.6	70.7	71.1	79.9	80.4
Direct taxes	...	86.4	86.6	93.0	89.9	96.5	96.8	99.4	103.5
Balance	-0.8	2.8	0.4	5.3	-0.1	0.9	-0.4	0.7	0.1
					(In percent of GDP 4/)				
State budget									
Expenditures	27.8	28.6	26.2	28.3	25.6	28.4	25.5	27.0	25.7
Receipts	27.7	29.2	26.2	29.2	25.6	28.6	25.4	27.0	25.7
Taxes	25.9	27.0	22.4	26.0	23.4	25.1	23.7	25.3	24.4
Indirect taxes	...	11.7	8.5	11.1	9.9	10.6	10.0	11.3	10.6
Direct taxes	...	15.3	13.9	14.9	13.5	14.5	13.7	14.0	13.7
Balance	-0.1	0.5	0.1	0.8	0.0	0.1	-0.1	0.1	0.0
Memorandum item:									
Nominal GDP (in billions of Lux F) 5/	...	563.5	...	624.6	...	665.7	...	708.7	754.5

Sources: Luxembourg authorities; and staff calculations.

1/ Including borrowing, debt redemption and transfers to Special Funds.

2/ Final budget.

3/ Preliminary outturn.

4/ All data are expressed as a percent of GDP outturn.

5/ Based on ESA95. Data for 1999 and 2000 represent staff estimates.

Table A13. Luxembourg: Structure of State Budget Tax Receipts

(In percent of total receipts)

	1992	1993	1994	1995	1996	1997	1998 1/	1999 1/	2000 2/
Total Receipts 3/	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Direct taxes	44.2	49.5	52.1	52.6	52.6	51.1	51.9	51.9	53.3
Income taxes	40.6	45.8	47.8	48.0	47.6	46.4	46.9	46.6	48.4
Corporate income tax	11.1	15.7	16.7	16.8	17.1	17.9	19.9	18.8	19.6
Withholding tax on salaries	20.6	21.0	21.1	21.6	21.8	21.1	19.9	20.9	22.2
Withholding tax on capital income	1.0	1.0	1.4	1.4	1.2	1.4	1.3	1.7	1.4
Other income taxes	8.0	8.0	8.6	8.2	7.5	6.0	5.8	5.2	5.2
Wealth tax	2.0	2.1	2.3	2.4	2.8	2.5	2.8	3.1	2.8
Solidarity tax	0.8	0.9	1.2	1.5	1.5	1.4	1.5	1.5	1.5
Other direct taxes	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.6
Indirect taxes	39.6	42.2	39.4	38.9	40.1	38.2	38.0	41.7	41.4
Excise taxes from BLEU	11.6	13.8	13.7	12.0	12.7	12.6	11.3	11.2	11.9
Excise taxes on petroleum derivatives	2.4	1.4	2.1	1.9	1.9	1.8	1.8	1.9	1.6
Registration fees	3.6	3.0	2.1	2.3	2.0	2.3	2.6	3.1	2.8
Value added tax	16.2	16.8	13.5	15.6	16.6	14.3	14.2	16.9	16.8
Subscription tax on corporations	3.8	5.1	5.5	4.9	4.8	5.1	5.9	6.5	6.0
Other indirect taxes	2.0	2.1	2.6	2.1	2.1	2.1	2.2	2.1	2.3
Other ordinary receipts	16.2	8.3	8.5	8.5	7.2	10.7	10.1	6.4	5.3

Sources: Ministry of Finance; and staff calculations.

1/ Preliminary.

2/ Budget.

3/ Ordinary receipts.

Table A14. Luxembourg: Structure of State Budget Expenditures

	1992	1993	1994	1995	1996	1997	1998 1/	1999 1/
	(In percent of total expenditures)							
Total expenditures (excluding participations and amortization)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Current expenditure	83.4	83.2	85.1	83.5	86.0	84.5	86.0	84.2
Current expenditure for goods and services	29.7	29.5	29.0	28.6	31.1	29.4	30.1	28.4
Salaries and contributions	24.2	24.1	23.6	23.3	23.0	21.8	23.0	21.4
Purchases of goods and services	4.6	4.5	4.5	4.3	8.2	7.6	7.1	7.0
Interest and rent	0.7	0.7	1.0	0.6	0.6	0.8	1.0	0.9
Transfers to other sectors	19.1	19.3	20.1	15.4	16.3	16.2	18.6	17.8
Subsidies	6.7	6.6	6.6	3.8	4.2	4.2	4.9	4.8
Other transfers to enterprises and financial institutions	4.2	4.1	4.2	2.1	2.0	1.8	2.4	2.3
Other transfers	8.2	8.6	9.3	9.5	10.1	10.2	11.2	10.6
Transfers to other government levels	33.9	33.8	35.1	39.0	38.0	38.2	36.3	37.2
Social security	24.6	24.3	25.7	29.8	28.7	29.4	27.8	28.6
Local government	8.7	8.8	8.8	8.5	8.7	8.2	8.5	8.6
Capital expenditure	16.6	16.8	14.9	16.5	14.0	15.5	14.0	15.7
Transfers to other sectors	5.2	4.4	4.5	5.2	4.1	4.5	3.6	4.6
Enterprises and financial institutions	2.9	2.2	2.5	2.5	1.9	2.0	1.2	1.9
Households	1.4	1.0	0.9	1.1	2.2	2.5	2.4	2.7
Transfers to other government levels	1.2	1.4	1.6	1.8	1.3	1.5	1.1	0.9
Social security	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
Local government	1.2	1.4	1.5	1.8	1.3	1.5	1.0	0.9
Investments	10.2	11.0	8.8	9.4	8.6	9.5	9.3	10.2
Buildings	3.2	3.5	3.3	3.6	3.4	3.8	3.7	3.6
Public works	5.4	5.4	4.2	4.6	3.2	3.7	3.8	5.1

Source: Ministry of Finance; and staff calculations.

1/ Preliminary.

Table A15. Luxembourg: Transactions of Selected Special Funds

(In millions of Lux F)

	1992	1993	1994	1995	1996	1997	1998	1999 1/
Receipts								
Road funds	3,729	5,025	3,125	6,132	3,967	3,530	6,000	1,500
Budgetary transfers	1,750	1,650	950	950	950	500	...	...
Borrowing	1,923	3,245	2,055	5,027	3,000	3,000	...	...
Other receipts	56	130	120	155	17	30	...	...
Post and telecommunication	800	0	0	0	0	0	0	0
Environment protection	550	1,350	1,900	1,150	2,150	1,950	2,850	1,850
Public investment funds	150	950	5,425	2,050	4,100	3,350	8,350	5,350
Public administration	0	400	1,750	1,000	1,250	1,300	3,300	2,800
Public schools	0	550	3,350	725	2,525	1,725	4,725	1,725
Sanitary and social services	150	0	325	325	325	325	325	825
Employment fund	2,412	4,813	3,423	5,452	6,741	5,637	5,459	6,380
Rail fund	25	1,106	885	752	5,413	4,619	4,699	4,134
Expenditures								
Road funds	4,385	4,647	4,020	3,353	2,974	2,445	2,539	4,298
Post and telecommunication	3,226	0	0	0	0	0	0	0
Environment protection	961	1,502	1,555	1,436	1,132	2,168	1,245	1,580
Public investment funds	1,935	2,276	2,129	2,502	2,811	3,890	4,947	5,153
Public administration	1,033	1,125	1,205	1,527	1,228	1,343	1,217	1,446
Public schools	685	934	808	819	1,351	2,238	3,290	3,002
Sanitary and social services	217	216	117	156	231	310	441	705
Employment fund	3,063	3,566	4,633	4,460	6,052	6,471	6,354	8,227
Rail fund	0	0	0	4,210	5,015	3,927	4,032	4,344

Sources: Ministry of Finance; and staff calculations.

1/ Preliminary.

Table A16. Luxembourg: Social Insurance Fund 1/

	1992	1993	1994	1995	1996	1997	1998	1999
				(In billions of LuxF)				
Total revenues	88.0	95.7	102.2	109.1	113.4	119.5	127.7	143.4
Contributions	49.8	54.5	57.1	59.8	61.7	65.6	69.6	77.8
Other current transfers	31.3	34.0	38.7	43.2	45.9	48.5	52.1	60.4
Of which:								
From state	30.4	32.8	37.2	41.9	44.5	48.2	51.7	...
From local governments	0.7	0.8	1.1	0.9	1.0	0.0	0.0	...
Other revenues	6.9	7.2	6.5	6.1	5.7	5.4	6.0	5.3
Total expenditures	77.3	87.5	94.1	101.3	107.7	113.4	117.7	133.7
Intermediate inputs	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.7
Wages and salaries	1.7	1.9	1.9	2.0	2.0	2.1	2.1	2.2
Social transfers	74.1	84.3	91.1	98.0	104.0	110.1	114.2	130.2
In cash	56.7	64.5	70.5	75.5	78.1	83.1	88.1	100.5
In kind	17.4	19.8	20.6	22.4	25.9	26.9	26.1	29.7
Other expenditures	1.1	0.8	0.6	0.7	1.0	0.6	0.7	0.5
Financial balance	10.8	8.2	8.1	7.9	5.6	6.1	10.0	9.8
Total reserves (end of year)	101.9	111.6	119.3	128.0	134.3	142.0	152.6	164.1
				(In percent of GDP)				
Total revenues	21.1	20.9	20.5	20.3	20.1	19.1	19.2	20.2
Contributions	11.9	11.9	11.4	11.1	10.9	10.5	10.5	11.0
Other current transfers	7.5	7.4	7.8	8.0	8.2	7.8	7.8	8.5
Of which:								
From state	7.3	7.2	7.5	7.8	7.9	7.7	7.8	...
From local governments	0.2	0.2	0.2	0.2	0.2	0.0	0.0	...
Other revenues	1.6	1.6	1.3	1.1	1.0	0.9	0.9	0.7
Total expenditures	18.5	19.1	18.9	18.8	19.1	18.2	17.7	18.9
Intermediate inputs	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Wages and salaries	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
Social transfers	17.7	18.5	18.3	18.2	18.5	17.6	17.2	18.4
In cash	13.6	14.1	14.1	14.0	13.9	13.3	13.2	14.2
In kind	4.2	4.3	4.1	4.2	4.6	4.3	3.9	4.2
Other expenditures	0.3	0.2	0.1	0.1	0.2	0.1	0.1	0.1
Financial balance	2.6	1.8	1.6	1.5	1.0	1.0	1.5	1.4
Total reserves (end of year)	24.4	24.4	23.9	23.8	23.8	22.7	22.9	23.2
Memorandum item:								
Nominal GDP 2/ (In billions of Lux F)	417.8	456.8	498.6	538.4	563.5	624.6	665.7	708.7

Sources: Statec; Ministry of Social Affairs; and staff calculations.

1/ Data according to ESA95.

2/ Data for 1999 represent staff estimate.

Table A17. Luxembourg: Official Development Assistance (ODA) 1/

(In millions of US$)

	1985-1986	1993	1994	1995	1996	1997	1998	1999 2/
Total ODA	10	50	59	65	82	95	112	120
Bilateral ODA 3/	2	31	40	43	57	67	77	83
Of which:								
Technical cooperation	0	1	2	2	2	...	2	1
Emergency and distress relief	0	8	5	7	9	...	10	25
Contributions to NGOs	0	0	0	7	12	...	11	14
Administrative costs	0	0	0	0	2	...	2	3
Contributions to multilateral institutions	8	18	19	22	26	29	35	37
Of which:								
European Commission	0	11	10	12	14	...	19	...
International Development Association	0	3	5	5	5	...	6	...
As a percent of GNP	0.17	0.35	0.40	0.36	0.44	0.55	0.65	0.66

Sources: OECD; Ministry of Foreign Affairs.

1/ Net disbursements.

2/ Preliminary.

3/ Grants and grant-like contributions.