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FRANCE

Selected Issues

Labor Market Developments and Related Policies: Consequences For Long-Run Unemployment, the Budget, Inflation, and the Business Cycle

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Approved by the European I Department

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OVERVIEW

1. The employment performance of the French economy during the economic upswing that started in 1997 has attracted widespread attention. True, France's starting point with an unemployment rate of more than 12 percent in 1997 was unenviable, but without significant labor market reforms, sustained wage moderation, and policies that supported both labor demand and supply, the subsequent sharp rise in activity rates could not have been taken for granted. Wage moderation played a key role, though the precise nature of its underlying cause—surmised to range from changes in employee preferences or loss in their bargaining power to corrections in workers' perceptions of true technological progress—will remain subject to some speculation pending further theoretical and empirical research.[1]

2. Equally important are the likely consequences of the recent episode of wage moderation and job-rich growth, a subject that is explored in this selected issues paper along four dimensions: the labor market, the budget, inflation, and the business cycle.

- As could be expected, wage moderation and the subsequent outward shift in labor demand have significant potential to improve the overall functioning of the labor market. In the long run, they are expected to cut the equilibrium unemployment rate in half from its reading in the mid-1990s, provided the factors underlying wage moderation do not reverse (Chapter I).

- While high growth certainly contributed to an underlying improvement in the public finances during 1997-2000, the attendant high rate of job creation did not result in a significant decline in spending on labor market and poverty reduction programs, owing to the pro-cyclical behavior of unemployment insurance coverage—offsetting the impact of a lower number of unemployed—and an ongoing trend toward expansion of social and active labor market programs (Chapter II).

- Wage moderation exerted a dampening effect on inflation, permitting France to post one of the lowest records on inflation during the 1990s. Inflation appears to be well explained by a hybrid neo-Keynesian Phillips curve, in which marginal costs—and thus wage and productivity behavior—play a key role (Chapter III). The recent uptick in inflation can thus partly be attributed to a slight acceleration of wage growth.

- France's business cycle is well attuned to global and euro-area developments. Nonetheless, during the job-rich upswing, it contained a moderately positive and significant idiosyncratic component, suggesting that labor market developments and related policies made a difference (Chapter IV).

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[1] See IMF Country Report No 01/198: Labor Market Developments and Wage Moderation in France in the 1990s.

I. Wage Moderation and Long-Run Unemployment in France[2]

A. Introduction

3. The economic expansion of the second half of the 1990s was characterized by a sharp rise in employment and reduction in unemployment. Employment increased by about 1.8 million people, a record in such a short period of time for France, and the unemployment rate fell from a peak of 12.3 percent at the beginning of 1997 to 8.6 percent in mid-2001. This performance is all the more noteworthy in that output grew less during this period than in previous expansions. Finally, nominal wages were surprisingly sluggish during the expansion and, as a result, real wage growth inched up 1¾ percent from 1997 to 2000. The combination of high employment and relatively modest output growth led some analysts to characterize the upswing as "rich in employment."[3]

4. Existing studies suggest that job-rich growth was caused in part by changes in the basic parameters of the wage setting mechanism resulting in a rightward shift in the labor–supply like relationship between real wages and the unemployment rate.[4] This improved the trade-off between wages and employment (the wage-setting relationship) in the 1990s, implying a much lower equilibrium unemployment rate than prevailed at the beginning of the decade.

5. This chapter provides an analytical framework to explain the consequences of the downward shift in the unemployment/wages relationship. This framework is also used to analyze possible changes in the equilibrium unemployment rate resulting from cuts in employers' social security contributions and movements in the user cost of capital. The model not only accounts for the large job growth associated with sluggish wages observed in the second half of the 1990s, but also predicts a pickup in investment rates as the economy converges to its long-run equilibrium. So, abstracting from business cycle effects, the previous job-rich growth phase could be followed by a "capital-rich" growth period. The contribution of wage moderation to the reduction in the equilibrium unemployment is quantified in the final part of the chapter. It is shown that if this moderation is not reversed in future years, the long-run unemployment rate will be less than half of its 1996 reading.

6. The rest of the chapter is organized as follows: section B discusses recent labor market performance in France; section C develops a model to analyze the job-rich nature of

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[2] Prepared by Enrica Detragiache and Marcello Estevão.

[3] See, for instance, Pisani-Ferry (2000) and Decressin and others (2001). As discussed in the latter paper, in the second half of the 1990s, the unemployment rate fell sharply and wage growth was weak also in Spain and, to a lesser extent, in Italy. The Netherlands and the United Kingdom posted very large declines in unemployment beginning in the 1980s.

[4] Decressin and others (2001) and Estevão and Nargis (2002).

growth in the last part of the 1990s and presents an estimate of the decline in the long-term unemployment rate resulting from wage moderation; Section D concludes the chapter.

B. Some Figures on Job-Rich Growth

7. The nature of employment growth during the second half of the 1990s can be illustrated by a comparison with the previous expansionary period at the end of the 1980s (Table I.1).[5] Annualized labor productivity growth—defined as changes in the output/employment ratio—in the business sector was 2 percentage points lower in the most recent episode, and employment growth was 1½ percentage points higher. If labor productivity growth at the end of the 1980s were used to back out employment growth given the rate of output change in the more recent period, employment would have risen only by about half of the rate posted at the end of the 1980s (fifth column, lines 1 and 2). The "extra" employment produced in the business sector during the most recent expansion (i.e., the number of jobs due to lower productivity growth for a given rate of output increase) was about 1.2 million jobs (the difference between the actual cumulated change in employment in column 3 and the counterfactual figure in column 5).

Table I.1. Job-Rich Growth

	Percent change during the period indicated at an annual rate					
	Labor productivity		Employment		Adjusted employment[1]	
	Business sector	Aggregate	Business sector	Aggregate	Business sector	Aggregate
Expansions						
1987Q2-1990Q3	3.15	2.64	1.09	1.05	1.09	1.05
1997Q1-2001Q2	1.16	1.39	2.47	1.77	0.50	0.54
				Accumulated changes in thousands[2]		
Expansions						
1987Q2-1990Q3			532	822	532	822
1997Q1-2001Q2			1540	1856	303	556

Source: Staff calculations using INSEE data.

[1] Adjusted employment for the latest expansion is equal to output growth minus productivity growth in the previous expansion.

[2] Employment adjustment for the latest expansion obtained by applying the adjusted rate of growth to levels from 1996Q4 forward.

[5] Comparing labor productivity growth during expansions controls for business cycle effects. The end of the 1980s was the last time France posted strong sustained quarterly output growth. See for instance, Pisani-Ferry (2000), page 29. The expansions were dated using two consecutive declines in the quarterly unemployment rate as their beginning and two consecutive increases as their end. Slight modifications of this criterion change the exact dating of these expansions but do not qualitatively alter the conclusions derived from Table I.1.

Table I.2. Decomposing Labor Productivity Growth in the Business Sector
(Percent change during the period indicated at an annual rate)

	Labor productivity	K/L	TFP	TFP/labor share
1970-1980	4.12	5.22	2.66	3.72
1980-1990	3.38	4.27	2.18	3.10
1990-2000	1.85	2.57	0.91	1.47
1987-1989	3.88	2.94	2.89	4.40
1997-2000	1.87	0.73	1.58	2.59

Source: Staff calculations using OECD data.
Note: Labor defined as total hours of work. 2-year moving average of the labor share used to approximate the elasticity of labor in the aggregate production function.

8. In considering these facts, it is worth noting that average hours of work have been declining steadily in France since the mid-1990s, thereby dampening the increase in total labor input used in the production process.[6] That reflects the higher use of part-time work as well as the three laws introduced after 1996 to reduce the workweek.[7] As shown in Table I.2, labor productivity growth—defined as changes in the ratio of output to hours of work—has in fact been declining steadily since the 1970s as a result of both slower capital deepening (i.e., lower growth in the capital/labor ratio, *K/L*) and slower TFP growth. The decline in capital deepening between the late 1980s and the late 1990s seems to have been significantly larger than the reduction in TFP growth, but such a comparison is tainted by possible errors in the way the capital stock is computed.[8] The last column shows the evolution of total factor

[6] Using microeconomic data from the French labor force survey (*Ênquete Emploi*) average weekly hours of work are estimated to have declined from 40.4 hours in 1991 to 38.5 hours in 2000, notwithstanding the economic expansion in the second half of the 1990s.

[7] These laws provided financial incentives to firms adopting the 35-hour workweek voluntarily (laws Robien, June 1996 and Aubry I, June 1998) and established deadlines for the compulsory introduction of this shorter work time (laws Aubry I and Aubry II, January 2000.) Firms employing more than 20 employees were obliged to adopt the 35-hour workweek in February 2000 while smaller firms were obliged to do so in January 2002. The law Aubry II, which regulates the compulsory introduction of the shorter workweek, also reduces firms' social security contributions to partly offset the expected increase in labor costs.

[8] According to a survey conducted by the Banque de France, capital operating time has been trending up in the second half of the 1990s. Because capital stock data does not take into account movements in factor utilization, the TFP growth series, which is obtained by residual, is biased upwards. Therefore, it is possible that there have been more capital deepening and less TFP growth than shown in Table I.2.

productivity weighted by the labor share, a measure of labor–augmenting technological growth (see Blanchard, 1997).

9. Another stylized fact concerning labor markets in France in the 1990s is the deceleration in wages. Using data from the *Ênquete Emploi*, Estevão and Nargis (2002) show that real hourly wages increased only by 3.2 percent during 1990–2000 in France (an average annual rate of 0.3 percent), well below total factor productivity growth adjusted for the labor share (about 1.5 percent per year)—our measure of labor–augmenting technical progress. Real wages grew only 1¾ percent between 1997 and 2000.[9] The strong job creation associated with this tame real wage growth suggest either a large labor demand shock with important composition effects toward less-skilled workers or a positive labor supply shock or both.

10. The 1990s have actually been marked by many policy changes in France, most of them targeted to the hiring of less-skilled workers. Among the measures affecting labor demand directly were legislated cuts in firms' social security contributions and in the size of the workweek. Among the measures to improve the quality of the labor pool were policies to enhance the employability of young workers through targeted job creation in the public sector (*emplois jeunes*) and to raise labor skills (*contrats de formation et alternance*). As will be further discussed below, there is some evidence that the first type of policy had a positive effect on employment but, in the absence of composition effects, they should have boosted wages as well. There is no convincing evidence of the effects of the second type of policies on employment in France although new results for a panel of OECD countries suggest a positive effect (see Estevão and De Coninck, 2002).

C. Wage Moderation and Variations in Structural Unemployment

11. Box I.1 presents an equilibrium labor market model to evaluate the impact of shifts in labor supply and labor demand on the short- and long-run unemployment rates and wages. Figure I.1 summarizes the important features of the model, which comprises: 1) a short-run labor demand equation that results from firms' profit maximization process for a given level of capital (SLD curve); 2) a flat long-run labor demand curve that results from the hypothesis of a small open economy—interest rates, the user cost of capital, and thus the marginal product of capital are determined in the world market (LLD curve); 3) a contract curve relating wages to the unemployment rate (assumed, for the sake of simplicity, to be equal to $1-N$, where N is the employment level) that results from bargaining between firms and unions (WS curve). Wages are defined as a ratio of the technology level (or, as it is commonly called, "in efficiency units"), implying that in equilibrium (for instance, point E in Figure I.1) wages grow at the rate of labor-augmenting technological growth.

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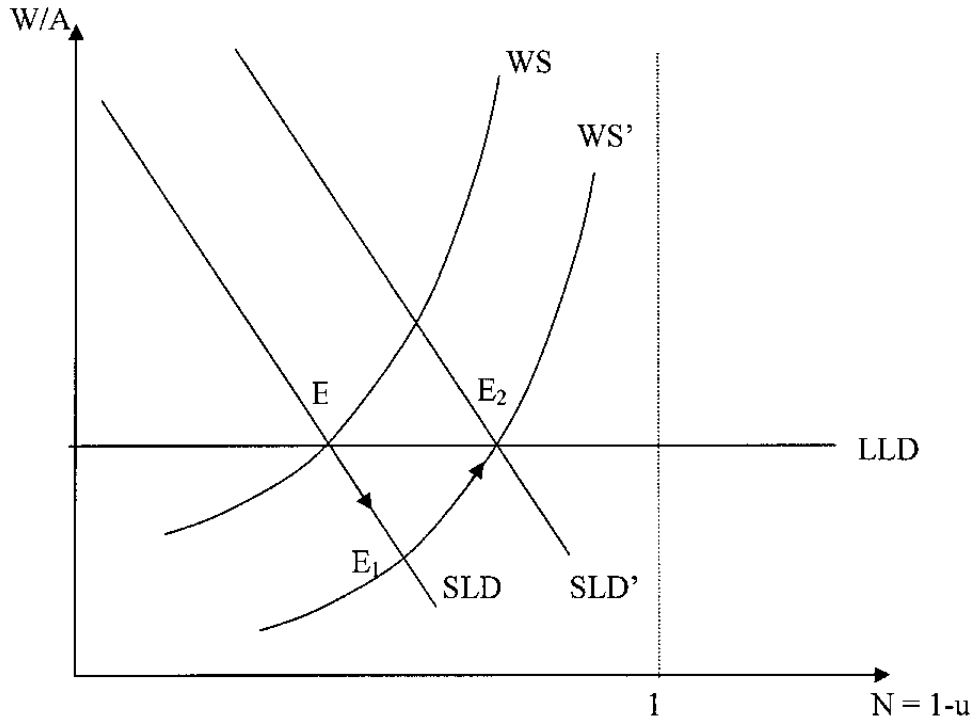
[9] As discussed in Estevão and Nargis (2002), part of the substantial real wage increase between 1990 and 1993 was actually a figment of composition effects during the recession years: less-skilled workers (and, thus, low-wage earners) were the first to be fired and that raised average wages.

Figure I.1. Wage Moderation and Long-Run Adjustment



12. Under the hypothesis of a significant downward shift in the contract curve between wages in efficiency units (*W/A*) and employment (*N=1-u*)—due for instance to a shift in workers preference toward employment and away from wages—wages will grow less than technological progress and the unemployment rate will decline as the economy moves along a negatively sloped short-run labor demand curve and reaches the short run-equilibrium point E_1. However, in this situation firms will have a large incentive to invest in capital, as low wages raise profit rates to a level above the user cost of capital. The short-run labor demand will then shift outwards, moving along the labor supply relationship, until the profit rate and the unit cost of capital are equal, point E_2. Structural unemployment is lower than in *E* but wages in efficiency units are unchanged.

13. In terms of this model, the movement in the WS curve between 1996 and 2000 was quite large. Using microeconomic data from the French labor force survey (*Enquête Emploi*), Estevão and Nargis (2002) document that the WS curve moved to the right during the 1990s. The shift was stronger after 1996 and cannot be explained by reductions in the relative tax wedge on labor and unemployment income, by declines in either unemployment benefits or replacement rates, or by technological changes. Their analysis also accounts for compositional changes that may be driving the sluggish behavior in aggregate wages.

Box I.1. Wage Determination and Structural Unemployment

Following Blanchard (2000) and Carnot and Quinet (2000), assume the economy grows along a balanced path determined by the rate of labor augmenting (Harrod-neutral) technological growth, g_a. The production function combines labor and capital according to a constant returns to scale technology:

$$Y = F(AN, K), \quad F_1 \text{ and } F_2 > 0;\ F_{11} \text{ and } F_{22} < 0;\ F_{12} > 0 \tag{1}$$

Y, N, K and A denote output, labor, capital, and the technology level. Assuming that capital is fixed in the short-run and firms maximize profits, the short-run labor demand curve is:

$$N = \frac{K}{A} G\left(\frac{W(1+t^e)}{A}\right), \quad G_1 < 0 \tag{2}$$

The link between wages in efficiency units, W/A, and labor is affected by the level of capital in efficiency units and the rate of employers' social security contributions, t^e. This relationship is drawn as the curve SLD in Figure I.1, where the labor force is normalized to 1 and employment is $N = 1-u$ (u is the unemployment rate). In the long run, capital is allowed to vary and, assuming interest rates are determined abroad, the user cost of capital, C, is exogenously given. In this case, labor cost in efficiency units is set to equalize the profit rate to the user cost of capital independently of the unemployment rate (LLD in Figure 1).

$$C = \pi = g\left(\frac{W(1+t^e)}{A}\right) \tag{3}$$

A "labor supply-like" relationship can be modeled according to the *right-to-manage* model (see Layard and others, 1991) in which firms and unions bargain over wages given the short-run labor demand. A version of such a model, developed in Estevão and Nargis (2002), generates:

$$\frac{W}{A * B} * \tau = f(m, u), \quad f_m > 0 \text{ and } f_u < 0 \tag{4}$$

where, B and τ stand for, respectively, the income a worker would receive if unemployed and the ratio between the fiscal wedge on unemployment income and the fiscal wedge on labor income; m is a structural parameter determining the position of the wage curve and its steepness, which is affected among other things by unions' bargaining power and the relative importance of employment vis-à-vis wages in workers' utility function. For a given rate of unemployment, wages in efficiency units depend on unemployment income (net of the relative tax wedge) and on the position of the wage curve, a function of m. Ceteris paribus, wage demands are higher the larger is unemployment income, as the outcome in case of disagreement is less unattractive. On the other hand, when the unemployment rate increases, the probability of not finding a job also augments and wage demands are more subdued. Whenever workers' bargaining power becomes weaker, or whenever workers value employment more, the parameter m decreases and wages are lower for a given rate of unemployment.

Point E in Figure I.1 represents the long-run equilibrium in the labor market, where wages are such that the profit rate equals the worldwide user cost of capital. In this steady state, output, capital, and employment in efficiency units (AN) grow at g_a percent.

14. According to these estimates, the shift in the aggregate wage setting relationship and the accompanying outward shift in labor demand (movement from E to E_2 in Figure I.1) would have more than halved the long-run equilibrium unemployment rate with respect to the mid-1990s. The full effect of the shift in WS takes place in the long-run though, as firms adjust their capital stock to align profitability to the user cost of capital. Point E_1 in Figure I.1 corresponds to a "short-run" NAIRU of about 8½ percent.[10]

15. These calculations illustrate the importance of shifts in the wage–setting relationship for the sharp increase in employment during the period but the precise causes of the shift are difficult to determine. Estevão and Nargis (2002) attribute such a shift to a change of unions' preferences toward more employment and away from wages. A variation of this interpretation is offered by Blanchard (2000). According to him, the unemployment rate rose between the mid-1970s and the mid-1980s because of workers' failure to perceive the (exogenous) reduction in technological growth that took place in those years (Table I.2). As a result, wages grew faster than productivity. By the end of the 1980s, workers adjusted wage demands to the new reality, and the WS curve began to move back to its long-run equilibrium, with wages growing by less than productivity.

16. Wage moderation could also have been the result of bargaining among social partners or between social partners and the government, where unions limited their wage demand in exchange for other concessions (for example, the 35-hour workweek and training programs). Last, the employment policies implemented in the 1990s might have improved worker quality (mainly, among the long-term unemployed and younger individuals), increased labor availability, and, therefore, contributed to depress wages. Estevão and De Coninck (2002) show that larger expenditures in active labor market policies as a proportion of GDP during the 1990s have, in fact, been associated, on average, with higher employment rates in the business sector among OECD countries. The same was not true for the 1980s, which explains in part the negative results on the link between these policies and employment performance in studies written in the mid 1990s.

17. At the same time, however, the downward shift in the wage-setting relationship is likely not the only factor behind the recent positive labor market performance in France. First, as discussed in Blanchard (2000), changes in world interest rates have also moved long-run labor demand since the 1970s. While the increase in interest rates depressed investment and reduced the capital stock in the 1980s, causing an inward shift in labor demand, the decrease in these rates during the 1990s moved long-run labor demand outward

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[10] The "short-run" NAIRU depends on the elasticity of the short-run labor demand with respect to variations in labor costs. Kramarz and Philippon (2000) estimated this elasticity at about -1.5 for individuals earning the minimum wages. As summarized in Hamermesh (1993), the short-run elasticity of demand for lower-skill (and, therefore, lower-paid) workers tends to be larger than for higher-skill individuals, leading to an average elasticity of demand for labor in France below -1.5. Using an elasticity of -1, assuming a given labor force size, and setting the NAIRU in the mid-1990s at around 12 percent generates the 8½ percent figure.

and pushed structural unemployment further down.[11] Second, the various cuts in firms' social security contributions, targeted to the hiring of low-wage workers, allowed firms to offer higher wages at the same overall cost and likely caused an outward shift in labor demand and less structural unemployment. Crépon and Dezplatz (2001) calculate that about 450,000 jobs were either created or maintained between 1994 and 1997 due to reductions in employers' social security contributions. Even though this is a very large number, there is no direct evidence of the isolated effect of this policy on employment growth between 1996 and 2000.[12]

D. Conclusions

18. The observed wage moderation and part of the employment increase in the second half of the 1990s can be viewed as the first phase of a labor market adjustment process where a structural change in wage bargaining in France dominates outward shifts in labor demand. After this stage, a "capital-intensive" phase is expected as investment rates increase to bring profit rates down until they match the user cost of capital. When this effect becomes sufficiently strong, wages should grow more rapidly than observed in the 1990s. In addition, these gains should not be taken for granted and labor cost increases (like the one coming from the unification of the minimum wage (SMIC) and monthly income guarantees by 2005) may easily reverse them. Finally, past cuts in employers' social security contributions and reductions in world interest rates likely contributed significantly to a lower structural unemployment rate.

19. Wage moderation and the subsequent outward movement in labor demand is expected to cut the equilibrium unemployment rate in half in the long run. This amelioration comes, however, after a likely upward shift in the wage setting curve in the 1970s and 1980s, suggesting that the wage/unemployment locus is somewhat volatile in France.

20. Because of the importance of shifts in this curve to determine structural unemployment, wage behavior and, ultimately, inflation and economic growth, more research on the determinants of the trade-off between wages and unemployment in France is needed. Also, given our ignorance about the fundamental mechanisms behind wage moderation in France and the fact that world interest rates are not under the control of French

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[11] The logic is simple: given a lower (higher) user cost of capital, the profit rate needs to decline (increase) to keep the zero profit condition underlying the long-run relationship (4). This only happens if wages in efficiency units increase (decline).

[12] Their results could be used to partially reconcile an outward shift in labor demand with observed wage moderation. They show that about half of the jobs created or maintained belonged to workers earning about the minimum wage, even though these low-paid workers accounted for only about 15 percent of the workforce in 1994 (our own calculations using the *Ênquete Emploi*). By 2000, the share of workers earning the minimum wage or less in France grew to 20 percent. Estevão and Nargis (2002) account for this composition effect and still find a large downward shift in the wage-setting relationship.

authorities, a continuation of policies to lower labor costs could be crucial to ensure reduced unemployment rates.

References

Blanchard, Olivier, 2000, "The Economics of Unemployment: Shocks, Institutions, and Interactions," *Lionel Robbins Lecture*, London School of Economics, October.

———, 1997, "The Medium Run," *Brookings Papers on Economic Activity*, 2, pp. 89–158.

Carnot, Nicolas and Alain Quinet, 2000, "L'Enrichissement du Contenu en Emploi de la Croissance: Une Tentative de Clarification," Complément B in Jean Pisani-Ferry, *Plein Emploi*, Conseil d'Analyse Économique, Paris.

Crépon, Bruno, and Rozenne Dezplatz, 2001, "Une Nouvelle Évaluation des Effets des Allégements de Charges Sociales sur les Bas Salaires," *Economie et Statistique*, no. 348, pp. 3-24, August.

Decressin, Jorg, Marcello Estevão, Phillip Gerson, and Christopher Klingen, 2001, "Job-Rich Growth in Europe," *Background paper to the French, German, Italian and Spanish 2001 Article IV consultation*, IMF.

Estevão, Marcello, and Raphael De Coninck, 2002, "Active Labor Market Policies and Business Employment in OECD countries," *unpublished*, IMF, August.

Estevão, Marcello, and Nigar Nargis, 2002, "Wage Moderation in France," *IMF Working Paper*, no. WP/02/151, Washington, DC.

Hagneré, Cyrille, and Alain Trannoy, 2001, "L'impact conjugué de trois ans de réforme sur les trappes à inactivité," *Économie et Statistique*, INSEE, 346/347:161–185.

Hamermesh, Daniel, 1993, *Labor Demand*, Princeton University Press, Princeton.

Kramarz, Francis, and Thomas Philippon, 2000, "The impact of differential payroll tax subsidies on minimum wage employment," *Discussion Paper*, no. 00/488:1-30, University of Bristol, June, forthcoming in *Journal of Public Economics*.

Laroque, Guy, and Salanié, Bernard, 2000, "Une décomposition du non-emploi en France," *Economie et Statistique*, INSEE, 331:47–66.

———, 1999, "Prélèvement et transferts sociaux: une analyse descriptive des incitations financières au travail," *Économie et Statistique*, 328:3–20.

Layard, R., S., Nickell, and R. Jackman, 1991, *Unemployment*, Oxford, Oxford University Press.

Pisani-Ferry, J., 2000, *Plein Emploi*, Conseil d'Analyse Economique, Paris.

II. The Fiscal Effects of Job-Rich Growth in France[13]

A. Introduction

21. This chapter addresses the question of the fiscal benefits of job-rich growth in France during 1997-2000. Higher economic growth tends to improve the fiscal accounts, since revenues automatically increase with income while most spending does not. But are the favorable effects of growth particularly large if growth is rich in employment? While a number of *a priori* considerations would suggest so, the experience of France indicates that the "fiscal dividend" from strong employment creation was negligible.

22. When growth is job-rich fiscal revenues may be higher and expenditures lower. On the revenue side, large employment creation may boost the labor share and revenues, since labor is usually taxed more heavily than capital.[14] On the spending side, transfer expenditures on unemployment insurance or poverty programs are likely to decline appreciably as employment expands. Indeed, the large size of transfer programs in France often results in a small financial gain in shifting from inactivity to employment because generous benefits are withdrawn and employment income is taxed.[15] The counterpart of this phenomenon should be that the government reaps a large financial gain from reducing the benefit rolls. Spending on labor market policies (including cuts in social security contributions) may also fall as the target population for these policies shrinks. Here, though, the relationship is more ambiguous, because growth might be rich in employment because of stepped up spending on in labor market policies.

23. The chapter is organized as follows. The next section contains an overview of the behavior of revenues, spending on unemployment insurance and other unemployment-related transfers, poverty programs, and active labor market policies in France in the 1990s. Section C analyzes why labor-related expenditure declined only marginally. Section D concludes.

B. Fiscal Revenues, Labor Market, and Poverty Spending in 1990-2000

24. By boosting economic growth, and therefore fiscal revenues, wage moderation certainly contributed to ease the financial position of the government and create room for tax cuts in 1997-2000. In addition, during this period fiscal revenues grew much faster than income.[16] Can the job-rich nature of growth explain these high elasticities? A disaggregated

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[13] Prepared by Enrica Detragiache and Marcello Estevão.

[14] For an overview of the relative taxation of capital and labor and their evolution in OECD countries, see Duval (2002).

[15] Laroque and Salanié (1999 and 2000) and Hagneré and Trannoy (2001), among others, study different aspects of the poverty and inactivity traps in France.

[16] According to the *Rapport Economique, Social et Financier du Gouvernement 2001*, the elasticity of government revenues with respect to GDP was 2.2 in 1999 and 1.9 in 2000.

analysis of the relationship between tax revenues and employment is beyond the scope of this paper. However, at a more general level job-richness leads to revenue elasticities higher than one if it increases the share of labor in GDP, since labor is taxed more heavily than capital. In particular, between 1991-1997 the average effective tax rate on labor was 40.2 percent in France, while the tax rate on capital was 23.6 percent (Duval, 2002). Accordingly, an increase in the labor share of, for instance, 5 percentage points could increase the ratio of tax revenues to GDP by 0.8 percentage points. However, using INSEE annual national accounts data, the share of labor income in total value added barely increased in 1997-2000, moving from 56.5 percent to 56.6 percent of GDP as employment creation was almost completely offset by slow wage growth.[17] Thus, when wage moderation is the main factor causing job-rich growth, revenues need not be especially buoyant.[18]

25. On the spending side, unemployment and poverty transfers should be directly affected by job-rich growth. Table II.1 below shows the behavior of these spending categories in France at the beginning of the decade, the year in which job-rich growth began (1997), and the year of the cyclical peak (2000). Unemployment spending includes unemployment insurance, early retirement programs, and other transfers to the unemployed. The largest poverty programs are housing subsidies, means-tested transfers related to maternity and family, and an income support mechanism (RMI). Some benefits related to illness and disability are also provided on a means-tested basis. Means-tested old-age pensions have been excluded, because they are not affected by current labor market conditions but rather by past earnings.

Table II.1 Government Transfer Programs Related to Poverty and Unemployment
(In percent of GDP)

	1990	1997	2000
Labor market	2.0	2.0	1.8
Of which: Unemployment insurance	1.2	1.3	1.2
Early retirement	0.6	0.4	0.3
Other	0.3	0.3	0.3
Means-tested transfers	1.9	2.4	2.3
Of which: Health	0.4	0.5	0.5
Maternity and family	0.8	1.0	0.9
Housing	0.8	0.9	0.9
Poverty (RMI)	0.2	0.4	0.4
Total: Unemployment and poverty transfers	4.0	4.3	4.1
Memorandum item:			
Unemployment rate (Eurostat)	8.4	11.6	9.0
Government spending (Percent of GDP)	50.7	55.0	52.7

Source: DREES, Comptes de la Protection Sociale.

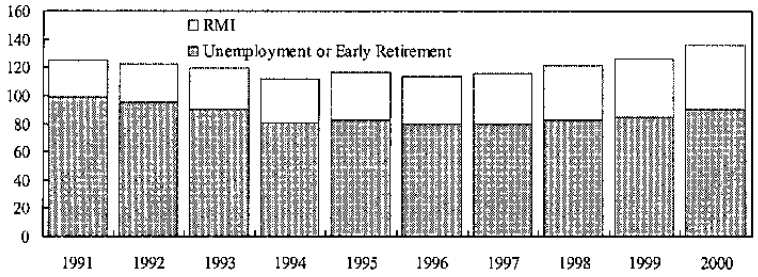
26. Spending on unemployment and poverty represented 4 percent of GDP in 1990, rose to 4.3 percent as unemployment climbed in 1997, and then fell back to 4.1 percent at the end

[17] The labor share had declined sharply in the 1980s, from 61.4 percent in 1982 to 55.9 percent in 1994.

[18] High revenues from corporate taxes and capital income were important contributing factors.

of the decade. At constant prices, this class of expenditures rose by a cumulative 4.7 percent, while real government spending grew by 6.7 percent in 1997–2000.

Figure II.1. Coverage Ratios of Unemployment Programs
(Benefit Recipients as a Percent of Unemployment)



Source: DREES, Comptes de la Protection Sociale; and Eurostat.

27. The sensitivity of unemployment spending to changes in the unemployment rate was curbed by movements in the coverage ratio (the fraction of the unemployed entitled to compensation) and the average benefit.[19] The average benefit fell about 4 percent in real terms in 1990–97, helping to contain the growth in unemployment spending, while it rose by 9.6 percent in 1997–2000, a bit below real GDP growth of 11.3 percent. The coverage ratio fell from over 90 percent in the early 1990s to below 80 percent in 1997, and reached over 90 percent in 2000 again (see Figure II.1 below).[20] Thus, during the job-rich growth years of 1997–2000 the increase in the coverage ratio limited cost savings in unemployment spending, even as early retirement programs were being phased out.

28. Spending on poverty programs grew sharply between 1990 and 1997, but declined only modestly in the following three years. Some savings were achieved in family and maternity transfers and, to a lesser extent, housing subsidies. On the other hand, means-tested transfers related to health and spending on the RMI grew slightly relative to GDP. Thus, somewhat surprisingly, high economic growth and the sharp reduction in unemployment did not generate substantial savings in social spending.

29. Expenditures on active labor market policies declined only modestly during the period of job-rich growth. France has a large array of instruments, ranging from training programs to incentives for private enterprises to hire particular categories of workers, to special public sector jobs programs. The cost of these measures almost doubled as a percent of GDP from 1990 to 1997, but declined only modestly in the following three years. More

[19] A large negative correlation between the coverage ratio and the rate of unemployment is found also in longer times series including the 1980s.

[20] These ratios are computed using Eurostat's harmonized unemployment.

specifically, training and employment subsidies in the private sector were scaled back during this period, but spending on youth measures increased markedly starting in 1999 as a result of a new program of temporary, public sector jobs for young workers (*emploi jeunes*).

Table II.2 Spending on Active Labor Market Policies and Reductions in Social Security Contributions (In percent of GDP)

	1990	1997	2000
Public employment services and administration	0.1	0.2	0.2
Training	0.3	0.3	0.3
Youth measures	0.2	0.3	0.4
Subsidized employment	0.1	0.5	0.4
Total active labor market policies	0.7	1.3	1.2
Reductions unrelated to 35 hours	0	0.6	0.4
Reductions 35 hours	0	0.0	0.4
Total reductions in SSCs	0	0.6	0.8
Total active policies and reductions in SSCs	0.7	1.8	2.0

Sources: OECD, DARES.

30. Increased use of cuts in social security contributions to boost labor demand has also weighed on the public finances, although it probably also contributed to job-rich growth (see Chapter I). Employers' social security contributions were reduced for low-skilled workers first in 1993. As part of the policy to reduce the standard workweek to increase labor demand, broader cuts were offered to firms switching to a 35-hour workweek and committing to hire new workers beginning in June 1996 with the law Robien and reinforced by the laws Aubry I of mid-1998 and Aubry II of January 2000. As more firms adopted the reduced workweek, the revenue loss associated with these policies grew from 0.6 percent of GDP in 1997 to 0.8 percent in 2000. These additional costs all but erased the savings in labor market spending obtained elsewhere.

31. Adding together all the spending categories considered, labor market-related spending rose from 4.7 percent of GDP in 1990 to 6.2 percent in 1997, and declined only marginally during the subsequent upswing, reaching 6.1 percent in 2000. Thus, the job-rich nature of growth during 1997–2000 seems to have contributed only marginally to expenditure reduction during the period.

C. Explaining the Rigidity of Labor-Market and Poverty Expenditures

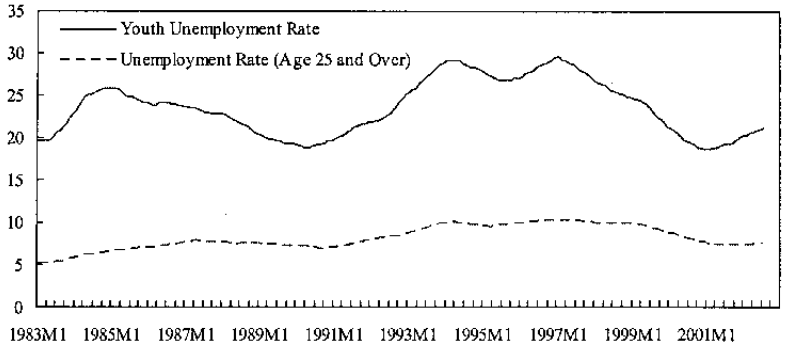
32. Active management of the unemployment fund (UNEDIC) likely played a role in limiting the response of unemployment spending to changes in the unemployment rate.[21] Faced with a rapid increase in spending in the early 1990s, the social partners, who run the fund, put in place corrective measures involving not only higher contributions but also lower

[21] See Freyssinet (2002) for a brief overview of unemployment reform in France in an international perspective.

benefits.[22] Conversely, the new UNEDIC accord reached at the end of 1996, when the financial situation of the fund was improving, expanded benefits and introduced a new program for older unemployed—the *allocation chômeurs âgés*. In 2001, faced with a Unedic surplus a new accord further reduced contributions and increased benefits by abolishing tapered benefits (*dégressivité*), although it tightened job search requirements. With the recent cyclical downturn, the accounts of the unemployment fund deteriorated once again, and the cuts in contributions were recently rescinded.

33. The hiring and firing decisions of employers may also lead to procyclical changes in the coverage ratio. During adverse economic conditions firms prefer to reduce employment by not replacing retiring employees to avoid firing costs. As a result, the unemployment rate increases mostly among new entrants in the labor market, who are not entitled to unemployment benefits. On the other hand, in times of strong employment growth it may be easier for employers to hire individuals who are not receiving benefits and thus do not face high implicit marginal tax rates when returning to work. This interpretation is consistent with high firing costs and inactivity traps in France, as well as data on unemployment by age group, showing that youth unemployment has the greatest sensitivity to the cycle (see Figure II.2).

Figure II.2. Youth Unemployment Rate
(Percent)



In addition, there may be a negative stigma associated with being a benefit recipient, which leads employers to prefer new entrants.

34. Fluctuations in the coverage ratio of unemployment insurance are not just due to the movement of people from unemployment insurance to the minimum income program (RMI). This program provides a minimum benefit to the unemployed not entitled to compensation, either because they did not work long enough before becoming unemployed or because they exhausted their benefits. The coverage ratio including RMI recipients increased even more

[22] The *dégressivité*, whereby benefits decline with unemployment duration, was introduced in 1992.

sharply in 1997-2000, as the number of minimum income recipients continued to rise until 1999. All in all, if the coverage ratio had remained as in 1997, spending on unemployment transfers and the RMI would have been lower by almost 0.3 percentage points of GDP in 2000.

35. Concerning poverty programs, there may be an underlying trend towards broadening social insurance in France, which led to the introduction of new programs and expansion of others even as income and employment grew rapidly.[23] The RMI program has shown an especially strong upward trend, which improved economic conditions may have just slowed down rather than reversed.[24] In addition, as in the case of unemployment insurance the level of some transfers tended to behave somewhat pro-cyclically. For example, the housing subsidy per beneficiary fell in real terms in 1993–97—when the parameters were not revalued to keep up with inflation—and then caught up in 1998-2000. Also, the policy of the "*intéressement,*" by which benefits (mainly the RMI and the housing subsidy) are withdrawn only gradually when an individual returns to work, may have resulted in a sluggish response of poverty expenditures to employment growth. This policy, expanded at the end of 1999 and 2000, is intended to remove disincentives to return to work.

36. New labor market policies, especially reductions in social security contributions for low wage workers to promote a reduction in the workweek, offset savings in other programs. Unfortunately, accurate ex-post evaluations of the effects of these policies on employment are not available yet, so it is not possible to assess to what extent they contributed to the job-rich nature of growth. The analysis of Chapter I, however, suggests that autonomous shifts in labor supply not directly related to government policy are large enough to explain most of the employment creation observed during 1997–2000.

D. Conclusions

37. Structural changes in the labor market led to rapid economic growth during 1997–2000 in France, which boosted revenues and taxes contributed to the notable improvement in the public finances during this period and created room for tax reduction. However, while labor market and poverty spending had grown sharply in the early 1990s, the subsequent improvement in labor market conditions and decline in unemployment did not result in a significant reduction of the share of these expenditures in GDP: while there were fewer unemployed, more of them received unemployment insurance, and the benefits became more generous. Among poverty programs, savings remained small or absent as a trend towards

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[23] For instance, eligibility to obtain subsidies on private rentals was expanded substantially in 1992–95; access to disability benefits was expanded in 1998, and to certain family benefits in 1999.

[24] For a recent evaluation of the RMI, including the difficulties in exiting the program, see the collection of articles in *Économie et Statistique*, No. 346–347, 2001.

expanding social programs and a pro-cyclical behavior of the level of benefits offset the consequences of higher incomes and lower unemployment. In addition, spending on active labor market policies grew relative to GDP, mainly because of the expansion of public sector jobs for young people and the growing cost of reductions in social security contributions tied to the 35-hour workweek.

38. Looking forward, with labor market and poverty expenditures in France at 6 percent of GDP, the potential savings from further progress towards lowering structural unemployment are non-negligible. However, past experience shows that to reap this "employment dividend" the tendency to expand benefits when resources become available needs to be curbed. Also, the present level and any further expansion of active labor market policies needs to be carefully considered in the light of their cost-effectiveness.

References

Abramovici, Gérard, and Marie-Odile Rattier, 2001, *Comptes de la Protection Sociale 2000*, DREES Working Paper No. 24.

_____ 2000, *Comptes de la Protection Sociale 1995-1999*, Dossiers Solidarieté et Santé No. 2, DREES.

Bourguinon, François and Bureau, Dominique, 1999, *L'architecture des prélèvements en France*, Conseil d'Analyse Economique, Paris.

Crépon, Bruno and Rozenn Dezplatz, 2001, "Une Nouvelle Évaluation des Effets des Allégements de Charges Sociales sur les Bas Salaires," *Economie et Statistique*, No. 348, pp. 3-24, August.

Duval, Guillaume, 2002, Le Dumping Fiscal, une Spécialité Européenne, Problémes Économiques, No. 2.756, pp. 1-4.

Estevão, Marcello, and Raphael De Coninck, 2002, "Active Labor Market Policies and Business Employment in OECD countries," *unpublished*, IMF, August.

Freyssinet, Jacques, 2002, *Idemnisation du chômage en France: quid de la réforme?*, Problémes Économiques, No. 2.768, pp. 1-7.

Hagneré, Cyrille and Alain Trannoy, 2001, "L'impact conjugué de trois ans de réforme sur les trappes à inactivité," *Économie et Statistique*, INSEE, 346/347:161–185.

Klein, T., 2002, Les Politiques d'Allégements de Cotisations Sociales: Permanence et Inflexions, DARES.

Laroque, Guy and Salanié, Bernard, 2000, "Une décomposition du non-emploi en France," *Economie et Statistique*, INSEE, 331:47–66.

———, 1999, "Prélèvement et transferts sociaux: une analyse descriptive des incitations financières au travail," *Économie et Statistique*, 328:3–20.

Roguet, B., 2002, Le Coût de la Politique de l'Emploi en 2000, DARES.

III. Explaining Inflation With the Help of the New Keynesian Phillips Curve[25]

A. Introduction

39. Following a long period of disinflation, underlying consumer price inflation in France edged up again in 2001 and 2002. After having fallen to below 1 percent in the late nineties, it rose back to 1.3 percent in 2000, 1.9 percent in 2001, and above 2 percent in the first seven months of 2002. Inflation rates calculated on the basis of the GDP deflator—more clearly reflecting developments on the production side and domestic labor market—had also fallen to less than one percent per annum in the late nineties but increased to 1.1 percent in 2000 and 1.6 percent in 2001 (Figure III.1).

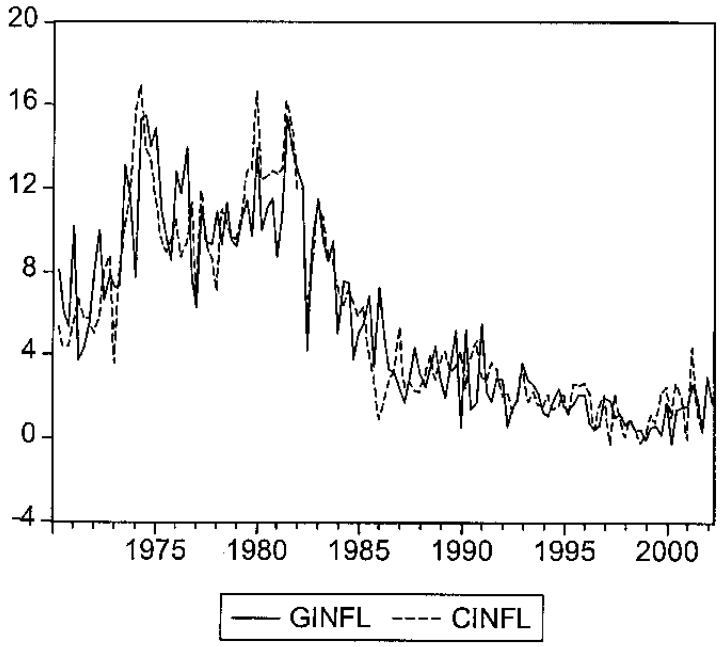
40. While temporary factors have played a key role in the rise of inflation, unit labor costs, and related wage and productivity developments, also exerted a significant influence. The influence of one-off or temporary factors affecting food, energy and service prices (adverse weather conditions, livestock diseases, oil price increases, the euro depreciation of 2001 and the euro-conversion of January 2002) appears to explain only part of the recent inflation acceleration. At the same time, unit labor cost growth also rose, from 0.5 percent in 1999 to 2.5 percent in 2001.

41. This chapter concludes that (i) the so-called New Keynesian Phillips curve can explain French inflation, although with some limitations, and that (ii) the New Keynesian Phillips curve captures more of the recent increase in inflation than its conventional counterpart. The first result contrasts with the findings of an earlier study by Jondeau and Le Bihan (2001) but is consistent with the findings of Gali and Gertler (1999) and Gali, Gertler and Lopez-Salido (2001) that the New Keynesian Phillips curve explains inflation in the euro area as a whole (though they did not study French data in isolation). Different estimation specifications contribute to this contrast. It is worth noting that the New Keynesian Phillips curve performs well only if it integrates elements of the conventional Phillips curve (i.e., lagged inflation expectations) and only when applied to the GDP deflator as opposed to the CPI. The second finding emerges from a comparison of fitted inflation from estimations of the New Keynesian Phillips and the conventional Phillips curves during the period 1999 to 2001.

[25] Prepared by Hans Weisfeld.

Figure III.1: GDP Deflator and CPI Inflation Rates, 1970:2–2002:2

(In percent)



Legend: GINFL and CINFL are the annualized quarterly inflation rates for the GDP deflator and the harmonized CPI index, respectively.
Sources: OECD Analytical Database and INSEE

B. The New Keynesian Phillips Curve

42. The New Keynesian Phillips curve relates today's inflation to expectations of future inflation and to real marginal costs or, under additional assumptions, to the output gap (see Appendix).[26] It is given by

$$\pi_t = \beta E_t \pi_{t+1} + \lambda mc_t$$

in a formulation comprising marginal production costs, and by

$$\pi_t = \beta E_t \pi_{t+1} + \lambda h(y_t - \bar{y}_t)$$

[26] See, e. g., Goodfriend and King (1997) and King (2000) for discussions of New Keynesian economics.

in a version showing the output gap; where π_t denotes the inflation rate of period t, β is a so-called discount factor expressing firm's valuation of future income relative to present income, $E_t\pi_{t+1}$ is the best expectation of the inflation rate in period t+1 that individuals can form based on information available in period t, λ is a parameter linked to the discount factor and the frequency of price adjustments, mc_t is the percentage deviation of marginal costs (the costs of producing one additional unit of output) from its long-term average (the so-called steady state), h is a parameter linked to the assumed production function, y_t denotes the economy's output, $\bar{y}_t$ potential output, and $(y_t - \bar{y}_t)$ the output gap.

43. The New Keynesian Phillips curve is derived from an optimization-based theory of firm's price setting that relates today's prices in a positive fashion to present and expected future marginal costs. Higher present and expected marginal costs lead to higher prices, and higher present and expected increases in marginal costs to higher inflation rates. The expected inflation term on the right-hand side of the New Keynesian Phillips curve embodies expectations about future marginal costs. The output-gap based version of the New Keynesian Phillips curve is derived from the marginal cost based form, using additional assumptions about production technology and the short-run determination of capital used in production. For a derivation, see Appendix.

44. In attempts to improve the fit of the New Keynesian Phillips curve, both forward- and backward-looking price setting has been included. While the inclusion of backward-looking price setting does not correspond very well with the rationality hypothesis on which the New Keynesian Phillips curve is founded, it can be seen as resulting from rule-of-thumb pricing (see Appendix). The hybrid New Keynesian Phillips curve is then given by

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \pi_{t+1} + \lambda mc_t$$

based on marginal costs, and

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \pi_{t+1} + \lambda h(y_t - \bar{y}_t),$$

using the output gap, where γ_b and γ_f are functions of behavioral parameters.

45. For the same reason, variants using more than one lag and leads of (expected) inflation as explanatory variables have been suggested. While the microeconomic foundations of this enlarged Phillips curve are generally seen as being limited, integrating additional inflation terms has advantages for empirical modeling. Following Fuhrer (1997) and Roberts (2001), using three-quarter leads and lags yields

$$\pi_t = \omega \frac{1}{3}\sum_{j=1}^{3} \pi_{t-j} + (1-\omega)\frac{1}{3}\sum_{j=1}^{3} \pi_{t+j} + \lambda mc_t,$$

and

$$\pi_t = \omega \frac{1}{3}\sum_{j=1}^{3}\pi_{t-j} + (1-\omega)\frac{1}{3}\sum_{j=1}^{3}\pi_{t+j} + \lambda(y_t - \bar{y}_t),$$

where ω is the weight of backward looking price setters.

C. Estimation Methodology, The Data, and Estimation Results

46. The New Keynesian Phillips curve, both in its pure and its hybrid forms, and alternatively with marginal costs and the output gap was estimated using the General Methods of Moments (GMM) methodology. GMM estimation involves formulating freedom-of-correlation conditions derived from economic theory. Here, the property of rational expectations precludes expectations errors from being correlated with information available at the time expectations are formed. This leads to the conditions

$$E[(\pi_t - \beta\pi_{t+1} - \lambda mc_t)z_t] = 0$$

for the marginal cost based Phillips curve and

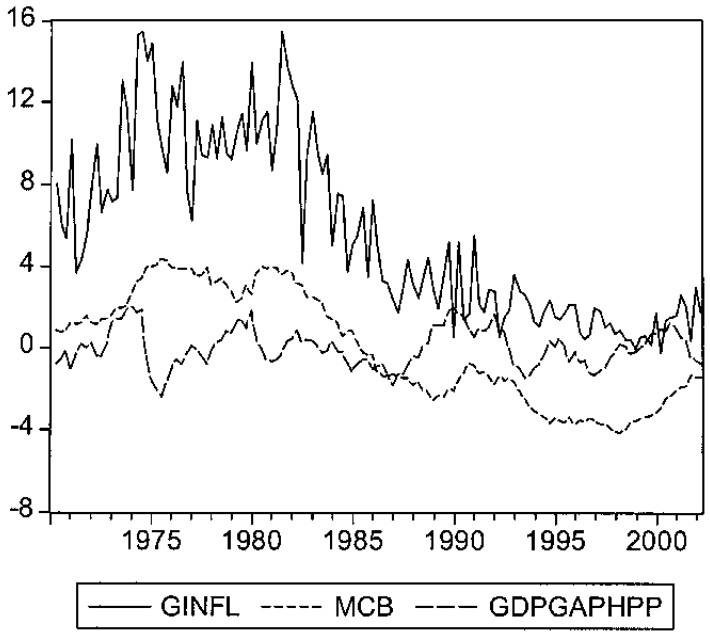
$$E[(\pi_t - \beta\pi_{t+1} - \lambda h(y_t - \bar{y}_t))z_t] = 0,$$

for the output gap based relationship, where z_t is a vector of instruments comprising the inflation rate, marginal cost, the output gap, and real GDP growth before and up to period t. Inflation has been calculated as annualized quarterly changes of the GDP deflator; the real marginal costs variable as the deviation of real unit labor costs from their long-term average, with as real unit labor costs the ratio of the business sector nominal wage bill and nominal GDP[27] (for a motivation of this measure see the Appendix); the output gap as the cyclical component of GDP computed with the help of the Hodrick-Prescott filter; and real GDP growth as annualized quarterly changes of real GDP. Figure III.2 shows the inflation, marginal cost and output gap series.

[27] Using private sector GDP instead of overall GDP did not alter the results.

Figure III.2: Inflation, Marginal Costs, and The Output Gap, 1970:2–2002:2

(In percent)



Legend: GINFL is the annualized quarterly inflation rate calculated using the GDP deflator, MCB is the deviation of marginal cost from the long-term average of marginal costs in the business sector, and GDPGAPHPP is the output gap, shown here as a percentage of potential output.
Sources: OECD Analytical Database and INSEE

47. The following estimation result was obtained:[28]

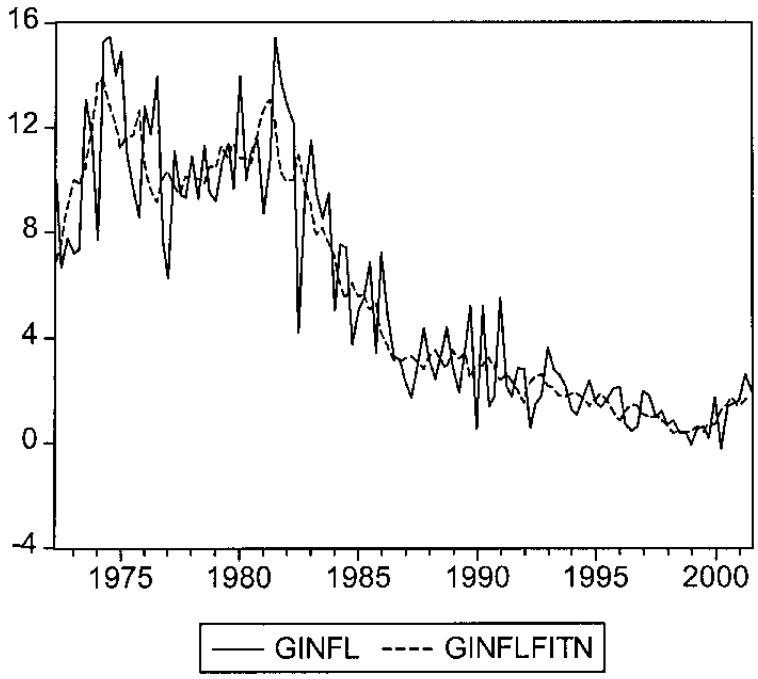
$$\pi_t = \underset{5.21}{0.276}\frac{1}{3}\sum_{j=1}^{3}\pi_{t-j} + \underset{13.67}{0.724}\frac{1}{3}\sum_{j=1}^{3}\pi_{t+j} + \underset{1.81}{0.017}\,mc_t,$$

where t-values are shown beneath estimated parameters. All estimated coefficients have the expected signs and are significant at the 10 percent level. The estimation results suggests that price setting is mostly forward looking and that above-average marginal costs in the form of

[28] This estimation used 118 observations after adjusting endpoints and covered the period 1972:2 to 2001:3, with remaining raw data in the sample used for calculation of explanatory variables. As instruments we chose 8 lags of inflation and 3 lags each of marginal costs, the output gap and real GDP growth. Estimation relied on prewhitening, a quadratic kernel and the Newey-West bandwidth. Further, we imposed the restriction that the estimated coefficients on lagged and future (expected) inflation sum to one.

higher real unit labor costs lead to higher inflation. Significance of the parameter associated with marginal costs at conventional confidence levels is maintained across a limited range of estimation specifications. Significance is, however, often lost when the quadratic kernel is substituted by a Bartlett kernel, as in Jondeau and Le Bihan (2001).[29] Also, while estimation results are robust to some data transformations (for example, similar results were obtained when we computed the output gap using a linear trend of real GDP), they show sensitivity to others. Further, the marginal cost parameter ceased to be significant for all or most test specifications when lagged inflation was excluded, the CPI index was used for inflation calculation, or the output gap was substituted for marginal costs. The reported regression explains inflation up to and including 2001:3, with later inflation observations used as explanatory variables. Figure 3 shows actual and fitted inflation. Unfortunately, the presence of future (expected) inflation rates among the explanatory variables makes forecasting and an analysis of forecast performance impossible.

Figure III.3: Actual Inflation and Inflation Explained by the New Keynesian Phillips Curve, 1972:2–2001:3
(In percent)



Legend: GINFL is the actual and GINFLFITN the fitted annualized quarterly inflation rate emerging from the reported estimation of the New Keynesian Phillips curve.
Sources: GINFL - OECD Analytical Database, INSEE; GINFLFITN - Fund staff calculations.

[29] We are not aware of any reasons that would let one kernel appear superior to the other.

48. The New Keynesian Phillips curve explains a larger part of the recent increase of inflation than its conventional predecessor. In order to compare the performance of the New Keynesian in explaining the recent increase of inflation to that of the conventional Phillips curve

$$\pi_t = \sum_{j=1}^{k} \delta_j \pi_{t-j} + \lambda(y_t - \bar{y}_t),$$

we also estimated the latter. We obtained the following result:[30]

$$\pi_t = \underset{5.68}{0.426}\pi_{t-1} + \underset{3.54}{0.278}\pi_{t-3} + \underset{3.80}{0.296}\pi_{t-6} + \underset{2.19}{0.041}(y_t - \bar{y}_t).$$

As is usually the case with estimations of the conventional Phillips curve, the coefficient associated with the output gap term is significant. Comparing fitted inflation rates between the year of lowest inflation 1999 and the year 2001 (first three quarters), the New Keynesian Phillips curve performs better than its conventional counterpart: while actual inflation rose from 0.3 percent in 1999 to 2.0 percent in 2001, the New Keynesian Phillips curve explains an increase from 0.5 percent in 1999 to 1.6 percent, and the conventional relationship a rise from 0.6 percent to 1.4 percent (see Figure III.4). Thus, while both versions underpredict the recent observed increase in inflation, the New Keynesian Phillips curve fares better than the conventional relationship.

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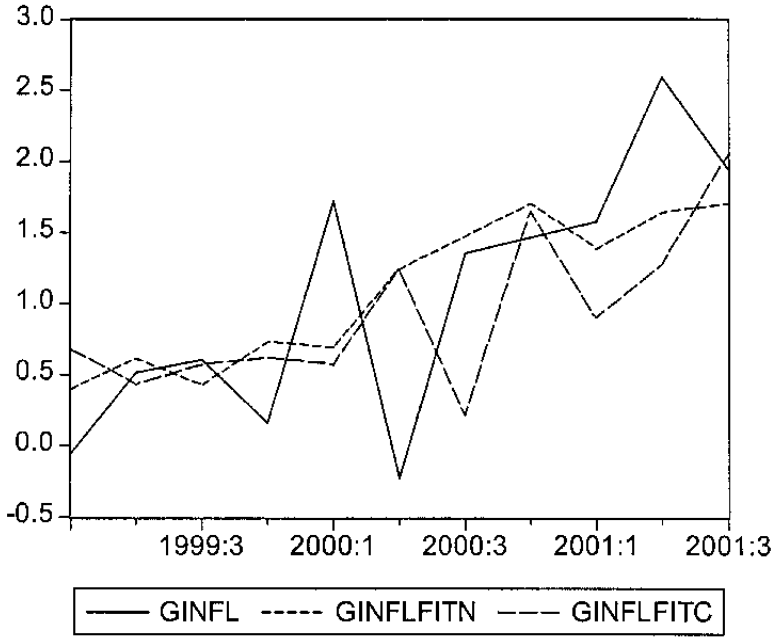
[30] Using the ordinary least squares estimator, we started with eight lags of inflation, eliminated insignificant lags, and successfully tested and imposed the restriction $\sum_{j=1}^{k} \delta_j = 1$ that assures the accelerationist Phillips curve, excluding a long-run trade-off between output and inflation. The estimated residuals were free of autocorrelation but showed signs of heteroskedasticity. In order to account for this, we conducted a GARCH (1,1) maximum likelihood estimation. After adjusting for endpoints, the sample covered the period 1971:4-2002:2 and comprised 123 observations.

Figure III.4: Actual Inflation and Inflation Explained by the New Keynesian and the Conventional Phillips Curves, 1999:1–2001:3

(In percent)



Legend: GINFL is actual inflation, and GINFLFITN and GINFLFITC are the fitted annualized quarterly inflation rates emerging from the reported estimations of the New Keynesian and the conventional Phillips curves.
Source: GINFL - OECD Analytical Database, INSEE; GINFLFITN and GINFLFITC - Fund staff calculations.

D. Conclusions

49. The New Keynesian Phillips curve appears to provide a good analysis of inflation determination in France, although with some limitations. Forward–looking price setting is an important part of French firms' price setting, and higher expected unit labor costs lead to higher inflation. The New Keynesian Phillips curve explains a larger share of the recent increase in inflation than the conventional Phillips relationship. That it, too, underpredicts inflation, can at least in part be attributed to unexpected events such as livestock diseases and adverse weather conditions that affected agricultural output negatively and pushed food prices up in 2001.

DERIVING THE NEW KEYNESIAN PHILLIPS CURVE

50. This appendix presents some steps needed for deriving the New Keynesian Phillips curve in its different forms. For a complete derivation, see, e.g., Goodfriend and King (1997).

Timing of price adjustments and price stickiness

51. The economy is inhabited by a large number of firms that differ only in that each produces a differentiated good. Each period, a firm has a probability $(1-\eta)$ of setting a new price and a complementary probability of η of not being able to choose a new price. Thus, firms face a probability of η^j of still having, in period $t+j$, the price that was set in period t, and the probability of first adjusting a price in j periods is $(1-\eta)\eta^{j-1}$. The expected duration of a price remaining unchanged is therefore

$$1(1-\eta)+2(1-\eta)\eta+\ldots(j+1)(1-\eta)\eta^j+\ldots=(1-\eta)\sum_{j=0}^{\infty} j\eta^{j-1}=\frac{1}{1-\eta}.$$

The parameter η thus summarizes price stickiness. In a quarterly model, with a value of $\eta=0.75$, for example, prices would be adjusted on average once per year.

Determining the price level

52. The overall price level is the average over all prices. The fraction of firms adjusting prices in period t is equal to the probability of price adjustment $(1-\eta)$ and the fraction of firms stuck with a price that is j periods old is $(1-\eta)\eta^j$. Denoting the (log of the) price chosen by all adjusting firms in period t by p_t^*, the (log of the) price level by p_t is therefore given by

$$p_t=(1-\eta)\sum_{j=0}^{\infty}\eta^j p_{t-j}^*=\eta p_{t-1}+(1-\eta)p_t^*.$$

Price setting

53. Firms consider future market conditions when setting prices. Optimal pricing is governed by

$$p_t^*=(1-\beta\eta)\sum_{j=0}^{\infty}(\beta\eta)^j E_t[mc_{t+j}]=\beta\eta E_t p_{t+1}^*+(1-\beta\eta)[mc_t],$$

where β is a discount factor, $E_t(z_{t+j})$ the expected value of variable z_{t+j} based on information available at time t, and mc_t the percent deviation of real marginal cost from its steady state. Thus, the price chosen by firms can be seen as a weighted average of present and expected future marginal costs, or, equivalently, as an average of present marginal costs and the price level expected for the next period.

Introducing the output gap

54. In a final step, it is often assumed that the deviation of real marginal cost from its steady state is positively related to the output gap:

$$mc_t = h(y_t - \bar{y}_t),$$

where y_t represents (the log of) output and $\bar{y}_t$ (the log of) potential output. A positive value of the parameter h is the result of conventional assumptions about the aggregate production function and factor supply elasticities. Real marginal costs would rise with the level of economic activity if the economy had some fixed factors such as a predetermined capital stock.

Solving for the rate of inflation

55. Combining the above equations and using the definition of the inflation rate $\pi_t = p_t - p_{t-1}$ leads to

$$\pi_t = \beta E_t \pi_{t+1} + \lambda mc_t$$

in a formulation comprising marginal costs and

$$\pi_t = \beta E_t \pi_{t+1} + \lambda h(y_t - \bar{y}_t)$$

in a version showing the output gap, with $\lambda = \frac{(1-\eta)(1-\beta\eta)}{\eta}$.

Introducing the hybrid Phillips curve

56. Suppose that a fraction ω of firms performs backward, rather than forward, looking pricing. The price level still evolves according to

$$p_t = (1-\eta)\sum_{j=0}^{\infty} \eta^j p^*_{t-j} = \eta p_{t-1} + (1-\eta) p^*_t,$$

only price setting is now determined through

$$p_t^* = \omega p_t^b + (1-\omega) p_t^f,$$

where p_t^b is the price set by backward-looking firms and p_t^f the price set by forward-looking firms. Backward looking pricing is assumed to accord to the rule of thumb

$$p_t^b = p_{t-1}^* + \pi_{t-1},$$

so that last period's inflation rate is used by backward looking firms as a predictor of the current inflation rate. The resulting hybrid Phillips curves are

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \pi_{t+1} + \lambda mc_t$$

and

$$\pi_t = \gamma_b \pi_{t-1} + \gamma_f E_t \pi_{t+1} + \lambda h(y_t - \bar{y}_t),$$

where parameters are functions of ω, η and β.

Measuring marginal costs

57. Let A_t denote technology, K_t capital, and N_t labor. Assuming a Cobb-Douglas production function, output Y_t is given by

$$Y_t = A_t K_t^{\alpha_k} N_t^{\alpha_n}.$$

With capital fixed in the short run, short run real marginal cost MC_t is given by the ratio of the wage rate to the marginal product of labor, i.e., $MC_t = (W_t / P_t)/(\partial Y_t / \partial N_t)$, where W_t represents nominal wages. Thus,

$$MC_t = \frac{S_t}{\alpha_n},$$

where $S_t \equiv W_t N_t / P_t Y_t$ is real unit labor costs (equivalently, the labor income share). Log-linearizing around the steady state yields

$$mc_t = s_t,$$

where s_t is the percentage deviation of real unit labor costs from their steady state. Thus, the percentage deviation of marginal costs from their steady state is equal to the percentage deviation of real unit labor costs from theirs. We use the sample average of real unit labor costs as an estimator of the steady state.

References

Fuhrer, J., 1997, "The (Un)importance of Forward Looking Behavior in Price Specifications," Journal of Money, Credit, and Banking, Vol. 29, No. 3, pp. 338–350.

Jondeau, E., and H. Le Bihan, 2001, "Testing for a Forward-Looking Phillips Curve. Additional Evidence from European and US Data," Université Paris XII Val de Marne Faculté de Sciences Economiques et de Gestion Document No. 01–05.

Gali, J., and M. Gertler, 1999, "Inflation Dynamics: A Structural Econometric Analysis," Journal of Monetary Economics Vol. 44, pp. 195–222.

Gali, J. M., Gertler and D. Lopez-Salido, 2001, "European Inflation Dynamics," European Economic Review, Vol. 45, No. 7, pp. 1237–1270.

Goodfriend, M., and R. King, 1997, "The New Neoclassical Synthesis and the Role of Monetary Policy," in: B. Bernanke and J. Rotemberg (ed.), NBER Macroeconomics Annual, Cambridge, MA, MIT Press, pp. 231–282.

King, R., 2000, "The New IS-LM Model: Language, Logic, and Limits," Federal Reserve Bank of Richmond Economic Quarterly, Volume 86, No. 3 (Summer), pp. 45–103.

Roberts, J., 2001, How Well does the New Keynesian Sticky-Price Model Fit the Data?," Federal Reserve Board, Finance and Economics Discussion Series, No. 2001–13.

IV. Common and Idiosyncratic Components of the French Business Cycle[31]

A. Introduction

58. Most macroeconomic aggregates seem to comove, and in certain cases even seem to be synchronized in that turning points occur at roughly the same point in time, or differ by roughly constant intervals. This observation led Burns and Mitchell (1946) to develop the idea of a *reference cycle*. As national accounts were developed and real GDP became the best available measure of aggregate economic activity, understanding comovements and synchronization of macroeconomic aggregates within a country as well as across countries became a major theme in theory, practice, and policy discussions. The objective of this chapter is to dissect the French real GDP cycle into its common and idiosyncratic components.[32] The main finding is that there is a great deal of synchronization between the French cycle and the rest of the world and Europe. The French idiosyncratic component is also significant, albeit smaller than one would have surmised from looking at differences in employment behavior during what has been called "employment-rich growth" in the late 1990s.

59. The issue of French output comovement with the rest of the euro area, or the rest of world output, has drawn additional attention in light of the disparate output behavior between France and other major European economies during the last cycle. Some observers have considered it to be a one-time effect of reforms while others have suggested a more durable change in output behavior. At a European level, the outset of monetary union, the different pace of fiscal consolidation under the Stability and Growth Pact, the different degree of structural reforms, and divergences in the areas chosen for reform by several European countries, have introduced an additional sense of importance into trying to assess the quantitative impact of those changes on output behavior.

60. The next section of the chapter defines what is meant by a cycle in real GDP. This leads to a discussion of what is meant by comovements between economic time series. Section C calculates the index of concordance and the test statistic developed by Harding and Pagan (2001a, 2001b, 2002). Section D develops an approach to determine whether there is a common component among the same set of series that have been found to be synchronized. The approach is inspired by the work of Stock and Watson (1991) on coincident indicators. It is applied to determine the presence of a "world" or global common factor, and a European or regional common factor. It also identifies the idiosyncratic factors of real GDP. The results are presented in Section E. The last section concludes and discusses policy implications.

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[31] Prepared by Francisco Nadal De Simone.

[32] Henceforth, the words component and factor are used as synonyms.

B. Measuring the Cycle

61. This section will be concerned with the *level* of real GDP. A pattern of recurrent moves between phases—contractions and expansions—in the level of activity is what is normally referred to as the *classical cycle*. The analysis here will not involve any detrending, as done, for instance, in the work of Cooley and Prescott (1995), and in all the related and vast literature. The main reason for this approach is to stay as close as possible to Burns and Mitchell's methodology of dating and defining the features of business cycles. Also importantly, the approach seeks to avoid the well known problem that the detrending procedure itself alters the properties of the cycle.[33]

62. The Burns and Mitchell methodology is made operational by using the algorithm originally developed by Bry and Boschan (1971) and adapted by Harding and Pagan (2002).[34] Empirical analysis will concentrate on quarterly data for France (FR), Germany (DE), Italy (IT), the rest of the euro area (REA), and the United States (US). The seasonally-adjusted real GDP data are from the OECD database except for French GDP which is from INSEE. The sample period comprises 1975:1–2001:4.

63. The turning points in the real GDP series are shown in Figure IV.1.[35] The REA real GDP series did not have at least two peaks (troughs) and one trough (peak), and thus could not be dated. Peaks are shown as taking a value of 1 and troughs as taking a value of -1. For the US, the algorithm returns the same dates of peaks and troughs as the NBER dating. The dates for the other countries are very similar to the ones obtained by Harding and Pagan (2001b) and by WEO (2002). Although the dating of the classical cycle for G7 and European countries done by Artis, Kontolemis and Osborn (1997) used industrial production, the dates in Figure IV.1 for the European countries real GDP are not too different.

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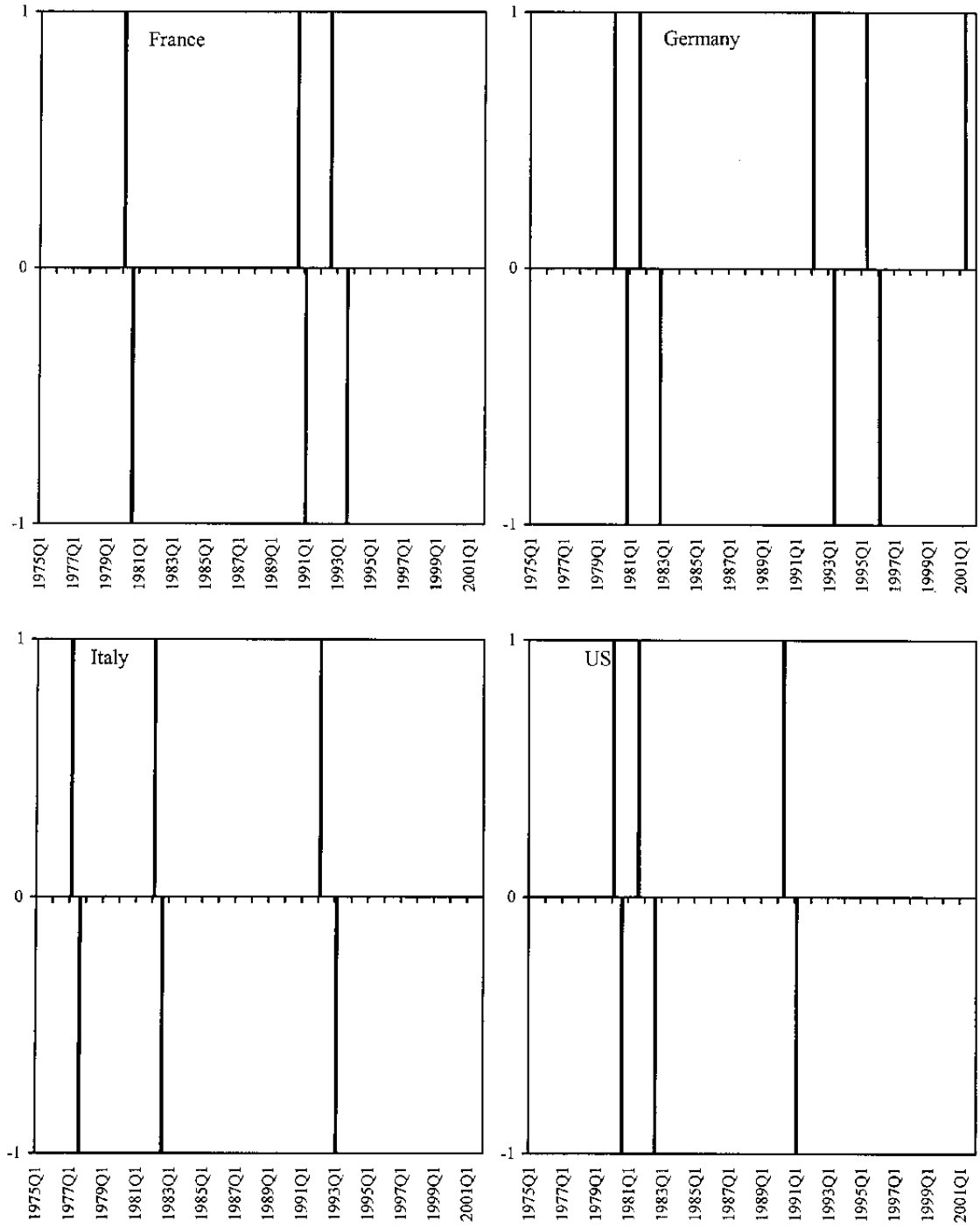
[33] See Ross and Ubide (2001) and WEO (2002) for a similar argument, and related references. Briefly, the main point is that filters such as Hodrick-Prescott or Baxter and King's band-pass remove the permanent component of a series that is nonstationary (e.g. a unit root process I(1)). The major difficulty these filtering procedures create is that the resulting stationary series (i.e., I(0) series) is not unique because any stationary series could be added to the I(1) series and it would still be I(1).

[34] The algorithm defines a peak (trough) at time t as occurring when the series $y_t > (<) y_{t+2}$. It also ensures that peaks and troughs alternate. Finally, it imposes the restriction that a cycle phase must last at least two quarters, and a complete cycle should have a minimum duration of five quarters. While the classical cycle is concerned with the *level* of real GDP, the turning points are located using *changes* in the series. Harding and Pagan (2001b) present a technical discussion.

[35] Paul Cashin's assistance in running the code is greatly appreciated. The code was used in Cashin and McDermott (2002), and is based on Watson's modified Bry-Boschan algorithm.

Figure IV.1. Turning Points of Real GDP
(Peaks=1, Troughs=-1)



Source: Staff estimates.

Cycle characteristics

64. Having determined the cycle, what follows presents statistics on duration, amplitude (or deepness), steepness, and cumulative movements of output within cycle phases. The duration of a cycle is the number of periods elapsed between two consecutive peaks (or troughs). The amplitude or deepness of a recession is the output contraction from peak to trough in percent of GDP (and, mutatis mutandi, for an expansion). Steepness is the rate of change of output from peak to trough, or vice versa, in a given period of time. Cumulative movements of output are the output losses (gains) from peak to trough (trough to peak) relative to the previous peak (trough). As cumulative movements are approximated using a linear procedure, a measure of the excess in cumulated movements is also provided.

65. Statistics of the classical cycle for FR, DE, IT, REA, and US are set out in Table IV.1. Output contractions are defined as PT (peak-to-trough) and expansions are defined as TP (trough-to-peak). The French cycle is very similar to other countries' cycles in terms of the duration and amplitude of contractions, but diverges in terms of expansions. This divergence is a more general phenomenon: in the case of FR, IT, and REA, expansions are longer than in DE and the US (see also WEO, 2002). The French steepness statistics display significant similarity with other European countries in both phases of the cycle, although cycles throughout Europe are less steep than in the US. Finally, as shown by the excess statistic for expansions (TP), French recoveries do not display strong output expansions, a well known feature of US cycles.[37]

Table IV.1. France: Business Cycle Characteristics
(In percent, unless otherwise indicated)

	FR	DE	IT	REA	US
Mean duration (quarters)					
PT	2.7	4.0	2.7	3.0	3.0
TP	23.0	17.3	28.0	46.0	17.5
Mean amplitude					
PT	-0.7	-1.6	-1.2	-1.1	-2.2
TP	13.1	11.6	19.2	30.3	21.0
Steepness					
PT	-0.3	-0.4	-0.4	-0.4	-0.7
TP	0.6	0.7	0.7	0.7	1.2
Cumulation[1]					
PT	-1.5	-3.9	-1.4	-2.1	-4.4
TP	203.5	154.0	319.2	563.1	375.6
Excess					
PT	-0.1	-0.1	0.1	-0.1	-0.3
TP	-0.8	-0.5	1.3	-2.9	2.8

[1]Percent of GDP in first quarter of phase.

66. The divergent cyclical characteristics of European countries raise a range of important policy questions. For instance, do the divergences in output behavior across

[37] See Nadal-De Simone (2001), and references therein.

European countries change when a *growth cycle* definition is used?[38] How serious a handicap for the conduct of a single monetary policy within the Euro area is the result that other countries' expansions are longer than German ones? Could disparities across European countries in the extent to which automatic stabilizers are allowed to play explain divergences in their cycles? And what are the relative contributions to output behavior of global, regional, and idiosyncratic shocks? A thorough answer to all these questions is clearly beyond the scope of this chapter. However, Sections D and E will deal with the last one.

C. Concordance and Synchronization

67. Because turning points signal phases of contractions and expansions, any two real GDP series would be perfectly synchronized if they were in the same phase of the cycle at all points in time. Harding and Pagan (2001a) measure the fraction of time that the two series spend in the same phase using the following bivariate index of concordance:

$$I_j = \frac{1}{T}\sum_{t=1}^{T}\left\{S_{it}S_{jt} + (1-S_{it})(1-S_{jt})\right\}, \qquad (1)$$

where i and j are any two time series, T is the number of observations, and S_t is a state variable that takes the value 1 during expansions and 0 during contractions. To be a useful measure of synchronization, the index has to be modified to eliminate the possibility of obtaining high values of the index simply because one of the series spends a large fraction of the time in expansions. Thus, a mean correction of the index is necessary.[39]

68. The non-demeaned concordance index among real GDP series as well as the correlation coefficients with their t-statistics (between parentheses) are in Table IV.2.[40] There is a significant degree of synchronization between French and German and US real GDP, but

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[38] The same approach used for analyzing the classical cycle was applied to the growth cycle, calculated by removing a deterministic linear time trend from the real GDP series. In general, growth cycles are more similar across countries than suggested by classical cycles, and are less divergent across European countries than between them and the US. The duration and amplitude of FR growth cycles, however, are more similar to those of REA and the US than those of DE and IT.

[39] After mean-correcting, Harding and Pagan (2001a) show that the index is proportional to the regression coefficient estimate of a linear regression of S_{jt} against a constant and S^a_t. This estimate is in turn proportional to the correlation coefficient between S_{jt} and S_{it}. This is so because the demeaned index has an expectation of zero under the null hypothesis of no synchronization.

[40] The null hypothesis is no association between the series. The t-ratios are robust to the heteroskedasticity and the serial correlation present in the state variable S_t.

not between French and Italian real GDP. There is also high synchronization for the pairs DE-IT and DE-US.

Table IV.2. France: Concordance, Correlation and t-Statistics				
		Concordance		
	FR	DE	IT	US
FR	1	0.85	0.89	0.92
DE		1	0.87	0.86
IT			1	0.88
US				1
		Correlation and t-Statistics		
	FR	DE	IT	US
FR	1	0.35*	0.19	0.43*
		(2.28)	(1.23)	(2.42)
DE		1	0.44*	0.40*
			(2.77)	(3.40)
IT			1	0.17
				(1.15)
US				1

69. The results suggest that at least part of those significant comovements might result from complicated links that the bivariate approach of the concordance index and correlation analysis would have difficulty in unveiling. Why while all European countries in the sample comove with the US, the pair FR-IT does not seem to comove in a statistically significant way? This question cannot be answered satisfactorily in a bivariate framework such as this one. A multivariate approach is necessary. The next section uses the evidence of comovement in real GDP obtained above to explore the question of the presence of a possible underlying component or factor in a multivariate framework.

D. A Model of a Common Component

70. One possible explanation for the synchronization results obtained above is that the set of time series is driven by a common factor. Therefore, it seems intuitive that the common factor be constructed by weighting the time series in some way, very much as the NBER does with its "coincident indicator index." The model that will be used for extracting this presumed common component is inspired by Stock and Watson's (1991) dynamic factor model of coincident economic indicators, which they showed to replicate the NBER coincident index fairly well. The objective of this section is to construct an index that captures the comovement of real GDP across countries. The model developed will allow for lags in the time series to capture the possibility of phase shifts in the series comovement. As shown by Harding and Pagan (2001a and 2001b), the presence of a common factor does not imply synchronization of the specific cycles.

71. The dynamic factor model can be written in levels if the series are nonstationary and cointegrated. Alternatively, the model can be written in first differences if the series are not

cointegrated. In fact, the real GDP series are clearly nonstationary (Table IV. 3) and are not cointegrated (results not shown).[41]

Table IV.3. France: Elliot, Rothenberg, and Stock Test for Unit Roots Statistics for ρ= 0 1975Q1 -2001Q4

	Lags	$\Delta FGLS^{\tau}$		Lags	$\Delta FGLS^{\tau}$
FR	3	-2.41	ΔFR	1	-4.20*
DE	1	-1.42	ΔDE	1	-5.94*
IT	1	-1.18	ΔIT	1	-4.81*
REA	3	-2.24	ΔREA	1	-3.36*
US	1	-2.13	ΔUS	1	-6.08*

*All variables are measured in natural logarithms. Lags are determined according to Schwarz information criterion and checking that the residuals are white noise. The $\Delta DFGLS^{\tau}$ has a null of unit root with a constant and a linear trend. The 5 percent critical value is -2.89.

72. Therefore, the dynamic factor model is written in first differences as follows:

$$\Delta y_{it} = I_{it} + \gamma_i \Delta c_t + e_{it}, \tag{2}$$

where Δy_{it} represents changes in the set of real GDP time series. Δc_{it} is the change in the common component, defined as:

$$\phi(L)\Delta c = \delta + \eta_t, \tag{3}$$

where ϕ (L) is a lag polynomial of order p, δ is mean growth rate of the common component $c_{f|t}$, and η_t is assumed to be normally distributed with a zero mean and a variance σ_η^2. The common component is thus a random walk with a drift. The error terms e_{it} are assumed to be independent, and to follow a process defined by the lag polynomial of order k, ψ (L):

$$\psi_i(L)e_{it} = \varepsilon_{it}, \tag{4}$$

where ε_{it} is normally distributed with mean zero and variance $\sigma_{\varepsilon i}^2$. The independence assumption of e_{it} means that the comovements of the real GDP series in the sample have a single source c_t, although the common component is allowed to enter each real GDP series

[41] The rates of change in GDP are all stationary.

with a different weight γ_i. For each real GDP series, $I_{it} + e_{it}$ represents the idiosyncratic component.

73. The identification issues of a coincident economic indicator model were discussed by Stock and Watson (1991), and therefore are just briefly mentioned here. First, the scale of Δc_t is identified by setting $\sigma_\eta^2 = 1$. Second, given the mean of Δy_t, I_{it} and δ are not separately identified because it is not possible to identify the factor loadings and the variance. Thus, Stock and Watson suggested writing the model in terms of deviations from sample means. This approach is also followed here. With these restrictions, the model can be put in state space form and its parameters can be estimated using full information maximum likelihood. Once the parameters are estimated, the Kalman filter is applied to obtain $\Delta c_{t|t}$.[42]

74. Finally, note that the absence of a common trend among the real GDP series (the absence of cointegration) implies that innovations to the common component c_t are transitory.

75. The common component of FR, DE, IT, REA, and US real GDP will proxy a "world" or global common factor in output. To identify the French idiosyncratic component, however, the model will be used to extract a European or regional common component that might be left in output once the global common component has been removed. For this purpose, a two-step strategy will be followed. First, the global common component among all series will be extracted. This will produce the (first-step) "idiosyncratic" component of real GDP, i.e., $I_{it} + e_{it}$. Second, using those "idiosyncratic" component series, the model will be run again to extract the European common component among FR, DE, IT, and REA, i.e., excluding US. After this second step, the original real GDP series will contain only the "true" idiosyncratic component.

E. Empirical Results

76. The results suggest that the French cycle is driven by a global common component, to a much lesser extent by a euro area common component, and has a small though significant idiosyncratic component.

The global common component

77. The estimated unobserved common global component shows significant first order serial correlation and limited second order serial correlation (Table IV.4).[43] The weight of the global common component in FR real GDP is strongly significant, and quite similar to that of

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[42] A technical discussion of the modeling and estimation issues is in Kim and Nelson (1999).

[43] The common component is of order two, i.e., p=2 in $\phi(L)$, and the lag polynomial ψ_i has k=1.

other European countries. The weight of the global component in the US real GDP is only marginally significant. The (first-step) idiosyncratic components of FR and other European countries do not show significant serial correlation while the US does. The variances of all the (first-step) idiosyncratic components are, however, strongly significant. Figure IV.2 brings together the annual percentage changes in French real GDP, the global common component, and the (first-step) French idiosyncratic component.

Table IV.4. France: Estimated Single-Index Model of Common **Global** Component in Real GDP

	Variable (i)				
Parameters	ΔFR	ΔDE	ΔIT	ΔREA	ΔUS
γ_i	0.26*	0.31*	0.28*	0.26*	0.15
	(0.08)	(0.08)	(0.06)	(0.06)	(0.10)
	0.02				
	(0.06)				
ψ_i	-0.14	-0.02	0.05	0.01	0.23*
	(0.17)	(0.11)	(0.11)	(0.14)	(0.09)
σ_i	0.10*	0.38*	0.33*	0.13*	0.96*
	(0.03)	(0.06)	(0.05)	(0.03)	(0.13)

$$\Delta C^{g}_{t} = 0.66^{*}\ \Delta C^{g}_{t-1} + 0.03\ \Delta C^{g}_{t-2} + w_t$$
(0.30) (0.27)

L = 15.48

78. While US real GDP is less affected by a global common factor, it is likely that the significant idiosyncratic shocks to the United States output will themselves be a source of disturbance to the rest of the world. The opposite is less likely. This is an important result for understanding the international transmission of disturbances.

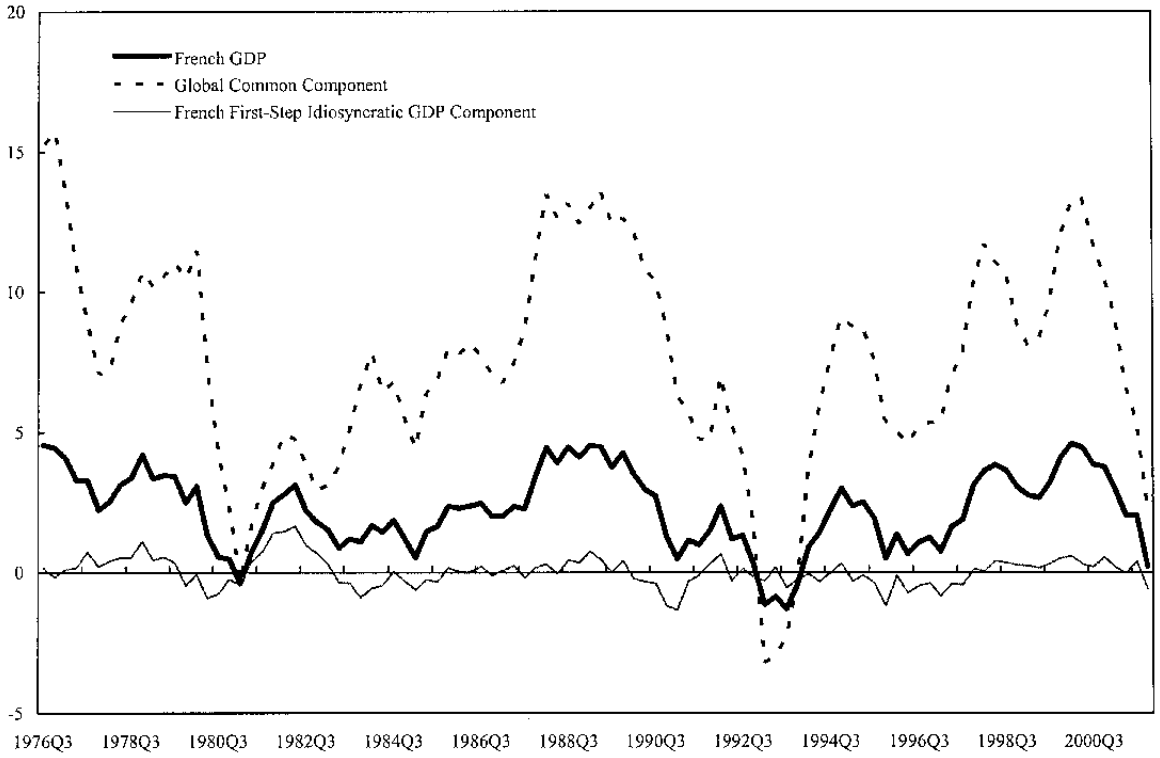
79. The estimated model seems to be well specified. With very few exceptions, the disturbances in the observed variables are not predictable (Table IV.5).[44]

The regional common component

80. The (first step) "idiosyncratic" components of FR, DE, IT, and REA (i.e., excluding US) are used to extract a euro area common component. As with the global common component, the unobserved regional common component shows significant first order serial

[44] This test regresses each of the forecast error terms of the model against a constant, 4 lags of the errors, and the changes in all real GDP series. The test was used to choose the 0-lag specification for all GDP series except the French one where one lag was preferred. The index is thus not a purely coincident index but a mixed coincident/lagging index.

Figure IV.2. French Real GDP: Global and First-Step Idiosyncratic Component
(Annual Percentage Changes)



Source: Staff estimates.

Table IV.5. France: Marginal Significance Levels of Diagnostic Test for Single-Index Model of Common **Global** Component					
	Forecast errors				
Regressors	e_{FR}	e_{DE}	e_{IT}	e_{REA}	e_{US}
e_{FR}	0.85	0.63	0.26	0.88	0.02
e_{DE}	0.57	0.48	0.75	0.49	0.72
e_{IT}	0.04	0.87	0.25	0.35	0.17
e_{REA}	0.32	0.75	0.31	0.79	0.55
e_{US}	0.32	0.12	0.28	0.86	0.73
ΔlnFR	0.70	0.77	0.27	0.62	0.04
ΔlnDE	0.56	0.49	0.73	0.46	0.74
ΔlnIT	0.03	0.81	0.28	0.33	0.18
ΔlnREA	0.39	0.72	0.24	0.86	0.56
ΔlnUS	0.32	0.08	0.18	0.85	0.70
The series e_i are the one-step ahead forecast errors from the single-index model. The table reports the p-values from the regression of e_i against a constant and four lags of the regressors. The p-values correspond to the F-test of the hypothesis that the coefficients on those four lags are zero. The test statistics are corrected only for the number of regressors.					

correlation, and limited second order serial correlation (Table IV.6).[45] However, the regional common component is less persistent than the global common component, i.e., the duration of shocks is 2 quarters against 3. The weights of the European common component are relatively less significant for FR output than for IT, and REA output.[46] DE real GDP, in contrast, does not seem to be affected by the euro area common component during the sample period.

Table IV.6. France: Estimated Single-Index Model of Common **Regional** Component in Real GDP				
	Variables			
Parameters	ΔFR	ΔDE	ΔREA	ΔIT
γ_i	-0.05	0.02	0.22*	-0.14*
	(0.04)	(0.06)	(0.06)	(0.08)
	0.12*	-0.07	-0.27*	0.21*
	(0.03)	(0.07)	(0.03)	(0.06)
ψ_i	-0.30*	-0.05	0.88*	0.13
	(0.13)	(0.10)	(0.08)	(0.10)
σ_i	0.06*	0.32*	0.01	0.27*
	(0.01)	(0.05)	(0.00)	(0.04)
$\Delta C^r_t =$	$0.51^* \Delta C^r_{t-1} + 0.06\ \Delta C^r_{t-2} + w_t$			
	(0.23) (0.13)			
	L = 182.42			

[45] As in the first step of the estimation process, the common component is of order two, i.e., p=2 in ϕ (L), and the lag polynomial ψ_i has k=1.

[46] Using monthly industrial production, Lumsdaine and Prasad (1999) also find that French output has lower correlation with a European common component than with the global common component.

81. French output has a significant "true" idiosyncratic component that exhibits strong negative correlation. The REA output is the only other output that has a strong idiosyncratic component. It displays positive correlation. The variances of the idiosyncratic components of FR, DE, and IT are all strongly significant.

82. The idiosyncratic factors of real GDP from the two steps, i.e., including and excluding the regional common component, are displayed in Figure IV.3. The euro area common factor is less significant for FR, and DE (especially before unification). In contrast, the euro area common component is very important for REA output—affecting it negatively—and for IT—affecting it in a positive way.

83. It is important to stress that the French idiosyncratic component has made a positive contribution to growth in the recent cycle, much like in the REA, although smaller. This contrasts with both Germany and Italy, where idiosyncratic components have been larger but have dragged growth down. Therefore, the idiosyncratic component of output of European countries needs to be part and parcel of modeling and forecasting output behavior. This finding might explain, for instance, the difficulties experienced in forecasting the differential behavior of output in France and Germany in recent years.

84. The fit of the single-index model of the regional common factor is satisfactory (Table IV.7). With just a couple of exceptions, the disturbances in the observed variables are not predictable.[47]

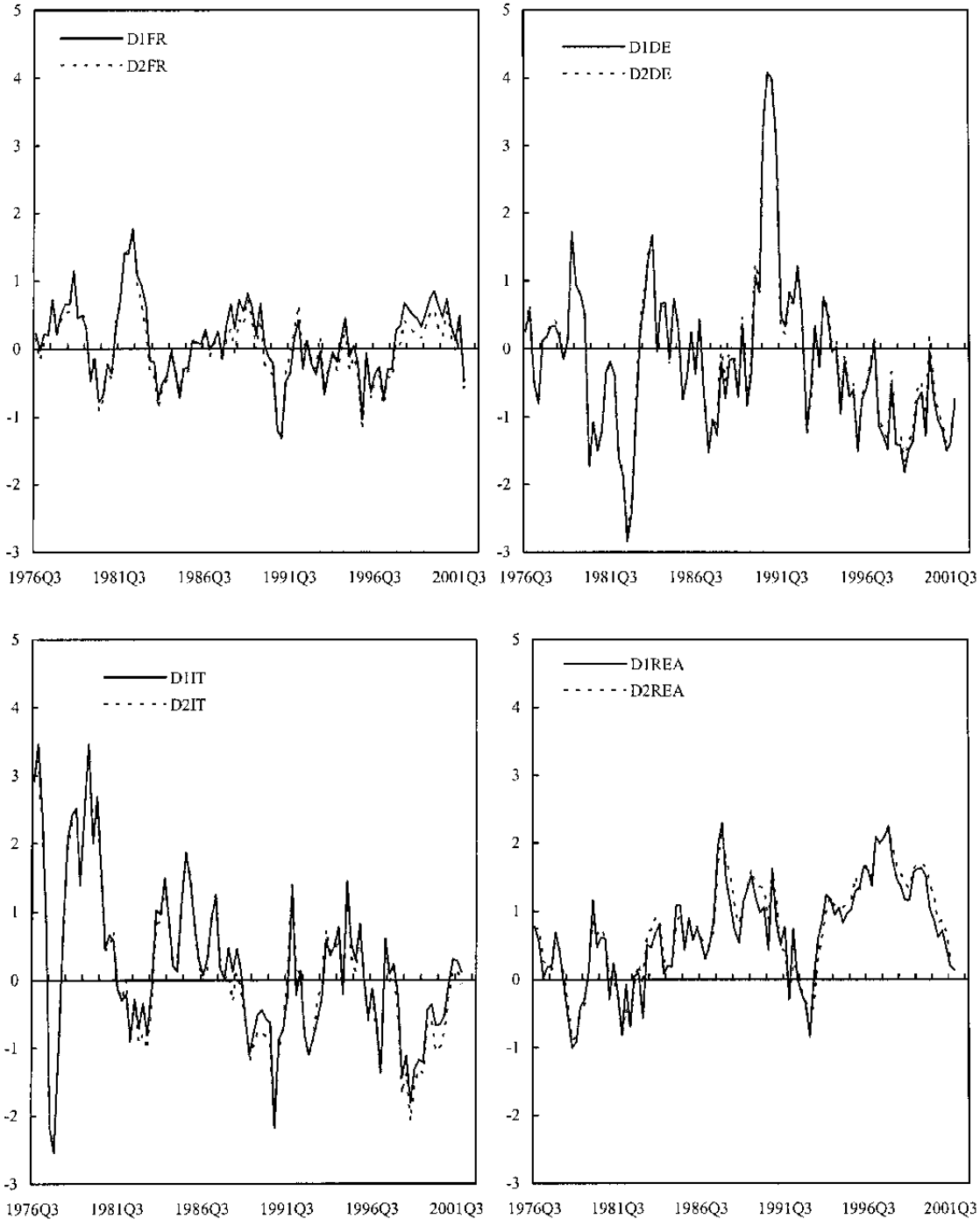
Table IV.7. France: Marginal Significance Levels of Diagnostic Test for Single-Index Model of Common **Regional** Component

	Forecast errors			
Regressors	e_{FR}	e_{DE}	e_{IT}	e_{REA}
e_{FR}	0.36	0.73	0.52	0.13
e_{DE}	0.45	0.42	0.88	0.14
e_{IT}	0.84	0.02	0.21	0.11
e_{REA}	0.29	0.17	0.82	0.09
ΔlnFR	0.39	0.90	0.88	0.13
ΔlnDE	0.43	0.42	0.87	0.14
ΔlnIT	0.86	0.02	0.22	0.11
ΔlnREA	0.25	0.16	0.06	0.48

The series e_i are the one-step ahead forecast errors from the single-index model. The table reports the p-values from the regression of e_i against a constant and four lags of the regressors. The p-values correspond to the F-test of the hypothesis that the coefficients on those four lags are zero. The test statistics are corrected only for the number of regressors.

[47] This test was used to choose the 1-lag specification for all GDP series.

Figure IV.3. Idiosyncratic Factors of Real GDP:
Including (1) and Excluding (2) the Regional Common Component
(Annual Percentage Change)



Source: Staff estimates.

F. Conclusions and Policy Implications

85. The main general finding of this chapter is that there is a great deal of comovement/synchronization between the French cycle and the rest of the world and Europe, particularly in the last cycle. The French cycle is driven by a global common component, to a much lesser extent by a euro area common component, and has a small albeit relevant idiosyncratic component. Although the latter is smaller than one would have surmised from looking at differences in employment behavior during the recent "employment-rich" expansion, the idiosyncratic component made a significant positive contribution to growth in the recent cycle.

86. The classical French cycle is very similar to other countries in terms of the duration and amplitude of contractions, but diverges somewhat in terms of expansions. This divergence is a more general phenomenon, and in the case of France shows that expansions are longer (like in Italy) than in Germany or the United States. French recoveries do not display strong early output expansions, an asymmetry that has been well documented for US cycles.

87. The similarity of contraction phases indicates a certain commonality of negative shocks to output and/or a similarity of responses to negative shocks.[48] In contrast, divergences of expansions point to cycles that tend to be supported by forces that contain more idiosyncratic elements. These results suggest a number of policy implications.

88. Policy making should take into account that while cycles across euro area countries share broadly similar characteristics, disparities remain. For example, the results suggest the desirability of coordinating fiscal policies to contribute to the smoothing of remaining disparities in cycles, and to let automatic stabilizers operate symmetrically over the cycle.[49] If, for instance, expansions tend to be relatively longer in France, given a certain Euro area monetary policy stance, it will be desirable that French fiscal policy contributes to achieving the appropriate overall policy mix for the country. Looking forward, however, it could be argued that attainment of the Stability and Growth Pact requirements will be sufficient to induce the required discipline. In that case, once France has attained a sustainable structural fiscal position determined also by the impact of aging and reforms undertaken to deal with it, the unfettered play of automatic stabilizers operating symmetrically over the cycle should be

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[48] The WEO (2002) suggests that monetary policy could be such a common shock, at least in the case of synchronized recessions: peaks in interest rates usually just preceded or just followed peaks in output. Also, interest rate increases prior to the peaks are positively correlated with the depth of the subsequent recessions.

[49] The functioning of automatic stabilizers in the Euro area is discussed in Decressin et al, 2001.

enough to bring the country close to a combination of price stability and relatively low output variance.

89. Similarly, the importance of idiosyncratic components in output behavior indicates the need for flexibility in labor and product markets to respond to the transmission of output disturbances across countries. Unless the reforms geared to increasing labor and product market flexibility help to smooth divergences in cycle characteristics, output and inflation volatility may be unnecessarily high in some countries.

90. In order to shed light into the French idiosyncratic component it would be necessary to understand its determinants. If the component were the result of the labor market reforms enacted in the 1990s, (including the significant cuts on social security contributions), it would be likely that the beneficial effects of at least some of those measures continue to affect output growth positively for some time. The idiosyncratic component could also be the result of more transient factors, however. For instance, reductions in social security contributions that did not increase labor force participation would not have a lasting effect on growth. Implications for policy will be, therefore, contingent on the nature of the idiosyncratic component. Although a full analysis of the issue goes beyond the scope of this research, it could be construed that wage moderation and cuts in social security contributions (and other taxes) during the 1990s initiated a phase of labor deepening that pushed French growth up. They helped keep inflation low and increased real disposable income.[50] As a result, consumption was buoyant, which in turn had a positive impact on growth.

[50] INSEE (2001) shows that long-run consumption depends positively on real disposable income and negatively on inflation. Similarly, real disposable income has a positive effect of the short-run dynamics of consumption.

References

Artis, M. J., Z. G. Kontolemis, and D. R. Osborn, 1997, "Business Cycles for G7 and European Countries," *Journal of Business*, pp. 249–279.

Bry, G. and C. Boschan, 1971, "Cyclical Analysis of Time Series: Selected Procedures and Computer Programs," *NBER*, New York.

Burns, A. F. and W. C. Mitchell, 1946, *Measuring Business Cycles*, New York, NBER.

Cashin, P. and J. McDermott, 2002, "'Riding on the Sheep's Back': Examining Australia's Dependence on Wool Exports," *The Economic Record*, pp. 249–263.

Cooley, T. F. and E. C. Prescott, 1995, "Economic Growth and Business Cycles." In Cooley, T. F. and E. C. Prescott (eds.) *Frontiers of Business Cycle Research*, Princeton University Press, Princeton, NJ, pp. 1–38.

Decressin, J., E. Detragiache, M. Estevão, C. Klingen, G. M. Milesi-Ferretti, P. Gerson, T. Daban and S. Symansky, 2001, "Rules-Based Fiscal Policy and the Fiscal Framework in France, Germany, Italy, and Spain," Selected Euro-Area Countries, *International Monetary Fund*, pp. 5–35.

Harding, D. and A. Pagan, 2001a, "Synchronization of Cycles," University of Melbourne, mimeo.

———, 2001b, "Extracting, Analizing and Using Cyclical Information," University of Melbourne, mimeo.

———, 2002, "Dissecting the Cycle: A Methodological Investigation," *Journal of Monetary Economics*, pp. 365–381.

INSEE, 2001, *L'Economie Française*, Paris.

Kim, C-J. and C. R. Nelson, 1999, *State-Space Models with Regime Switching*, MIT University Press, Cambridge, Massachusetts, pp. 49–55.

Lumsdaine, R. L. and E. S. Prasad, 1999, "Identifying the Common Component in International Economic Fluctuations", IMF Working Paper WP/99/154, *International Monetary Fund.*

Nadal-De Simone, F., 2001, "Asymmetry in Business Fluctuations: International Evidence on Friedman's Plucking Model," *International Monetary Fund*, mimeo.

Ross, K. and A. Ubide, 2001, "Mind the Gap: What is the Best Measure of Slack in the Euro Area?" Working Paper WP/01/203, *International Monetary Fund.*

Stock, J. H. and M. W. Watson, 1991, "A Probability Model of the Coincident Economic Indicators." In K. Lahiri and G. H. Moore (eds.) *Leading Economic Indicators*, Cambridge University Press, Cambridge, pp. 63-89.

World Economic Outlook, 2002, "Recessions and Recoveries," pp. 104-137, *International Monetary Fund*, April.