LABOR MARKET POLICIES AND UNEMPLOYMENT DYNAMICS IN SPAIN

Jeffrey Franks

Banco de España - Servicio de Estudios
Documento de Trabajo nº 9708

LABOR MARKET POLICIES AND UNEMPLOYMENT DYNAMICS IN SPAIN

Jeffrey Franks (*)

(*) International Monetary Fund.
Part of this research was carried out when I was working as a research fellow at the Bank of Spain. The opinions expressed here are not necessarily shared by the International Monetary Fund or the Bank of Spain.

Banco de España - Servicio de Estudios
Documento de Trabajo nº 9708

In publishing this series the Banco de España seeks to disseminate studies of interest that will help acquaint readers better with the Spanish economy.

The analyses, opinions and findings of these papers represent the views of their authors; they are not necessarily those of the Banco de España.

The Banco de España is disseminating some of its principal reports via INTERNET and INFOVÍA.

The respective **WWW** server addresses are: http://www.bde.es and http://www.bde.inf.

ISSN: 0213-2710
ISBN: 84-7793-527-0
Depósito legal: M. 1161-1997
Imprenta del Banco de España

Abstract

This paper explores the role of adjustment lags and labor market policies in the generation and perpetuation of high unemployment in Spain. A simple three equation model of the labor market (a labor force equation, an employment equation, and a wage-setting equation) is estimated using error correction techniques, allowing for lagged terms so as to capture dynamic adjustment effects. The results suggest that the Spanish labor market adjusts very slowly -it takes at least 6-8 years for unemployment to adjust to 90 percent of its new equilibrium level after an exogenous shock. The introduction of several policy-related variables into the model demonstrated a number of statistically significant effects of labor market policies on unemployment: 1) higher social contributions and rising severance pay settlements significantly reduce employment; 2) increases in minimum wages and unemployment benefits push up real wages, while increased use of temporary contracts reduce them; 3) unemployment benefits also contribute to unemployment by encouraging higher labor force participation, while increased disability benefits reduce it; and 4) Labor conflictiveness (strikes) and greater collective bargaining reduce employment.

LABOR MARKET POLICIES AND UNEMPLOYMENT DYNAMICS IN SPAIN
Jeffrey R. Franks

No country in Europe has as great an unemployment problem as Spain. From less than 5 percent in the mid-1970s, the unemployment rate has peaked at more than 20 percent in each of the last two economic slowdowns, without dropping below 15 percent in times of strong growth. From an analytical standpoint, the Spanish case is a fascinating, extreme example of the pan-European unemployment problem. From the policy perspective, it is essential to understand and attack labor market problems successfully in Spain if the unemployment crisis of the European Union (EU) is to be tackled, especially since the number of jobless in Spain in 1995 was higher than in the much larger EU countries of France, Italy, and the United Kingdom, and nearly as high as in Germany.

Broadly speaking, two competing schools of thought have existed in analyses of European unemployment over the last twenty years. One approach is to focus primarily on cyclical factors in generating unemployment, the implication being that macroeconomic shocks have caused unemployment to deviate from a (low) "natural" or nonaccelerating inflation rate of unemployment (NAIRU)[1]. Studies in this vein look to a series of adverse macroeconomic shocks to explain the high and persistent unemployment rates in Europe since the 1970s. The oil crises of the 1970s and the recession of the early 1990s are seen as triggers for increased European unemployment, exacerbated by high real interest rates that reduced investment[2]. At the other extreme is the hysteresis theory invoked by Blanchard and Summers (1986) and others, which argues that most of the unemployment increase is due to an increase in the NAIRU rather than in deviations therefrom. Indeed, in its most extreme form,

Note: The author wishes to thank Brian Henry for helpful comments throughout the development of the paper. Discussions with the other participants in the unemployment project (C. Cristofides, K. Habermeier, P. Mauro, R. Ramaswamy, and T. van der Willigen) were also of great help. L. Monasi provided research assistance on the data and M. Karanassou assisted with the policy simulations. All errors are my own.

[1]Friedman (1968) coined the term "natural rate of unemployment," which was subsequently used extensively in the so-called New Classical Economics school of thought.

[2]Bianchi and Zoega (1994).

hysteresis implies that every change in unemployment becomes an equilibrium, as structural features of the labor market translate temporary shocks into permanent changes in the natural rate of unemployment.

In Spain, where unemployment has not only shown large cyclical swings (rising nearly 9 percentage points during the last recession), but has also demonstrated remarkable persistence at very high levels, the traditional NAIRU concept loses much of its usefulness. Can one really argue that an estimated NAIRU of 18-20 percent (as some economists have recently calculated) is a meaningful indication of what unemployment rate is "natural" for Spain? At the same time, however, the full hysteresis argument ignores the undeniably large cyclical movements in unemployment while implicitly arguing for an even higher (albeit path-dependent) natural rate of unemployment.

For these reasons, the analytical approach taken in this paper is something of an intermediate position between the extreme NAIRU view that unemployment has a clearly defined (relatively low) equilibrium rate to which it returns after macroeconomic shocks, and the extreme hysteresis view that unemployment is a random walk, with the equilibrium rate equal to the current unemployment rate in each period. A simple three-equation model of the labor market--a labor force equation, a wage determination equation, and an employment equation--is presented. By permitting several lags in the system of equations--and by allowing full interaction among the lags in the different equations--the model permits an examination of the degree to which unemployment is persistent, while allowing the identification of the sources of persistence in the different equations. This model structure implicitly assumes that the true nature of unemployment dynamics is a subtle combination of factors generating persistence and forces pushing toward equilibrium.

On the one hand, the structural nature of the system implies that there is indeed some underlying "equilibrium" level of unemployment in the economy, thus rejecting the extreme hysteresis view. On the other hand, by allowing for long and interactive lags, the issue of what the precise equilibrium rate is becomes less crucial than the structural features of the economy that produce the pattern of lags[3]. Long lags have profound implications for the actual rate of unemployment; once the period of adjustment exceeds the average time between shocks (or the length of the average economic cycle), shocks can compound their effects and feed back on each other, generating unemployment persistence far beyond what one would expect from a simplistic analysis of the natural rate of unemployment vis-à-vis the country's position in the economic cycle. Before one shock has worked its way through the labor market another has already arrived, producing a complex, dynamic evolution that may have little correlation with the underlying NAIRU. Indeed, the emphasis of the impact of labor market institutions on unemployment behavior focuses more on how structure affects the adjustment process (that is, the nature of the lags) than on structure as a determinant of some underlying natural unemployment rate.

SPANISH LABOR MARKET SINCE THE MID-1970S

The structure of the labor market has changed more profoundly in Spain than in any other Western European country in the past twenty years. No other country has seen its unemployment rate rise as dramatically and stay so persistently high. These two facts do not represent mere coincidence--in the profound transformation in the structure of employment relations (and the transformation of the Spanish economy more generally) lies much of the explanation for Spain's dismal unemployment rate. Although Spain was buffeted by the same macroeconomic shocks as the remainder of Europe in the 1970s, these shocks alone do not provide a satisfactory causal explanation of the rise in unemployment from less than 5 percent in 1975 to 24 percent in 1994.

EMPLOYMENT, UNEMPLOYMENT, AND THE LABOR FORCE

The performance of the labor market in Spain from 1975 through 1994 can be divided into three cyclical periods. During the first period, in the late 1970s and early 1980s, the second oil crisis produced several years of weak economic growth that in turn led to a sharp decline in employment.

---

(3) Karanassou and Snower (1993).

The unemployment rate rose sharply, rising from 7 percent in 1978 to over 20 percent in 1984, while the size of the labor force was relatively stagnant, growing at an average rate of only 0.5 percent a year. Despite the increase in unemployment, real wages continued to rise at nearly 1 percent a year.

The second period began in 1985, with Spain's preparations to enter the European Community (EC). Spanish accession to the EC (in 1986) sparked a major economic recovery, with growth averaging 4.5 percent a year during 1986-90. This expansion, plus the Government's introduction of flexible temporary labor contracts in 1984 (see next section), fueled an increase in employment averaging 3 percent a year. The unemployment rate fell from over 21 percent in 1985 to 16 percent in 1990. This drop in unemployment was smaller than might be expected from such strong employment growth as the result of a sharp acceleration in the growth of the labor force to 2.1 percent a year, primarily because of a significant increase in the participation rate for women. Real wage growth continued, albeit at the slower pace of 0.6 percent a year.

The overall changes in employment and unemployment do not do justice to the depth of the changes in the labor market, because they mask a profound shift in the nature of employment. The progressive opening of the economy accelerated a major transformation in the economic structure that had already begun in the 1970s. The role of agriculture and basic industry (for example, coal, steel, and shipbuilding) declined sharply, while modern industry and the services sector (particularly tourism and financial services) surged[(4)].

The economy slowed in 1991 and entered into recession in the second half of 1992. The unemployment rate climbed rapidly to 24.6 percent by the third quarter of 1994--a peak-to-trough variation of more then 8 percentage points in less than three years. While labor force growth decelerated (to an average of 0.7 percent), most of the increase in unemployment came from a sharp drop in labor demand. Employment fell by

---

[(4)]See Franks (1994) for a detailed discussion of the effects of these structural changes on the labor market in Spain.

7 percent between 1991 and 1994. Until labor market reforms began to bite in 1994, real wages continued an unabated rise despite the enormous slack in the labor market.

STRUCTURE OF THE LABOR MARKET

During the Franco period, Spain had a rigidly controlled labor market. Trade union activism was prohibited and the social security benefits of the modern welfare state were largely nonexistent. In their place was a set of labor regulations that rigidly defined working conditions and provided social protection by making it difficult to fire workers and providing generous severance pay for dismissals.

After General Franco's death in 1975, the country underwent a major economic transformation that paralleled the political transition to democracy. The economy modernized rapidly, with sharp declines in traditional agricultural and basic industrial activity and the rise of modern manufacturing and services. The economy also opened to further international competition, culminating in accession to the EC in 1986.

Similarly profound changes occurred in the labor market, affecting every aspect of labor relations. The tight regulations on working conditions with their attendant restrictions on geographical and functional mobility were continued, but they were combined with the labor relations systems and the social protection of a modern welfare state. Trade unions became both legal and extremely active. Although union membership remains relatively low, the coverage of union-negotiated agreements was well in excess of 80 percent of all salaried workers by the late 1980s. After a series of national wage pacts in the late 1970s that kept industrial action and wage increases under control, collective bargaining moved largely to the sectoral level. Union activism surged, with Spain consistently among the European countries with the largest number of days lost to strike activity.

While the legal structure of dismissals did not change radically from the Franco era, the effective real costs of dismissals rose owing to the unions' ability to negotiate collectively for better severance payments and owing to government-supported schemes to support workers on temporary redundancies and to help pay severance costs of those permanently dismissed. Average severance payments grew from just over 4.5 months of pay in 1981 to over 12 months of pay by 1993.

To this severance system was added an increasingly complete social protection system providing relatively generous unemployment benefits for dismissed workers and pensions for those injured, disabled, or retiring. Whereas in 1983-84 fewer than 30 percent of nonagricultural workers were eligible for unemployment compensation, by 1993 over 60 percent were receiving compensation. The size of unemployment benefits also grew substantially. Benefits per unemployed person grew by 30 percent in real terms between 1984 and 1993. These high benefit levels reflected a system under which workers were entitled to unemployment compensation with a generous replacement ratio of the previous salary, particularly during the first year of joblessness. The period of work required to become eligible for benefits was also quite short--six months of work entitled one to three months of benefits, with the same 2:1 ratio holding for longer periods on the job.

Not all developments in the 1980s increased the rigidity of the labor market. Whereas during the 1970s the minimum wage grew by 55 percent in real terms (an average real growth rate of 4.5 percent a year), that growth leveled off in the early 1980s, and there was actually a 6 percent real decline in the level of the minimum wage by 1990. In 1984, in response to the sharply rising unemployment rate, the Government liberalized the use of temporary contracts, permitting temporary workers (on contracts of up to three years) to do essentially the same work as permanent workers. Because temporary workers were not subject to the same hiring and firing conditions and their contracts effectively granted the firms greater functional and geographical mobility, this step significantly reduced rigidities for those firms using temporary workers. The growing number of temporary workers increased the dualism of the labor market, as the labor force became increasingly segregated into permanent and temporary "castes."

As the Spanish economy slowed in 1991 and 1992 and unemployment again soared above 20 percent, it became increasingly clear that the labor market was in need of more profound reforms. In 1993 and 1994, the Government undertook a series of reforms designed to reduce unemployment compensation, facilitate workplace mobility, and reduce firing costs. Early results of these reforms appear to be favorable, but given the long response time in the labor market, it is premature to evaluate whether they will make a major contribution to the reduction of unemployment over the medium and long term.

In summary, the analysis of the causes of high and persistent unemploy-ment in Spain must look to the interaction of two sets of factors. First, at the macroeconomic level, profound changes in the structure of the economy as a whole (opening to international trade, accession to the EU, the decline of agriculture and basic industry, and the rise of modern manufacturing and services) as well as sociodemographic changes in the size of the working-age population and the rise of female participation in the labor force have affected the labor market at least as profoundly as the macroeconomic shocks of the oil crises and the rise in real interest rate that are often cited as the source of European unemployment[5]. Second, at the level of the labor market itself, Spain has experienced profound changes in the structure of labor market institutions that could have a major impact on the level and persistence of unemployment. During the past twenty years, Spain has seen the resurgence of trade union activism and the rise of the protection of a modern social welfare state and has reformed the legal framework for the labor market.

BASIC MODEL

In this section, a basic three-equation labor market model is constructed and estimated for 1971-93. It contains variables designed to measure the interactions between labor supply, labor demand, and real wages. In keeping with the focus on examining not just the equilibrium relationship, but also the adjustment process, each equation uses a set of

[5]See Bean (1994) for a review of explanations of European unemployment.

lags on both the dependent and independent variables to capture the dynamics of the labor market. This model will be used to determine the basic rela-tionships among the key variables, as well as to pinpoint structural breaks that could be identified with known changes in labor market institutions. Unfortunately, good time-series data on many important policy variables over the entire sample period are lacking, so the estimations over this period are conducted using a simple specification. Making virtue out of necessity, however, these results provided interesting contrasts with those of the policy model estimated over the 1980s and 1990s as described in the next section.

STRUCTURE

The empirical specifications used here are based on an underlying right-to-manage type of wage and employment setting process[6]. Potential workers decide unilaterally whether or not to enter the labor market based on the wage they can get if employed, the probability of employment, and sociodemographic factors exogenous to the model. To incorporate adjustment lags, lagged values on both the endogenous and the exogenous variables are permitted. Thus, the labor supply equation is as follows:

$$\ln LF_t = \alpha + \sum_{i=0}^{n} \beta_i UR_{t-i} + \sum_{i=0}^{n} \gamma_i \ln W_{t-i} + \sum_{i=1}^{n} \delta_i \ln LF_{t-i} + \Theta_i X_t + \epsilon, \qquad (1)$$

where LF is the labor force, W is the real wage, UR is the unemployment rate, and X is a vector of variables exogenous to the model that could affect the labor supply. For the basic version of the model estimated in this section, the only exogenous variable included is the working-age population.

The real wage is a variable jointly determined by bargaining between employers and trade unions. This bargain is affected by past real wages, by the unemployment rate, by labor productivity, and by a vector of

[6]See Booth (1995) pp. 124-28 for an exposition of the right-to-manage model. Oswald and Turnbull (1985) provide empirical evidence in support of the right-to-manage assumption for the United Kingdom.

exogenous variables (such as the reservation wage determined by unemployment bene-fits). The empirical specification of the real wage equation is as follows:

$$\ln W_t = \alpha + \sum_{i=0}^{n} \beta_i UR_{t-i} + \sum_{i=1}^{n} \delta_i \ln W_{t-i} + \sum_{i=0}^{n} \rho_i \ln \prod_{t-i} + \Theta_i X_t + \epsilon, \tag{2}$$

where Prod is labor productivity. For the basic version of the model estimated in this section, the only exogenous variable included is the minimum wage, under the assumption that minimum wage increases may have played a role in setting expectations for wage increases in the private sector[7].

In accordance with the right-to-manage literature, once wages are determined in collective bargaining, employers are assumed to be free to set employment levels so as to maximize profits subject to the legal and institutional constraints of the Spanish labor market. Employment thus depends on past employment, real product wages (that is, the real wage of the worker plus social contributions paid by the employer), and a vector of exogenous variables as follows:

$$\ln E_t = \alpha + \sum_{i=0}^{n} \beta_i \ln W_{emp_{t-i}} + \sum_{i=1}^{n} \delta_i \ln E_{t-i} \, \Theta_i X_t + \epsilon, \tag{3}$$

---

[7]Minimum wages may not be a completely exogenous variable, because there is often an implicit or explicit linkage between average wages and the setting of the minimum wage. In Spain, there appears to have been some effort to maintain the minimum wage as a share of the average wage in the mid-1970s, but not since then. Nevertheless, in the estimation of the model, the minimum wage variable was included with a lag to avoid a possible simultaneity problem. See Dolado and others (1996) for an in-depth discussion of the effect of minimum wages on employment.

where $\underline{E}$ represents employment, and $\underline{W}_{emp}$ is the wage paid by the employer[8]. For the empirical specification in this section, the only "exogenous" variable included is GDP.

The model is closed by the following identities:

$$W_{emp} = W + T_{socsec}, \tag{4}$$

and

$$UR = 1 - \frac{E}{LF}, \tag{5}$$

$$\ln \prod = \frac{\ln E}{GDP}, \tag{6}$$

where $\underline{T}_{socsec}$ are social security taxes paid by the employer[9]. As shown in equation (5), the unemployment rate term in the labor force and real wage equations indirectly incorporates the effects of employment on labor supply and of employment and labor supply on real wages. Although GDP is not explicitly modeled, it is treated as an endogenous variable and a simple GDP equation is included in the simulations in the section Structural Change and Unemployment: Persistence and Responsiveness.

---

[8]This employer wage is not a fully fledged product wage because for simplicity it is deflated by the consumer price index (CPI) rather than by some producer price index. Nevertheless, because the CPI and producer prices are highly correlated, the results differ little if a pure product wage is used.

[9]While for the basic model in this section the model results are reported for the employers' wage as a whole, in the policy model in the following section, the wage and security contribution variables are included separately, allowing their coefficients to differ.

CHARACTERISTICS OF THE DATA

The empirical analysis was conducted using quarterly data from 1971 through 1994[10]. The data were obtained from the databases of the Bank of Spain, the Ministry of Economy, and the Organization for Economic Cooperation and Development (OECD). For GDP data, for which quarterly information was not available for the entire period, interpolations developed by the OECD were used. The data are not seasonally adjusted; rather, seasonal dummies are included in all of the regressions. All variables, except for the unemployment rate, are in logs.

The most important feature of the variables under consideration is their stationarity (or lack thereof). Hysteresis theories of unemployment imply that unemployment is a nonstationary variable, raising the issue of nonstationarity of both employment and unemployment. An essential first step was to examine the variables to be used for the existence of unit roots. The results of Augmented Dickey-Fuller (ADF) tests on the variables to be included in the model in levels suggested that essentially all should be treated as nonstationary. From unit root test on the differenced variables, it appears that they may be treated as I(1).

ESTIMATION RESULTS

After initial exploratory regressions in ordinary least squares (OLS), the model was estimated as an autoregressive distributed lag (ARDL) model in levels using instrumental variables (IV) in order to find a cointegrating long-run relationship[11]. The model was then estimated in error correction formulation in differences using instrumental variables when necessary to control for endogeneity[12]. In estimation, a strictly

---

[10]Owing to the lag structure incorporated into the estimates and the missing data for some variables, the estimates were generally done for 1972-93.

[11]Pesaran and Shin (1995).

[12]The preferred specification was also estimated simultaneously using full information maximum likelihood (FIML) techniques to compare with the instrumental variables results. The FIML results did not differ

empirical approach was taken to the structure of the lags. Up to eight lags of each endogenous variable were included in initial specifications, with only lags with robust significance being retained in the chosen specifications. In this respect, the model differs from a structural vector autoregression (VAR) model--where all variables would contain the same number of lags--because only significant lags were retained in the final specifications. Chow tests were undertaken to test for structural breaks in the model, and in preparation for estimating the policy model in this section, the basic model was estimated separately for the two subperiods of 1971-80 and 1981-93.

In addition to an examination of the regression coefficients of the error correction model, diagnostics are presented to analyze the dynamic response of each estimated equation to changes in explanatory variables and to shocks. A series of diagnostic statistics on the dynamics is also calculated. First, the "cross-persistence" of temporary shocks and the "cross-responsiveness" to permanent shocks of each equation are examined, building on the measures of persistence and responsiveness for unemployment developed by Snower and Karanassou (1995). These measures basically measure the sum of the deviations of the dependent variable from its equilibrium; in other words, they are a normalized version of the integral of the impulse response curve. The measures used, and how they differ from those developed by Snower and Karanassou, are discussed in detail in the appendix. Second, information on the "half-life" of impulse responses is presented. The half-life of a permanent change is defined as the time required for one-half the change to be transmitted through to the dependent variable. For a temporary shock, the half-life is the time required for the dependent variable to reach one-half its maximum deviation and its original and final value.

LABOR FORCE EQUATION

Economic models of the labor force are notoriously difficult, because many noneconomic factors affect labor force participation. The results

substantially from those of the IV error correction model (ECM) specification reported below.

presented here are no exception. Table 1 shows the long-run cointegrating relationships of the model, while Table 2 presents the preferred specification for the labor force equation in error correction form. The long-run relationship shows a positive coefficient on the working-population variable, but a negative one on the real wage. While somewhat surprising, the negative relationship is not inconsistent with rational utility maximization in the decision to participate in the labor force, as higher wages among primary wage earners may lead secondary household members to participate less through an income effect[13]. The unemployment rate does not figure in the long-run relationship, because its coefficient was not robustly significant and the equation failed to cointegrate when it was included.

Turning to the error correction specification, several features of the regression results stand out. First, it is interesting that the coefficient on the error correction term, while significant and carrying the correct sign, is quite small, implying relatively slow adjustment to the long-run relationship. Second, unemployment, which did not participate in the long- run relationship, plays a dynamic role. Lagged changes in unemployment on balance have a slightly negative effect on labor force participation growth, as do lagged changes in the rate of labor force growth. Although these results are not as strong as one would like, both the ARDL regressions producing the long-run cointegrating relationships and the error correction model regressions pass standard tests for

---

[13]Interestingly, when the sample is split and the same regression is run separately over 1972-80 and 1981-93, the negative relationship between wages and labor force participation disappears, particularly for the second half of the sample, implying that there may have been an exogenous change in the social attitudes regarding households' work-leisure trade-off. Indeed, exogenous shifts in the labor force participation of women would have precisely the effect of shifting the quantity of labor offered by the household at a given income level. Thus, while in the early period, households may have been at or close to the backward-bending section of their labor supply curves, exogenous changes in female participation made the elasticity of the labor supply to the real wage highly positive in the 1980s and 1990s.

misspecification, autocorrelation, normality of the errors, and heteroscedasticity[14].

A clearer idea of the overall impact of the different explanatory vari-ables on the labor force can be obtained by examination of the indicators of equation dynamics presented in Table 3. As can be seen, permanent wage and population shocks take a long time to manifest their full effects on the equilibrium labor force. For a real wage shock, after 8 quarters only one-half of the final effect has been transmitted, while for a population shock, it takes 35 quarters. A onetime shock to the labor force itself will be reversed over time as the long-run equilibrium relationship reasserts itself, but this process is a long one. It takes 13 quarters for one-half of the adjustment to occur. The data on responsiveness show that the accumulated deviations from long-run equilibrium from permanent changes are quite significant in the case of real wages, where the difference between the long-run equilibrium labor force and the sum of the actual values is 2.6 percent.

Temporary shocks to wages and unemployment have relatively small maximum effects on the labor force, while a (totally unrealistic) temporary jump in the working-age population has a large temporary effect on the labor force. Of course, because the unemployment rate is not in the long-run relationship, it has only temporary effects. In all of these cases, it takes one to two years for the effects of these temporary shocks to dampen down to half their maximum level. A temporary shock to the labor force itself has a half-life of 14 quarters.

Chow tests on the labor force equation show clear evidence of structural breaks, so the model was re-estimated for the sample divided at 1981. Both halves of the sample now show a negative relationship between wages and labor force participation, as well as a negative link

[14]The following tests were performed in PC-Give on both the ARDL specification and on the error correction equation: the Lagrange multiplier test for $\underline{n}$th order autocorrelation; the Autoregressive Conditional Heteroscedastic (ARCH) test; the X^2 test for normality of the residuals; the X^2 test for heteroscedasticity and correct functional form; and the Ramsey regression specification (RESET) test.

between unemployment and labor force participation. There was also an important drop in the coefficient on the error correction term between the first and second half of the sample, suggesting a lengthening of the time required for the labor force to adjust to shocks.

REAL WAGE EQUATION

The long-run cointegrating relationship for real wages (Table 1) shows a strongly positive relationship between real wages and labor productivity, as one would expect. Unemployment has a small negative impact on wages that is only marginally significant statistically, suggesting that wages are largely insensitive to labor market conditions. There is a strong correlation between minimum wages and average wages in the long run, which, although it may be a statistical artifact, may also indicate that general wage increases follow trends set in increases in the minimum wage.

The error correction specification (Table 4) also shows a significantly positive relationship between productivity growth and wage growth. The relationship with the minimum wage also remains positive in differences. Changes in the unemployment rate fail to be significant and are excluded from the preferred specification. Lagged changes in the real wage exert a strongly negative effect on wage growth in the current period, reflecting a strong tendency to revert to trend after variations in wage growth rates. The coefficient on the error correction term is highly significant and relatively large. As was the case with the labor force variable, there is clear evidence of structural breaks in the equation, but other specification tests are passed.

Table 5 indicates that, as expected from the higher coefficient on the error correction term, the adjustment to a permanent shock is faster in the wage equation than in the labor force equation. Productivity shocks are the slowest in transmission into wages, with a half-life of more than three years. This lag is also reflected in the large negative responsiveness number, which indicates a cumulative deviation of -21 percent in wages after a productivity shock from the new equilibrium wage. Temporary shocks in the wage equation work themselves out relatively quickly, with half-lives of five quarters or less from shocks in all of the variables.

EMPLOYMENT EQUATION

The long-run employment equation is presented in Table 1. As expected, it shows a strongly positive relationship between GDP and employment (although the fact that the coefficient is larger than 1 is surprising). The product wage has the expected negative effect on employment, with a relatively large coefficient of -0.33.

The preferred specification for the error correction form of the model is presented in Table 6. Changes in GDP growth have a positive impact on employment growth. On balance, the evolution of the real product wage has a positive impact as well, in contrast to the long-run relationship. On balance, lagged values of the dependent variable have a slightly negative impact, with a long adjustment process implied (the sixth lag proves to be significant). The error correction term is significant and correctly signed, but the coefficient is quite small (only 0.1), which means that the adjustment to long-term equilibrium is quite weak. As with the other two equations, there is strong evidence of structural breaks in the model, but other statistical tests are passed, indicating no major problems with autocorrelation, heteroscedasticity, or misspecification of the equations.

The dynamic of the employment equation is intermediate between the relatively quick adjustment displayed by the real wage equation and the slow adjustment of the labor force equation. As can be seen from Table 7, half-life adjustments to shocks generally take one and a half to two and a half years, with the adjustment to output shocks somewhat quicker. Of particular interest is the dynamic of an adjustment in the product wage, which, despite its large long-term effect, demonstrates relatively slow adjustment to shocks. The responsiveness to permanent shocks is particularly poor.

RESULTS OF THE BASIC MODEL

The evidence of structural breaks in the equations, together with the unexpected negative relationship between wage and labor force participation, suggests that the exact results of this preliminary analysis should be interpreted with caution. Nevertheless, the results are strong enough to warrant several interesting qualitative conclusions. The most telling of these is the evidence that long lags in the adjustment of the labor market to shock play a crucial role in sustaining high unemployment. The half-life numbers presented suggest that it takes between 3 and 35 quarters for one-half of the final effect of a permanent shock in an explanatory variable to be felt in the corresponding dependent variable. The numbers are even more striking as regards the time taken for 90 percent adjustment. For example, a permanent output shock takes over six years to manifest 90 percent of its final effect on employment; a permanent working- population shock (for example, the Spanish baby boom) takes 63 quarters (15.75 years) to manifest 90 percent of its final effect on the labor force; a permanent wage shock takes four years to show 90 percent of its final effect on the wages themselves, over eight years to show 90 effect on employment, and nearly ten years for the labor force equation. While the exact values of these lags should not be relied upon, they are broadly consistent with other recent work on adjustment lags in Spain [15] and clearly justify the conclusion that adjustment is extremely slow. Chart 1 shows graphically the adjustment process for some of these key permanent shocks to give an idea of the full dynamics of adjustment in each equation.

The second interesting insight from the basic model is the striking lack of sensitivity of the labor market to the unemployment rate. Unemployment has no long-run and little short-run impact on the labor force and has a minuscule effect on real wages, suggesting that the labor

---

[15] Dolado and López-Salido (1996) use a conventional VAR approach to look at the response of output, unemployment, and wages to different types of macroeconomic shocks. Their results indicate that the half-life adjustment of these variables is on the order of three to five years. As with the results obtained here, the adjustment to labor supply shocks tends to be even slower.

market does not contain a strong self-correcting tendency in the face of high unemployment.

Even in this basic model, sociodemographic factors and policies and institutions of the labor market itself play a very important role in labor market outcomes. The increase in the working-age population coupled with changes in attitudes toward female labor force participation, which produce a coefficient on the population variable that is larger than unity, have clearly contributed to the rise in unemployment. In the two policy variables included in the basic model (the minimum wage and the tax wedge of social security contributions), there is strong evidence that institutional factors have also played an important role in pushing up product wages and reducing employment.

Finally, the instability of the coefficients of the basic model highlights the importance of structural changes in the labor market in Spain. This phenomenon will be explored in more detail in the next section.

POLICY MODEL

The results of the basic model, while providing some general information about the behavior of the Spanish labor market, are unsatisfactory for several reasons. First, the model is econometrically deficient owing to clear structural breaks (undoubtedly produced by the changes in the structure of the labor market since the early 1970s). Second, from a more conceptual standpoint, the basic model does not explain well the causes of Spanish unemployment. The institutional features of the labor market discussed as potential factors in generating high unemployment are not really modeled. These weaknesses motivate the development of another version of the model, where the structural problems and unanswered causal questions of the basic model can be addressed.

ADDITIONAL VARIABLES

The "policy" model has the same general form as the basic model but with the addition of a series of variables designed to capture explicitly some of the institutional features of the labor market that could have played a role in generating persistent unemployment in Spain. Including these aspects of the labor market structure makes the model less susceptible to structural breaks in the coefficients. The model is estimated only for 1981-93; this shorter time series also makes it less likely to suffer from structural breaks than the 1972-93 period used in the basic model, because it excluded the Franco era and democratic transition in the 1970s. However, this restricted sample has the disadvantage of excluding the initial rise in unemployment in the wake of the oil shocks of 1973-74 and 1979-80, but the data for most of the key policy variables included do not reach back into the 1970s.

The basic labor force equation in the policy model includes two variables in addition to those in the basic model--the average level of disability pensions and the replacement ratio of unemployment compensation. Disability pensions would be expected to decrease the labor force directly because people granted disability benefits leave the labor force, but, in addition, a negative relationship is to be expected between the level of benefits and the labor force because some firms in Spain have used pensions as an alternative to redundancies. The disability pension variable may also capture some of the effect of retirement pensions on the labor force(16). The inclusion of the replacement ratio variable reflects the incentives a person may have to remain in the labor force (or enter) despite high unemployment. High unemployment benefits could prevent

(16)Controls on disability pensions were fairly weak until the 1990s; there is substantial anecdotal evidence of firms using temporary disability classifications of workers as an alternative to redundancies for younger workers. For older workers, early retirements were often used with official acquiescence. This effect may also be captured by the disability pension variable.

discouraged workers from leaving the labor force or could provide incentives for entering the labor market[17].

The wage equation includes two new policy-related variables--the replacement ratio of unemployment benefits and the share of temporary workers in the labor force. The replacement ratio reflects the reservation wage of workers, and hence should have a positive impact on collectively bargained wages. It is not clear ex ante whether the presence of temporary workers would increase or decrease average wages. On the one hand, because temporary workers tend to be paid less than their permanent counterparts, there is a composition effect that would cause the average wage to decline as the share of temporary workers increases. On the other hand, the presence of temporary workers may exacerbate insider-outsider problems by making permanent workers less susceptible to redundancies (see Bentolila and Dolado (1994); Jimeno and Toharia (1993)). Finally, the minimum wage is included as with the basic model.

In estimating the employment equation, three policy variables were added to the variables included in the basic model. Two relate to labor market relations between worker and employers, one measuring days lost to strike action and the other measuring the coverage of trade union agreements. The strike activity variable reflects a clear nonwage cost to employers that could negatively affect their level of employment. The coverage of union agreements may also affect employment levels by constituting a direct labor cost, or, through wages, an indirect cost. The third policy variable, severance pay, measures the real value of severance pay settlements as a means of exploring the impact of dismissal costs on employment levels. In addition, in order to examine the effect of government policies on labor market taxation, the product wage variable has been split into its constituent parts--a real social contribution costs variable (TSS) and the real wage as perceived by employees.

---

[17]First-time entrants into the labor force are not eligible for unemployment benefits. Nevertheless, the future availability of unemployment benefits will certainly have a positive impact on the expected value of entering the labor force, especially since there has been a large amount of rotation between temporary jobs and unemployment since temporary contracts were liberalized in 1984.

ESTIMATION RESULTS

As with the model in the previous section, the policy model was initially explored in OLS, with regressions subsequently run in error correction form using, where necessary, instrumental variables and including cointegrating long-run relationships. The long-run relationships are shown in Table 8, with the error correction models of the individual equations shown in Tables 9-11.

LABOR FORCE EQUATION

As seen in Table 8, wages and the labor force show a significant positive relationship in the long-run, in contrast to the negative sign given in the basic model. The idea that higher wages draw more labor force participation is more intuitively satisfactory than the negative sign found previously. The positive long-run relationship between working-age population and the labor force is also strongly significant, as expected. The fact that the size of the coefficient is even larger than in the basic model probably reflects the accelerating trend of the incorporation of women into the labor force in the 1980s compared with the 1970s. Turning to the policy variables, there is a small but significant positive effect of the replacement ratio on labor force participation, while the generosity of disability pension benefits holds the expected negative correlation with participation. The unemployment rate showed no significant relationship, and was excluded from the preferred specification[18].

The error correction version of the model is shown in Table 9. Wage growth has the expected significant positive effect on the labor force. The two policy variables also hold significant signs in the expected direction, with increasing disability pensions decreasing the labor force, while the growth replacement ratio increases it. The error correction term also has the expected sign. In contrast, short-run fluctuations in the working-age population paradoxically decrease the labor force. As in the basic model, changes in the unemployment rate have virtually no net effect.

---

[18]It should be noted, however, that the long-run regressions do not unambiguously cointegrate. See the footnote to Table 8.

An examination of the summary statistics on equation dynamics in Table 12 shows that the half-lives of the responses to permanent shocks are smaller than those for the basic model, while the speed of adjustment to temporary shocks is somewhat longer. The speed of adjustment to shocks in the labor force itself seems to have improved significantly. This phenomenon appears for all of the policy model equations, as well as for the dynamics of the system as a whole (see section on structural change and unemployment). This apparent improvement should not, however, be interpreted as reflecting better real adjustment; rather, the structural variables included reduce the coefficients on the lagged dependent variables because they are accounting for some of the causes of delayed adjustment[19].

REAL WAGE EQUATION

The long-run determinants of wages (Table 8) show the expected strong positive correlation between productivity and wage growth. In contrast to the basic model, the coefficient is less than one, implying that not all productivity improvements are translated into wages. This result is consistent with the general increase in profit margins experienced in Spain in the 1980s. Unemployment has a significantly negative effect on wages, although the size of the effect is small. The minimum wage

---

[19] In the basic model, own variable persistence and responsiveness measures capture the adjustment effects of the structural features of the labor market that are separately modeled in the policy model. To illustrate this effect, consider the comparison between a simple autoregression versus an autoregressive equation with additional structural variables. If one calculates the adjustment speed of the simple autoregressive model compared with the model that includes structural variables, the autoregressive model will necessarily show slower adjustment (that is, higher coefficients on the lagged terms) because the autoregressive terms are picking up some of the effects of the persistence of the omitted structural variables. One should not, however, conclude that the impulse response functions shown in the basic model are useless because they come from a model that suffers from omitted variable bias and is therefore misspecified. By that criterion, virtually every VAR would also be classified as useless as a result of misspecification because VARs do not include potentially important structural variables. Rather, the impulse response functions should be seen as illustrative of the adjustment time required as a result of a shock given the "average" underlying levels of the structural variables over the period of the regression.

continues to have a positive effect on real wages; however, the size of this pass-through effect is smaller than in the basic model. Turning to the policy variables introduced in this version of the model, increases in the replacement ratio increase wages as expected. Interestingly, the share of temporary workers in the labor force on balance exerts a moderating effect on wages, suggesting that the composition effect of lower wages paid to temporary workers dominates the insider-outsider effect that more temporary workers could have on wage bargaining.

The error correction version of the real wage equation, shown in Table 10, provides stronger results than those of the labor force equation. Real wage increases tend to perpetuate themselves into the future, as demonstrated by the net positive impact lagged wage growth has on current wage increases. The error correction coefficient is large and highly significant, suggesting a rapid adjustment to the long-run real wage path. Changes in the replacement ratio have a significantly positive impact on wage growth, as in the long-run relationship. The share of temporary workers in the workforce has a short-run positive effect compared with its long-run negative effect. Changes in the unemployment rate, in productivity, and in the minimum wage have short-run effects that also run counter to their long-run relationship with real wages. Unemployment growth lagged one quarter is positively linked to wage increases, while the coefficient on lagged productivity is of only marginal significance statistically.

As with the labor force equation, the real wage equation of the policy model shows faster adjustment than with the basic model, as demonstrated by the shorter half-lives and less negative responsiveness numbers (see Table 13). This is particularly true of the response of the real wage to a real wage shock. Temporary shocks, in contrast, tend to have longer half- lives than in the basic model. This is a result of the functional form of the equation, which induces a behavior that oscillates around the final values. These oscillations take time to settle down, hence the long half- lives despite small net persistence statistics.

EMPLOYMENT EQUATION

One of the most striking results of the long-run regression on the employment equation is the weakness of the relationship between wages and employment (Table 8). Although the variable has the expected negative sign (unlike in the basic model), it is not significantly different from zero according to standard t-tests. Social security contributions, in contrast, demonstrate a strongly negative effect on employment. GDP holds a positive relationship with employment of approximately one to one, implying little or no long-run labor productivity growth. The three policy-related variables included in the regression all maintain a significant relationship with employment. Severance pay is negatively related with employment, as is strike activity. The coverage of collective bargaining agreements is also related negatively with employment.

The error correction version of the employment equation is presented in Table 11. As with the real wage equation, the error correction term is large and highly significant. Changes in employment tend to persist over time, as evidenced by the positive net relationship between current employment growth and its lagged values. Social security taxes retain the negative relationship with employment in differences that they have in the long-run regression, while wages have a very small negative effect on employment growth. GDP growth has an unexpected negative relationship with employment growth over the short run. Changes in the coverage of collective bargaining agreements have a negative impact on employment growth, while strike action has a very small positive effect. Severance pay was not significant in the short-run regressions and was excluded from the preferred specification.

Table 14 shows a faster speed of adjustment in the policy model compared with that of the employment equation in the basic model. The time for one-half of the adjustment is less than one and a half years, although the oscillations in employment caused by shocks in several of the explanatory variables (for example, social security taxes, collective bargaining, and strike days) led to considerable overshooting that is not reflected in the summary statistics.

RESULTS OF THE POLICY MODEL

One important conclusion of the three equations in the policy model is that labor market structure does indeed play an important role in the underlying long-run equilibria of employment, real wages, and the labor force, as well as in the dynamics. In addition to confirming that increases in the minimum wage appear to contribute to upward pressure on overall real wages, there is also evidence that other key social and labor market policies of the government affect employment, wages, and the labor force. The policy effects can be summarized as follows:

- Higher minimum wages push up real wages overall.
- Higher employer social security contributions reduce employment.
- Higher average disability pensions reduce the labor force.
- Increases in the generosity of unemployment benefits contribute to higher unemployment by increasing the labor force and also help generate higher real wages.
- The liberalization of temporary contracts has dampened wage increases.
- Higher severance pay reduces employment.
- More labor conflicts (as measured by strike days) reduce employment.
- Greater coverage of collective bargaining agreements reduces employment.

Each of these effects is statistically significant. The impression that institutional variables are crucial to understanding the Spanish labor market is reinforced by the fact that the policy model equations are much more econometrically stable than those of the basic model. Comparing the basic model, run over the same sample period, with the policy model confirms that much of the slow adjustment captured in the basic model is due to the effects of the institutional variables included in the policy model.

The second key insight emerging from the policy model is the lack of responsiveness of the Spanish labor market to traditional market clearing forces. Unemployment has little effect on the decision of potential workers to enter the labor force, nor does it have much impact on moderating wages (the coefficient is significant but small). Even more striking is the fact that the expected negative effect of real wages on employment is not strongly present. The variable has the expected negative sign, but it is not statistically significant. Thus, not only are real wages insensitive to the level of slack in the labor market, but employment itself does not unambiguously respond to the wage.

As with the basic model, a number of variables were tested for inclusion in an attempt to capture directly the effects of macroeconomic shocks. The policy model is also notable as much for the variables not found to be significant as for those included in the chosen specification. Two sets of variables in particular are conspicuous by their absence. Beyond GDP (included in the employment equation) and productivity (in the wage equation), no variables related to real economic shocks were found to be significant in any of the equations. Neither the oil price nor real interest rates were found to be significant. Furthermore, a series of fiscal variables also proved to be insignificant in explaining Spanish unemployment. Regressions were run using variables representing overall government spending, social spending, overall taxation, and direct and indirect taxation. None of these variables proved significant, which suggests that the size of government in the economy has not in itself had a negative or positive effect on unemployment or wages in Spain. Of course, the use of the product wage in the employment equation includes the tax wedge, which does prove to be significant, but it is striking that overall fiscal pressure has no independent effect.

STRUCTURAL CHANGE AND UNEMPLOYMENT: PERSISTENCE AND RESPONSIVENESS

So far in this paper, the static and dynamic characteristics of each equation in the three-equation model have been analyzed separately. This exercise yields interesting information, but it ignores the possibility that changes in one equation could feed back into other equations in the model, prolonging the adjustment process. The specifications chosen for both the basic model and the policy model provide several channels for such interequation effects: changes in employment generate effects in wages via the unemployment rate; changes in the labor force affect unemployment, which feeds into the wages; changes in real wages could affect both the labor force and employment, and so on. Recognizing the endogeneity of GDP to this labor market model, additional avenues of feedback become apparent. Output and employment are simultaneously determined and, through labor productivity, they affect wages. To test the importance of these feedback effects and obtain a more complete idea of the overall speed of adjustment of the labor market to shocks, simulations were conducted for the system as a whole for both the basic and policy models following the methodology of Snower and Karanassou (1995).

To simulate the model as a complete system, it was necessary to develop a simple equation for GDP. A simple Cobb-Douglas style output equation was estimated as follows:

$$\ln GDP = a_o + 0.75 \ln E + 0.25 \ln K + a_1 t, \tag{7}$$

where K is the capital stock and t is a simple trend term. For the purposes of the simulations, increases in real wages are assumed to affect both the consumption wage and the level of social security contributions (effectively assuming that social security contribution rates remain constant).

Using this four-equation system, a shock was administered to the model so that the persistence and responsiveness measures for the full system could be observed. In these simulations the employment equation was shocked by 1 percent, and the Snower-Karanassou measures of persistence and responsiveness for the level of unemployment itself were calculated. For the basic model, a temporary shock yields a persistence of 32.6, with a half-life of 32 quarters[20]. A permanent shock has a

[20]The Snower-Karanassou persistence measure used here is slightly different from that used in the measures of persistence used for shocks to the individual equations in previous sections. See the appendix for details.

persistence measure of -1439, with a half-life of 22 quarters (Chart 2). The chart confirms that a significant proportion of the adjustment takes place several years after the initial shock. Indeed, for a permanent shock, it takes 80 quarters (20 years) for 90 percent of the final impact of the shock to appear, while for a temporary shock it takes nearly as long--75 quarters (18.7 years)[21]. With the recovery period from shocks lasting considerably longer than the average business cycle, the dynamics of unemployment become extremely complex, with the unemployment effects of one recession beginning before the effects of the previous one have become fully manifest. With this dynamic pattern, the whole concept of "natural" rate of unemployment can be called into question.

The results of the basic model confirm the central assertion of this paper--that feedback both within and between equations produces a situation where the adjustment to labor market shocks is extremely slow in Spain. The additional delays in adjustment from the interaction among equations can be clearly seen by comparing the 32-quarter half-life for an employment shock as a whole with the 7-period half-life of a temporary employment shock on the employment equation alone. The shock to employment affects output, which feeds back to employment and wages (through a countercyclical increase in productivity); higher wages affect the labor force and, through product wages, feed back into employment, maintaining the high unemployment rate.

The adjustment to shocks is not only slow relative to the adjustment of the individual equations, it is also slow relative to other European countries discussed in other chapters. For a temporary shock, a comparison of the persistence and half-life measures with those of the other major European countries shows that the half-life is longer than those for Germany (six and a half years), Italy and the United Kingdom (five years), and France (three years). The persistence measure is also the highest, tied with the United Kingdom and well above those for the

---

[21]Once again, it should be emphasized that the exact values of the adjustments should be treated cautiously owing to the inadequacies of the basic model; nevertheless, it is safe to conclude generally that adjustment is extremely slow and that adjustment times lengthen when interequation effects are taken into account.

other major EU countries. For a permanent shock, the same conclusion holds--the adjustment time for Spain is significantly longer than for the other major European economies.

Turning to the policy model, there appears to be either a contradiction with the basic model or a marked improvement in the speed of adjustment of the Spanish labor market in the 1980s and early 1990s compared with that in the 1970s (reflected in the basic model)--a persistence of 10.3 with a half-life of 13 quarters for a temporary shock. As shown in Chart 3, the pattern of both the permanent and temporary shock dynamics is similar to the basic model, but the size of the reactions is smaller and the time scale is compressed. For a permanent shock, responsiveness is -102.4, with an adjustment half-life of 11 quarters. While it remains true that adjustment is slower for the system as a whole than for the individual equations (13 quarters versus 4 for the employment equation alone), the Spanish results now compare reasonably well with those for the other major European countries. This does not mean that adjustment is quick. To achieve 90 percent recovery from a temporary shock, it still takes eight and a half years, while 90 percent adjustment to a permanent shock takes six years.

These speeds of adjustment, while considerably faster than in the basic model, are slow enough that they do not alter the qualitative conclusions of the basic model. Furthermore, as argued above, the contradiction is more apparent than real. Under the policy model, adjustment to "equilibrium" unemployment is indeed more rapid than under the basic model, but it is an adjustment to an equilibrium level that is driven higher by the inexorable increase during the 1980s of labor market policies that induced unemployment to persist. In other words, the basic model indicates that unemployment persists in Spain; the policy model indicates that this persistence is due to the persistence (and even increasing rigidity) of labor market institutions (including unemployment benefits, severance pay, minimum wages, and social contributions)[22].

---

[22]The models of the other countries used in the comparison are actually more similar to the basic model than to the policy model, so that the basic is the more appropriate reference point.

CONCLUSIONS

This paper has presented two main contentions. First, it is argued that the dynamics of labor market adjustment constitute an important part of the explanation of the size and persistence of unemployment. This is amply demonstrated by the results of the basic model, where an external shock can take eight years just for one-half of the eventual effects to manifest themselves--the slowest adjustment rate among major European countries.

The second main conclusion points to the causes of this observed persistence in unemployment and the associated poor adjustment dynamics of the labor market. Profound structural changes have affected the economy, as have long-term sociodemographic factors (indicated by the significance and greater-than-unity size of the coefficient on the population variable), as confirmed by the results obtained in the empirical analysis. The comparison of the basic model with the policy model suggests that the persistence of unemployment observed in the basic model is due to the persistence of certain variables linked to the structure and policies governing the labor market in Spain (such as labor taxation, replacement ratios of unemployment benefits, minimum wages, collective bargaining, and the share of temporary contracts). Furthermore, the evidence on the importance of the policy variables in the regressions suggests that policies themselves have played a role not just in sustaining, but in generating high unemployment beyond the role of any external shocks.

Only a significant change in these features of the labor market generating and sustaining high unemployment can lead to a substantial reduction in Spanish unemployment. The Government made a start in 1993-94 with significant reforms in unemployment benefits, changes in certain rigidities in hiring and firing, and improvements in the flexibility in using the workforce. These reforms are slowly bearing fruit in terms of lower unemployment and more flexible real wages, but it is likely that many additional changes will have to be undertaken if unemploy-ment in Spain is to fall to the European average or below.

Table 1. Long-Run Cointegrating Regressions for the Basic Model

Labor Force Equation

$$\ln LF = 1.137 - 0.1727 \ln W + 1.149 \ln WorkPop - 0.09056 \text{ Seasonal}$$
(SE) (0.2336) (0.04182) (0.133) (0.0351)

WALD test $X^2(3) = 147.08$ [0.0000] **

Tests on the significance of each variable

Variable	F(num,denom)	Value	Probability	Unit Root t-test
ln *LF*	F(1, 80) =	1316.2	[0.0000] **	-3.8009*
ln *LW*	F(2, 80) =	8.069	[0.0006] **	-3.1943
ln *WorkPop*	F(2, 80) =	11.332	[0.0000] **	3.7608
Constant	F(1, 80) =	11.473	[0.0011] **	3.3872
Seasonal	F(3, 80) =	14.518	[0.0000] **	-2.6918

Real Wage Equation

$$\ln W = -2.713 - 0.003419\, UR + 0.7195 \ln PROD + 0.9247 \ln WMIN - 0.3595 \text{ Seasonal}$$
(SE) (0.5385) (0.001998) (0.06656) (0.05897) (0.03558)

WALD test $X^2(4) = 1229.5$ [0.0000] **

Tests on the significance of each variable

Variable	F(num,denom)	Value	Probability	Unit Root t-test
ln *W*	F(2, 83) =	19.74	[0.0000] **	-6.0076**
UR	F(1, 83) =	3.802	[0.0546]	-1.9499
ln *PROD*	F(1, 83) =	30.207	[0.0000] **	5.4961
ln *WMIN*	F(2, 83) =	14.74	[0.0000] **	5.4275
Constant	F(1, 83) =	13.743	[0.0004] **	-3.7071
Seasonal	F(3, 83) =	17.304	[0.0000] **	-6.1764

Table 1 (continued)

Employment Equation

$$\ln E = -7.366 - 0.333 \ln \mathit{Wprod} + 1.316 \ln \mathit{GDP} + 0.3234\ \text{Seasonal}$$

(SE) (1.723) (0.2191) (0.171) (0.06799)

WALD test $X^2(4) = 77.384$ [0.0000] **

Tests on the significance of each variable

Variable	F(num,denom)	Value	Probability	Unit Root t-test
ln *E*	F(4, 73) =	709.45	[0.0000] **	-5.4854**
Constant	F(1, 73) =	24.3	[0.0000] **	-4.9295
ln *WProd* [1]	F(2, 73) =	-16.685	[0.0000] **	-5.3147
ln *GDP*	F(2, 73) =	21.05	[0.0000] **	6.0038
Seasonal	F(3, 73) =	17.343	[0.0000] **	5.8042

Notes: One asterisk means significant at the 5 percent level and two asterisks mean significant at the 1 percent level.

Both the significance tests and the *t*-statistics should be taken as only rough guides to significance, since they do not make the adjustments necessary for Phillips-Hansen (1990) fully modified estimation of cointegrating relationships.

[1] Calculated by combining the estimates for social security contributions and real wages.

Table 2. Basic Model Results for the Labor Force Equation, 1972-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob	PartR²
Constant	-0.0046171	0.0029604	-1.560	0.1230	0.0310
Dln W(1)	0.025603	0.0094077	2.721	0.0081	0.0888
Dln W(3)	-0.026833	0.010219	-2.626	0.0104	0.0832
Dln W(4)	-0.027768	0.010260	-2.706	0.0084	0.0879
DUR(5)	-0.0027475	0.00080911	-3.396	0.0011	0.1317
DUR(8)	0.0029098	0.00098402	2.957	0.0041	0.1032
Dln WorkPop(4)	-1.1142	0.52383	-2.127	0.0367	0.0562
Dln WorkPop(6)	-1.0661	0.48717	-2.188	0.0317	0.0593
Seasonal	0.0017203	0.0021740	0.791	0.4312	0.0082
Seasonal_{-1}	0.016041	0.0039911	4.019	0.0001	0.1753
Seasonal_{-2}	0.011635	0.0025946	4.484	0.0000	0.2092
LFECM(1)	-0.054273	0.025020	-2.169	0.0332	0.0583

R^2 = 0.589644 F(11, 76) = 9.9277 [0.0000] σ = 0.00260946 *DW* = 1.83
RSS = 0.00051750381 for 12 variables and 88 observations

AR 1- 5F(5, 71) = 0.56186 [0.7288]
ARCH 4 F(4, 68) = 0.25429 [0.9061]
Normality χ^2(2) = 2.857 [0.2397]
χ^2 F(19, 56) = 0.46904 [0.9647]
RESET F(1, 75) = 0.053158 [0.8183]

Note: Dependent variable is *Dln LF*, estimated by OLS. None of the endogenous variables was significant in contemporaneous variables, so the estimation was done with OLS rather than IV.

Table 3. Indicators of Labor Force Equation Dynamics, Basic Model

	Response of a 1 Percent Shock to			
	Wages	Unemploy- ment rate	Working population	Labor force
Permanent shock				
Long-run elasticity	-0.1727	0	1.149	0
Half-life (quarters)	8	--	35	13
Responsiveness (percent)	-2.62	0	-1.059	-0.02
Temporary shock				
Maximum deviation	-0.037	-0.0028	-1.075	1
Half-life (quarters)	5	8	7	14
Persistence (percent)	-0.1744	0	1.149	-1.009

Table 4. Basic Model Results for the Real Wage Equation, 1972-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob
Constant	-0.0084830	0.019519	-0.435	0.6650
Dln W(1)	-0.30033	0.099220	-3.027	0.0033
Dln W(2)	-0.34003	0.10596	-3.209	0.0019
Dln W(3)	-0.34639	0.083345	-4.156	0.0001
Dln PROD	1.7841	0.88210	2.023	0.0463
Dln PROD(2)	-1.3308	0.51530	-2.583	0.0116
Dln WMIN(3)	0.17398	0.063875	2.724	0.0079
WECM(1)	-0.30078	0.057241	-5.255	0.0000
Seasonal	-0.10570	0.020184	-5.237	0.0000
$Seasonal_{-1}$	0.093051	0.036693	2.536	0.0131
$Seasonal_{-2}$	0.037127	0.031524	1.178	0.2423

Notes: σ = 0.0221772 *DW* = 1.99

RSS = 0.04082159323 for 11 variables and 94 observations

2 endogenous and 10 exogenous variables with 12 instruments

Reduced form σ = 0.0203942

Specification $\chi^2(1)$ = 3.317 [0.0686]

Testing β = 0: $\chi^2(10)$ = 610.9 [0.0000] **

Dependent variable is *Dln W*, estimated by IV. Two asterisks mean significant at the 1 percent level.

Table 5. Indicators of Real Wage Equation Dynamics, Basic Model

	Response of a 1 Percent Shock to			
	Product	Minimum wage	Unemploy-ment rate	Wages
Permanent shock				
LR elasticity	0.7185	0.9247	0.003	1
Half-life (quarters)	13	5	6	6
Responsiveness (percent)	-20.95	-6.133	-6.605	-6.623
Temporary shock				
Maximum deviation	-1.76	0.277	-0.001	1
Half-life (quarters)	5	5	3	2
Persistence (percent)	-0.74	-0.92	-.0034	-3.315

Table 6. Basic Model Results for the Employment Equation, 1972-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob
Constant	0.00061231	0.0012243	0.500	0.6185
Dln E(1)	0.27658	0.088304	3.132	0.0025
Dln E(6)	-0.37990	0.082863	-4.585	0.0000
*Dln Wprod**	-0.12430	0.040882	3.040	0.0026
Dln Wprod(1)*	0.15814	0.038609	4.096	0.0001
Dln Wprod(3)*	0.13946	0.034501	4.042	0.0001
Dln GDP	0.36081	0.086105	4.190	0.0001
EmpECM(1)	-0.10588	0.013703	-7.726	0.0000
Seasonal	0.0081766	0.0035076	2.331	0.0224
Seasonal$_{-1}$	-0.016746	0.0031162	-5.374	0.0000
Seasonal$_{-2}$	0.0093842	0.0019501	4.812	0.0000

Notes: σ = 0.0032641 *DW* = 1.72

RSS = 0.0007990785297 for 12 variables and 87 observations

3 endogenous and 10 exogenous variables with 19 instruments

Reduced form σ = 0.00344761

Specification $X^2(7)$ = 12.083 [0.0979]

Testing $\beta = 0$: $X^2(11)$ = 355.71 [0.0000] **

Dependent variable is *Dln E*, estimated by IV. One asterisk means calculated by combining the estimates for social security contributions and real wages; two asterisks mean significant at the 1 percent level.

Table 7. Indicators of Employment Equation Dynamics, Basic Model

	Response of a 1 Percent Shock				
	GDP	Real wages	Social security taxes	Product wage	Employ-ment
Permanent shock					
LR elasticity	1.316	1.078	-1.411	-0.333	1
Half-life (quarters)	3	6	8	10	6
Responsiveness (percent)	-7.85	-9.81	1.411	-15.29	-9.43
Temporary shock					
Maximum deviation	0.35	0.128	-0.194	-0.124	1.172
Half-life (quarters)	3	7	7	11	7
Persistence (percent)	1.31	1.073	-1.403	-0.331	9.43

Table 8. Long-Run Cointegrating Regressions for the Policy Model

Labor Force Equation

$$\ln LF = -3.017 + 0.237 \ln W + 1.452 \ln WorkPop - 0.1703 \ln DPens + 0.01395 \ln RepR + 0.02548\ \text{Seasonal}$$

(SE): (0.7534) (0.107) (0.1376) (0.08463) (0.004754) (0.01834)

WALD test $X^2(5) = 1127.2$ [0.0000] **

Tests on the significance of each variable

Variable	F(num,denom)	Value	Probability	Unit Root t-test
ln *LF*	F(1, 43) =	106.51	[0.0000] **	-3.8288 1/
Constant	F(1, 43) =	13.393	[0.0007] **	-3.6596
ln *W*	F(1, 43) =	7.6414	[0.0084] **	2.7643
ln *WorkPop*	F(1, 43) =	15.689	[0.0003] **	3.9609
ln *PensD*	F(1, 43) =	6.4561	[0.0147] *	-2.5409
ln *REPR*	F(1, 43) =	4.7291	[0.0352] *	2.1746
Seasonal	F(3, 43) =	13.341	[0.0000] **	1.6176

Real Wage Equation

$$\ln W = 2.2 - 0.004407\ UR + 0.8892 \ln PROD + 0.368 \ln WMIN + 0.03123 \ln RepR - 0.001464\ Tempshare - 0.08182\ \text{Seasonal}$$

(SE): (2.393) (0.001611) (0.13) (0.1622) (0.004906) (0.0005428) (0.03824)

WALD test $X^2(6) = 1212.5$ [0.0000] **

Tests on the significance of each variable

Variable	F(num,denom)	Value	Probability	Unit Root t-test
ln *W*	F(3, 42) =	10.517	[0.0000] **	-7.8598**
UR	F(2, 42) =	17.506	[0.0000] **	-3.1633
Constant	F(1, 42) =	0.79076	[0.3789]	0.88925
ln *PROD*	F(1, 42) =	53.676	[0.0000] **	7.3264
ln *REPR*	F(1, 42) =	40.206	[0.0000] **	6.3408
ln *WMIN*	F(3, 42) =	1.8698	[0.1494]	2.2322
Tempshare	F(1, 42) =	9.9623	[0.0030] **	-3.1563
Seasonal	F(3, 42) =	16.758	[0.0000] **	-2.3641

Table 8 (continued)

Employment Equation

$$\ln E = -2.298 - 0.1019 \ln W - 0.2949 \ln TSS + 1.016 \ln GDP$$
$$(SE) \quad (0.7786) \quad (0.08087) \quad (0.06779) \quad (0.03561)$$

$$- 0.06734 \ln SEVER - 0.002626 \ln STRIKE - 0.01571 \ln Coverage$$
$$(0.009573) \quad (0.001331) \quad (0.002264)$$

$$- 0.01261 \text{ Seasonal}$$
$$(0.02735)$$

WALD test $X^2(7) = 1820.6$ [0.0000] **

Tests on the significance of each variable

Variable	F(num, denom)	Value	Probability	Unit Root t-test
ln *E*	F(4, 37) =	12.62	[0.0000] **	-5.6891**
ln *W*	F(1, 37) =	1.3874	[0.2464]	-1.1779
ln *TSS*	F(3, 37) =	11.238	[0.0000] **	-4.4591
ln *GDP*	F(1, 37) =	34.985	[0.0000] **	5.9148
ln *Coverage*	F(1, 37) =	14.286	[0.0006] **	-3.7796
ln *SEVER*	F(1, 37) =	17.064	[0.0002] **	-4.1309
ln *STRIKE*	F(1, 37) =	4.1322	[0.0493] *	-2.0328
Constant	F(1, 37) =	6.8657	[0.0127] *	-2.6203
Seasonal	F(3, 37) =	6.9233	[0.0008] **	-0.44946

Notes: One asterisk means significant at the 5 percent level and two asterisks mean significant at the 1 percent level.

Both the significance tests and the *t*-statistics should be taken as only rough guides to significance, since they do not make the adjustments necessary for Phillips-Hansen (1990) fully modified estimation of cointegrating relationships.

1/ The critical value for this test is about 3.9, so there is not conclusive evidence of cointegration. Nevertheless, the same model without the inclusion of the dummy variables does unambiguously cointegrate. On this basis, and in light of the characteristics of the residuals to the regression, cointegration is accepted.

Table 9. Policy Model Results for the Labor Force Equation, 1981-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob	$PartR^2$
Constant	-0.0040603	0.0026636	-1.524	0.1353	0.0549
*D*ln *W*(3)	-0.034878	0.016465	-2.118	0.0404	0.1009
DUR(7)	0.0022275	0.0012352	-1.803	0.0789	0.0752
DUR(8)	0.0026690	0.0013203	2.021	0.0500	0.0927
*D*ln *WorkPop*(3)	-2.4973	0.63070	-3.960	0.0003	0.2816
*D*ln *REPR*(3)	0.0018743	0.0014475	1.295	0.2028	0.0402
*D*ln *REPR*(4)	0.0035148	0.0015403	2.282	0.0279	0.1152
*D*ln *LPENSD*	-0.053779	0.030614	-1.757	0.0866	0.0716
LFECM2(1)	-0.20421	0.046137	-4.426	0.0001	0.3288
Seasonal	0.0036653	0.0034986	1.048	0.3011	0.0267
$Seasonal_{-1}$	0.0075809	0.0041596	1.823	0.0759	0.0767
$Seasonal_{-2}$	0.016190	0.0032696	4.952	0.0000	0.3800

$R^2 = 0.737506$ $F(11, 40) = 10.217$ [0.0000] $\sigma = 0.00239251$ $DW = 2.31$

$RSS = 0.0002289640177$ for 12 variables and 52 observations

AR 1- 4 $F(4, 36) = 0.98292$ [0.4291]
ARCH 4 $F(4, 32) = 0.18011$ [0.9470]
Normality $X^2(2) = 3.7685$ [0.1519]
X^2 $F(19, 20) = 0.52641$ [0.9161]
RESET $F(1, 39) = 0.54023$ [0.4667]

Notes: Dependent variable is *D*ln *LF*, estimated by OLS. None of the endogenous variables was significant in contemporaneous variables, so the estimation was done with OLS rather than IV.

Table 10. Basic Model Results for the Real Wage Equation, 1971-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob	PartR^2
Constant	0.013066	0.015687	0.833	0.4096	0.0162
Dln W(3)	-0.23414	0.087457	-2.677	0.0105	0.1458
Dln W(4)	0.34891	0.10150	3.438	0.0013	0.2196
Dln PROD(3)	-1.0042	0.52678	-1.906	0.0635	0.0796
DUR(1)	0.013594	0.0047158	2.883	0.0062	0.1652
DREPR	0.030792	0.0082032	3.754	0.0005	0.2512
Dln WMIN(2)	-0.31806	0.097096	-3.276	0.0021	0.2035
Dtempshare(3)	0.0021394	0.00096377	2.220	0.0319	0.1050
LWECM2(1)	-0.66090	0.12613	-5.240	0.0000	0.3953
Seasonal	-0.068184	0.022547	-3.024	0.0042	0.1788
Seasonal_{-1}	-0.0021800	0.022236	-0.098	0.9224	0.0002
Seasonal_{-2}	0.029393	0.020928	1.405	0.1675	0.0449

R^2 = 0.983182 F(11, 42) = 223.21 [0.0000] σ = 0.0132199 *DW* = 2.23
RSS = 0.007340122792 for 12 variables and 54 observations

AR 1- 4F(4, 38) = 1.5174 [0.2166]
ARCH 4 F(4, 34) = 0.2956 [0.8788]
Normality χ^2(2) = 1.2894 [0.5248]
χ^2 F(19, 22) = 0.34389 [0.9890]
RESET F(1, 41) = 3.1949 [0.0813]

Notes: Dependent variable is *Dln W*, estimated by OLS. None of the endogenous variables was significant in contemporaneous variables, so the estimation was done with OLS rather than IV.

Table 11. Policy Model Results for the Employment Equation, 1981-93

(Lags shown in parentheses)

Variable	Coefficient	Standard Error	t-value	t-prob
Constant	-0.00013265	0.0025914	-0.051	0.9595
Dln *GDP*	0.24073	0.13816	1.742	0.0910
Dln *GDP*(3)	-0.61608	0.15212	-4.050	0.0003
Dln *W*	-0.040610	0.019300	-2.104	0.0433
Dln *W*(1)	0.035554	0.014486	2.454	0.0197
Dln *E*(1)	0.39297	0.082871	4.742	0.0000
Dln *E*(3)	0.21376	0.094120	2.271	0.0300
Dln *E*(6)	-0.24854	0.057618	-4.314	0.0001
Dln *TSS*	-0.26215	0.041517	-6.314	0.0000
Dln *TSS*(1)	0.30460	0.039048	7.801	0.0000
Dln *TSS*(3)	0.096461	0.046362	2.081	0.0456
Dln *TSS*(4)	-0.16525	0.044189	-3.740	0.0007
Dln *STRIKE*(2)	-0.00095640	0.00033149	-2.885	0.0069
Dln *STRIKE*(4)	0.0014214	0.00033737	4.213	0.0002
Dln *COVER*(1)	-0.0094967	0.0024831	-3.825	0.0006
EmpECM2(1)	-0.44459	0.052754	-8.428	0.0000
Seasonal	-0.0089656	0.0045113	-1.987	0.0555
Seasonal$_{1}$	0.013916	0.0041862	3.324	0.0022
Seasonal$_{2}$	0.0073756	0.0019385	3.805	0.0006

Additional instruments used:
Dln *SEVER* Dln *TSS*(2) Dln *GDP*(1) Dln *COVER* Dln *E*(5) Dln *W*(2)
Dln *W*(3) Dln*SEVER*(1)

σ = 0.00176823 *DW* = 2.02
RSS = 0.000100052243 for 19 variables and 51 observations
3 endogenous and 17 exogenous variables with 25 instruments
Reduced form σ = 0.00155334
Specification $X^2(6)$ = 10.587 [0.1020]
Testing ß = 0: $X^2(18)$ = 1157.8 [0.0000] **

Testing for error autocorrelation from lags 1 to 4
$X^2(4)$ = 1.4692 [0.8321]

IV error autocorrelation coefficients:

	Lag 1	Lag 2	Lag 3	Lag 4
Coeff.	-0.05538	0.1402	-0.1866	-0.1426

ARCH 4 F(4, 24) = 0.94264 [0.4564]
Normality $X^2(2)$= 0.40163 [0.8181]

Notes: Dependent variable is Dln *E*, estimated by IV. Two asterisks mean significant at the 1 percent level.

Table 12. Indicators of Labor Force Equation Dynamics, Policy Model

	Response of a 1 Percent Shock to					
	Wages	Unemployment rate	Working population	Replacement ratio	Pension	Labor force
Permanent shock						
LR elasticity	0.237	0	1.452	-0.333	-0.17	1
Half-life (quarters)	6	--	11	10	3	5
Responsiveness (percent)	-5.62	--	-13.3	-15.29	-3.35	-4.91
Temporary shock						
Maximum deviation	0.0482	0.0031	-2.27	-0.124	-0.054	1
Half-life (quarters)	7	10	8	11	2	5
Persistence (in percent)	0.236	$7*10^{8}$	1.478	-0.331	-0.169	4.887

Table 13. Indicators of Real Wage Equation Dynamics, Policy Model

	Response of a 1 Percent Shock to					
	Productivity	Minimum wage	Unemployment rate	Replacement ratio	Temporary share	Wages
Permanent shock						
LR elasticity	0.8892	0.368	-0.0044	0.031	-.00146	1
Half-life (Quarters)	6	4	15	1	9	2
Responsiveness (percent)	-2.55	-3.314	-4.518	0.508	-2.867	-1.52
Temporary shock						
Maximum deviation	-0.927	0.242	0.011	0.031	0.002	1
Half-life (quarters)	16	16	11	6	13	2
Persistence (percent)	0.897	0.371	-.0043	0.031	-0.0015	1.512

Table 14. Indicators of Employment Equation Dynamics, Policy Model

	Response of a 1 Percent Shock to							
	GDP	Real wages	Social security tax	Product wage	Collective bargaining	Strike days	Severance pay	Employment
Permanent shock								
LR elasticity	1.016	-0.1019	-0.295	-0.397	-0.0157	-0.0026	-0.0673	1
Half-life (quarters)	2	5	4	4	2	3	3	3
Responsiveness (percent)	-2.28	-1.338	-1.251	-1.273	-0.295	-0.26	-1.453	-1.451
Temporary shock								
Maximum deviation	0.438	-0.04	-0.261	-0.301	-0.0164	-0.00261	-0.0298	1
Half-life (quarters)	7	5	6	6	3	4	5	4
Persistence (percent)	1.014	-0.101	-0.293	-0.394	-0.0156	-0.0026	-0.067	2.253

Chart 1.
Basic Model: Impulse Response Graphs for Permanent Shocks to Key Variables

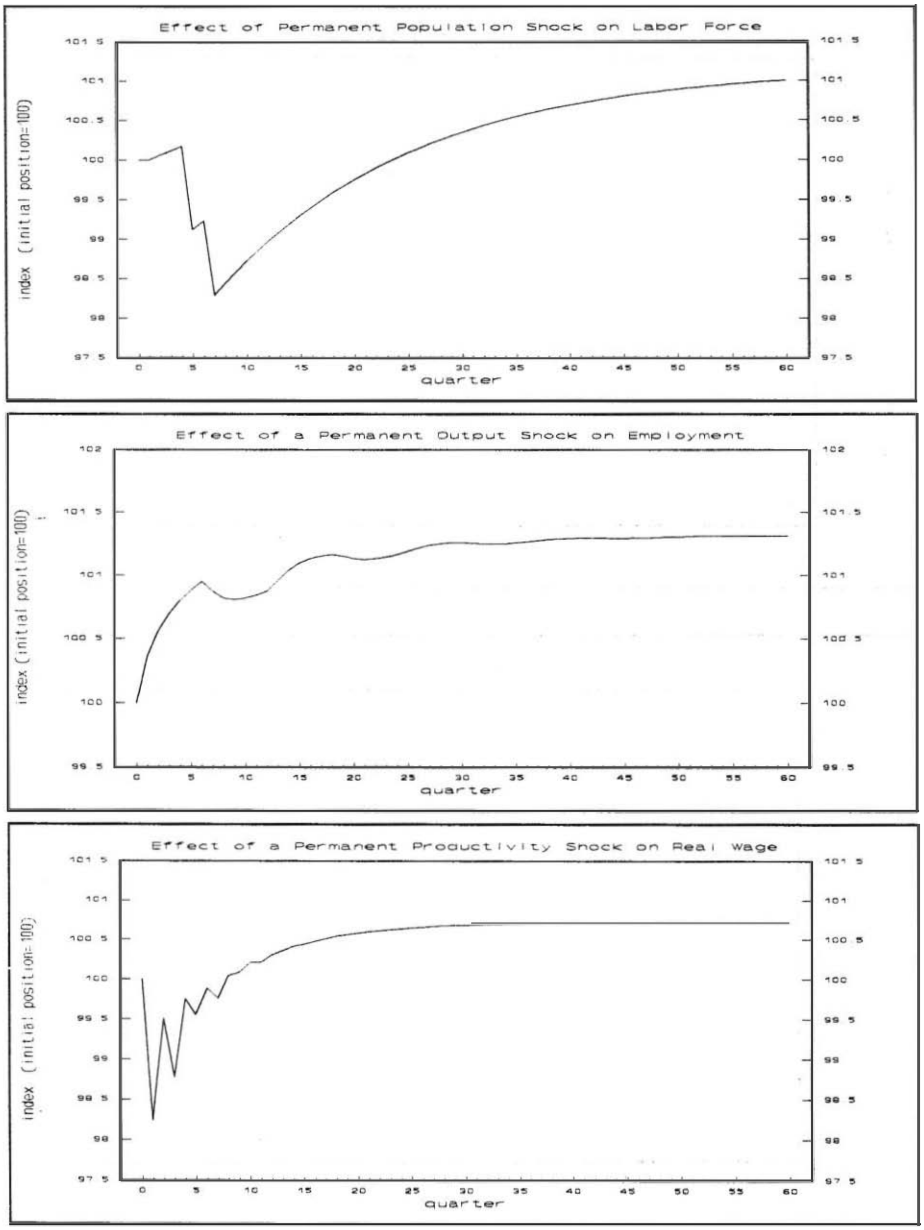
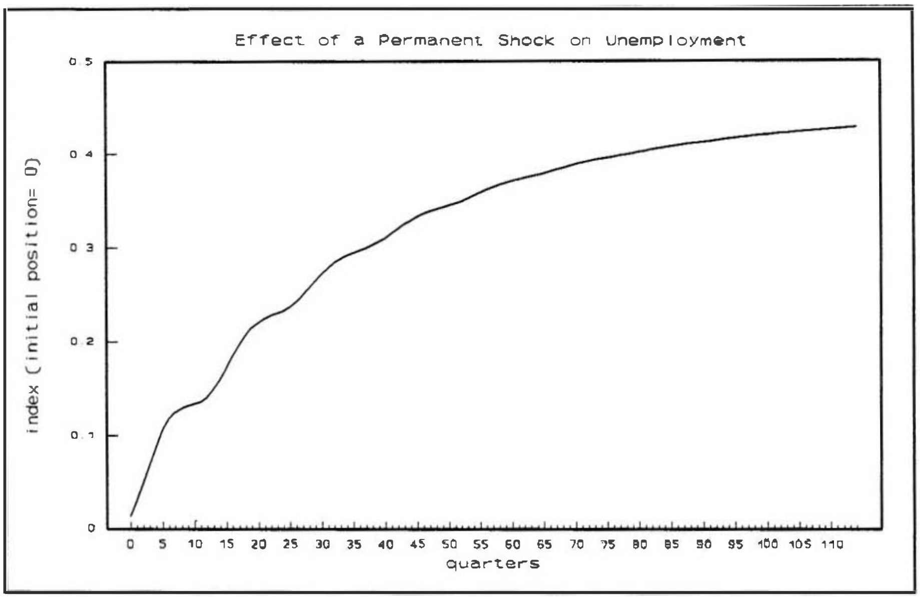


Chart 2.
Basic Model: Impulse Response Graphs for the Model as a Whole



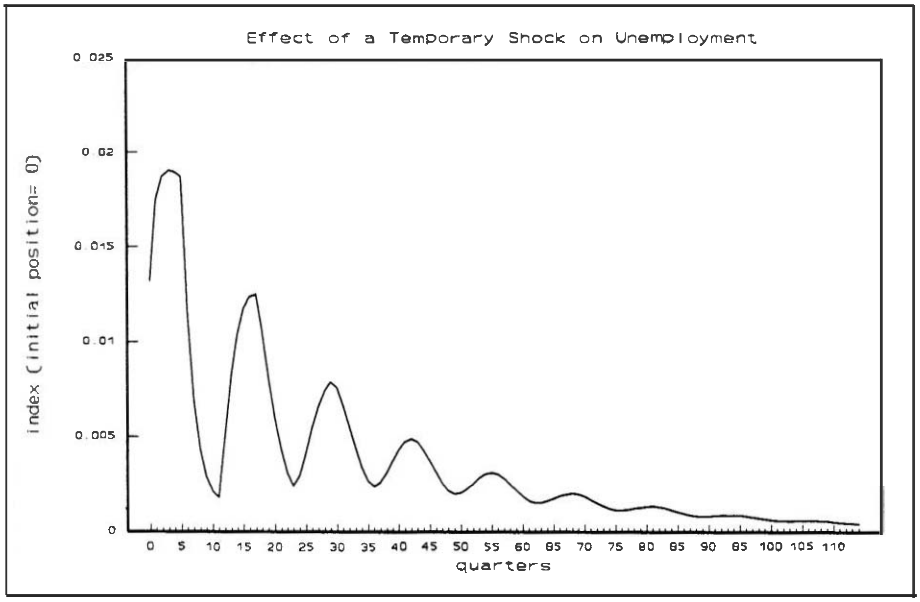
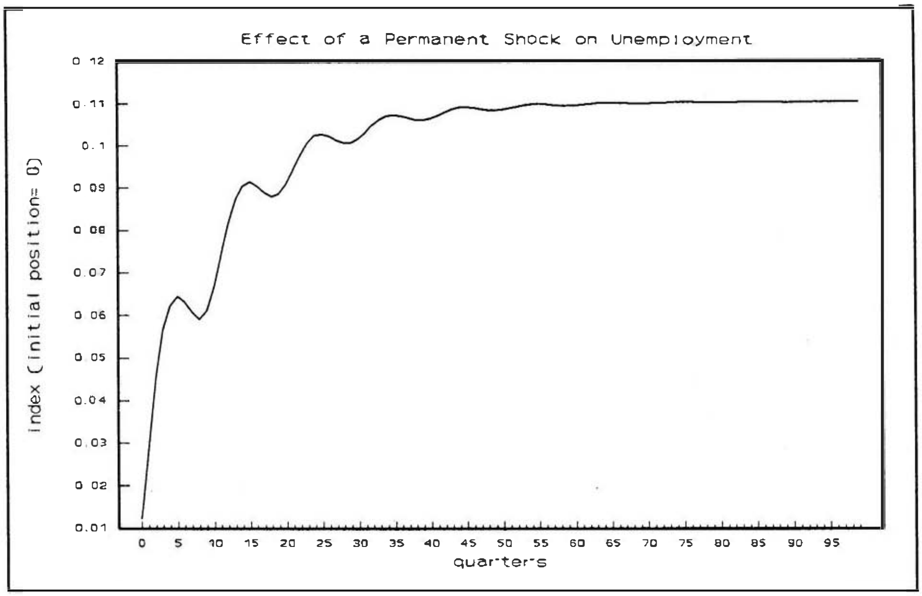
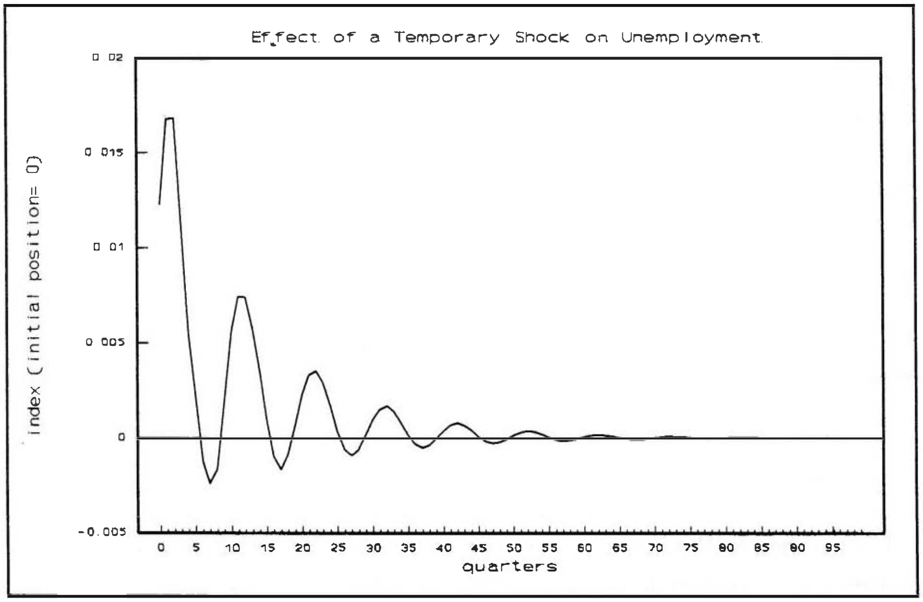


Chart 3.
Policy Model: Impulse Response Graphs for the Model as a Whole





APPENDIX. SIMPLE MEASURES OF "CROSS-PERSISTENCE" AND "CROSS-RESPONSIVENESS"

Snower and Karanassou (1995) define unemployment persistence as the sum of the deviations of unemployment from its initial value from an employment shock as follows:

$$\pi = \sum_{t=1}^{\infty} \frac{u_t' - u_t}{\Delta \varepsilon_0},$$

where $\Delta\epsilon_0$ is the shock in period 0. To obtain a measure of persistence for shocks in explanatory variables, this indicator must be modified, because it is unclear what the denominator would be because the shock is the domain of a variable different from the reaction. To solve this, it is normalized by the equilibrium value of the dependent variable rather than by the shock itself. Thus, the cross-persistence measure of deviations in the dependent variable, y, owing to a shock in variable x, is as follows:

$$\pi_{yx} = \sum_{t=1}^{\infty} \frac{y_t' - y_t}{y_0},$$

where y_0 is the value of the dependent variable before the shock to x. Where persistence is measured due to a shock in the dependent variable, π_{yy} is related to Snower-Karanassou persistence (π_{sk}) by the following relationship:

$$\pi_{yy} = \{(y_1 - y_0)/y_0\}\pi_{sk}.$$

For responsiveness to a permanent shock, the Snower-Karanassou measure is

$$\sigma = \sum_{t=0}^{\infty} \frac{u_t'' - \overline{u_t''}}{\Delta \varepsilon_1},$$

where u" bar is the long-run equilibrium value. Here again, the Snower-Karanassou measure has to be modified to measure the cross-responsiveness effect of one variable on another, although here the modification is more minor. The difference between the initial and final equilibrium values is used to normalize as follows:

$$\sigma_{xy} = \sum_{t=0}^{\infty} \frac{y_t'' - \overline{y''}}{y_o - \overline{y''}}.$$

For responsiveness to shocks in the dependent variable in a single-equation error correction model, this measure would be identical to the corresponding Snower-Karanassou responsiveness measure (although this might not be true for a system of equations where feedback effects from other equations could cause the long-run change in the dependent variable to be larger than the shock.

References

Bean, Charles R., 1994, "European Unemployment: A Survey," Journal of Economic Literature, Vol. 32 (June), pp. 573-619.

Bentolila, Samuel, and Juan J. Dolado, 1994, "Labour Flexibility and Wages: Lessons from Spain," Economic Policy: A European Forum, Vol. 9 (April), pp. 53-99.

Bianchi, Marco, and Gylfi Zoega, 1994, "Unemployment Persistence: Does the Size of the Shock Matter?" CEPR Discussion Paper No. 1082 (London: Centre for Economic Policy Research).

Blanchard, Olivier, and Lawrence Summers, 1986, "Hysteresis and the European Unemployment Problem," NBER Macroeconomics Annual 1986 (Cambridge, Massachusetts: MIT Press), pp. 15-78.

Booth, Alison, 1995, The Economics of the Trade Union (Cambridge, England; New York: Cambridge University Press).

Dolado, Juan José, and others, 1996, "The Economic Impact of Minimum Wages in Europe," forthcoming in Economic Policy.

Dolado, Juan José, and David López-Salido, 1996, "Hysteresis and Economic Fluctuations (Spain, 1970-94)," CEPR Discussion Paper No. 1334 (London: Centre for Economic Policy Research).

Dolado, Juan José, and José Malo de Molina, 1986, "Spanish Industrial Employment: Some Explanatory Factors," Economica, Vol. 53 (Supplement), pp. S313-S334.

Franks, Jeffrey R., 1994, "Explaining Unemployment in Spain: Structural Change, Cyclical Fluctuations, and Labor Market Rigidities," IMF Working Paper No. 94/102 (Washington: International Monetary Fund).

Friedman, Milton, 1968, "The Role of Monetary Policy," American Economic Review, Vol. 58 (March), pp. 1-17.

Jimeno, Juan F., and Luis Toharia, 1993, "The Effects of Fixed-Term Employment on Wages: Theory and Evidence from Spain," Investigaciones Económicas, 27(3).

Karanassou, Marika, and Dennis J. Snower, 1993, "Explaining Disparities in Unemployment Dynamics," CEPR Discussion Paper No. 858 (London: Centre for Economic Policy Research).

Oswald, Andrew J., and Peter J. Turnbull, 1985, "Pay and Employment Determination in Britain: What Are Labour Contracts Really Like?" Oxford Review of Economic Policy, Vol. 1 (No. 2), pp. 80-97.

Pesaran, H., and Shin, Y., 1995, "An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis," DAE Working Paper No. 9514 (Cambrigde, England: University of Cambridge, Department of Applied Economics).

Phillips, Peter C.B., and Bruce E. Hansen, 1990, "Statistical Inference in Instrumental Variables Regressions with I(1) Processes," Review of Economic Studies, Vol. 57 (January), pp. 99-125.

Snower, Dennis J., and Marika Karanassou, 1995, "A Contribution to Unemployment Dynamics," CEPR Discussion Paper No. 1176 (London: Centre for Economic Policy Research).

WORKING PAPERS (1)

9210 **Ángel Serrat Tubert:** Riesgo, especulación y cobertura en un mercado de futuros dinámico.

9211 **Soledad Núñez Ramos:** Fras, futuros y opciones sobre el MIBOR.

9213 **Javier Santillán:** La idoneidad y asignación del ahorro mundial.

9214 **María de los Llanos Matea:** Contrastes de raíces unitarias para series mensuales. Una aplicación al IPC.

9215 **Isabel Argimón, José Manuel González-Páramo y José María Roldán:** Ahorro, riqueza y tipos de interés en España.

9216 **Javier Azcárate Aguilar-Amat:** La supervisión de los conglomerados financieros.

9217 **Olympia Bover:** An empirical model of house prices in Spain (1976-1991). (The Spanish original of this publication has the same number.)

9218 **Jeroen J. M. Kremers, Neil R. Ericsson and Juan J. Dolado:** The power of cointegration tests.

9219 **Luis Julián Álvarez, Juan Carlos Delrieu and Javier Jareño:** Treatment of conflictive forecasts: Efficient use of non-sample information. (The Spanish original of this publication has the same number.)

9221 **Fernando Restoy:** Interest rates and fiscal discipline in monetary unions. (The Spanish original of this publication has the same number.)

9222 **Manuel Arellano:** Introducción al análisis econométrico con datos de panel.

9223 **Ángel Serrat:** Diferenciales de tipos de interés ONSHORE/OFFSHORE y operaciones SWAP.

9224 **Ángel Serrat:** Credibilidad y arbitraje de la peseta en el SME.

9225 **Juan Ayuso and Fernando Restoy:** Efficiency and risk premia in foreign exchange markets. (The Spanish original of this publication has the same number.)

9226 **Luis J. Álvarez, Juan C. Delrieu y Antoni Espasa:** Aproximación lineal por tramos a comportamientos no lineales: estimación de señales de nivel y crecimiento.

9227 **Ignacio Hernando y Javier Vallés:** Productividad, estructura de mercado y situación financiera.

9228 **Ángel Estrada García:** Una función de consumo de bienes duraderos.

9229 **Juan J. Dolado and Samuel Bentolila:** Who are the insiders? Wage setting in spanish manufacturing firms.

9301 **Emiliano González Mota:** Políticas de estabilización y límites a la autonomía fiscal en un área monetaria y económica común.

9302 **Anindya Banerjee, Juan J. Dolado and Ricardo Mestre:** On some simple tests for cointegration: the cost of simplicity.

9303 **Juan Ayuso and Juan Luis Vega:** Weighted monetary aggregates: The Spanish case. (The Spanish original of this publication has the same number.)

9304 **Ángel Luis Gómez Jiménez:** Indicadores de la política fiscal: una aplicación al caso español.

9305 **Ángel Estrada y Miguel Sebastián:** Una serie de gasto en bienes de consumo duradero.

9306 **Jesús Briones, Ángel Estrada e Ignacio Hernando:** Evaluación de los efectos de reformas en la imposición indirecta.

9307 **Juan Ayuso, María Pérez Jurado and Fernando Restoy:** Credibility indicators of an exchange rate regime: The case of the peseta in the EMS. (The Spanish original of this publication has the same number.)

9308 **Cristina Mazón:** Regularidades empíricas de las empresas industriales españolas: ¿existe correlación entre beneficios y participación?

9309 **Juan Dolado, Alessandra Goria and Andrea Ichino:** Immigration and growth in the host country.

9310 **Amparo Ricardo Ricardo:** Series históricas de contabilidad nacional y mercado de trabajo para la CE y EEUU: 1960-1991.

9311 **Fernando Restoy and G. Michael Rockinger:** On stock market returns and returns on investment.

9312 **Jesús Saurina Salas:** Indicadores de solvencia bancaria y contabilidad a valor de mercado.

9313 **Isabel Argimón, José Manuel González-Páramo, María Jesús Martín and José María Roldán:** Productivity and infrastructure in the Spanish economy. (The Spanish original of this publication has the same number.)

9314 **Fernando Ballabriga, Miguel Sebastián and Javier Vallés:** Interdependence of EC economies: A VAR approach.

9315 **Isabel Argimón y M.ª Jesús Martín:** Serie de «stock» de infraestructuras del Estado y de las Administraciones Públicas en España.

9316 **P. Martínez Méndez:** Fiscalidad, tipos de interés y tipo de cambio.

9317 **P. Martínez Méndez:** Efectos sobre la política económica española de una fiscalidad distorsionada por la inflación.

9318 **Pablo Antolín and Olympia Bover:** Regional Migration in Spain: The effect of Personal Characteristics and of Unemployment, Wage and House Price Differentials Using Pooled Cross-Sections.

9319 **Samuel Bentolila y Juan J. Dolado:** La contratación temporal y sus efectos sobre la competitividad.

9320 **Luis Julián Álvarez, Javier Jareño y Miguel Sebastián:** Salarios públicos, salarios privados e inflación dual.

9321 **Ana Revenga:** Credibility and inflation persistence in the European Monetary System. (The Spanish original of this publication has the same number.)

9322 **María Pérez Jurado and Juan Luis Vega:** Purchasing power parity: An empirical analysis. (The Spanish original of this publication has the same number.)

9323 **Ignacio Hernando y Javier Vallés:** Productividad sectorial: comportamiento cíclico en la economía española.

9324 **Juan J. Dolado, Miguel Sebastián and Javier Vallés:** Cyclical patterns of the Spanish economy.

9325 **Juan Ayuso y José Luis Escrivá:** La evolución del control monetario en España.

9326 **Alberto Cabrero Bravo e Isabel Sánchez García:** Métodos de predicción de los agregados monetarios.

9327 **Cristina Mazón:** Is profitability related to market share? An intra-industry study in Spanish manufacturing.

9328 **Esther Gordo y Pilar L'Hotellerie:** La competitividad de la industria española en una perspectiva macroeconómica.

9329 **Ana Buisán y Esther Gordo:** El saldo comercial no energético español: determinantes y análisis de simulación (1964-1992).

9330 **Miguel Pellicer:** Functions of the Banco de España: An historical perspective.

9401 **Carlos Ocaña, Vicente Salas y Javier Vallés:** Un análisis empírico de la financiación de la pequeña y mediana empresa manufacturera española: 1983-1989.

9402 **P. G. Fisher and J. L. Vega:** An empirical analysis of M4 in the United Kingdom.

9403 **J. Ayuso, A. G. Haldane and F. Restoy:** Volatility transmission along the money market yield curve.

9404 **Gabriel Quirós:** El mercado británico de deuda pública.

9405 **Luis J. Álvarez and Fernando C. Ballabriga:** BVAR models in the context of cointegration: A Monte Carlo experiment.

9406 **Juan José Dolado, José Manuel González-Páramo y José M.ª Roldán:** Convergencia económica entre las provincias españolas: evidencia empírica (1955-1989).

9407 **Ángel Estrada e Ignacio Hernando:** La inversión en España: un análisis desde el lado de la oferta.

9408 **Ángel Estrada García, M.ª Teresa Sastre de Miguel y Juan Luis Vega Croissier:** El mecanismo de transmisión de los tipos de interés: el caso español.

9409 **Pilar García Perea y Ramón Gómez:** Elaboración de series históricas de empleo a partir de la Encuesta de Población Activa (1964-1992).

9410 **F. J. Sáez Pérez de la Torre, J. M.ª Sánchez Sáez y M.ª T. Sastre de Miguel:** Los mercados de operaciones bancarias en España: especialización productiva y competencia.

9411 **Olympia Bover and Ángel Estrada:** Durable consumption and house purchases: Evidence from Spanish panel data.

9412 **José Viñals:** Building a Monetary Union in Europe: Is it worthwhile, where do we stand, and where are we going? (The Spanish original of this publication has the same number.)

9413 **Carlos Chuliá:** Los sistemas financieros nacionales y el espacio financiero europeo.

9414 **José Luis Escrivá and Andrew G. Haldane:** The interest rate transmission mechanism: Sectoral estimates for Spain. (The Spanish original of this publication has the same number.)

9415 **M.ª de los Llanos Matea y Ana Valentina Regil:** Métodos para la extracción de señales y para la trimestralización. Una aplicación: Trimestralización del deflactor del consumo privado nacional.

9416 **José Antonio Cuenca:** Variables para el estudio del sector monetario. Agregados monetarios y crediticios, y tipos de interés sintéticos.

9417 **Ángel Estrada y David López-Salido:** La relación entre el consumo y la renta en España: un modelo empírico con datos agregados.

9418 **José M. González Minguez:** Una aplicación de los indicadores de discrecionalidad de la política fiscal a los países de la UE.

9419 **Juan Ayuso, María Pérez Jurado and Fernando Restoy:** Is exchange rate risk higher in the E.R.M. after the widening of fluctuation bands? (The Spanish original of this publication has the same number.)

9420 **Simon Milner and David Metcalf:** Spanish pay setting institutions and performance outcomes.

9421 **Javier Santillán:** El SME, los mercados de divisas y la transición hacia la Unión Monetaria.

9422 **Juan Luis Vega:** Is the ALP long-run demand function stable? (The Spanish original of this publication has the same number.)

9423 **Gabriel Quirós:** El mercado italiano de deuda pública.

9424 **Isabel Argimón, José Manuel González-Páramo y José María Roldán:** Inversión privada, gasto público y efecto expulsión: evidencia para el caso español.

9425 **Charles Goodhart and José Viñals:** Strategy and tactics of monetary policy: Examples from Europe and the Antipodes.

9426 **Carmen Melcón:** Estrategias de política monetaria basadas en el seguimiento directo de objetivos de inflación. Las experiencias de Nueva Zelanda, Canadá, Reino Unido y Suecia.

9427 **Olympia Bover and Manuel Arellano:** Female labour force participation in the 1980s: the case of Spain.

9428 **Juan María Peñalosa:** The Spanish catching-up process: General determinants and contribution of the manufacturing industry.

9429 **Susana Núñez:** Perspectivas de los sistemas de pagos: una reflexión crítica.

9430 **José Viñals:** ¿Es posible la convergencia en España?: En busca del tiempo perdido.

9501 **Jorge Blázquez y Miguel Sebastián:** Capital público y restricción presupuestaria gubernamental.

9502 **Ana Buisán:** Principales determinantes de los ingresos por turismo.

9503 **Ana Buisán y Esther Gordo:** La protección nominal como factor determinante de las importaciones de bienes.

9504 **Ricardo Mestre:** A macroeconomic evaluation of the Spanish monetary policy transmission mechanism.

9505 **Fernando Restoy and Ana Revenga:** Optimal exchange rate flexibility in an economy with intersectoral rigidities and nontraded goods.

9506 **Ángel Estrada and Javier Vallés:** Investment and financial costs: Spanish evidence with panel data. (The Spanish original of this publication has the same number.)

9507 **Francisco Alonso:** La modelización de la volatilidad del mercado bursátil español.

9508 **Francisco Alonso y Fernando Restoy:** La remuneración de la volatilidad en el mercado español de renta variable.

9509 **Fernando C. Ballabriga, Miguel Sebastián y Javier Vallés:** España en Europa: asimetrías reales y nominales.

9510 **Juan Carlos Casado, Juan Alberto Campoy y Carlos Chuliá:** La regulación financiera española desde la adhesión a la Unión Europea.

9511 **Juan Luis Díaz del Hoyo y A. Javier Prado Domínguez:** Los FRAs como guías de las expectativas del mercado sobre tipos de interés.

9512 **José M.ª Sánchez Sáez y Teresa Sastre de Miguel:** ¿Es el tamaño un factor explicativo de las diferencias entre entidades bancarias?

9513 **Juan Ayuso y Soledad Núñez:** ¿Desestabilizan los activos derivados el mercado al contado?: La experiencia española en el mercado de deuda pública.

9514 **M.ª Cruz Manzano Frías y M.ª Teresa Sastre de Miguel:** Factores relevantes en la determinación del margen de explotación de bancos y cajas de ahorros.

9515 **Fernando Restoy and Philippe Weil:** Approximate equilibrium asset prices.

9516 **Gabriel Quirós:** El mercado francés de deuda pública.

9517 **Ana L. Revenga and Samuel Bentolila:** What affects the employment rate intensity of growth?

9518 **Ignacio Iglesias Araúzo y Jaime Esteban Velasco:** Repos y operaciones simultáneas: estudio de la normativa.

9519 **Ignacio Fuentes:** Las instituciones bancarias españolas y el Mercado Único.

9520 **Ignacio Hernando:** Política monetaria y estructura financiera de las empresas.

9521 **Luis Julián Álvarez y Miguel Sebastián:** La inflación latente en España: una perspectiva macroeconómica.

9522 **Soledad Núñez Ramos:** Estimación de la estructura temporal de los tipos de interés en España: elección entre métodos alternativos.

9523 **Isabel Argimón, José M. González-Páramo y José M.ª Roldán Alegre:** Does public spending crowd out private investment? Evidence from a panel of 14 OECD countries.

9524 **Luis Julián Álvarez, Fernando C. Ballabriga** y **Javier Jareño:** Un modelo macroeconométrico trimestral para la economía española.

9525 **Aurora Alejano y Juan M.ª Peñalosa:** La integración financiera de la economía española: efectos sobre los mercados financieros y la política monetaria.

9526 **Ramón Gómez Salvador** y **Juan J. Dolado:** Creación y destrucción de empleo en España: un análisis descriptivo con datos de la CBBE.

9527 **Santiago Fernández de Lis** y **Javier Santillán:** Regímenes cambiarios e integración monetaria en Europa.

9528 **Gabriel Quirós:** Mercados financieros alemanes.

9529 **Juan Ayuso Huertas:** Is there a trade-off between exchange rate risk and interest rate risk? (The Spanish original of this publication has the same number.)

9530 **Fernando Restoy:** Determinantes de la curva de rendimientos: hipótesis expectacional y primas de riesgo.

9531 **Juan Ayuso and María Pérez Jurado:** Devaluations and depreciation expectations in the EMS.

9532 **Paul Schulstad and Ángel Serrat:** An Empirical Examination of a Multilateral Target Zone Model.

9601 **Juan Ayuso, Soledad Núñez and María Pérez-Jurado:** Volatility in Spanish financial markets: The recent experience.

9602 **Javier Andrés e Ignacio Hernando:** ¿Cómo afecta la inflación al crecimiento económico? Evidencia para los países de la OCDE.

9603 **Barbara Dluhosch:** On the fate of newcomers in the European Union: Lessons from the Spanish experience.

9604 **Santiago Fernández de Lis:** Classifications of Central Banks by Autonomy: A comparative analysis.

9605 **M.ª Cruz Manzano Frías y Sofía Galmés Belmonte:** Credit Institutions' Price Policies and Type of Customer: Impact on the Monetary Transmission Mechanism. (The Spanish original of this publication has the same number.)

9606 **Malte Krüger:** Speculation, Hedging and Intermediation in the Foreign Exchange Market.

9607 **Agustín Maravall:** Short-Term Analysis of Macroeconomic Time Series.

9608 **Agustín Maravall and Christophe Planas:** Estimation Error and the Specification of Unobserved Component Models.

9609 **Agustín Maravall:** Unobserved Components in Economic Time Series.

9610 **Matthew B. Canzoneri, Behzad Diba and Gwen Eudey:** Trends in European Productivity and Real Exchange Rates.

9611 **Francisco Alonso, Jorge Martínez Pagés y María Pérez Jurado:** Weighted Monetary Aggregates: an Empirical Approach. (The Spanish original of this publication has the same number.)

9612 **Agustín Maravall and Daniel Peña:** Missing Observations and Additive Outliers in Time Series Models.

9613 **Juan Ayuso and Juan L. Vega:** An empirical analysis of the peseta's exchange rate dynamics.

9614 **Juan Ayuso Huertas:** Un análisis empírico de los tipos de interés reales *ex-ante* en España.

9615 **Enrique Alberola Ila:** Optimal exchange rate targets and macroeconomic stabilization.

9616 **A. Jorge Padilla, Samuel Bentolila and Juan J. Dolado:** Wage bargaining in industries with market power.

9617 **Juan J. Dolado and Francesc Marmol:** Efficient estimation of cointegrating relationships among higher order and fractionally integrated processes.

9618 **Juan J. Dolado y Ramón Gómez:** La relación entre vacantes y desempleo en España: perturbaciones agregadas y de reasignación.

9619 **Alberto Cabrero and Juan Carlos Delrieu:** Construction of a composite indicator for predicting inflation in Spain. (The Spanish original of this publication has the same number.)

9620 **Una-Louise Bell:** Adjustment costs, uncertainty and employment inertia.

9621 **M.ª de los Llanos Matea y Ana Valentina Regil:** Indicadores de inflación a corto plazo.

9622 **James Conklin:** Computing value correspondences for repeated games with state variables.

9623 **James Conklin:** The theory of sovereign debt and Spain under Philip II.

9624 **José Viñals and Juan F. Jimeno:** Monetary Union and European unemployment.

9625 **Maria Jesús Nieto Carol:** Central and Eastern European Financial Systems: Towards integration in the European Union.

9626 **Matthew B. Canzoneri, Javier Vallés and José Viñals:** Do exchange rates move to address international macroeconomic imbalances?

9627 **Enrique Alberola Ila:** Integración económica y unión monetaria: el contraste entre Norteamérica y Europa.

9628 **Víctor Gómez and Agustín Maravall:** Programs TRAMO and SEATS.

9629 **Javier Andrés, Ricardo Mestre y Javier Vallés:** Un modelo estructural para el análisis del mecanismo de transmisión monetaria: el caso español.

9630 **Francisco Alonso y Juan Ayuso:** Una estimación de las primas de riesgo por inflación en el caso español.

9631 **Javier Santillán:** Política cambiaria y autonomía del Banco Central.

9632 **Marcial Suárez:** Vocábula (Notas sobre usos lingüísticos).

9633 **Juan Ayuso and J. David López-Salido:** What does consumption tell us about inflation expectations and real interest rates?

9701 **Víctor Gómez, Agustín Maravall and Daniel Peña:** Missing observations in ARIMA models: Skipping strategy versus outlier approach.

9702 **José Ranón Martínez Resano:** Los contratos DIFF y el tipo de cambio.

9703 **Gabriel Quirós Romero:** Una valoración comparativa del mercado español de deuda pública.

9704 **Agustín Maravall:** Two discussions on new seasonal adjustment methods.

9705 **J. David López-Salido y Pilar Velilla:** La dinámica de los márgenes en España (Una primera aproximación con datos agregados).

9706 **Javier Andrés and Ignacio Hernando:** Does inflation harm economic growth? Evidence for the OECD.

9707 **Marga Peeters:** Does demand and price uncertainty affect Belgian and Spanish corporate investment?

9708 **Jeffrey Franks:** Labor market policies and unemployment dynamics in Spain.

(1) Previously published Working Papers are listed in the Banco de España publications catalogue.

Queries should be addressed to: Banco de España
Sección de Publicaciones. Negociado de Distribución y Gestión
Telephone: 338 51 80
Alcalá, 50. 28014 Madrid