

France: Selected Issues

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FRANCE

Selected Issues

Prepared by Francisco Nadal De Simone, Werner Schule, and Jianping Zhou (all EUR)

Approved by the European Department

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EXECUTIVE SUMMARY

The staff's analytical work associated with the 2005 Article IV Consultation of France covers inflation, the benefits of product and labor market reform, and the impact of hiring and firing restrictions on unemployment. A study of France's external sector performance, jointly with that of other large euro area countries, is being issued under separate cover. It was found that most of the recent increase in French inflation stemmed from temporary factors, while underlying inflation has remained benign. The macroeconomic benefits of raising competition in labor and products markets are large and can be advanced by synchronizing reforms across markets and coordination within the euro area. Removing hiring and firing restrictions can substantially reduce unemployment, provided some other labor market rigidities are softened.

The recent increase of French headline inflation above the euro area average is no reason for concern, as it has been predominantly due to transitory cost-push factors, such as energy prices, indirect taxes, and public sector-related prices, with no evidence of second-round effects thus far (Chapter I). Nonetheless, some price pressure stemming from a buoyant residential real estate market and from labor cost increases in some service sectors was also identified. Results are also presented in less detail for Germany, Italy, and Spain. As a corollary to the analysis, it is shown that the common component of inflation, extracted with the Generalized Dynamic Factor Model, is a good measure of underlying inflation, for some purposes superior to traditional measures of core inflation.

Simulations with the Fund's Global Economic Model, calibrated on the EU, show that increasing competition in France to the level of the best performing EU countries yields large output and employment gains (Chapter II). When increased labor market flexibility is combined with greater competition in goods and services markets, households reap earlier and larger benefits. Coordination of structural reforms within the euro area is key to win support from monetary policy, which would expedite adjustment and virtually eliminate transition costs. Long-run benefits would also be higher due to positive spillover effects from more efficient markets abroad.

A search-matching model with hiring and firing restrictions calibrated on the French labor market shows that eliminating these restrictions could potentially reduce the unemployment rate appreciably, by up to about 2¾ percentage points (Chapter III). The magnitude of the effect depends on the scope of the reform and the implementation of supporting labor market reforms. Conversely, partial reform consisting of making fixed term contracts more flexible could have perverse effects and increase unemployment in the long run. By using a parametric approach, the analysis allows to resolve the theoretical ambiguity of the effect of employment protection on unemployment. The model simulations further suggest that the authorities' new labor market initiative, which includes a contract without employment restrictions though limited in time and applicable to small enterprises only, will need to be extended in scope to yield decisive results in terms of unemployment reduction.

I. RECENT FRENCH INFLATION BEHAVIOR: IS IT ANY DIFFERENT FROM THE EURO AREA'S?¹

A. Introduction

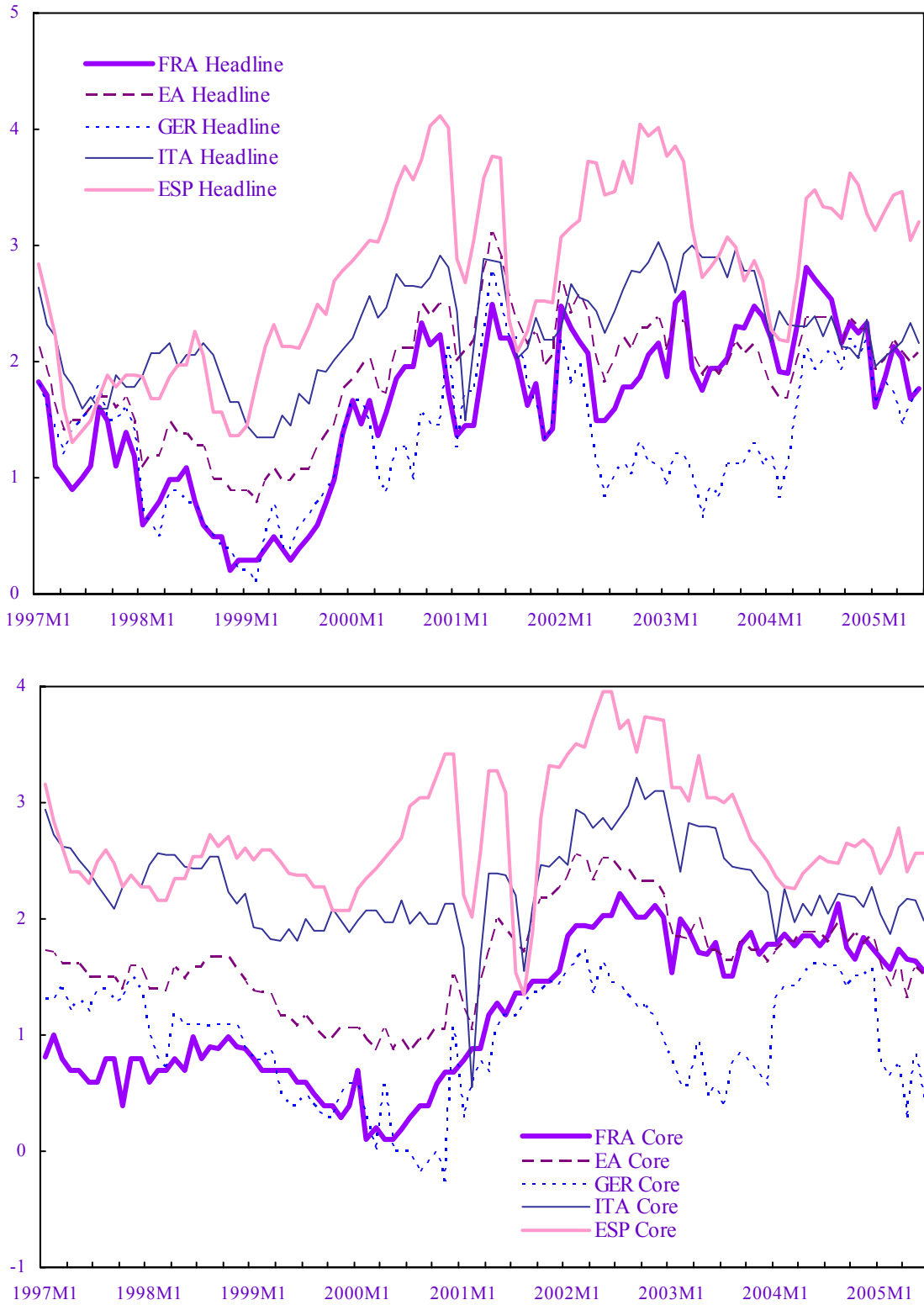
1. **French headline inflation moved above the euro area average during the last two years.** Measured as year-on-year changes in the monthly Harmonized Index of Consumer Prices (HICP), French inflation, traditionally below the euro area average, moved above it around the beginning of 2003 and remained so until the start of 2005, when it fell back below the euro area average (Figure 1). The change in French inflation behavior becomes even clearer using a measure of core inflation—the HICP excluding energy and unprocessed food. In contrast, a similar change in inflation behavior is not apparent in the three other major euro area countries, Germany, Italy, and Spain.

2. **This chapter demonstrates that the recent change in French headline inflation behavior resulted from a few idiosyncratic, i.e., transient factors.** Applying the generalized dynamic factor model (GDFM) to a disaggregated panel data set, it appears that beyond the impact of oil prices on headline inflation, the change in inflation behavior is related to two sets of factors. The first one is government policies, as reflected in the role of tobacco excise taxes, electricity, and hospital service prices. The second factor is what could be referred to as specific market conditions and developments. Given the recent buoyancy of the French real estate market and residential construction, it is not surprising that housing rents come second on the list of idiosyncratic components of inflation. In addition, with the adoption of the 35-hour workweek, wage price pressures can be expected to be the strongest in sectors with pricing power. This could explain the higher-than-average inflation in domestic services, maintenance and repair of personal transport equipment and dwellings. Despite some cross-country variation, results for the other three major euro area countries also point to the role of oil prices and indirect taxes, but not to the extent of changing the inflation profile as in France.

3. **Contingent on idiosyncratic inflationary factors subsiding, French headline inflation can be expected to decelerate.** There are already signs of a deceleration of house price inflation and a more moderate pace of activity in the construction sector, which should slow down the progression of rental housing costs. However, a durable decline of headline inflation will require that oil price rises end and that increases of indirect taxes and public sector-controlled prices moderate. The latter points to the possibility of enhancing welfare by better coordinating policy objectives such as sustaining private demand with correcting fiscal imbalances, which may require tariff or excise tax hikes.

¹ Prepared by Francisco Nadal De Simone.

Figure 1. France: Headline and Core Inflation
(Percent change over same period of previous year)



Source: Cronos database.

4. **As a corollary, this chapter argues that the common components of inflation are a more robust indicator of underlying inflation pressures than the standard core inflation measure.** The common components of inflation are less clouded by large idiosyncratic factors than the standard measure of core inflation. As such, they may be superior both for formulating and providing accountability in monetary policy-making.

5. **The remainder of the chapter is organized as follows.** Section B presents the data and the model to be estimated. Section C discusses the main results regarding the common and idiosyncratic components. Section D proposes the common components of headline inflation as a robust measure of underlying inflationary pressures. Section E concludes.

B. The Data and the Model

6. **This study uses HICP data for 12 member countries of the euro area and the euro area aggregate.** The HICP data are at the most disaggregated level currently available, i.e., the 4-digit level, for 12 members of the euro area (11 members only until December 2000). The data panel comprises 1,177 series with 99 observations. The sample period is 1996M1–2005M3, the longest period for which the HICP is available for at least 11 euro area member countries. Inflation is defined as annual inflation measured as the change in the HICP between a given month and the same month of the previous year.²

7. **Distinguishing between underlying and transitory inflationary forces is often fraught with imprecision and practical difficulties.** Traditionally, monthly inflation reports take a bottom-up (i.e., disaggregated) approach to “explain” inflation and signal out the main “culprits.” They refer, for instance, to the role of exogenous factors such as an unusually early end of sales, a rapid increase in oil prices, or a policy-driven factor such as a rise in tobacco excise taxes. Yet, a proper distinction between underlying and transient inflationary forces is not always clear. For instance, statistical approaches such as a trimmed-mean involve a great deal of subjectivity. Also, while using the median may take care of skewness in price changes, it does not necessarily take into account that price changes tend to be kurtotic, an issue discussed further in Section D.³ A more structured procedure is desirable, especially one that is flexible enough to be used regularly for policy analysis and forecasting at a minimum computational cost.

8. **This chapter uses the GDFM to distinguish persistent underlying inflationary forces from transient idiosyncratic ones, and discusses the economic developments that may explain the later.** Forni and others (2000 and 2003) expanded on the principal component and the Stock and Watson’s (1989) methods by developing a coincident and a leading indicator called the GDFM. The GDFM reconciles dynamic principal components

² The main results are not altered when inflation is defined as the monthly change in the HICP.

³ Kurtosis characterizes the relative peakedness or flatness of a probability distribution compared with the normal distribution.

analysis with the dynamic factor model of Sargent and Sims (1977) and Geweke (1977). This method allows an estimation of an index without an a priori distinction between coincident and noncoincident series. Unlike Stock and Watson's approach (1989), Forni and others (2000 and 2003) point out that leading and lagging variables contribute to a better estimation of the coincident indicator. The coincident index is the weighted average of common components.⁴ The GDFM differs from other methods in that it allows for limited cross-correlation among idiosyncratic components; imposing zero cross-correlation is a demanding restriction that seems unrealistic in most practical cases. Identification is achieved by working with a large data panel.⁵

9. The GDFM enables the efficient estimation of the common and idiosyncratic components of very large data sets. The GDFM assumes that each time series in a large data set is composed of two sets of unobserved components. First, the common components, which are driven by a small number of shocks that are common to the entire panel—each time series has its own loading associated with the shocks. Second, the idiosyncratic components, which are specific to a particular variable and orthogonal with the past, present, and future values of the common shocks. Common components of inflation are best viewed as the result of the underlying inflation process, and it is thus expected that they will be persistent.⁶ The idiosyncratic components instead reflect local aspects of markets that are not persistent, i.e., those that affect a specific industry such as an increase in the price of fresh fruit following a drought. The idiosyncratic components, however, also capture unsystematic measurement errors. Therefore, even though idiosyncratic components are of limited interest for medium- and long-run movements of inflation, their role is far from negligible and they may account for a sizable percentage of inflation in the short term. If idiosyncratic components reflect truly local aspects of markets, they will display little correlation with the

⁴ As in Stock and Watson, the common shocks and their factor loadings together make the common components.

⁵ Technically, to achieve identification, Forni and others (2000 and 2003) assume an infinite cross-sectional data dimension. The idiosyncratic components are stationary processes uncorrelated with past, present, and future values of the common shocks. In addition, the common component of each series can be uniquely identified and consistently estimated if (1) the spectral density matrix of the observation matrix X_t exists; (2) the first q eigenvalues go to infinity as the number of series n goes to infinity; and (3) all remaining eigenvalues are bounded. In practice, when the number of series is larger than 1,000, as in this study, those assumptions may reasonably be expected to hold.

⁶ Friedman (1963) emphasized the distinction between the steady, trend, or persistent element of inflation, which tends to be incorporated into expectations, and the transient component, which is less readily anticipated. He associated underlying inflation with the persistent component of inflation. Quah and Vahey (1995), however, include also the cyclical part of inflation into their definition of underlying inflation. A subtle different view on underlying inflation may result from associating it with generalized inflation (Keynes, 1930). In this view, relative price changes, while temporary, are expected to also affect aggregate inflation. Only if one believes that relative price changes that affect aggregate inflation are mostly driven by supply shocks, both views of underlying inflation are basically equivalent. This matter can only be settled empirically and is not explored here.

rest of the variables in the panel. However, note that to the extent that idiosyncratic components are allowed to be mutually correlated to some extent in the model, substitution-on-demand effects, for instance, will result in some “contagion” across idiosyncratic components.

10. **The GDFM model is very general.** Assume a vector of n series expressed as in equation (1):

$$x_t^i = \alpha_i(L)u_t + \varepsilon_t^i, \quad (1)$$

where x_t^i is an $(t \times n)$ vector stochastic stationary process with zero mean and variance 1, $x_t^i = (x_t^{1i}, x_t^{2i}, \dots, x_t^{ni})'$; $u_t = (u_t^1, u_t^2, \dots, u_t^q)'$ is a $(q \times t)$ vector of mutually orthogonal common shocks with zero mean and unit variance, and with $q < n$; $\varepsilon_t^i = (\varepsilon_t^{1i}, \varepsilon_t^{2i}, \dots, \varepsilon_t^{ni})'$ is a $(n \times t)$ vector of idiosyncratic shocks; and $\alpha^i(L)'$ is a $(n \times q)$ matrix of rational functions with the lag operator L . The model allows for correlation between ε_t^i variables, but the variances of ε_t^i are bounded as $i \rightarrow \infty$. When n is large, the idiosyncratic components, which are poorly correlated, will vanish, and only the common components will be left, and thus they will be identified (see Forni and others, 2000, for a technical proof).

11. **The GDFM model is estimated using the one-sided estimator proposed by Forni and others (2003).** The procedure comprises two steps:⁷ first, estimating the spectral density matrix of the vector stochastic process x_t^i and, second, using the calculated q largest (real) eigenvalues—and their corresponding eigenvectors—of the spectral density matrix to estimate the generalized common components. In this study, the x_t^i $(t \times n)$ vector stochastic stationary process has $t = 99$ monthly observations and $n = 1,177$ series; $q = 1$ common shock—underlying inflation. Accordingly, there are 1,177 idiosyncratic shocks; and in the $\alpha^i(L)'$ $(n \times q)$ matrix of rational functions with the lag operator L , the number of lags M is 6.⁸

C. Inflation Common and Idiosyncratic Components

12. **The euro area as well as all countries in the sample experienced an increase in headline inflation toward the end of 1999.** The increase in the mean of headline inflation of

⁷ The headline inflation series were tested for stationarity using the unit root test developed by Elliott, Rothenberg, and Stock (1996). The tests are available upon request.

⁸ Forni and others (2000) suggest to determine the number of lags using the formula $M = \frac{2}{3}T^{1/5}$. However, this formula tends to result in too few lags. For example, in this study, the formula would suggest three lags. Given the high frequency of the data, and Yang's (2003) suggestion to include more lags, $M = 6$ in this study so as to capture higher order dynamics.

the euro area and all countries toward the end of 1999 is even clearer when looking at the common components of inflation (Figure 2).

13. **Starting in 2003, French headline inflation moved above the euro area average, but this was not the result of a persistent shock to inflation.** No country in the sample experienced any change in the profile of its inflation common components relative to the euro area during the sample period. The common components of French and German inflation have been consistently below the common components of euro area inflation. In contrast, Italian and Spanish inflation common components have consistently been above the euro area inflation common components. With common components reflecting underlying inflation behavior, the change in French inflation behavior that started at the beginning of 2003 did not signal a persistent shock to inflation.

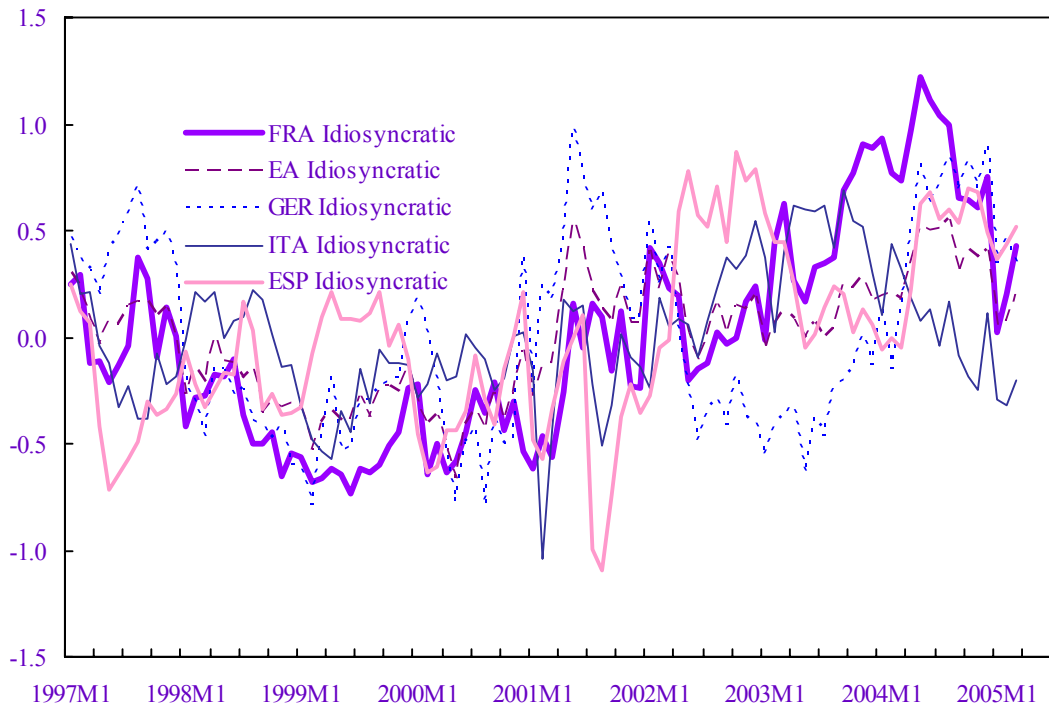
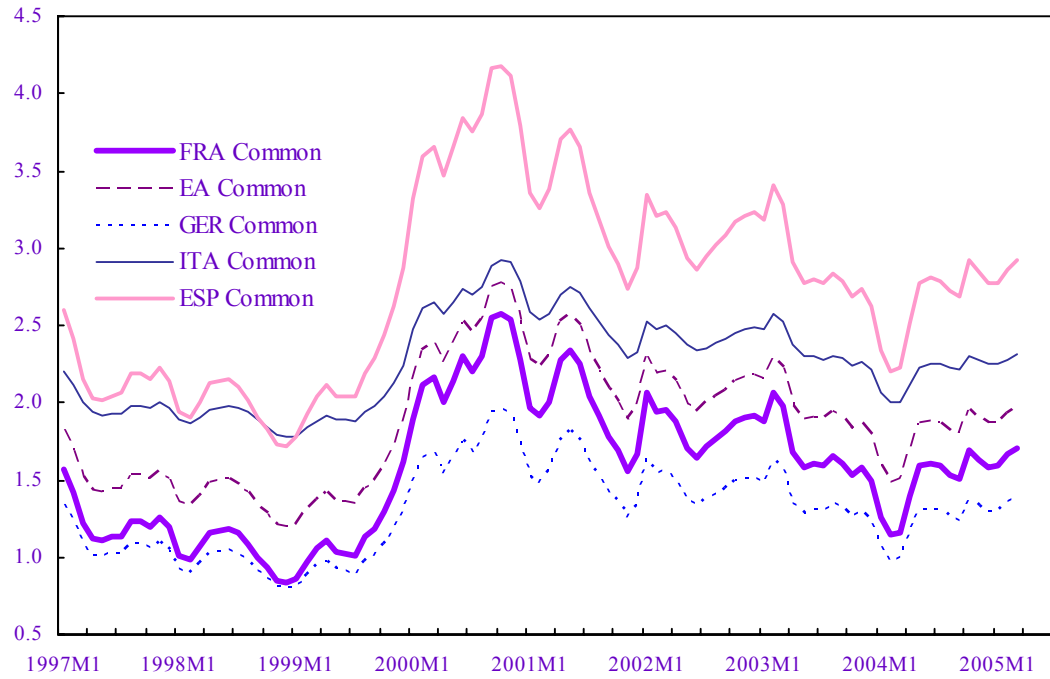
14. **The recent increase in French headline inflation was the result of idiosyncratic components.** French idiosyncratic factors added an average of about $\frac{2}{3}$ of one percentage point to annual inflation starting in 2003.⁹ Instead, German idiosyncratic components of inflation became negative in the second half of 2002 and remained so until the first half of 2004, subtracting about $\frac{1}{3}$ of one percentage point from headline inflation during that period. Also starting in 2003, Italian idiosyncratic inflation components added about $\frac{1}{4}$ of one percentage point to headline inflation per annum, while Spanish idiosyncratic inflation components added just $\frac{1}{10}$ of one percentage point to inflation.

15. **A few domestic factors explain the recent increase in headline inflation in France** (Figure 3 and Table 1). Tobacco is the item that recorded the highest inflation rate by far; it is followed by housing rents, electricity, spare parts and accessories for personal transport equipment, and a number of service-related items. Oil prices seem to have a particularly strong effect on French inflation.¹⁰ Given their nature, however, idiosyncratic components or local factor inflation should vanish, even in the medium run, which could be taken to be the sample period used in this study. Indeed, the 1997M1–2005M3 average idiosyncratic inflation in each of the items is basically zero (not shown). Over a relatively shorter period of time, idiosyncratic factors will not be zero, however; structural factors such as the demand price elasticity, pricing power, and government policy are therefore bound to play a major role in explaining the idiosyncratic components' behavior and thus affect headline inflation. In what follows, the main possible factors explaining the idiosyncratic components of inflation are discussed.

⁹ According to the *Banque de France*, the annual impact of the euro nominal appreciation on French headline inflation was -1.2 percentage points in 2003, the period during which the idiosyncratic components increased French inflation by 0.3 of one percentage point (De Bandt and others, 2004).

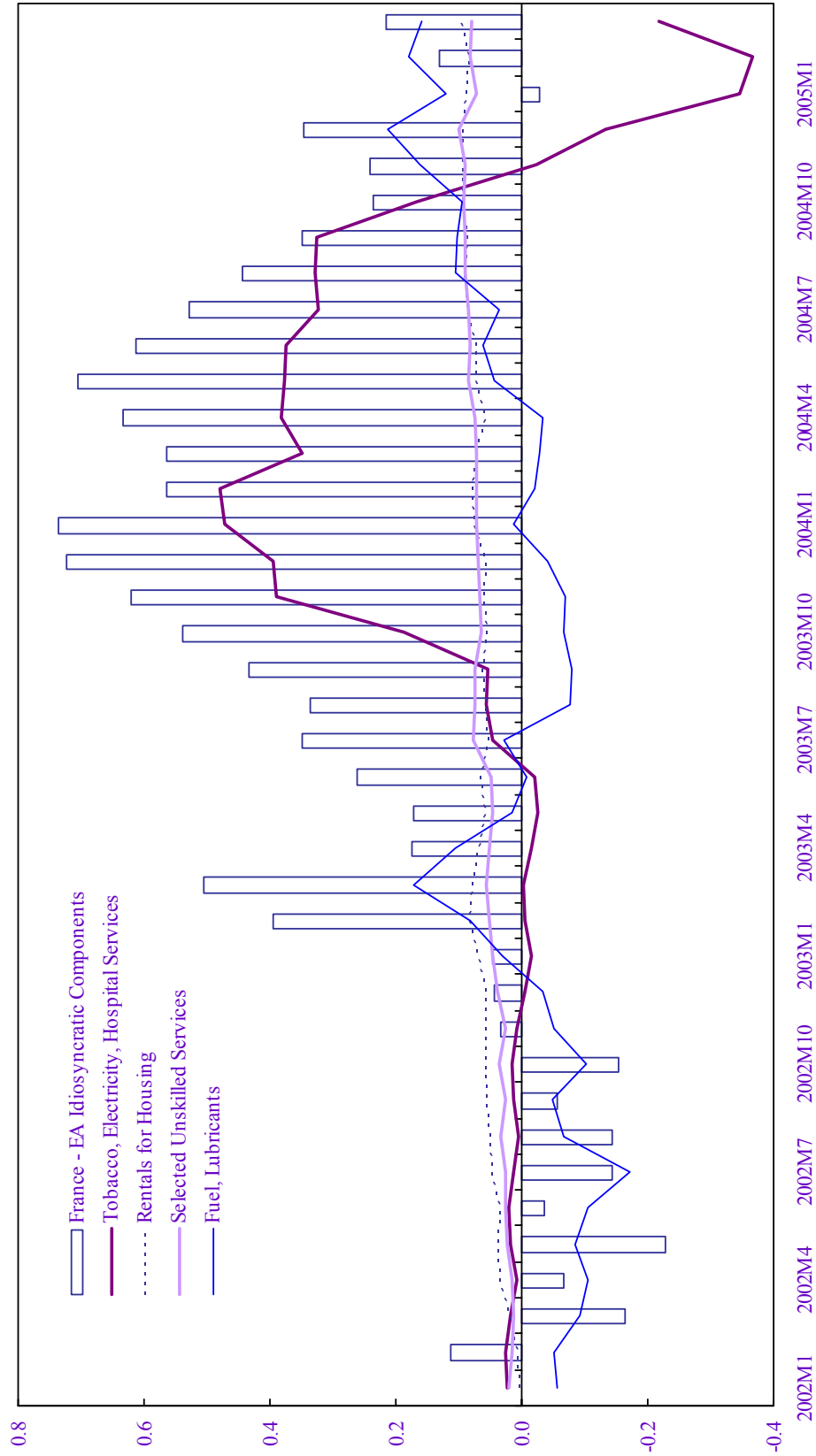
¹⁰ The difference between the common components of inflation in fuels and lubricants and in liquid fuels between the euro area and France is zero. However, France seems to have a much higher incidence of transitory inflationary forces in those categories than the euro area. The causes for this behavior remain to be established, but could be linked to changes in the excise tax regime weighing on these items in France as well as the relatively more dynamic French domestic demand, which may have facilitated the transmission of the shocks to inflation.

Figure 2. France: Headline Inflation Components
(Percent change over same period of previous year)



Sources: Cronos database; and IMF staff calculations.

Figure 3. France vs. Euro Area Selected Idiosyncratic Components of Headline Inflation
(Percent change over same period of previous year)



Sources: Cronos database; and IMF staff calculations.

Table 1. France and Euro Area: Idiosyncratic Components of Inflation 1/

	1/2003-3/2005	FRA-EA
	(In percent)	
France		
Tobacco	0.20	0.09
Actual rents for housing	0.08	0.08
Fuels and lubricants for personal transport equipment	0.07	0.03
Electricity	0.05	0.02
Spares parts and accessories for personal transport equipment	0.05	0.04
Motor cycles, bicycles, and animal-drawn vehicles	0.05	0.04
Liquid fuels	0.05	0.02
Telephone and telefax services	0.04	-0.01
Hospital services	0.04	0.01
Domestic and household services	0.03	0.03
Maintenance and repair of personal transport equipment	0.03	0.01
Services for the maintenance and repair of the dwelling	0.02	0.02
Social protection	0.02	0.00
Restaurants, cafés, and the like	0.02	0.00
Insurance connected with health	0.02	0.01
Medical and paramedical services	0.02	-0.01
Refuse collection	0.02	0.02
Average	0.01	
Standard deviation	0.03	
Skewness	4.05	
Kurtosis	25.20	

Sources: Cronos database; and IMF staff calculations.

1/ The table displays the items which idiosyncratic components recorded the highest inflation since 2003M1 relative to the euro area idiosyncratic components. Only those HICP items that recorded idiosyncratic inflation rates larger than the average idiosyncratic inflation are included.

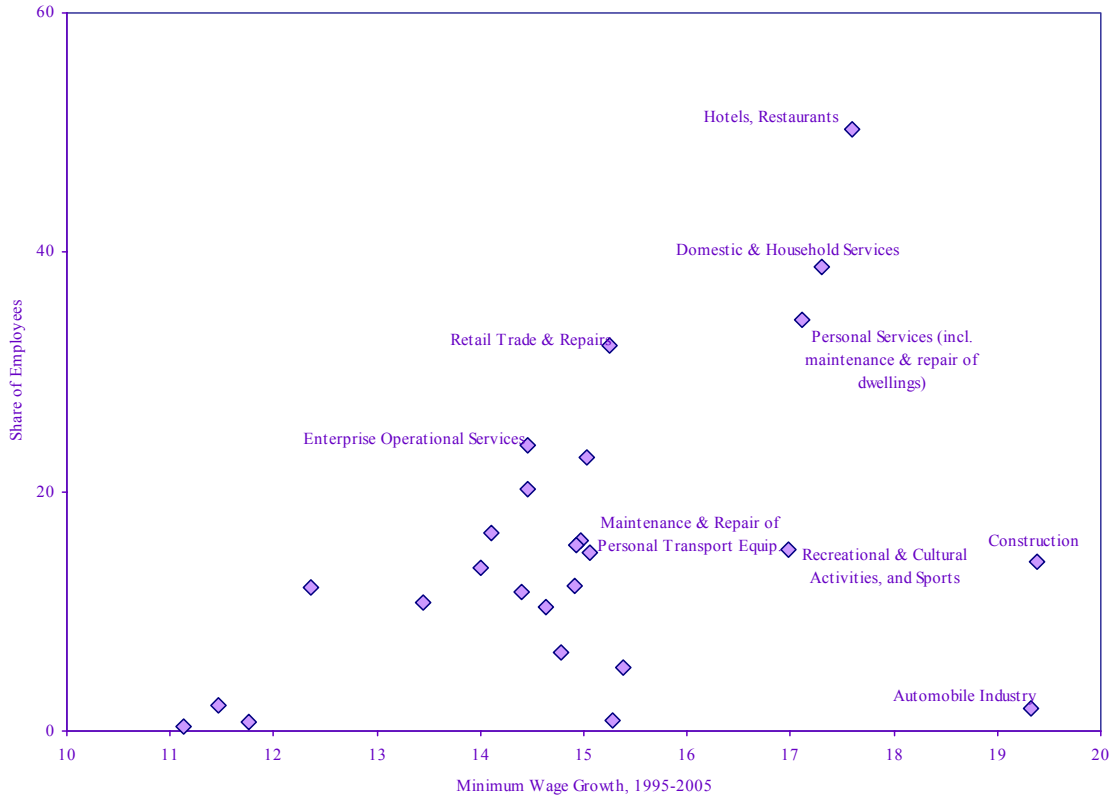
16. Government policies is one of the two main domestic factors explaining the idiosyncratic components of French inflation. Government policies affect tobacco prices, which have been subject to large excise-tax-related price increases during the last two years. The monopoly taxing power of the government is clearly evident in the idiosyncratic component, reflecting as well the low short-run price elasticity of demand for tobacco. Similarly, the role of the French state in price formation seems to explain idiosyncratic components of inflation in the electricity sector, in hospital services, and in medical and paramedical services. The privatization of telephone and telefax services undertaken in France had a positive impact on inflation as the corresponding idiosyncratic component shows.

17. Specific market conditions are the other domestic factor explaining idiosyncratic components of French inflation. Specific market conditions include two groups of items:

- Wage pressures in sectors that employ mostly unskilled workers may explain part of French idiosyncratic inflation. The impact of the 35-hour workweek on firms'

operating costs and margins may explain the price increases in sectors with pricing power. This is the case of domestic services and household services, maintenance and repair of personal transport equipment and the dwelling, and refuse collection (Figure 4).

Figure 4. France: Employees Earning Minimum Wage and Sectoral Wage Growth



Sources: ACEMO; and Bank of France.

- Similarly, the buoyant housing market and construction sector contribute to inflationary pressures in France (housing rents come second on the list of idiosyncratic components inflation and are legally tied to the construction price index).

18. **Most likely due to cyclical factors, German idiosyncratic components of inflation made a negative contribution to headline inflation** (Table 2). Despite the increase in tobacco excise taxes in 2003, the rise in gas and electricity prices as well as the price increases that resulted from health care reform, cyclical forces held idiosyncratic components of inflation down. Consequently, for instance, prices of services such as package holidays and restaurants fell. Rents for housing contributed negatively, reflecting the subdued performance of the German real estate market.

Table 2. Germany and Euro Area: Idiosyncratic Components of Inflation 1/

	1/2003-3/2005	GER-EA
	(In percent)	
Package holidays	-0.06	-0.03
Garments	-0.04	-0.03
Heat energy	-0.04	-0.02
Meat	-0.04	-0.02
Restaurants, cafés, and the like	-0.03	-0.04
Cultural services	-0.03	-0.04
Actual rents for housing	-0.03	-0.03
Insurance connected with transport	-0.02	-0.01
Vegetables	-0.02	0.02
Hairdressing salons and personal grooming establishments	-0.02	-0.01
Milk, cheese, and eggs	-0.02	-0.01
Furniture and furnishings	-0.02	-0.01
Gas	-0.01	0.01
Fruit	-0.01	-0.01
Footwear, including repair	-0.01	-0.01
Refuse collection	-0.01	-0.01
Gardens, plants, and flowers	-0.01	-0.01
Bread and cereals	-0.01	-0.02
Fish and seafood	-0.01	0.01
Electrical appliances for personal care; other appliances; articles and products for personal care	-0.01	-0.01
Books	-0.01	0.00
Accommodation services	-0.01	-0.01
Coffee, tea, and cocoa	-0.01	0.00
Equipment for the reception, recording, and reproduction of sound and pictures	-0.01	0.00
Nondurable household goods	-0.01	0.00
Equipment for sport, camping, and open-air recreation	-0.01	0.00
Passenger transport by sea and inland waterway	-0.01	0.00
Other services n.e.c.	-0.01	-0.01
Major household appliances, whether electric or not; and small electric household appliances	-0.01	0.00
Average	0.00	
Standard deviation	0.03	
Skewness	2.70	
Kurtosis	11.88	

Sources: Cronos database; and IMF staff calculations.

1/ The table displays the items which idiosyncratic components recorded the lowest inflation since 2003M1 relative to the euro area idiosyncratic components. Only those HICP items that recorded idiosyncratic inflation rates lower than the average idiosyncratic inflation are included.

19. **Public policy-related price increases are key idiosyncratic components of recent Italian inflation** (Table 3). As in France, excise tax increases explain the large contribution of tobacco to Italian idiosyncratic components of inflation.¹¹ In addition, both the financial difficulties of the Italian national carrier and the contractual changes that took place between air companies and travel agencies' commercial relationships resulted in an increase in air fares. Additional taxation of air travel in 2004 also contributed. Local governments hiked prices for water supply and local transport. Finally, new financial sector regulations increased costs, which were reflected in higher prices for financial services.

20. **Various factors, including government-related price increases, contributed to Spanish idiosyncratic inflation, which was, however, quite small** (Table 4). A drought is largely responsible for foodstuff price inflation (e.g., fruit and cereals), and government-related price increases pushed inflation (e.g., electricity). Yet, as discussed below, there may be some market idiosyncrasies associated with the catching-up process of prices to the euro area average in areas such as services (e.g., restaurants).

D. Corollary: Common Components of Inflation and Underlying Inflation

21. **The estimated model identifies the common components of inflation or underlying inflationary forces, and so does core inflation: which is a better measure of trend inflation?** As in the euro area, the common components of French inflation suggest that underlying inflation has been increasing since end-December 2004. The core inflation measure, instead, points to a decline (Figures 1 and 2). Which indicator is superior as a measure of trend, underlying inflation? The question is best viewed from the perspective of statistical inference as price changes are not drawn from a well-known, stable population distribution. If price changes were approximately normal, then the sample mean would be the best estimator of trend inflation in the sense of being unbiased and efficient. If price changes are not normal, however, the mean may still be an unbiased estimator of underlying inflation, but it may not be as robust or efficient.

22. **Common components have different statistical properties from core inflation.** Various statistical measures illustrate that common components and core inflation (normally referred to as "underlying inflation" and calculated as headline inflation excluding energy and unprocessed food) have different statistical behavior (Figure 5). The policy horizon that interests the analyst or monetary policymaker matters for deciding whether the common components of inflation are a more robust measure of underlying inflation than the traditional core inflation measure, both for formulating policy and for policy accountability.

23. **If a monetary policymaker is interested either in trend inflationary pressures or in inflation at periodicities of one to two years, the common components of inflation**

¹¹ The causes for the rapid increase in the idiosyncratic components of restaurant services are not known.

Table 3. Italy and Euro Area: Idiosyncratic Components of Inflation 1/

	1/2003-3/2005	ITA-EA
	(In percent)	
Tobacco	0.10	0.00
Restaurants, cafés, and the like	0.05	0.02
Pharmaceutical products	0.05	0.01
Passenger transport by air	0.04	0.03
Fuels and lubricants for personal transport equipment	0.03	0.00
Maintenance and repair of personal transport equipment	0.03	0.01
Financial services n.e.c.	0.02	0.02
Oils and fats	0.02	0.01
Other services n.e.c.	0.02	0.01
Meat	0.02	0.04
Social protection	0.02	-0.01
Recreational and sporting services	0.01	0.01
Liquid fuels	0.01	0.00
Medical and paramedical services	0.01	-0.02
Jewelry, clocks, and watches	0.01	0.01
Dental services	0.01	0.00
Water supply	0.01	0.01
Combined passenger transport	0.01	0.01
Telephone and telefax services	0.01	-0.05
Bread and cereals	0.01	0.00
Other services in respect of personal transport equipment	0.01	0.01
Fruit	0.01	0.01
Books	0.01	0.01
Sugar, jam, honey, chocolate, and confectionery	0.01	0.00
Mineral waters, soft drinks, fruit, and vegetable juices	0.01	0.01
Spares parts and accessories for personal transport equipment	0.01	-0.01
Furniture and furnishings	0.01	0.01
Package holidays	0.01	0.04
Average	0.00	
Standard deviation	0.02	
Skewness	1.28	
Kurtosis	10.51	

Sources: Cronos database; and IMF staff calculations.

1/ The table displays the items which idiosyncratic components recorded the highest inflation since 2003M1 relative to the euro area idiosyncratic components. Only those HICP items that recorded idiosyncratic inflation rates larger than the average idiosyncratic inflation are included.

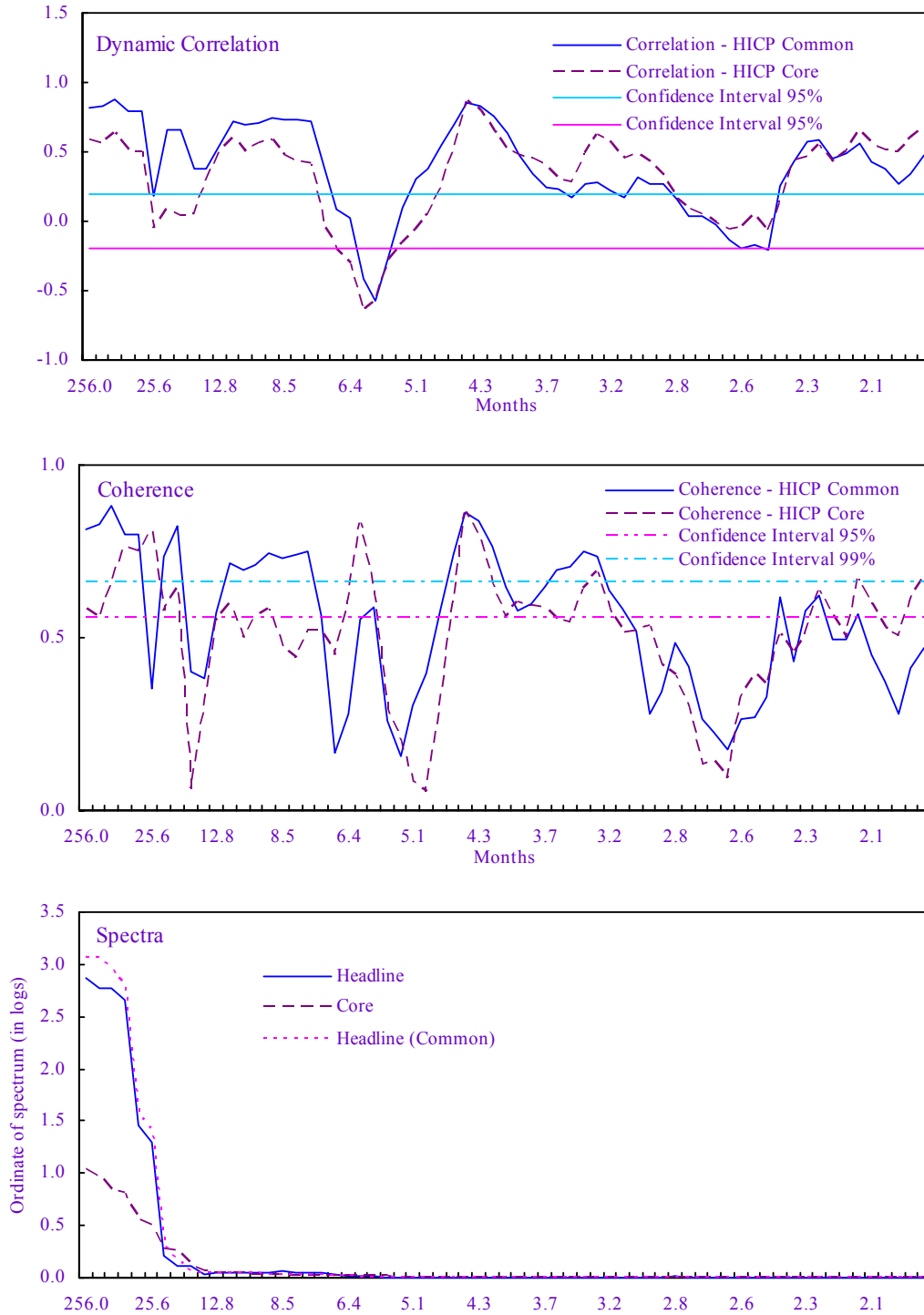
Table 4. Spain and Euro Area: Idiosyncratic Components of Inflation 1/

	1/2003-3/2005	ESP-EA
	(In percent)	
Oils and fats	0.10	0.09
Restaurants, cafés, and the like	0.07	0.05
Fuels and lubricants for personal transport equipment	0.07	0.04
Fruit	0.07	0.08
Electricity	0.06	0.03
Bread and cereals	0.05	0.05
Maintenance and repair of personal transport equipment	0.03	0.01
Garments	0.03	0.05
Education	0.03	0.02
Meat	0.02	0.04
Milk, cheese, and eggs	0.02	0.03
Water supply	0.02	0.02
Motor cycles, bicycles, and animal-drawn vehicles	0.01	0.00
Liquid fuels	0.01	-0.01
Actual rents for housing	0.01	0.01
Sugar, jam, honey, chocolate, and confectionery	0.01	0.00
Mineral waters, soft drinks, and fruit and vegetable juices	0.01	0.01
Hairdressing salons and personal grooming establishments	0.01	0.01
Coffee, tea, and cocoa	0.01	0.01
Other insurance	0.01	0.00
Dental services	0.01	-0.01
Social protection	0.01	-0.02
Furniture and furnishings	0.01	0.01
Medical and paramedical services	0.01	-0.03
Books	0.01	0.01
Household textiles	0.01	0.01
Average	0.00	
Standard deviation	0.02	
Skewness	1.44	
Kurtosis	4.82	

Sources: Cronos database; and IMF staff calculations.

1/ The table displays the items which idiosyncratic components recorded the highest inflation since 2003M1 relative to the euro area idiosyncratic components. Only those HICP items that recorded idiosyncratic inflation rates larger than the average idiosyncratic inflation are included.

Figure 5. France: Spectral Analysis of Headline and Core Inflation and Headline Common Components
(In percent)



Sources: Cronos database; and IMF staff calculations.

may be a robust measure of underlying inflation.¹² First, headline inflation comoves more closely with its common components than with the standard measure of core inflation; central banks are interested in a measure of underlying inflation that minimizes the influence of all supply shocks so as to achieve their inflation objectives with minimal output variance.¹³ The comparison with respect to headline inflation is pertinent as headline inflation is the preferred measure of inflation by central banks that make explicit their inflation targets, and similarly, the yardstick by which they are made accountable. Second, core inflation simply *assumes* that the two items excluded are uncorrelated with underlying inflation and also that they are the only items that mostly respond to supply shocks. Instead, the common components are constructed *imposing the constraint* that idiosyncratic components are uncorrelated with them, and this assumption is applied to all items in the HICP. Because common components provide a clearer measure of underlying inflation, they avoid the impression that a deviation from the target is a weakening in the monetary authority's commitment to the target. This should also minimize the risk of the supply shock feeding through into inflation expectations.¹⁴

24. Future research could explore the relative efficiency of the common components measure given that alternative measures of underlying inflation, such as the trimmed mean or the median, have drawbacks. It is known that the relative efficiency of estimators of trend inflation is sensitive to the kurtosis (i.e., the presence of extreme price changes) of the distribution of price changes. In the case of France, the kurtosis of price changes oscillates between about 5 and 59. Given such high values (the normal distribution has a kurtosis of 3), measures that attribute little (or zero) weight to the tails of the distribution of price changes are bound to be more efficient estimators of trend inflation. One such measure is the trimmed-mean. Simulation studies suggest, however, that the trimmed-mean performs well when kurtosis is between 4 and 5.5 (see Roger, 1997). For higher values of kurtosis, the median is instead recommended. The median, however, is not an efficient estimator of the trend when the population is skewed, which is the case for price changes (e.g., Bryan and Cecchetti, 1996). In France, skewness oscillates between $-2\frac{1}{2}$ and $7\frac{1}{4}$ during the sample

¹² A key practical requirement for a measure of underlying inflation is also its timeliness. The common components can be made available almost simultaneously with the publication of the price index, and in this sense are not at a disadvantage with respect to the standard measure of core inflation.

¹³ The correlation between the common components and HICP is about 70 percent, while the correlation between core inflation and the HICP is 61 percent; the relative similarity of the spectral shapes of headline inflation and common components inflation beyond periodicities of 21 months supports this point.

¹⁴ Conceivably, the common components can be useful in forward-looking accountability as well when a shock blurs developments in underlying inflation. For example, if an adverse supply shock increases inflation and masks a fall in underlying inflation, an easing may be misinterpreted as a weakening in the monetary authority's commitment to its inflation target.

period. Future research could explore the relative efficiency of the common components of inflation as estimators of trend, underlying inflation.¹⁵

E. Concluding Remarks

25. **French inflation behavior changed between the start of 2003 and the beginning of 2005 due to oil price rises, increases in indirect taxation, and specific market developments.** Using statistical methods, it was found that there has not been any major change in underlying inflation pressures for France or any other country in the sample. The change in the French inflation profile was thus solely an idiosyncratic phenomenon. It was due to the peculiar impact that increases in oil prices had in France, and to factors associated with indirect taxation and specific market developments such as the booming French real estate market and construction sector. While it is true that shocks such as oil price rises also affected other countries in the sample and the euro area as a whole, the relatively more dynamic French domestic demand may have facilitated the transmission of the shocks to headline inflation.

26. **The results in this study suggest that French inflation should decelerate in the near future if the idiosyncratic components of headline inflation subside, while raising the issue of the timing of public sector-induced price changes.** Barring further oil prices or government-related price hikes, French headline inflation should return to its underlying trend in the near future. These developments, however, raise the policy question of the timing of tax changes. Increases in indirect taxes or in utilities tariffs, to the extent that they boost inflation, may conflict with other policy objectives simultaneously sought, such as supporting real disposable income and increasing private consumption.

27. **As a corollary, this study shows that the common components of French inflation are a more robust indicator of underlying inflation than the standard core inflation measure.** Thus, they may be better for formulating and providing accountability in monetary policy-making. They are less clouded by large idiosyncratic factors that could easily creep into the standard measure of core inflation. Moreover, the relative efficiency of the common components of inflation vis-à-vis alternative measures such as the trimmed-mean and the median, is an issue that deserves to be explored.

¹⁵ While the estimated common components presumably take care of the reweighing of the HICP items associated with the trimmed-mean, it is far from clear that the method does well in accounting for possibly time-varying trends in relative price changes. It is known, in contrast, that with time-varying trends in relative price changes, the trimmed-mean may exclude not only temporary shocks but also part of trend inflation.

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II. ESTIMATING THE MACROECONOMIC EFFECTS OF HIGHER COMPETITION IN LABOR AND PRODUCT MARKETS¹⁶

A. Introduction

28. **Greater competition would reduce markups in goods and labor markets, lower prices, and increase output and employment.** The Fund's global economic model (GEM) is used here to quantify the macroeconomic effects of increasing competition in France and the euro area. Simulations of the effects of lowering markups in product and labor markets show large gains in GDP, employment, and consumption, once the adjustment is completed. The dynamic adjustment paths following reforms in labor, services (nontradables), and goods (tradables) markets illustrate the advantages of exploiting reform complementarities across markets and the gains of coordinating structural reform among euro area countries.

29. **GEM is a useful tool to analyze macroeconomic effects and cross-country implications of structural reform.** GEM is a large-scale version of new open economy macro models and thus incorporates international economic linkages. Its structural equations are rooted in microeconomic theory, making GEM less susceptible to the Lucas critique, an advantage over traditional macro models. While the latter can provide valuable insights into the past and have been useful for short-term forecasting, they might be misleading when economic structures change. Exactly this happens when markets become deregulated and more open to domestic and foreign competition. Within its choice-theoretic framework, GEM assumes monopolistic competition, which allows the explicit analysis of removing distortions. At the same time, the judicious use of adjustment costs for nominal and real variables enables GEM to mimic the typical hump-shape reaction of GDP to shocks found in VAR studies.

30. **The remainder of this chapter is structured as follows:** Section B describes the model setup and calibration of some crucial economic relations and parameters. In Section C, the level of competition in labor and product markets in France and the other EU countries is discussed, including the size of markups. Section D looks into the economic impact of increasing competition in each market separately and the advantages of coordinating reforms within the euro area. Section E explores some fiscal policy implications. Section F concludes.

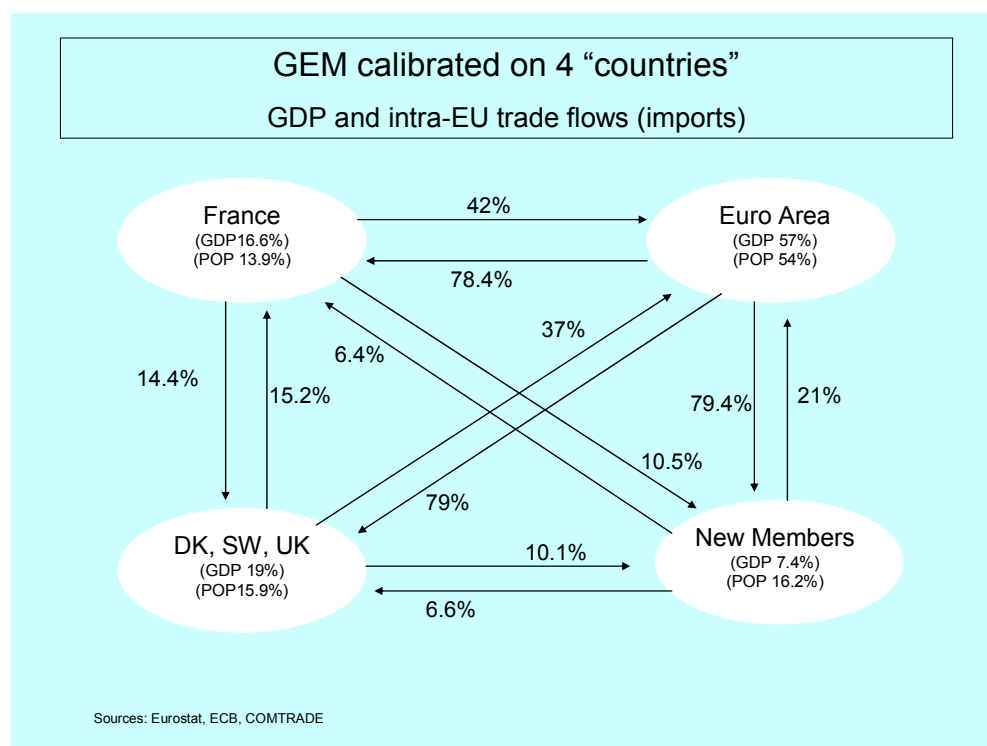
B. Model Setup and Calibration

31. **In the version of GEM used here, the world consists of four blocks that have been calibrated to represent France, the euro area, and old and new non-euro area EU member states.** This setting captures the EU context of structural reform in France. At various EU councils, most prominently at the Lisbon Council, the governments of the European Community have committed themselves to an ambitious reform agenda. While structural reform policies remain national, their benefits are likely to be enhanced by moving together toward best practice. Moreover, the monetary union (EMU) has increased the urgency of structural reform in the participating states.

¹⁶ Prepared by Werner Schule.

32. **GEM needs to be calibrated to represent country-specific economic relations.** Country-specific parameters are derived from the national accounts and trade statistics, and behavioral parameters were taken from the relevant literature, some of which are invariant across countries, and others have been modified when country-specific information has suggested it.¹⁷ Figure 1 shows country sizes by population and real GDP (in purchasing power parities) and bilateral trade flows in percent of GDP. The population and GDP shares add up to “world” population and income and are normalized at one. Trade covers intra-EU flows only. The four blocks appear therefore less open than they are in reality, and the spillover effects are limited to those that benefit EU members.¹⁸ Overall trade shares cover goods and services, while the bilateral and sector decomposition is based on trade in goods only.¹⁹ It is assumed that bilateral services trade flows are proportional to trade in goods. For France, this assumption appears to be relatively innocuous, in contrast to the United Kingdom, where the relative importance of financial services is much higher and the geographical distribution of financial services trade probably differs from trade in goods.

Figure 1. Country Size and Trade Relations



¹⁷ See Bayoumi and others (2004) for the calibration details. This paper follows in their footsteps.

¹⁸ Bayoumi and others (2004) estimate spillovers from the euro area to the rest of the world, which provide a benchmark for the degree of underestimation of spillover effects due to the reduced-openness assumption.

¹⁹ Trade flows are based on the UN COMTRADE statistics. For the sake of simplicity, the commodities sector was excluded from this version of GEM.

33. **The public sector is larger in France than in the other country blocks.** It absorbs about 26.2 percent of GDP in France, compared to 21½ percent in the rest of the EU.²⁰ The cross-country difference is due to public consumption, and, more importantly, to the public sector wage bill, which is higher in France (13.9 percent of GDP) than in the other three blocks (about 11 percent), while public investment in France (2.75 percent of GDP) is only marginally higher than in the rest of the EU. Consequently, the share of nontradables in GDP is larger and the role of competitive markets more limited.

34. **Nominal and real rigidities in GEM produce realistic dynamic adjustment patterns.** The EU economies are characterized by relatively strong real rigidities, relatively high adjustment cost in the investment equations, and strong habit persistence in consumption, combined with a high intertemporal elasticity of substitution. There is also habit persistence in labor supply. These real rigidities are necessary to enable GEM to mimic the typical hump shape response of GDP to some standard shocks (i.e., a temporary one percentage point exogenous hike in nominal interest rates) found in VAR studies. Once the degree of real rigidities has been set, adjustment costs in price and wage equations are calibrated to reproduce realistic sacrifice ratios (2.2 in France, 2.1 in the euro area, 1.4 in Denmark, Sweden, and the United Kingdom (the RE block), and 1.6 in the New Member States (NMS)).²¹

35. **Macroeconomic benefits of reform are sensitive to the value of two parameters.** Following Bayoumi and others (2004), the elasticity of labor supply with respect to real wages was set at 0.33, the high end of estimates in micro studies. The response of output and employment to a reduction in wage markups depends positively on this elasticity. And spillover effects of reforms in one country to the rest of the EU are inversely related to the degrees of import substitution, because of the resulting stronger real exchange rate movements.²² The elasticity of substitution between imports and domestic production was set at 1.2, above econometric estimates on aggregate data, though not by much (Table 1).

²⁰ The resource allocation to the public sector is based on national accounts data (WEO database). They do not include income redistribution.

²¹ Estimates of sacrifice ratios, the cumulated output costs of reducing inflation permanently by 1 percentage point, are often higher than these values, but they might reflect slow learning by central banks during the transition from a high to a low inflation environment.

²² For an extensive discussion of the sensitivity of results with respect to these parameters see Bayoumi and others (2004).

Table 1. Selected Calibration Parameters

	France	Euro Area	RE	NMS
Elasticities of substitution				
Intertemporal consumption	0.996	0.996	0.996	0.996
Elasticity of labor supply (Frisch)	0.33	0.33	0.33	0.33
Tradable and nontradable	0.50	0.50	0.50	0.50
Domestically-produced and imported tradables	1.20	1.20	1.20	1.20
Habit persistence				
Consumption	0.91	0.91	0.91	0.91
Labor	0.80	0.80	0.80	0.80
Discount factor	99.4	99.4	99.4	99.4
Home bias				
Consumption	0.68	0.65	0.62	0.70
Investment	0.28	0.26	0.24	0.30
Liquidity-constrained consumers (share)	0.45	0.40	0.25	0.55
Tax rate on labor (baseline steady state)	0.457	0.366	0.325	0.410

36. **GEM permits meaningful fiscal policy scenarios through the introduction of household liquidity constraints, distortionary taxes, and a fiscal rule.** The share of liquidity-constrained households is assumed to be 45 percent for France.²³ The fiscal policy rule ensures that the public debt-to-GDP ratio is nonexplosive in the long run, by adjusting tax rates on labor automatically so that public debt approaches a target level.²⁴ In the baseline, the debt-to-GDP ratio gradually declines from its current level of about 65 percent to a steady state level of 51 percent of GDP in France, consistent with the “reform and upfront fiscal adjustment” scenario in the main staff report.

37. **Monetary policy is set by the ECB, which targets euro area-wide indicators.** Nominal interest rates (i) in France are determined by the ECB, which was assumed to follow a forward-looking rule, targeting inflation (π) in the entire euro area. Following Orphanides (2003),²⁵ the interest rate rule nests a variety of policy strategies. France’s inflation and its output gap (gap) enter the ECB rule with the weight of its GDP in the euro area. With the euro as its currency, fluctuations in France’s nominal effective exchange rate are limited. Consequently, changes in relative prices between tradables and nontradables, or the real effective exchange rate, take the form of inflation differentials and result in important cross-country variations in the real interest rate after shocks.

²³ Empirical estimates of the share of liquidity-constrained households in France based on macro data are very large (up to 100 percent). However, these estimates are likely biased on the high side, because they refer to the pre financial liberalization period in France and the euro area and use highly aggregated macro data. Household surveys and credit data would indicate smaller shares.

²⁴ Tax rates on capital income are fixed at 10 percent. More sophisticated scenarios can be run by changing expenditures and taxes discretionary, alleviating the burden that falls on labor taxation.

²⁵ See also WEO April 2005, Annex 3.3 to Chapter III.

$$i_t = (1 - \alpha_1)i_{nat} + \alpha_1 i_{t-1} + \alpha_2 \pi_{t+3}^{exp} + \alpha_3 \Delta gap_{t+3}^{exp} + \alpha_4 gap_{t-1}$$

C. Markups in Product and Labor Markets

Product markets

38. **Markups are summary measures of firms' pricing power in goods markets.** In GEM, markups derive from the assumption that each product is made by one monopolistic firm. However, there is a very large number of firms offering (a continuum of) diverse products and services that are imperfect substitutes. Each firm sets a price for its product, given a demand curve, so as to maximize profits.²⁶

$$Price_t = markup_t * marginal\ cost_t \text{ or } p_t = \theta / (\theta - 1) * mc_t$$

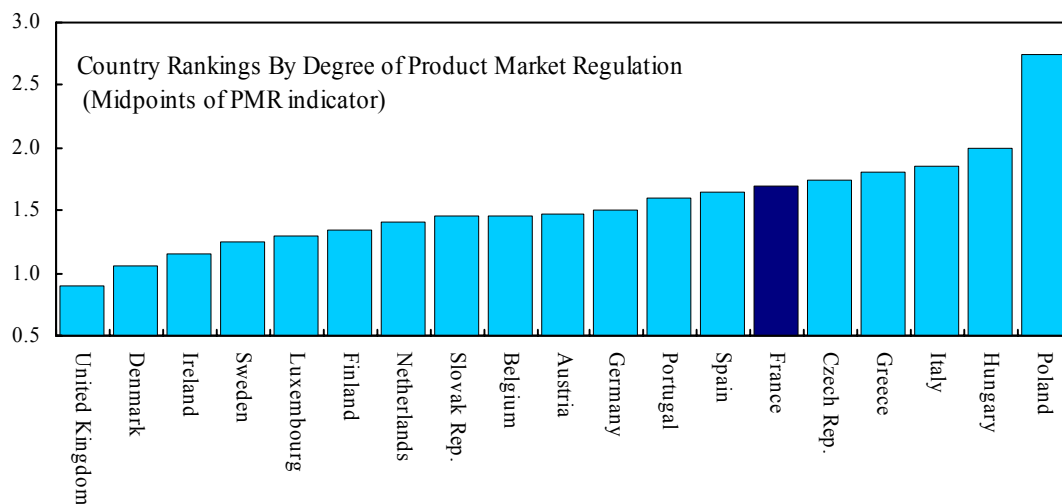
39. **The markup on prices over marginal costs (MC) is inversely related to substitution elasticities.** The elasticity of substitution (θ) between products of different firms (the slope of the demand curve) determines the market power of each firm, which sets prices subject to the risk of losing marking shares. The simplicity of this relation makes the analysis tractable, but admittedly comes at the expense of being agnostic about specific reasons for imperfect competition.

40. **Restrictive product market regulation curtails competition in France.** Deregulation in goods markets, partly driven by EU directives, has increased competition, though product markets remain regulated. An OECD measure of the degree of product market restrictedness (PMR) lists France among the more regulated countries (OECD, 2005). Competition suffers from barriers to entry and entrepreneurship, as well as state influence in the economy.²⁷ While most euro area member states are in a middle position, the United Kingdom takes the position of the most liberal country. The larger EU NMS are considered among the least competitive. The relative position of countries on the PMR scale was used to guide the calibration of markups in the NMS, where direct measures were not available (Figure 2).

²⁶ This simple formula ignores adjustment costs. An elasticity of substitution of 5 translates into a markup of 1.25 (25 percent). The markup goes to zero only if all products are perfect substitutes.

²⁷ More precisely, the OECD measure covers trade and investment restriction, regulatory barriers, discriminatory procedures, or ownership barriers; licensing and permits, administrative, sector-specific, and legal burdens, anti-trust exemptions; and state influence measured by the size and scope of the public enterprise sector, direct controls over business, and price controls or restrictions on establishment. See Conway and others (2005).

Figure 2. Product Market Regulation Index



Source: OECD, 2005.

41. **Empirical estimates show significant average markups in goods and services markets in France.** For the simulations here, the assumptions about goods (tradables) and services (nontradables) markups follow

Table 2. Markups in Product Markets

	Goods	Services
France	1.21	1.40
Euro area, excluding France	1.21	1.40
Denmark, Sweden, and the United Kingdom	1.15	1.27
New EU member states	1.29	1.45

largely empirical estimates by Oliveira Martins, Scarpetta, and Pilat (1996) and a number of follow-up publications (Table 2). Markups were adjusted for the size of public sectors as suggested in Bayoumi and others (2004). While these estimates are somewhat dated, Saint-Paul (2004) found that the level of markups in general may have changed little during the 1990s. Assumptions for the NMS are based on their PMR ranking. The values for the euro area are similar to those in earlier studies.²⁸

Labor markets

42. **Economic rents in goods and service markets may be shared between producers and workers.** Blanchard and Giavazzi (2003) made an important theoretical contribution on the macroeconomic effects of regulation in goods and labor markets. In their model, the share of rents going to workers depends on their bargaining power with firms.²⁹ There is also

²⁸ Bayoumi, Laxton, and Pesenti (2004); and Hunt (2004).

²⁹ Gali, Gertler, and Lopez-Salido (2002) developed a related model that explains the bulk of output gap fluctuations with price and wage markups.

abundant empirical evidence of a positive relation between goods market rents and wage premia over market clearing wages.³⁰ Workers' rents can assume various forms: wage premia, higher nonwage benefits, and more favorable general work conditions. All of them raise the cost of labor per unit of output. Workers' bargaining power depends on labor market institutions, such as legal job protection, union strength, the generosity of unemployment assistance, minimum wages, the size of the public sector, and political support.

43. In GEM, workers' bargaining power is reflected in the markup of real consumption wages over the marginal rate of substitution between consumption and leisure. Each worker offers a specific kind of labor services that is an imperfect substitute for services

Table 3. Markups in Labor Markets

	Economy-wide
France	1.32
Euro area, excluding France	1.30
Denmark, Sweden, and the United Kingdom	1.17
New EU member states	1.23

offered by other workers. The lower the degree of substitutability, because of skill differences, anti-competitive regulation or other factors, the higher will be the markup and the lower employment in terms of hours. The assumptions about markups in labor markets are based on Jean and Nicoletti (2002) for France, the euro area and the RE block, with some adjustment for the degree of public ownership (Table 3). Lacking empirical estimates on the NMS, it was assumed that wage markups lie in the middle between the euro area and the RE block.

D. Impact of Reform

44. Reforms are implemented through a reduction in markups in labor and product markets in France and the euro area. In each simulation, markups are gradually reduced to the level in the RE block. More specifically, markups in labor and goods markets are reduced over a period of five years, while in the services sector, where deregulation progresses slower, the lower level of markups will be reached after ten years. It is interesting to look at the relative contribution of reform in each market and subsequently at the difference between comprehensive reforms implemented only in France versus coordinated reforms across all 12 euro area countries.

a) The Contribution of More Competition in Labor and Product Markets

Long-run effects

45. The estimated overall gains from more competition are substantial in terms of GDP, employment, consumption, and welfare. Once the adjustment to reform in all markets is complete, real GDP will be about 10.7 percent above the baseline, produced by a

³⁰ Including recent work by: Jean and Nicoletti (2002), Saint-Paul (2004); Crepon, Desplatz, and Mairesse (2002); Dobbelaere (2005); Konings, Van Cayseele, and Warzynski (2001). Interestingly, Dobbelaere found much higher estimates of product market markups when estimated jointly with labor market equations measuring the bargaining power of workers.

larger capital stock (15.6 percent) and more hours worked (11.3 percent). The 8.1 percent increase in consumption is smaller than the GDP gains, because resources need to be diverted to investment, and other EU countries benefit from a transfer of purchasing power. The French real effective exchange rate depreciates by 11.3 percent, needed to boost exports given increased production capacities. The welfare gains are also sizable at 2.6 percent, weighting the benefits of higher consumption in utility terms against the disutility of working more hours (Table 4).

Table 4. Long-Run Effects of Reducing Markups in Labor and Product Markets in France 1/

(Deviations from baseline in percent)

	Real GDP	Consumption	Hours Worked	Welfare
Labor market	3.7	3.6	4.7	0.7
Services	5.8	3.8	5.0	1.9
Goods	1.2	0.8	1.5	0.4
All markets simultaneously	10.7	8.1	11.3	2.6

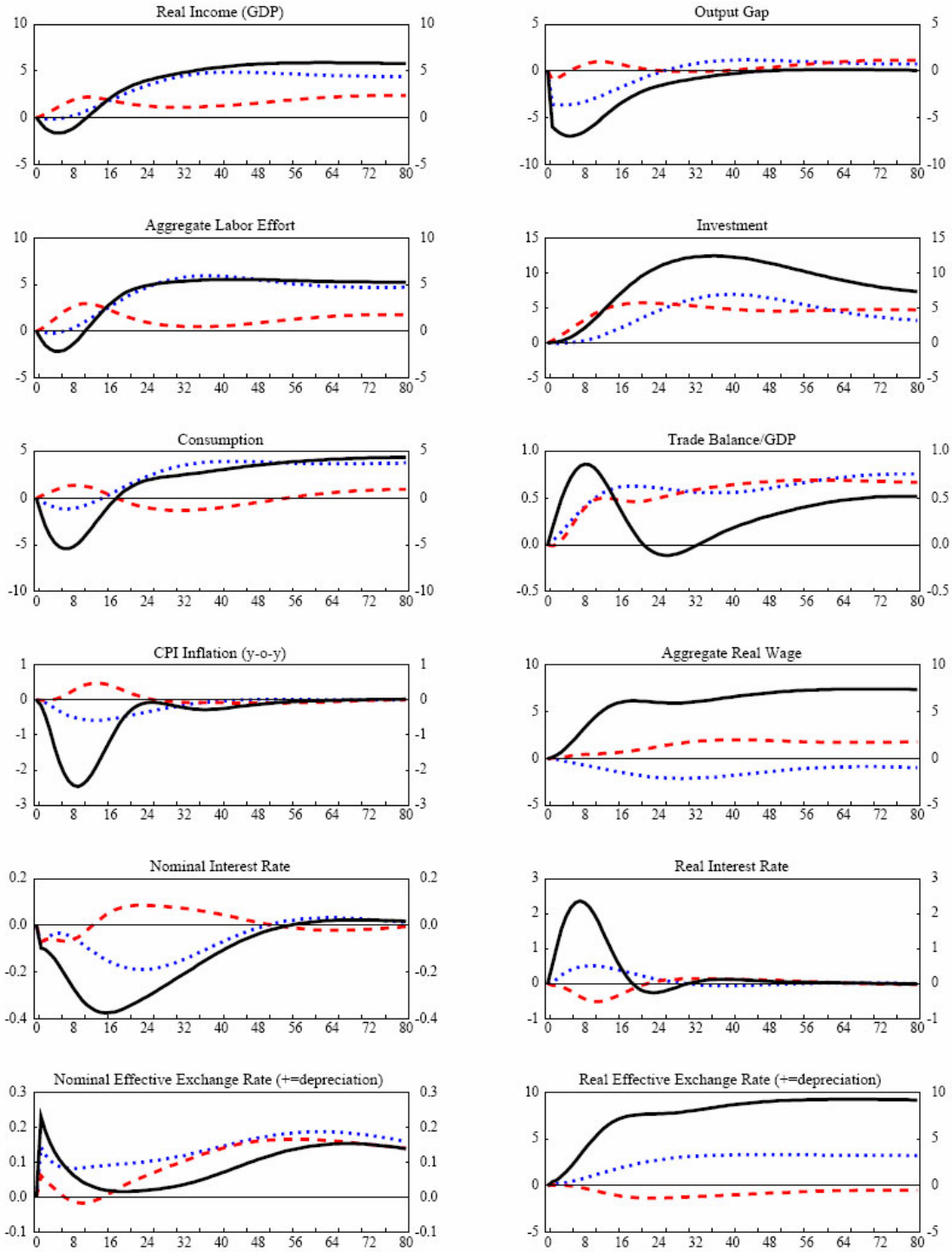
1/ Markups were reduced by 15 percentage points in labor markets, 13 percentage points in nontradables, and 6 percentage points in tradables.

46. **In the long run, increasing competition in each sector separately yields significant, though varying, gains in GDP and employment.** Comparing the effects of reforms across markets is not straightforward. The impact depends on the size of the reform (the distance from best practice in the EU) as well as the elasticity of output and employment on changes in relative prices. Further, the relationship between the elasticity of substitution across different products and labor inputs and respective markups is nonlinear. Structural reforms produce larger reductions in markups, relative to the reform effort, the further away the starting point is from perfect competition.

47. **There are important complementarities between labor and goods market reform.** When implemented in isolation, labor market reform would yield a 3.7 percent increase in GDP above baseline, goods market reform 1.2 percent, and liberalization of services 5.8 percent, once adjustment is completed. Labor market reform in itself raises output, employment, and consumption, but the welfare implications are small, as the utility of higher consumption is tempered by the disutility of working more. Moreover, real wages remain permanently below baseline because goods and services prices do not decline in proportion with wages, as firms increase rents and limit the expansion of output. In combination with product market reforms, however, real wages increase as labor becomes scarce. Welfare gains are easier to achieve in services markets, where markups fall deeper, as this sector is the least competitive in the French economy (Figure 3).

Figure 3. France: Dynamic Adjustment to Labor and Product Markets Reform in France
(Deviations from baseline in percent; quarterly figures)

(dotted line = labor market; dashed line = tradables; solid line = nontradables)



Dynamic adjustment paths

48. **The dynamic adjustment paths of real variables in response to reforms in the three markets differ significantly.** While output and employment increase quickly toward their new equilibrium levels in reaction to goods market reform, the initial effect of higher competition in services is negative and insignificant in the case of labor market reform. The differences in adjustment patterns are most evident for consumption, which exceeds its baseline values immediately after goods market reforms, but remains below baseline for about four years after services and labor market reforms. Investment becomes positive quickly after goods and services markets reforms, but reacts very slowly when higher competition in labor markets reduces markups on wages. The increase in investment is moderate because the relative price of labor to capital falls, which in turn slows down the pace of capital accumulation. In all cases, investment overshoots its long-term steady state level, which is reached once the capital stock needed to produce the higher output has been installed.

49. **In the short run, the adjustment to changes in relative prices is modified by disinflation.** In the first few years, domestic inflation falls as firms' margins are squeezed, and potential output increases ahead of demand, opening up a negative output gap.³¹ With nominal interest rates determined euro area-wide, the real interest rate rises when inflation falls below baseline. Higher real interest rates motivate forward-looking consumers to postpone consumption in favor of investment. With domestic inflation falling below inflation rates in trade partner countries, the real exchange rate depreciates (nontradables become cheaper relative to tradables), and net exports rise. However, the improvement in the trade balance is insufficient to fully compensate for the shortfall of domestic demand relative to supply. Once the price level adjustment is completed, inflation and the real interest rate return to baseline (the neutral real rate), consumption starts rising above baseline, and investment accelerates, temporarily reducing the trade surplus.

b) The Advantages of Coordinated Reform in the Euro Area

Long-run impact

50. **France would benefit from coordination within the euro area.** In France, long-run GDP gains increase to 14.1 percent when both France and the euro area reduce markups in labor and product markets simultaneously. Practically all additional GDP gains are direct spillovers from reforms abroad. Stand-alone reforms in the euro area (excluding France) of equal size would raise output and lower prices there. France would profit from higher demand for its products and higher real income, a terms-of-trade effect. As a result, French real GDP would increase by 3.0 percent.³² While the long-run increase in French GDP as a result of coordinated reforms does not go beyond the combined long-run impact of reforms in

³¹ Demand reacts sluggishly because of real and nominal rigidities in the model while the gradual implementation of reforms makes sure that potential output does not jump; this time pattern is entirely plausible for France and the EU as a whole.

³² Results are not reported here but are available on request.

each country separately, welfare gains from coordination are important. The percentage increase in consumption over baseline in France is up from 8.1 percent to 11.5 percent with relatively little additional work effort, plus 0.9 percent (Table 5).³³ Consequently, welfare gains at home are bigger. Consumption is higher as the real effective depreciation is only 3.2 percent in the coordinated reform scenario, instead of 11.2 percent in the case of stand-alone reform in France.

Table 5. Coordinated Euro Area-wide Structural Reform—
Long-run Impact on France 1/
(Deviations from baseline in percent)

	Real GDP	Consumption	Hours Worked	Welfare
Labor market	4.8	4.7	5.1	1.5
Services	6.5	4.5	5.2	2.5
Goods	2.5	2.1	2.0	1.2
All markets	14.1	11.5	12.2	4.8
<i>Of which: spillover from Euro area</i>	3.0	3.2	0.9	2.1

1/ GEM simulations. Markups were reduced in France by 15 percentage points in labor markets, 13 percentage points in nontradables, and 6 percentage points in tradables. The markup reductions in the euro area were 13, 13, and 6 percentage points respectively.

Dynamic adjustment path

51. **The adjustment in demand, wages, and prices is sluggish due to nominal and real rigidities.** When markups are reduced, hours worked and the capital stock will be higher in the long run, and potential output increases. In the presence of adjustment costs in investment, habit persistence in consumption, and nominal rigidities in wages and prices, the reaction of demand is delayed. Consequently, a negative output gap appears and is closed only gradually. The fall in markups causes wages (an important nontradables input) and services (nontradables) prices to fall relatively to third countries, implying a real exchange rate depreciation, either through a nominal exchange rate depreciation or temporary deflation.³⁴

52. **While monetary policy is neutral in the long run, the adjustment path depends strongly on the stance of monetary policy during the transition.** When markups are reduced only in France, area-wide nominal interest rates fall to the extent necessary to keep area-wide inflation at target, as the monetary policy rule is formulated in terms of euro area-wide indicators. The euro depreciates very little in nominal terms, as the share of France in euro area exports to EU countries outside the euro area is small. As a result, though the stance of monetary policy is optimal from a euro area-wide perspective, monetary conditions in France tighten, which exerts additional deflationary pressure in France. While the depreciation of the French real effective exchange rate is needed to balance supply and

³³ The flipside of the coin: for a given increase in output, employment increases by less.

³⁴ More competition in the tradables sector lowers tradables prices vis-à-vis nontradables prices and therefore represents a real appreciation of the home currency.

demand, it must come about through temporary lower inflation at home, further depressing prices, and raising the real interest rate. In the presence of nominal rigidities, insufficient monetary accommodation slows down the response of investment and consumption. The improvement in the trade balance does not fully compensate the initial fall in consumption, causing output and employment to drop below baseline in the first year and the output gap to be more persistent (Figure 4). The transitory adjustment problems peak after about six quarters and persist until the real interest rate returns to baseline after about five years.

53. **Coordination results in faster adjustment and lower transitional costs.** When markups are reduced in the entire euro area, nominal interest rates fall sufficiently to prevent transitory deflation. Real interest rates decline by 2.3 percentage points in the first year, and the nominal exchange rate depreciates by 2.9 percent. The difference this makes to demand is large during the first five years: in the case of coordinated reform, investment increases by 5.7 percent and consumption by 4.9 percent, compared to 1.7 percent for investment and -2.6 percent for consumption in the case of isolated reform in France (Tables 1 and 2 in the Annex).

E. Fiscal Policy Implications

54. **Fiscal adjustment would be greatly facilitated by increasing competition in labor and product markets.** In the long run, higher tax revenues from a much larger tax base let the general government debt-to-GDP ratio fall by 14 percentage points of GDP, while allowing cuts in labor tax rates by 4 percentage points. Lower labor taxes reinforce the impact of lower markups in both product and labor markets on the cost of labor. However, in the case of isolated reform in France, tax rates on labor rise initially as the gap between the actual and target debt ratios widens. The temporary hike in the labor tax rate reduces current disposable income and consumption by liquidity-constrained households (Figure 5).

Figure 4. France: Comparing Dynamic Adjustment of Stand-alone Versus Coordinated Reform

(Deviations from baseline in percent; quarterly figures)

(dashed line = euro area-wide reform; solid line = stand-alone reform in France)

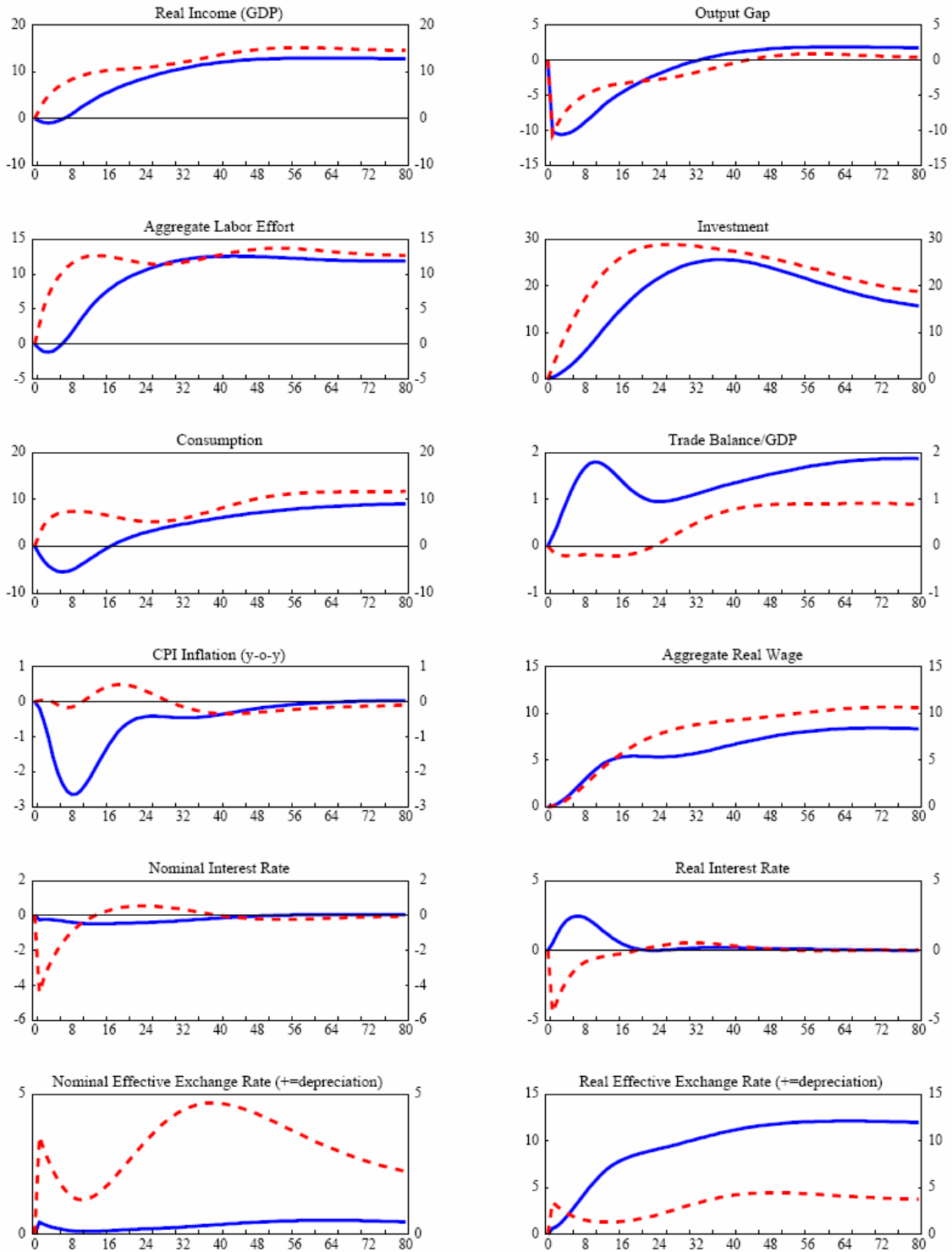
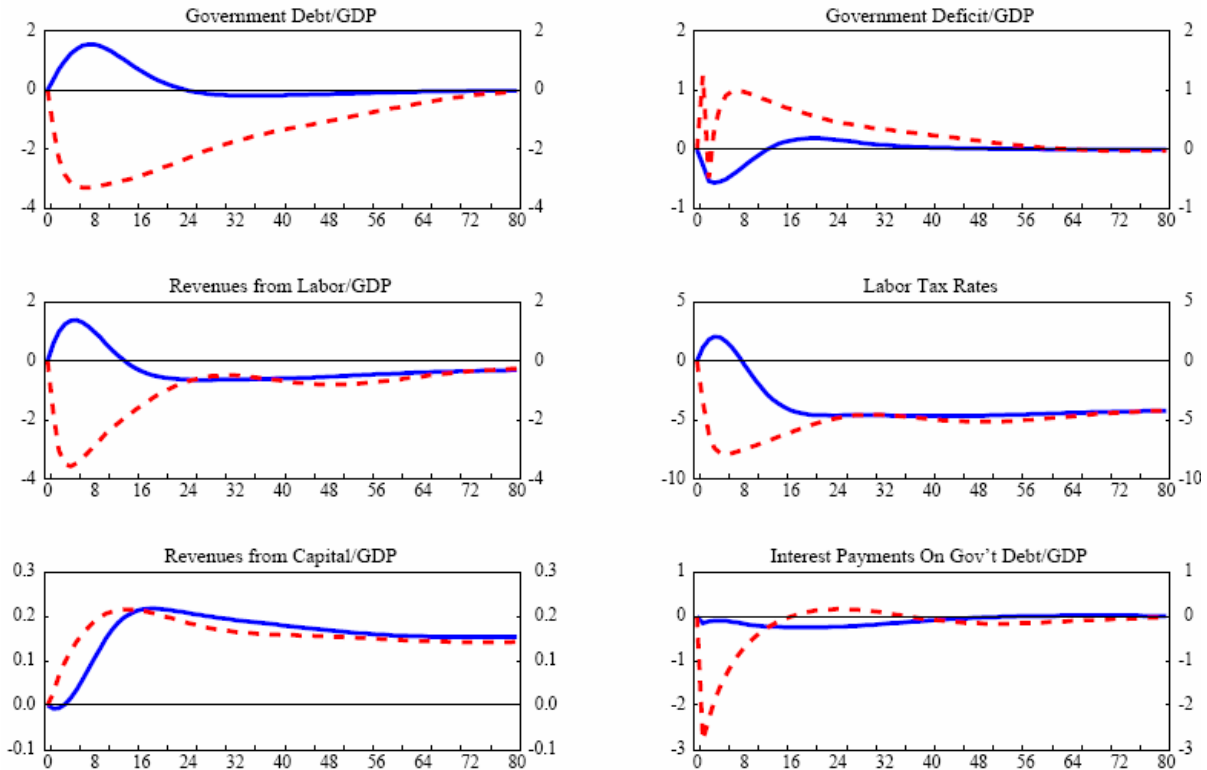


Figure 5. France: Dynamics of Fiscal Variables—Stand-alone Versus Coordinated Reform

(Deviations from baseline in percentage points; quarterly data)

(dashed line = euro area-wide reform; solid line = stand-alone reform in France)



F. Conclusions

55. **The simulated long-run effects of comprehensive reforms in labor and product markets are large.** Once adjustment is completed, the level of GDP would be higher by 10.7 to 14.1 percent, depending on whether reforms are implemented in France only or in coordination with the other euro area countries. Hours worked would increase by 11.3 percent (stand-alone reforms) to 12.2 percent (euro area-wide coordination).

- **The long-run output gains of increasing competition are significant, but the benefits are more evenly distributed when market forces are strengthened in all markets simultaneously.** While labor market reform on its own increases employment, welfare effects are higher when supplemented by product market reform.
- **With higher output and employment, fiscal adjustment is greatly facilitated.** More competition leads to more capital and hours worked, thus the tax base increases.
- **There are long-run gains from international coordination of reforms due to spillover effects.**

- **Coordination within the euro area would reduce the transition cost of reforms.**
When reforms are implemented in one euro area country only, real interest rates in the reforming country rise, causing higher upfront costs and longer transition. Synchronized euro area-wide deregulation would bring about more supportive monetary conditions.³⁵

These results need to be interpreted carefully, apart from their sensitivity to some parameters,³⁶ it was assumed that announced reforms are fully credible and that all actors have perfect foresight and complete knowledge of the structure of the economy. Therefore, the effects of greater competition are fully anticipated. In reality, reforms might not be credible initially, and there is uncertainty about how the economy will react.³⁷

³⁵ Raising competition represents an asymmetric positive supply shock when implemented in one country only.

³⁶ Work is currently under way in the IMF's Research Department to estimate some of the parameters of a scaled-down version of GEM using Bayesian techniques.

³⁷ Vagaries typically lead to caution, including on the side of monetary policymakers. As a result, monetary conditions might not be sufficiently accommodative, even in the case of synchronized euro area-wide reform.

Table 1. Increasing Competition in Labor and Product Markets in France

(Deviation from baseline in percent)

<i>Average of:</i>	First Year	Five Years	Ten Years	Long Run
<i>Impact in France</i>				
Real GDP	-0.86	2.15	5.21	10.70
Consumption	-2.57	-2.59	0.16	8.10
Investment	1.72	9.68	16.48	17.80
Capital stock	0.03	1.38	5.00	15.60
Hours worked	-0.96	3.64	6.76	11.32
Real wage	0.49	3.61	5.08	7.89
Welfare	-11.69	-2.48	-1.13	2.64
Nominal interest rate 1/	-0.16	-0.05	0.02	0.00
Real interest rate 1/	1.41	1.53	0.96	0.00
Real effective exchange rate	1.12	5.03	7.00	11.20
Trade balance 1/	0.44	0.49	0.09	0.00
<i>Spillover to euro area, excluding France</i>				
Real GDP	0.25	0.37	0.48	0.93
Consumption	0.30	0.42	0.40	1.00
Hours worked	0.18	0.27	0.27	0.29
Welfare	0.92	0.33	0.29	0.67
Nominal interest rate 1/	-0.16	-0.05	0.02	0.00
Real interest rate 1/	-0.16	-0.08	-0.03	0.00
Real effective exchange rate	0.69	-1.53	-2.51	-4.21
Trade balance	0.01	-0.04	0.02	0.00
<i>Spillover to Denmark, Sweden, and the United Kingdom</i>				
Real GDP	0.09	0.17	0.20	0.46
Consumption	0.15	0.19	0.11	0.49
Hours worked	0.09	0.09	0.09	0.14
Welfare	0.46	0.13	0.07	0.32
Nominal interest rate 1/	-0.09	-0.05	0.02	0.00
Real interest rate 1/	-0.07	-0.06	-0.02	0.00
Real effective exchange rate	-0.11	-0.73	-0.97	-1.54
Trade balance	-0.04	-0.04	0.03	0.00
<i>Spillover to New Member States</i>				
Real GDP	-0.44	0.47	0.60	0.51
Consumption	0.82	1.39	1.16	0.54
Hours worked	0.34	0.20	0.28	0.16
Welfare	2.91	1.45	0.98	0.36
Nominal interest rate 1/	-0.26	-0.40	-0.23	0.00
Real interest rate 1/	-0.02	-0.20	-0.08	0.00
Real effective exchange rate	-4.32	-2.28	-1.69	-1.18
Trade balance	-1.00	-0.64	-0.40	0.00

1/ Percentage points.

Table 2. Increasing Competition in Labor and Product Markets in France and the Euro Area
(Deviation from baseline in percent)

	<i>Average of:</i>	First Year	Five Years	Ten Years	Long Run
<i>Impact in France</i>					
Real GDP		4.46	8.42	9.65	14.11
Consumption		4.85	6.37	5.51	11.52
Investment		5.71	18.29	22.58	20.64
Capital stock		0.19	3.48	8.42	19.10
Hours worked		5.87	10.46	10.27	12.21
Welfare		12.71	2.90	2.03	4.81
Nominal interest rate 1/		-2.41	-0.31	0.17	0.00
Real interest rate 1/		-2.34	-0.61	-0.01	0.00
Real effective exchange rate		2.81	1.53	1.81	3.24
Trade balance		0.09	-0.29	-0.17	0.00
<i>Impact in the euro area</i>					
Real GDP		3.54	6.57	8.07	12.34
Consumption		2.31	3.49	4.02	10.13
Investment		4.56	15.44	20.07	19.00
Capital stock		0.14	2.78	7.06	17.40
Hours worked		4.23	8.73	8.96	10.78
Welfare		5.15	0.84	1.17	4.02
Nominal interest rate 1/		-2.41	-0.31	0.17	0.00
Real interest rate 1/		-2.31	-0.49	-0.11	0.00
Real effective exchange rate		8.62	5.63	5.23	5.28
Trade balance		0.90	0.40	0.18	0.00
<i>Spillover to Denmark, Sweden, and the United Kingdom</i>					
Real GDP		0.43	1.19	1.38	2.58
Consumption		0.77	0.86	0.91	2.74
Hours worked		0.99	0.80	0.57	0.79
Nominal interest rate 1/		-0.16	0.13	0.24	0.00
Real interest rate 1/		-0.22	-0.12	-0.02	0.00
Real effective exchange rate		-4.32	-5.60	-6.95	-9.13
Trade balance		-0.17	0.22	0.21	0.00
<i>Spillover to New Member States</i>					
Real GDP		-1.88	2.53	2.97	3.40
Consumption		4.58	6.32	4.88	3.66
Hours worked		0.83	0.46	1.29	1.08
Nominal interest rate 1/		-2.40	-2.28	-1.00	0.00
Real interest rate 1/		-1.20	-1.33	-0.50	0.00
Real effective exchange rate		-24.15	-11.68	-8.77	-7.81
Trade balance		-5.10	-2.63	-1.39	0.00

1/ Percentage points.

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III. EMPLOYMENT PROTECTION AND UNEMPLOYMENT IN FRANCE³⁸

A. Introduction

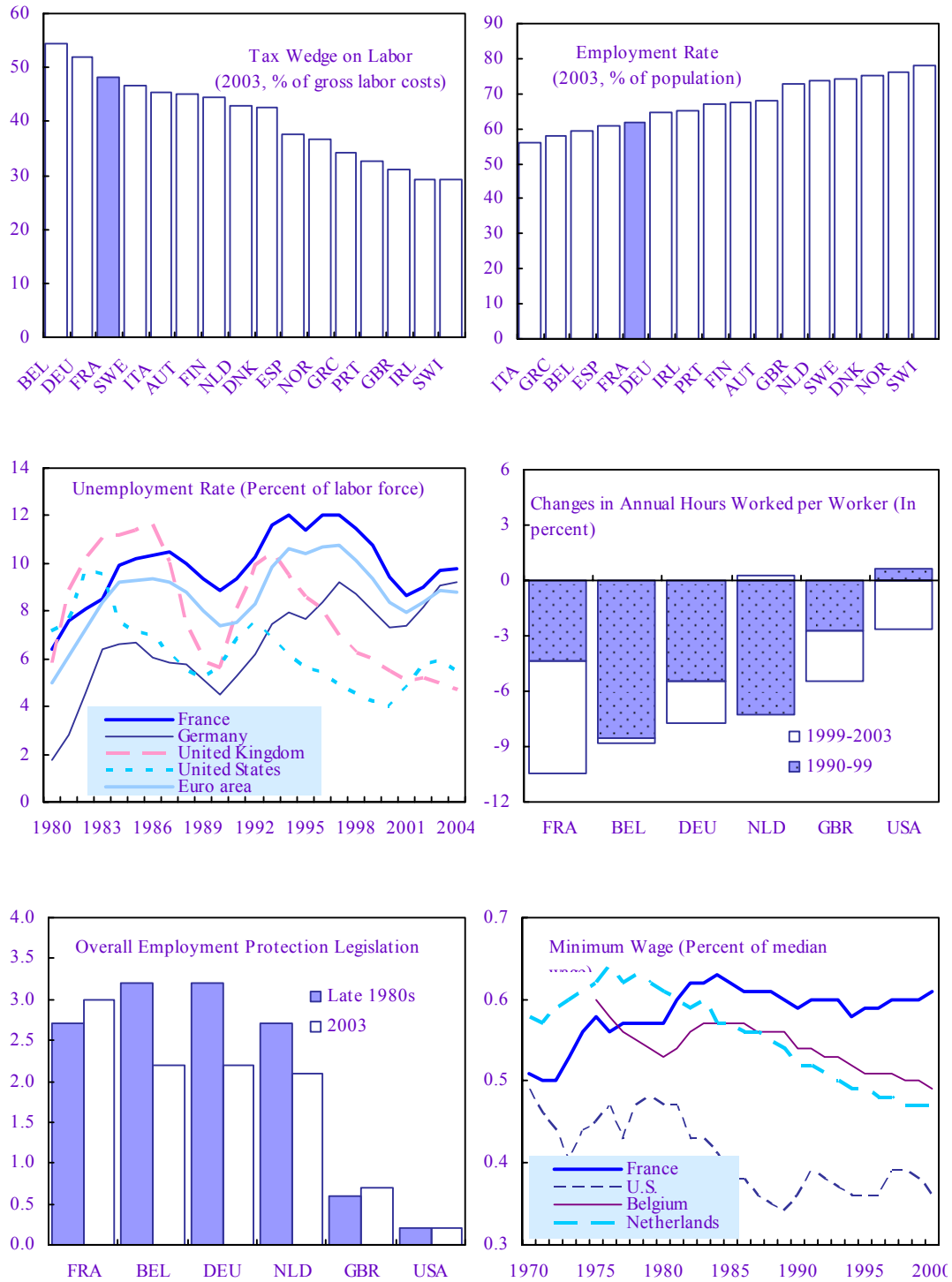
56. **Unemployment has remained high in France for the last two decades, despite some improvements during the late 1990s.** In particular, the unemployment rate has risen since 2001, though mostly for cyclical reasons to about 10 percent recently. This has prompted the government to adopt an emergency plan for employment (*le plan d'urgence pour l'emploi*) and set the reduction of unemployment as the top government priority.

57. **In the past, policies to address high structural unemployment have focused mainly on active labor market programs, leaving labor market rigidities largely untackled.** Remedial actions relied on employment subsidies, earned income tax credits, and cuts in social security contributions—all at a considerable cost to the budget. Attempts were made to reduce unemployment through work redistribution efforts, such as the reduction in the workweek. Despite these efforts, the French unemployment rate remains higher than the euro area average. Meanwhile, the tax wedge on labor remains high, permissible work hours are constrained, employment protection is strict, and minimum wage policy prices workers with low productivity out of employment (Figure 1).

58. **Recent studies suggest that reform of employment protection legislation is needed to enhance job creation.** A number of recent reports, some sponsored by the government, offer various reform proposals. The de Virville report (2004) suggests relaxing legal restrictions on the use of fixed-term contracts. Cahuc and Kramarz (2004) recommend the merger of permanent and fixed-term contracts into a single contract, with severance pay based on the duration of employment. Similarly, Blanchard and Tirole (2003) and Cahuc and Malherbet (2002) propose reducing firing costs associated with legal and administrative procedures and introducing a system of experience-rating into the unemployment benefit system. Most recently, the OECD country report (2005) also recommends reducing the difference between permanent and fixed-term contracts either by introducing a single contract with lower employment protection, or by reducing the legal and administrative costs of termination of permanent contracts and easing the use of fixed-duration contracts.

³⁸ Prepared by Jianping Zhou.

Figure 1. Labor Market Performance and Institutions, France and Selected Countries



Sources: OECD; and IMF staff calculations.

59. **In August, a new employment contract, *le contrat nouvelles embauches* or *CNE*, became effective.** The *CNE* is a special employment contract with a trial period of up to two years. Termination of such a contract during the trial period is not subject to the administrative and legal procedures that apply to permanent open-end contracts (*contrats à durée indéterminée*, or *CDI*), and severance pay is based on the duration of employment. At the end of the two-year trial period, a *CNE* would have to be converted to a *CDI* if not terminated. With no firing restrictions, a *CNE* contract compares favorably to a regular *CDI* contract. With a duration-based severance pay and no hiring restrictions, it also compares favorably to a fixed-duration contract (*contrat à durée déterminée*, or *CDD*) (See Section B). However, the use of *CNE* contracts is restricted to small enterprises with less than 20 employees.

60. **This paper analyzes the unemployment effects of reform proposals offered by recent reports, with a view to assessing the effectiveness of the *CNE* in promoting job creation and reducing the structural unemployment rate.** It uses a search-matching model with hiring and firing restrictions to identify the channels through which changes in employment protection legislation (EPL) affect hiring and firing decisions and aggregate labor market variables such as unemployment. This approach recognizes the frictions and imperfect information that exist in labor markets. With its focus on the job creation and destruction decisions of the firm as well as the job search behavior of the worker, it provides a useful framework for studying impacts of labor market policies (Pissarides and Mortensen, 1999).

61. **The structure of the paper is as follows:** Section B summarizes the key characteristics of the French employment legislation. Section C briefly reviews the theoretical and empirical literature on the labor market impact of arduous employment protection legislation, with a focus on studies related to France. The analytical framework is discussed in Section D (and the detailed model in Appendix I). Section E presents the simulation results from the calibrated model. Section F concludes with policy implications.

B. Employment Protection Legislation (EPL) in France

62. **Employment protection for workers hired under permanent contracts is very strict.** These workers are protected against unemployment resulting from company restructuring, under the current law on layoffs for economic reasons (*licenciement économique*). Although severance pay does not appear to be particularly high compared with other European countries and the notice period (one or two months depending on seniority) is relatively short,³⁹ a dismissal for economic reasons can be costly, as it is subject to complex

³⁹ For example, for an employee with five years of seniority, severance pay is half of the monthly gross salary per year in the case of a dismissal for “personal” reasons and one month of salary in the case of a dismissal for “economic” reasons (OECD, 2005).

and long administrative procedures and various legal restrictions.⁴⁰ In particular, justifications for dismissals of permanent workers due to economic reasons are strictly defined. Economic dismissals are allowed for preserving firms' competitiveness, but not for improving firms' competitiveness or profitability. The economic burden on firms is further increased by their legal obligation to find new jobs for the redundant workers.

63. Collective dismissals for economic reasons are subject to even more complex administrative procedures. In case of a collective dismissal, firms have to negotiate with the joint production committee. If the collective dismissal involves more than ten workers, an "employment preservation plan" (*plan de sauvegarde de l'emploi*) is required, which sets out measures for helping outside-firm job search, creating new activities, and improving training programs. Large firms (with more than 1,000 workers) also have to offer "reclassification leave," which is about four to nine months. During this leave period, firms are required to provide the redundant workers with training and assistance to find a job.

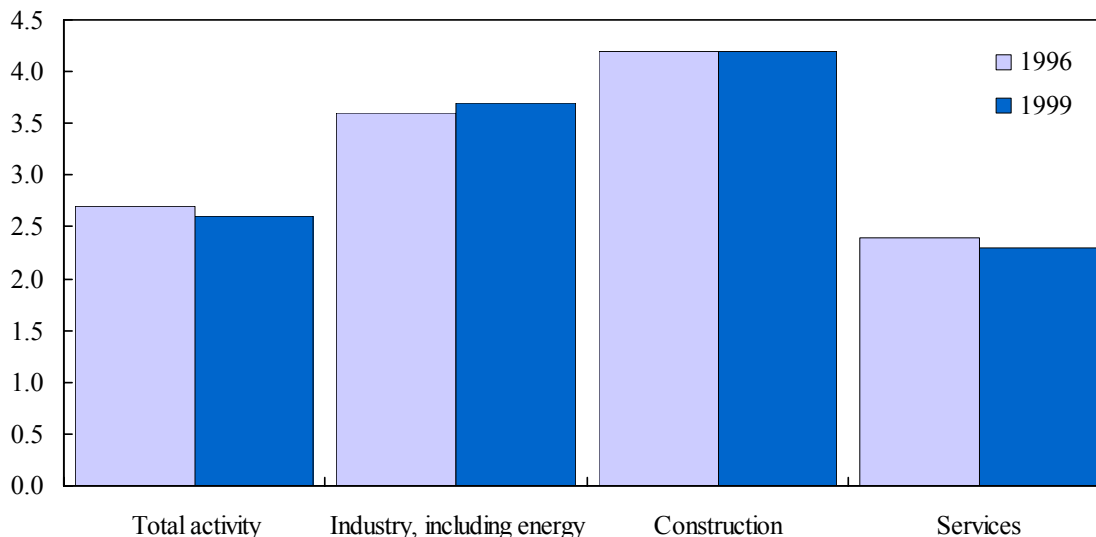
64. Workers hired on fixed-duration contracts (CDDs) do not have the same employment protection, but the use of these contracts is rather restricted.⁴¹ The layoff of workers with *CDDs* involves a severance payment and a notice period but does not require a costly administrative and legal process. However, *CDDs* can only be used for temporary increases in production activities or for replacing employees on leave, and cannot be used to fill permanent positions linked to permanent production activities. *CDDs* can be renewed only once, with the maximum duration usually limited to 18 months (including renewal).⁴² At the end of a *CDD*, the worker will either be hired on a regular *CDI* or receive a severance payment equivalent of 6 percent of the total salary received during the employment period. In the case of early termination of a *CDD*, the firm has to pay for the entire period specified by the contract. Consequently, although the maximum duration allowed is 18 months, the average effective duration of *CDDs* is relatively short (less than 3 months), compared to other European countries (about 6–12 months) (Figure 2). Furthermore, when a *CDD* is terminated for economic reasons, the firm is not allowed to hire another worker under a *CDD* for six months.

⁴⁰ Kramarz and Michaud (2004) estimate that for dismissals due to personal reasons, the average firing cost involving a worker with *CDD* is equivalent to 14 months' wages and significantly higher in case of a collective dismissal. This suggests that dismissals due to economic reasons can be more costly, since in the case of a dismissal for personal reasons, the firm and the worker often reach an agreement with high severance payments, thus avoiding the complex administrative and legal dismissal procedures.

⁴¹ *CDDs* were introduced in 1979. *CDDs* are also used for special employment programs targeted at the young and the long-term unemployed. The worker is then qualified for unemployment benefits, which start at 57.4 percent of the previous gross salary (or 40 percent of the gross salary plus a fixed sum) but decrease over time, depending on the age and the experience of the worker. This implies that workers can alternate between *CDDs* and unemployment spells, receiving unemployment benefits while unemployed.

⁴² The maximum duration can be extended to 24 months in very special cases.

Figure 2. France: Average Duration of Temporary Contracts by Sector
(In months)



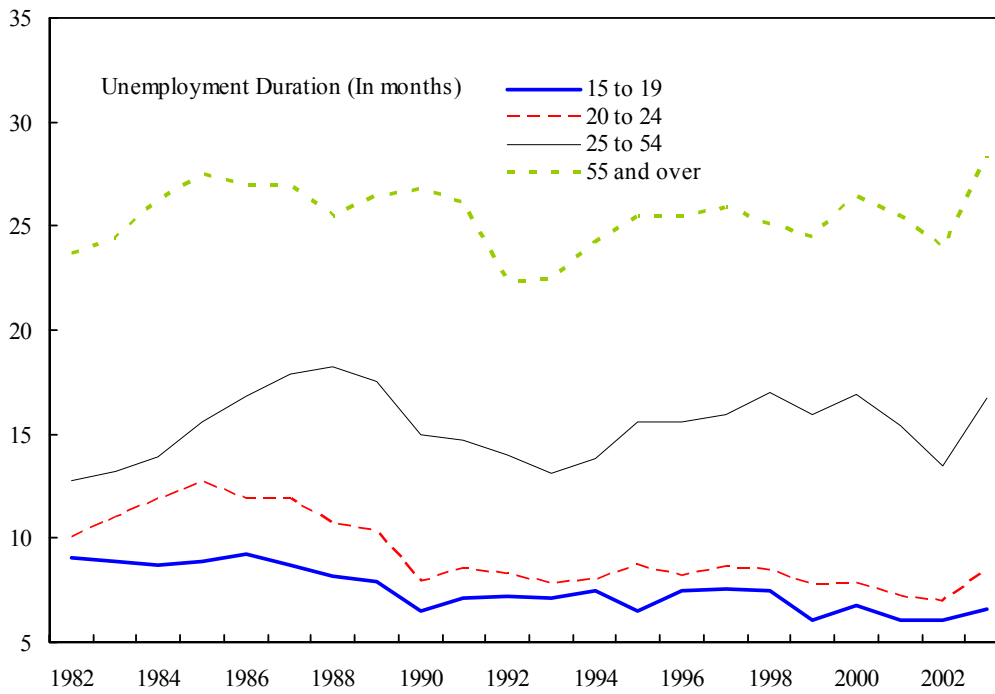
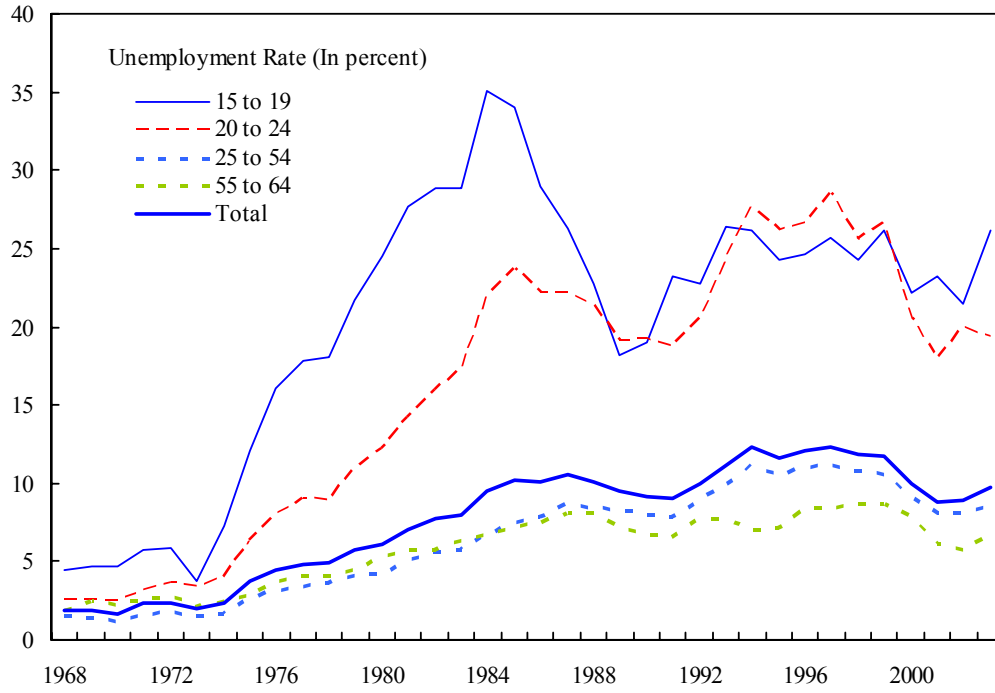
Source: OECD (2005).

65. **Overall employment protection in France has increased since the late 1980s, due both to new legislation and to jurisprudence** (Figure 1). Specifically, the employment protection legislation (EPL) concerning permanent labor contracts has been strengthened, as procedures for economic dismissal have become more complex, legal restrictions on economic dismissals have been tightened, and the burden on firms to help redundant workers to find new jobs has increased (OECD, 2005).

66. **With stricter EPL for permanent contracts, the use of fixed-duration contracts has risen, leading to growing labor market segmentation and unequal treatment between workers.** The share of workers hired with *CDDs* in total dependent employment has risen to 15 percent from less than 5 percent in the mid-1980s, accounting for about 80 percent of the new hires (Cahuc and Postel-Vinay, 2001). Therefore, while a majority of workers benefit from high employment protection, a growing number of them—mainly young workers—find themselves alternating between unemployment and short fixed-duration contracts, with increasing difficulty of obtaining a permanent or high productivity job.⁴³ Indeed, the recent increase in the unemployment rate has fallen disproportionately on the young and the low-skilled, who are most likely hired with *CDDs* (Figure 3 and Text Table).

⁴³ This phenomenon is shared by a large number of European countries.

Figure 3. France: Unemployment Rate and Duration by Age Group



Source: OECD.

Unemployment Rate in France, 2002-04 1/

	2002	2003	2004	<i>Increase during 2002-04</i>
According to ages:				
15-24 years	19.1	21.2	22.7	3.6
25-49 years	8.2	8.9	9.1	0.9
50 years or plus	6.5	7.2	7.1	0.6
According to professional skills:				
Managers	3.6	4.1	4.8	1.2
Mid-level professional:	4.3	5.0	5.9	1.6
Skilled workers	8.8	9.1	10.2	1.4
Low-skilled workers	9.9	10.8	12.3	2.4
Total	8.8	9.7	9.9	1.1

Source: Insee, *Enquêtes sur l'emploi*.

1/ Annual average, ILO definition.

C. Literature Review

67. **The impact of EPL on employment and unemployment has been the subject of a vast literature.** It is generally accepted that an arduous EPL inhibits labor market flexibility by reducing firms' ability to adjust the work force during changing economic conditions. However, the effects of firing and hiring regulations on unemployment have long been debated among economists and policymakers. In theory, arduous EPL leads to a low separation rate but long unemployment duration, with an ambiguous effect on the overall unemployment rate. Firing restrictions are often justified by the need to protect workers from arbitrary actions of firms and to provide some stability in employment (Blanchard and Tirole, 2003). Some even argue that firing and hiring restrictions may promote long-lasting relationships between workers and the firm and encourage investment in human capital. Others assert that strict EPLs can have negative effects on job creation, because they weaken firms' ability to take advantage of the opportunities offered by new technologies and access to new markets that often require a change in the skill composition of the workforce (Pierre and Scarpetta, 2005). Moreover, there is growing evidence that such EPLs may reduce certain groups' access to jobs, including women, the young, and the low-skilled.

68. **There is a consensus, however, that the effects of EPL are contingent on the initial characteristics of the labor market.** Simulations of calibrated models for a typical European labor market find that the effect of a strict EPL on job destruction is stronger than its effect on job creation, resulting in higher unemployment (Blanchard and Landier, 2001; and Cahuc and Postel-Vinay, 2001). Strict EPLs were introduced in many EU countries in the 1970s when unemployment was low, hence the impact was limited. When labor market conditions changed in the 1980s and 1990s, the dynamic between economic shocks and EPL changed, too. Blanchard and Wolfers (2000) suggest that EPL accounts for part of the

increase in unemployment and unemployment persistence in a sclerotic labor market characterized by high unemployment. An empirical study by Elmeskov and others (1998) find a robust positive effect of EPL on unemployment in the OECD countries.

69. One branch of the literature concerns the impact of targeted EPL on labor market performance. In France as well as in many other European countries, employment protection was reduced significantly for workers hired under fixed-term contracts—who constitute the majority of the newly-employed—but maintained for those hired under permanent contracts. Some contend that this type of partial reform may enable a gradual build-up of support for reform and serve as the intermediate step towards a complete reform. The argument is that, from the political economy point of view, persistent high unemployment could also be the result of the lack of political support for reforms to reduce unemployment, since political decisions are likely to reflect the interests of the employed majority rather than the unemployed minority (Saint-Paul, 1993).

70. Many studies find this type of partial reform an ineffective way to reduce unemployment, with negative implications for workers' welfare and productivity.⁴⁴ Cahuc and Postel-Vinay (2001) conclude that achieving labor market flexibility through promoting temporary jobs without a parallel reduction of high firing costs for permanent workers is both ineffective in fighting unemployment and inefficient in improving aggregate welfare. Similarly, Blanchard and Landier (2001) argue that the effects of such partial reform of employment protection may be perverse, with the main effect being a high turnover in fixed-duration workers, leading in turn to higher unemployment. Looking at French data for young workers since the early 1980s, they conclude that the reforms have substantially increased turnover, without a substantial reduction in unemployment duration, but with negative welfare implication for the young workers. Evidence from other countries, including Spain and Sweden, also suggests that under the system of targeted EPL, firms have strong incentives to hire workers at the entry level, on short fixed-duration contracts and without providing them a permanent job at the end of the contract. This increases job turnover but not necessarily overall employment or productivity. In Spain, net job creation began to rise, and unemployment began to fall significantly only after the government reformed the EPL for permanent contracts in the mid-1990s (Box 1).

⁴⁴ Blanchard and Landier, 2001; Cahuc and Postel-Vinay, 2001; Dolado, García-Serrano, and Jimeno, 2002; Cahuc and Zylberberg, 1999; and Pierre and Scarpetta, 2005.

Box 1. Reforming Employment Protection Legislation: the Experiences of Spain and Sweden¹

Spain. Before 1984, Spain had one of the most rigid EPLs in Europe. When the unemployment rate reached 20.1 percent in 1984, the Spanish EPL was reformed by easing the use of fixed-term contracts for nonseasonal productive activities while keeping the rigid EPL for permanent contracts. The use of fixed-term contracts was extended to hire workers performing regular activities, and the dismissal costs for these contracts were reduced substantially. Subsequently, the proportion of fixed-term workers in total dependent employment surged, exceeding 30 percent in 1993, as firms used fixed-term contracts for regular jobs. The unemployment rate, after falling initially, began to rise again in 1990, exceeding 24 percent in mid-1994. Dolado and others (2002) suggest that the expansion of short fixed-term jobs to increase labor market flexibility may be undesirable, especially when there is a strong EPL for permanent jobs. It may lead to unexpected perverse effects stemming from the existence of a segmented labor market, such as lower in-job training, lower labor productivity growth, and a more unequal distribution of unemployment.

The reforms of 1994, 1997, and 2001 led to the reimposition of some restrictions on the use of fixed-term contracts, but at the same time the creation of a new permanent contract with lower firing costs. The government also introduced significant rebates of social security contributions for workers under the new permanent contracts. Between 1994 and 2001, the unemployment rate fell by nearly 10 percentage points. Most recently, a new law was introduced in 2002 that provides the possibility of side-stepping the protracted dismissal process, entailing an effective reduction in dismissal costs.

Sweden. In the early 1990s, Sweden experienced a macroeconomic downturn unparalleled in the post-war period. The unemployment rate rose from less than 2 percent in 1990 to more than 8 percent in 1993. In 1994, a reform of EPL was introduced, which was repealed a year later, raising the duration of fixed-term contracts. The subsequent reform in 1997 significantly relaxed the use of fixed-term contracts but kept the restrictive EPL for permanent contracts untouched.² Employment in fixed-term contracts increased substantially over most of the 1990s, reaching 16 percent of total dependent employment by 2000. Among the other Nordic countries, only Finland has exhibited a similar growth in fixed-term contracts.³

Holmlund and Storrie (2002) find that the partial reform of EPL significantly increased the inflows into unemployment. The annual inflows rose from 5 percent of the labor force at the end of the 1980s to 11 percent in 1990–2000. About 50 percent of the rise in inflows was accounted for by higher inflow from fixed-term jobs. To the extent that there was a trend rise in fixed-term employment during the entire business cycle, it is conceivable that this contributed to an increase in the equilibrium unemployment rate through higher worker separation rates. The Swedish evidence also indicates that there is a wage penalty (about 10 percent) associated with fixed-term workers.

¹ Based on Dolado, García-Serrano, and Jimeno (2002) and Holmlund and Storrie (2002).

² According to the OECD, Swedish EPL is fairly restrictive, although it does not stand out as extreme by European standards.

³ The Finnish experience was more dramatic than the Swedish one, with both greater increase in fixed-term contracts and in unemployment.

D. Analytical Framework

71. **The model used here is based on Dolado and others (2005), which extends the standard Mortensen and Pissarides (1994) matching and search model with firing and hiring restrictions.** Unlike the traditional models of aggregate labor supply and labor demand, search models recognize job market frictions and the need to reallocate workers across productive activities in the face of economic shocks. They explicitly model uncertainties associated with future shocks, expectations of firms and workers, and wage determination mechanisms. In this model, decisions taken by firms and workers are mutually consistent. This type of model is often used to study the influence of alternative labor market institutions and policies on wages and unemployment, particularly the impact of employment protection legislations on unemployment in European countries.⁴⁵ The detailed model is presented in Appendix I.

72. **To best capture the main characteristics of the employment protection legislation in France, our model introduces the following assumptions:** (i) firms can fill a position by hiring a worker from the pool of unemployed either under a permanent *CDI* contract ($i=1$) or a fixed-duration *CDD* contract ($i=2$); (ii) the termination of a *CDI* is costly, with firing cost K_1 , which is treated as pure waste and not as a transfer to workers; and (iii) *CDDs* can be terminated at a lower cost K_2 , but the use of *CDDs* is restricted by government regulations.⁴⁶

73. **Job vacancies and unemployed workers meet according to a matching function $m(v,u)$,** where v and u represent, respectively, the number of vacant jobs and of unemployed workers. The matching function captures the job-searching behavior of the unemployed. The rate at which vacant jobs are filled is given by $q(\theta)=m(v,u)/v$, where $\theta = v/u$ can be interpreted as a measure of the tightness of the labor market from firms' perspective: firms fill their vacancies easily when there are more workers relative to available jobs. The rate at which an unemployed worker meets a firm with a vacancy is $m(u,v)/u$. Once the worker and the firm meet, a job is drawn from a distribution function $F(\varepsilon)$, and the possibility that this job is offered with a fixed-duration contract is α , which is a policy variable. After a match is formed, wages are determined by a Nash-bargaining solution.

74. **A typical risk-neutral worker accepts a job when the value of the employment (W) exceeds and the value of unemployment (U).** Specifically, the worker earns $w(\varepsilon)$ when employed and producing at productivity ε and searches for a job when unemployed while receiving a real income of b , which could include unemployment insurance benefits and the imputed real return from unpaid leisure activities, such as home production or recreation.

⁴⁵ Blanchard and Landier, 2001; Cahuc and Postel-Vinay, 2001; Dolado, García-Serrano, and Jimeno, 2002; Cahuc and Zylberberg, 1999.

⁴⁶ These EPL characteristics are shared by many European economies.

75. **A firm decides to fill a vacancy (hire a worker) when the value of a filled-vacancy (V) exceeds the value of when it is unfilled (J).** Hiring starts when the value of a filled vacancy is higher than the value of an unfilled vacancy, with the *hiring threshold* determined by equating the two values. A job is terminated when its value falls below the value when vacant minus firing cost, which determines the *firing threshold*. In steady-state, free entry drives the value of an unfilled vacancy to zero.

76. **Job creation and job destruction are endogenously determined.**⁴⁷ Each job is characterized by a fixed technology and produces a unit of a differentiated product. A job is created when a firm and a searching worker meet, agree to a match at a negotiated wage, and start producing.⁴⁸ Once a job is created, production continues until a negative idiosyncratic productivity shock arrives, at which point the productivity of the job moves to the low value. Jobs of which the productivity falls below a productivity threshold (*the reservation productivity*) are destroyed, and jobs with productivity above it are continued. When a job is terminated, the firm must pay a pure-waste firing cost. When the firm and the worker separate, the worker moves from employment to unemployment, and the firm can either withdraw from the market or open a new job vacancy. *Equilibrium unemployment* is obtained when the flow into unemployment equals the flow out of it.⁴⁹

77. **The job-creation curve (JC) and the job destruction curve (JD) capture the relationships between the productivity thresholds for hiring or firing and the labor market tightness** (Figure 4). It can be shown that as the labor market tightness increases, workers have a higher reservation value and, therefore, the firing productivity threshold increases. Hence, the job-destruction curve is upward sloped. The job-creation condition is determined by the free-entry condition: job creation stops when there is no rent left for the firm. The JC curve slopes downward.

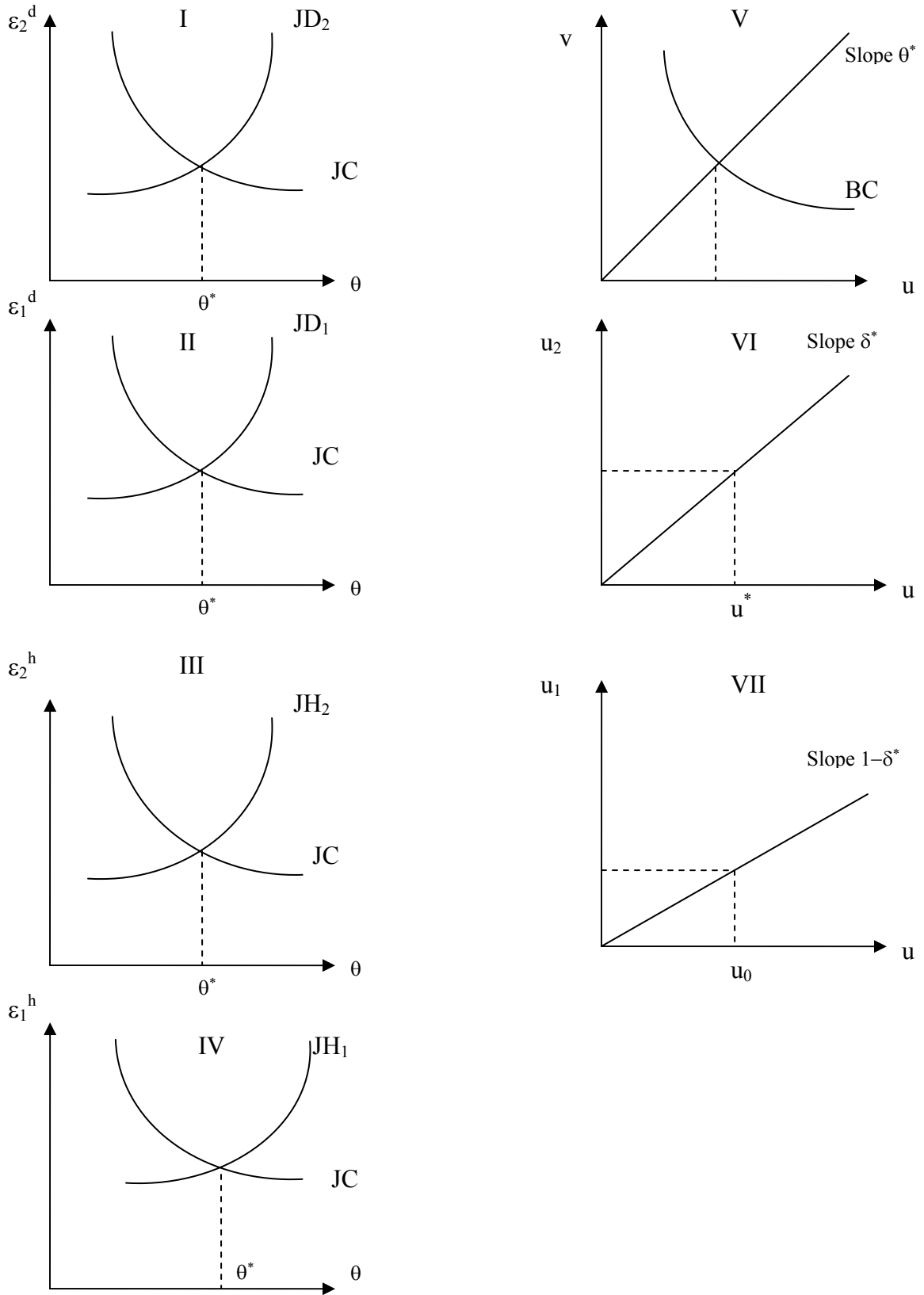
78. **In the steady state, a system of six equations solves for six variables:** hiring and firing thresholds for workers with different types of contract (ε_i^j , $i=1,2$ and $j=d,h$), labor market tightness (θ), equilibrium unemployment (u^*), and the composition of unemployed (δ). The system is recursive, in the sense that the productivity thresholds for hiring and firing each type of worker depend on labor market tightness, which, in turn, is determined by the job flows implied by these hiring and firing thresholds.

⁴⁷ When the job destruction rate is exogenous, the labor market tightness (the vacancy/unemployment ratio θ) is independent of the unemployment rate u .

⁴⁸ Opening a new job vacancy is not job creation, and is considered as creating a job vacancy.

⁴⁹ Alternatively, the steady-state condition can also be stated in terms of job flows, instead of unemployment flows. Specifically, in the steady state, the rate of job creation (inflows into employment) equals to the rate of job destruction (outflows from employment).

Figure 4. Model Diagram



79. Reducing firing costs increases job destruction as well as job creation, with an ambiguous effect on steady-state unemployment (Figure 5):

- For given labor market tightness θ , reducing firing costs raises the firing threshold and lowers the hiring threshold. This increases the expected employment duration of a match (as the inaction area is increased, i.e., the firm fires and hires less frequently), and hence the expected surplus (rent) from filled vacancies rises. Thus, reducing firing costs results in more job destruction as well as more job creation (the JD curve shifts to the left, and the JH curve shifts to the right), with ambiguous effect on unemployment. These results are consistent with the findings of the literature.
- The effect of lower firing costs on θ depends on the difference between the expected surplus from hiring workers with *CDD* and the surplus from hiring with *CDI*. As shown in Dolado and others (2005), it is plausible that the latter is larger than the former. As a result, the share of workers with *CDD* in total unemployment would go up, and market tightness decreases. The final impact on unemployment would depend on the changes in unemployment for two types of workers, or the change in the unemployment duration.

80. Facilitating the use of fixed-duration contracts encourages job creation, but at the same time it increases job destruction. Easing restrictions on *CDDs* raises productivity thresholds for both contracts and overall job market tightness. Since a *CDD* job (with lower firing costs) yields a higher surplus than a *CDI* job, increasing the *CDD* contracts fosters job creation. On the other hand, a tight labor market implies that workers would raise the minimum acceptable productivity of their jobs, leading to increasing wage pressure, which in turn leads to job destruction. The overall effect on unemployment depends, once again, on the relative strength of the job creation and job destruction effects (Figure 6).

81. In the next section, the model will be calibrated for France to evaluate the relative strength of these counteractive effects.

Figure 5. Reduction in Firing Costs K1

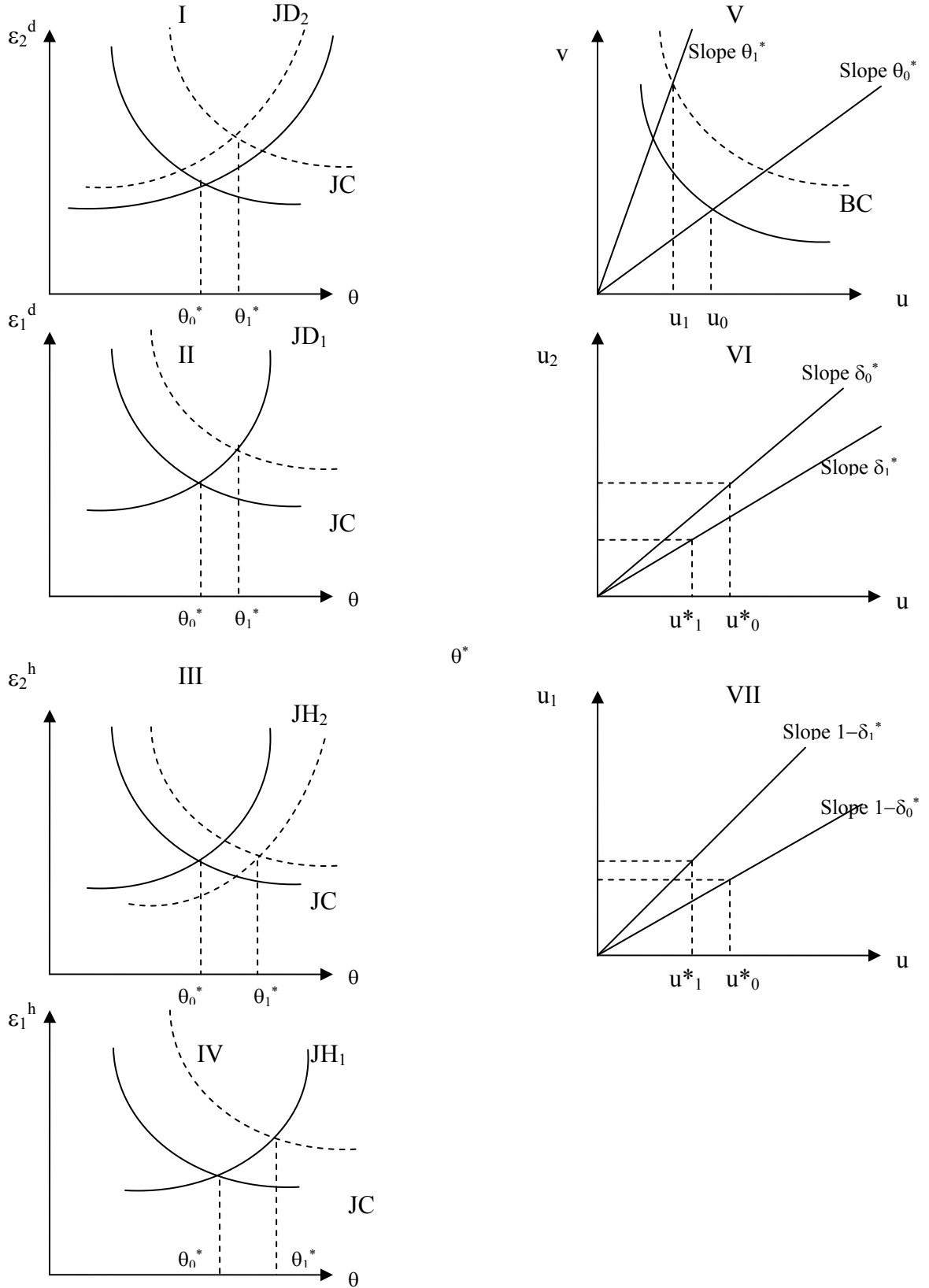
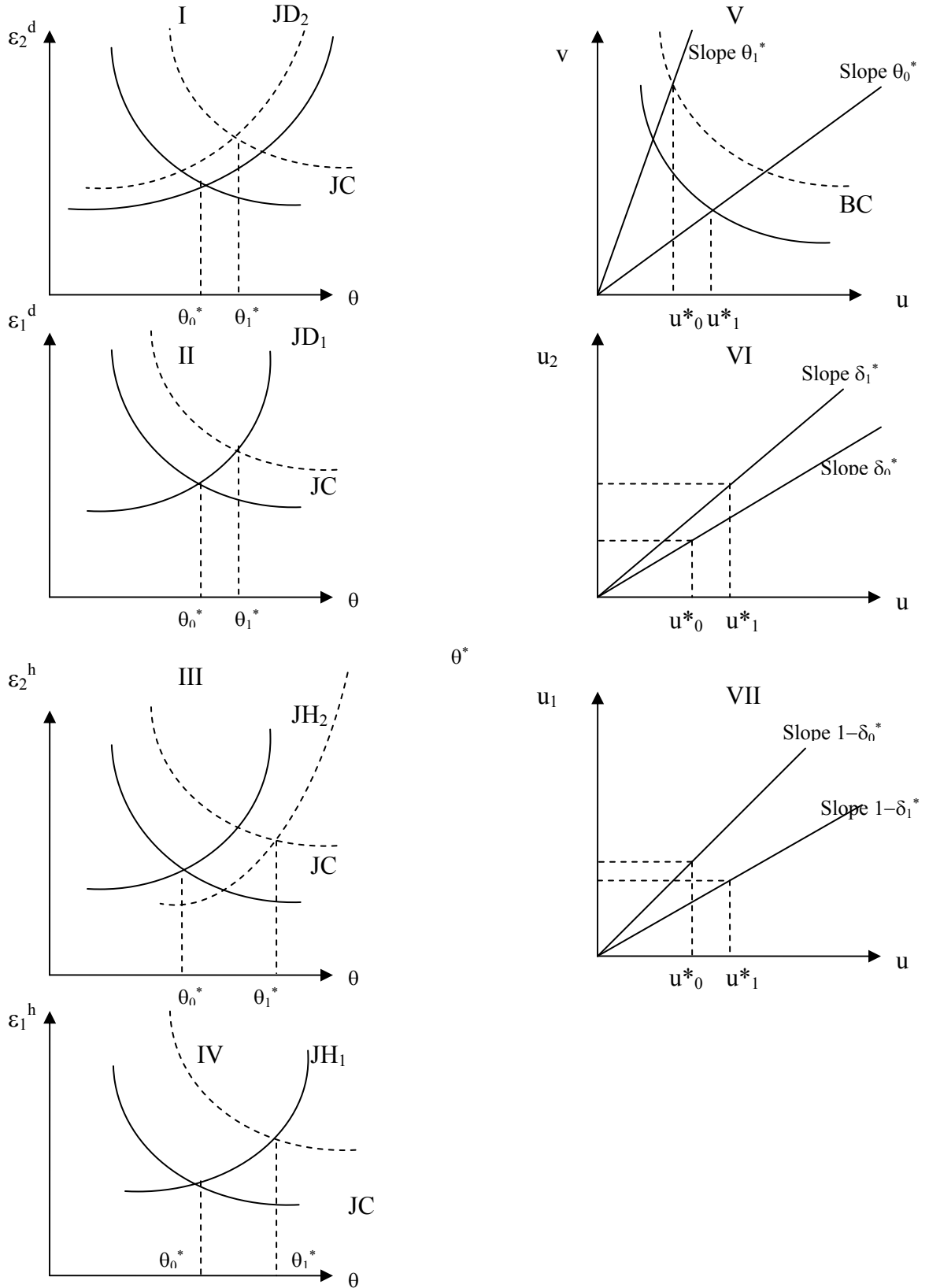


Figure 6. Increase in the Permitted Share of Fixed-term Contracts



E. Simulation Results

82. **In this section, the model discussed earlier is calibrated for the French labor market and used to simulate the effects of various reform proposals**, including (1) the impact of lower firing restrictions on *CDIs* (Scenario 1, captured by lowering K_1); (2) the impact of a less restrictive use of *CDDs* (Scenario 2, captured by higher α , in line with the reform proposal in the *de Virville* report); and (3) the impact of a specific combination of lower firing restrictions on *CDIs* and a merger of *CDI* and *CDD* (Scenario 3: lower K_1 and lower α , in line with reforms proposed by Kramarz and Cahuc and Blanchard).

83. **Parameters for simulations are chosen from existing studies** (Table 3). Following Dolado and others (2005), we assume that the productivity of workers with *CDDs* is uniformly distributed in $[0,1]$ and that productivity of workers with *CDIs* is uniformly distributed in $[1/3, 1]$. The utility of being unemployed (a proxy for unemployment benefits) is $b=0.25$, which represents half of a worker's average productivity. The cost of holding a vacancy unfilled is set at $c=1/3$. The matching function $m(u,v)=M u^\eta v^{1-\eta}$ is assumed to be Cobb-Douglas, in line with recent studies on France (for example, Cahuc and Postel-Vinay, 2001). The base period is one quarter, and the quarterly interest rate is set at 0.01. The arrival rate of productivity shocks is set at $\lambda =0.081$, as in Mortensen and Pissarides (1994). The policy variables are captured by firing costs K_1 and K_2 and by hiring restriction α . The base case with an unemployment rate of about 10 percent is calibrated by choosing K_2 while setting $K_1=1$ and $\alpha =0.2$.

Table 3. Baseline Parameters

Parameters	Value
λ	0.081
b	0.25
c	1/3
r	0.01
M	1
η	0.5
K_1	1
K_2	0.2
α	0.2

84. **The results of the simulation are summarized in Table 4.** They indicate that lowering firing costs for *CDIs* by 50 percent would lower the unemployment rate by 1 percentage point. The results also confirm the main conclusions in Blanchard and Landier (2001) and Cahuc and Postel-Vinay (2001): a partial EPL reform that relaxes the use of *CDDs* while keeping EPL for *CDIs* unchanged would lead to a higher, not lower, unemployment rate. A reform along the line of the proposal by Kramarz and Cahuc, which lowers the firing cost of *CDIs* to that of *CDDs*, thus effectively merging both contacts, would lower the unemployment rate by 2 percentage points. This effect would be even larger (about 3 percentage points) when firing restrictions are eliminated (Scenario 4).

85. **These results are subject to some caveats.** First, they depend on the specifications of the matching function as well as the distribution function of productivity. For example, simulations using a CES matching function as specified in Dolado and others (2004) imply a much larger negative unemployment effect of a partial EPL reform (raising the unemployment by 2.5 percent instead of 1 percent when using a Cobb-Douglas matching function). Second, our model does not capture one key element of the French wage setting mechanism, namely the existence of minimum wages.⁵⁰ As shown in Cahuc and Zylberberg (1999), the impact of job protection policies on unemployment is strongly influenced by the wage setting mechanisms. High and binding minimum wages prevent the internalization of high hiring costs (which is a key assumption of our model). Since high minimum wages may already price the low-skilled workers and young workers out of jobs, together with strict EPL, they can significantly lower the chances of these workers of coming to the active labor force.

Table 4. Simulated Effects of Various EPL Reform Proposals

	Unemployment Rate	Number of Vacancies per Unemployed
Base case		
Current situation (K1=1, K2=0.2, a=0.2)	10.3	0.71
Scenario 1		
<i>Deviation from the base case</i>		
Reduce firing restrictions on CDI by 50% (K1=0.5, K2=0.2, a=0.2)	-0.9	0.91
Scenario 2		
Keep EPL on CDI unchanged, but relax the hiring restriction on CDD (K1=1, K2=0.2, a=0.5)	0.9	0.81
Scenario 3		
Lower firing cost on CDI and merge CDD and CDI (K1=K2=0.2)	-1.8	1.16
Scenario 4		
Merge CDD and CDI and eliminate firing restrictions (K1=K2=0)	-2.7	1.45

Source: IMF staff estimates.

⁵⁰ Minimum wages in France apply to most wage-earners, irrespective of age and occupation. The government had in the past relied on increases in minimum wages to sustain consumption. Minimum wages in France began to rise sharply in relation to the median wage after the second half of 1960s and stayed high since the mid-1980s compared with its neighboring countries and the United States.

F. Concluding Remarks

86. **The new employment contract takes an important step toward reforming the employment protection legislation in France, but its effectiveness depends on further reforms.** While it will facilitate hiring, the *CNE* represents only a partial reform of the employment protection legislation. It introduces the needed flexibility for only up to two years and is limited to small enterprises. Moreover, it is equivalent to a fixed-duration contract with no hiring and firing restrictions. Easing the restriction on fix-duration contracts while keeping the strict firing restrictions on permanent contracts could undermine the effectiveness of the reform, as evidenced by the experiences from other countries, such as Spain and Sweden.

87. **The effectiveness of the new labor contract in promoting job creation and reducing the unemployment rate will depend crucially on broadening its application and adopting supporting reforms.** Simulations of a search-matching model, with hiring and firing restrictions calibrated to the French labor market, suggest that a reform, which effectively merges existing contracts into a single one by lowering firing costs and legal uncertainty (e.g., as in the proposal by Kramarz and Cahuc), would lower the structural unemployment rate by 2 percentage points. This effect could be even larger (about 3 percentage points) when firing restrictions are completely eliminated. The magnitude of these estimates should be interpreted with caution. It is sensitive to the choice of parameters and assumes efficient employment services and minimum wages that are sufficiently low to allow internalization of hiring and firing costs.

The Model

1. The model used here is based on Dolado and others (2005) and extends the standard Mortensen and Pissarides matching and search model (1994) with firing and hiring restrictions. In this model, the equilibrium unemployment rate is determined by both flows into unemployment and unemployment duration. This type of models is often used to study the effects of labor market policies, particularly employment protection legislations, on unemployment in European countries.⁵¹
2. To best capture the main characteristics of the employment protection legislations in France, the model introduces the following assumptions: (i) firms can fill a position by hiring a worker from the pool of unemployed either under a permanent *CDI* contract ($i=1$) or a fixed-duration *CDD* contract ($i=2$); (ii) the termination of a *CDI* is costly, with firing cost K_1 , which is treated as pure waste and not as a transfer to workers; and (iii) *CDDs* can be terminated at a lower cost K_2 , but the use of *CDDs* is restricted by government regulations.⁵²
3. **Job creation and job destruction are endogenously determined.**⁵³ Each job is characterized by a fixed technology and produces a unit of a differentiated product. Each firm has one job to offer, thus the number of firms is the same as the number of jobs. The cost of keeping a job vacancy unfilled is c . A job is created when a firm and a searching worker meet, agree to a match at a negotiated wage, and start producing.⁵⁴ Once a job is created, production continues until a negative idiosyncratic productivity shock arrives, at which point the productivity of the job moves to the low value. Jobs with productivity falls below a productivity threshold (*the reservation productivity*) are destroyed, and jobs with productivity above it are continued. When a job is terminated, the firm must pay a pure-waste firing cost. When the firm and the worker separate, the worker moves from employment to unemployment, and the firm can either withdraw from the market or open a new job vacancy.
4. **The model considers an economy populated by a fixed labor force (normalized to one).** Workers are risk-neutral, infinitely-lived, and can either be employed and producing or unemployed and searching. For simplicity, there is no on-the-job searching.⁵⁵

⁵¹ Blanchard and Landier, 2001; Cahuc and Postel-Vinay, 2001; Dolado, García-Serrano, and Jimeno, 2002; Cahuc and Zylberberg, 1999.

⁵² These EPL characteristics are shared by many European economies.

⁵³ When the job destruction rate is exogenous, the labor market tightness (the vacancy/unemployment ratio θ) is independent of the unemployment rate u .

⁵⁴ Opening a new job vacancy is not job creation, and is considered as creating a job vacancy.

⁵⁵ Hence worker flows and job flows are assumed to be the same. According to Mortensen and Pissarides (1994), the introduction of on-the-job search should not alter the main results of the model.

Matching process

5. **Job vacancies and unemployed workers meet according to a matching function $m(v,u)$** , where v and u represent, respectively, the number of vacant jobs and of unemployed workers. The matching function is increasing in both arguments and assumed to be concave, with constant returns to scale. Moreover, $m(v,0)=m(0,u)=0$.

6. The rate at which vacant jobs are filled is given by

$$q(\theta) = m(v,u) / v = m(1, u/v) = m(1, \frac{1}{\theta}), \quad q'(\theta) \leq 0.$$

where $\theta = v/u$ can be interpreted as a measure of the tightness of the labor market from the firm's perspective: the fewer unemployed the harder for the firm to fill a vacancy. During a small time interval dt , a vacant job is matched to an unemployed worker with probability $q(\theta)dt$, so that the average duration of a vacant job is $1/q(\theta)$. The probability that a vacant job will not be filled is $1 - q(\theta)dt$.

7. The rate at which an unemployed worker meets a firm with a vacancy is given by

$$m(v,u) / u = \theta q(\theta)$$

8. Once the worker and the firm meet, a job is drawn from the distribution $F(\epsilon)$, and the possibility that this job is offered with a fixed-duration contract CDD is α . The probability that an unemployed worker will not find a job is $1 - \theta q(\theta)dt$, with an unemployment duration of $1 / \theta q(\theta)$. It is easy to see that:

$$\begin{aligned} d(1/q(\theta)) / d\theta &\geq 0 \\ d(1/\theta q(\theta)) / d\theta &\leq 0 \end{aligned}$$

Thus unemployed workers find jobs easily when there are more jobs relative to the available workers, and the firms fill their vacancies easily when there are more workers relative to the available jobs.

9. **In this model, the flow into unemployment results from idiosyncratic productivity shocks that arrive to occupied jobs (a CDI job or a CDD job) at the Poisson rate λ** . Equilibrium unemployment is obtained when the flow into unemployment equals the flow out of it.⁵⁶ The flow into unemployment is the fraction of jobs that gets hit by a productivity shock below the productivity threshold ϵ_i^d ($i=1,2$), with the probability $F^d(\epsilon_i^d)$.

⁵⁶ Alternatively, the steady-state condition can also be stated in terms of job flows instead of unemployment flows. Specifically, in the steady state, the rate of job creation (inflows into employment) equals the rate of job destruction (outflows from employment).

Therefore, the flow into unemployment (job destruction) is given by $\lambda F^1(\varepsilon_1^d)(1-\alpha)(1-u)$ for a *CDI* worker and $\lambda F^2(\varepsilon_2^d)\alpha(1-u)$ for a *CDD* worker, with labor force normalized to be unity.

10. Hence, for given matching probabilities and productivity thresholds, the steady-state flow equations are given by:

$$[(1 - F^1(\varepsilon_1^h)]\theta q(\theta)(1 - \delta)u = \lambda F^1(\varepsilon_1^d)(1 - \alpha)(1 - u). \quad (1)$$

$$[(1 - F^2(\varepsilon_2^h)]\theta q(\theta)\delta u = \lambda F^2(\varepsilon_2^d)\alpha(1 - u). \quad (2)$$

where δ is the share of unemployed *CDD* workers in total unemployment.

11. **The steady-state unemployment can be solved as:**

$$u^* = \frac{\lambda F^2(\varepsilon_2^d)}{[1 - F^2(\varepsilon_2^h)][(1 - \delta)/(1 - \alpha)]\theta q(\theta) + \lambda F^2(\varepsilon_2^d)} \quad (3)$$

Equation 3 implies that for a given arrival rate of productivity shocks (λ) and labor market tightness (θ), there is a unique equilibrium unemployment rate.

Firms

12. For the firms, the value of an unfilled vacancy (V) and the value of filled vacancies of productivity ε with contract type i are given by the following equations:

$$rV = -c + (1 - \delta)q(\theta) \int_{\varepsilon_1^h}^1 [J_1(x) - V] dF^1(x) + \delta q(\theta) \int_{\varepsilon_2^h}^1 [J_2(x) - V] dF^2(x) \quad (4)$$

$$rJ_i(\varepsilon) = \varepsilon - w_i(\varepsilon) + \lambda F^i(\varepsilon_i^d)[V - J_i(\varepsilon) - K_i] + \lambda \int_{\varepsilon_i^d}^1 [J_i(x) - J_i(\varepsilon)] dF^i(x), (i = 1, 2). \quad (5, 6)$$

13. A firm decides to fill a vacancy (hire a worker) when its value when filled equals or exceeds the value of when it is unfilled. The hiring threshold is determined when the two values are equal. A job is terminated (a worker leaves employment and enters unemployment) when its value falls below the value of when it is unfilled minus firing costs. This gives the firing threshold.

Workers

14. A typical risk-neutral worker earns $w(\varepsilon)$ when employed and producing at productivity ε , and searches for a job when unemployed while receiving a real income of b (which could include unemployment insurance benefits and the imputed real return from unpaid leisure activities, such as home production or recreation). Unemployment income is assumed to be the same for all workers, and firms cannot discriminate against workers hired

under fixed-term contracts, as required by the French labor law. Thus, workers with the same productivity are paid at the same wage rate.⁵⁷

15. For the workers with productivity ε under contract type i , the value of employment (W_i) and the value of unemployment (U_i) are given by the following Bellman equations:

$$rU_i = b + \theta q(\theta) \int_{\varepsilon_i^h}^1 [W_i(x) - U_i] dF^i(x), \quad (i = 1, 2) \quad (7)$$

$$rW_i(\varepsilon) = w_i(\varepsilon) + \lambda F^i(\varepsilon_i^d) [U_i - W_i(\varepsilon)] + \lambda \int_{\varepsilon_i^d}^1 [W_i(x) - W_i(\varepsilon)] dF^i(x), \quad (i = 1, 2) \quad (8, 9)$$

Wage determination

16. After a match is formed, **wages are determined by a bargaining solution maximizing the weighted product of the worker's and the firm's surplus from a job match:**⁵⁸

$$\text{Max} [W_i(\varepsilon) - U]^\beta [J_i(\varepsilon) - V + K_i]^{1-\beta},$$

where $0 \leq \beta \leq 1$ can be interpreted as a relative measure of labor's bargaining power. Jobs with higher productivities offer high wages. An employment contract between the firm and the worker is a wage w for each period of time that they are together and a separation rule that is contingent on the arrival of an idiosyncratic productivity shock. This contract is renegotiated whenever new information arrives. A symmetric Nash bargaining solution ($\beta=0.5$), where the total surplus/rent generated by a job match is equally shared by the worker and the firm, implies.⁵⁹

$$W_i(\varepsilon) - U = J_i(\varepsilon) - V + K_i \quad (10)$$

Equilibrium

17. Hiring stops when the value of a filled vacancy falls below the value of an unfilled vacancy, and a job is terminated when the value of the job is below its value when vacant minus firing cost. In steady-state, the free entry drives the value of an unfilled vacancy to zero, hence we have:

⁵⁷ In theory, fixed-term workers should be offered a *wage premium* that compensates for the higher separation risk, but there is no empirical evidence suggesting this. On the contrary, there is evidence indicating a wage penalty associated with fixed-term workers (see Box 1).

⁵⁸ In this setup, wages are renegotiated continuously.

⁵⁹ This can be interpreted as the firm and the worker having the same bargaining power.

$$\begin{aligned} J_i(\varepsilon_i^h) &= V \\ J_i(\varepsilon_i^d) + K_i &= V \\ V &= 0 \end{aligned}$$

18. The first two equations above determine the productivity thresholds for hiring and firing, which give the **job destruction conditions**:

$$\varepsilon_i^d = b - \frac{\lambda}{r + \lambda} \int_{\varepsilon_i^d}^1 [1 - F^i(x)] dx + \frac{\theta q(\theta)}{2(r + \lambda)} \int_{\varepsilon_i^d}^1 [1 - F^i(x)] dx + \{\theta q(\theta)[1 - F^i(\varepsilon_i^h)] - r\} K_i \quad (11, 12)$$

$$\varepsilon_i^h = b - \frac{\lambda}{r + \lambda} \int_{\varepsilon_i^d}^1 [1 - F^i(x)] dx + \frac{\theta q(\theta)}{2(r + \lambda)} \int_{\varepsilon_i^d}^1 [1 - F^i(x)] dx + \{\theta q(\theta)[1 - F^i(\varepsilon_i^h)] + r + 2\lambda\} K_i \quad (13, 14)$$

Or

$$\varepsilon_i^h - \varepsilon_i^d = 2(r + \lambda) K_i. \quad (15, 16)$$

Equations 11 and 12 give the relationship between the firing thresholds and the labor market tightness (the JD curve), while equations 13 and 14 give the relationship between the hiring thresholds and the tightness (the JH curve). As shown in Dolado and others (2005), as labor market tightness increases, workers have a higher reservation value and, therefore, the firing productivity thresholds increase. With a higher firing threshold, the initial hiring threshold also increases. Hence, both the JD and JH curves are upward-sloped (see Figure 4).

19. **The job creation condition** is determined by $V=0$ (i.e., the free-entry condition, job creation stops when there is no rent left for firms), which can be written as follows:

$$\frac{c}{\theta q(\theta)} = \frac{\delta}{2(r + \lambda)} \int_{\varepsilon_2^h}^1 [1 - F^2(x)] dx + \frac{1 - \delta}{2(r + \lambda)} \int_{\varepsilon_1^h}^1 [1 - F^1(x)] dx \quad (17)$$

This equation captures the relationship among tightness, the hiring threshold, and the (composition of) unemployment.

20. In steady-state, a system of six equations (3, 11, 12, 13, 14, 17) solves for six variables: hiring and firing thresholds for workers with different type of contract (ε_i^j , $i=1,2$ and $j=d,h$), labor market tightness (θ), and the equilibrium unemployment (u^*). The system is recursive, in the sense that the productivity thresholds for hiring and firing each type of worker depend on labor market tightness, which, in turn, is determined by the job flows implied by these hiring and firing thresholds (see Figure 4).

21. For given labor market tightness θ , reducing firing costs raises the firing threshold and lowers the hiring threshold. This increases the expected employment duration of a match

(as the inaction area is increased, i.e., the firm makes less frequent firing and hiring), and hence the expected surplus (rent) from filled vacancies rises. Thus, reducing firing costs results in more job destruction as well as more job creation (JD curve shifts to the left and JH curve shifts to the right), with ambiguous effect on unemployment. These results are consistent with the findings of the literature.

22. The effect of lower firing costs on θ depends on the difference between the expected surplus from hiring workers with *CDDs* and the surplus from hiring with *CDIs*. As shown in Dolado and others (2005), it is plausible that the latter is larger than the former. As a result, the share of workers with *CDDs* in total unemployment would go up, and market tightness decreases. The final impact on unemployment would depend on the changes in unemployment for two types of workers, or the change in the unemployment composition.

23. Facilitating the use of fixed-term contracts, by increasing their rate of approval (α), increases productivity thresholds for both contracts and overall job market tightness. Since a *CDD* job (with lower firing costs) yields a higher surplus than a *CDI* job, increasing the *CDD* contracts fosters job creation. On the other hand, tight labor market implies that workers would raise the minimum acceptable productivity of their jobs, leading to increasing wage pressure, which in turn leads to job destruction. The overall effect on unemployment depends, once again, on the relative strength of the job creation and job destruction effects.

Variable List

Policy variables

K_1	firing cost associated with permanent contracts (<i>CDI</i>)
K_2	firing cost associated with fixed-duration contracts (<i>CDD</i>)
a	hiring restriction for a <i>CDD</i> contract (i.e., the approval rate for a <i>CDD</i>)

Endogenous variables

v	the number of vacancies
u	the number of unemployed workers
u_1	the number of unemployed workers who were hired under <i>CDIs</i>
u_2	the number of unemployed workers who were hired under <i>CDDs</i>
δ	unemployment composition (u_2/u)
$\theta=v/u$	labor market tightness from firms' point of view
$m(v,u)$	the matching function that determines the rate at which job vacancies and unemployed workers meet
$q(\theta)=m(v,u)/v$	the rate at which a vacancy is filled
$F(\varepsilon)$	the distribution of productivity ε , from which a job is drawn
ε_i^d	the firing threshold for workers with contract type i
ε_i^h	the hiring threshold for workers with contract type i
$w(\varepsilon)$	wage of a worker with productivity ε
V	the value of an unfilled vacancy
$J_i(\varepsilon)$	the value of a filled vacancy of productivity ε with contact type i
$W_i(\varepsilon)$	the value of employment for the workers with productivity ε under contact type i
U_i	the value of unemployment for the workers with productivity ε under contact type i

Parameters

r	quarterly interest rate
λ	the Poisson rate at which a job-specific productivity shock arrives to occupied jobs
b	real income of an unemployed worker (i.e., unemployment benefits)
c	the cost of keeping a job vacancy unfilled
β	a measure for the union's bargaining power
$i=1$	a contract is a <i>CDI</i>
$i=2$	a contract is a <i>CDD</i>

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