Unemployment and Finance: How do Financial and Labour Market Factors Interact?

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Abstract

Using annual data for 18 OECD countries over the period 1980-2004, we investigate how labour and financial factors interact to determine unemployment by estimating a dynamic panel model using the system generalized method of moments (GMM). We show that the impact of financial variables depends strongly on the labour market context. Increased market capitalization as well as decreased banking concentration reduce unemployment if the level of labour market regulation, union density and coordination in wage bargaining is low. The above financial variables have no effect otherwise. Increasing intermediated credit and banking concentration is beneficial for employment when the degree of labour market regulation, union density and coordination in wage bargaining is high. These results suggest that the respective virtues of ed and market-based finance are crucially tied to the labour market context.

JEL-Code: E24, J23, P17.

Keywords: unemployment, institutional complementarities and substituabilities, labour market, financial system.

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1 Introduction

For a long time, the diversity of unemployment rates among countries has fuelled the debate concerning the role of labour market institutions. A rich literature has developed, depicting strong labour legislation, unemployment protection, wage taxation and union action as sources of rigidity. In general, they are thought to lead to a low equilibrium rate of employment (Nickell (1997), Siebert (1997) and Layard & Nickell (1999))[1].

This literature has recently been reinforced by studies on the interactions between institutional arrangements within labour markets. For instance, Nickell, Nunziata, Ochel & Quintini (2002) show that the harmful effect of the gross replacement rate on unemployment is amplified when the duration of unemployment benefit is long. Similarly, Nickell, Nunziata & Ochel (2005) argue that the tax wedge increases unemployment all the more when the degree of coordination in wage bargaining is high. In a similar vein, the literature on institutional complementarities and substitutability has devoted special attention to the interactions between labour market institutions (notably employment protection legislation or union density) and product market regulations[2].

Labour and product market institutions are not the only factors determining unemployment. The empirical literature on 'growth and finance' shows that investment and growth are strongly related to financial development[3]. It is also well known that the size of financial markets, the role of financial intermediation, the degree of banking concentration etc. differ dramatically among countries (Allen & Gale (1995, 2000)). This has given rise to an abundant literature on the opposition between bank-based and marked-based financial systems. This literature investigates the respective virtues of banks and financial markets in terms of a reduction of information asymmetry and corporate financing. While banks allow to finance small and risky businesses as well as firms with lesser reputation and intangible assets, arm's length financing (through financial markets or multiple banking relationships) is more suitable for large and creditworthy firms, with solid reputation and tangible assets (Berlin & Loeys (1988), Diamond (1991), Berlin & Mester (1992) and Rajan (1992)).

These issues are all the more interesting considering recent developments within the political economy literature, which stress the interdependence between labour and financial market devices. According to Pagano & Volpin (2005), finance and labour contribute jointly to design the opposition between the so-called corporatist and non-corporatist economies. Contrary to the latter, corporatist economies are characterized by a proportional (rather than majority) voting system, weak shareholder protection as well as strong employment protection. In a similar vein, some contributions suggest that the emergence of bank-based finance and tight labour regulation

[1]For a survey of the literature on the links between labour market institutions and employment performances, see Arpai & Mourre (2005).

[2]The theoretical aspects of this literature are explored by Blanchard & Giavazzi (2003), Hebell & Haefke (2003), Amable & Gatti (2004) and Amable & Gatti (2006). Empirical analysis have been advanced by Nicoletti & Scarpetta (2005), Griffith, Harrison & Macartney (2006), Berger & Danninger (2007), Amable, Demmou & Gatti (2010), Fiori, Nicoletti, Scarpetta & Schiantarelli (2007) and Kugler & Pica (2008).

[3]See, among others, Levine & Zervos (1998), Beck & Levine (2002), Beck, Levine & Loayza (2002), Carlin & Mayer (2003) and Djankov (2008).

are both associated with civil law rather than with common-law (Egrungor (2004), Botero et al. (2005)) as well as with concentrated financial wealth (Perroti & Von Thadden (2006)). Taken together, these arguments suggest that a correlation might exist between tight institutions on labour and financial markets.

The theoretical literature has recently emphasized the idea that the interactions between labour and financial market institutions may have important consequences for aggregate employment. In fact, financial market imperfections create a bias in decisions concerning the creation of firms, job vacancies etc. According to ths literature, the sign and extent of the bias would depend on the structure of the labour market (Rendon (2001), Belke & Fehn (2002), Koskela & Stenbacka (2002) and Wasmer & Weil (2004)). Nevertheless empirical studies addressing the issue are infrequent. A few empirical papers focus on the determinants of labour demand and provide evidence on the role of financial factors based on micro-data (Nickell & Wadhwani (1991), Sharpe (1994), Nickell & Nicolitsas (1999), Belke & Fehn (2002), Belke, Fehn & Foster (2004), Caggese & Cunat (2008) and Benito & Hernando (2008)). However, empirical contributions adressing the macroeconomic effects of interactions between institutions on labour and financial markets and focusing on aggregate employment are missing. The goal of this paper is therefore to fill this gap.

We make here use of an annual data set for 18 OECD countries over the period 1980-2004 to investigate how labour and financial market features jointly affect the unemployment rate, and implement recently developed dynamic panel data methods. Specifically, we carry out the system Generalized Moment Method (GMM) estimator developed by Arellano & Bover (1995), Blundel & Bond (1998) to estimates a dynamic model that includes country fixed effects and interaction terms in order to capture the interdependence across several institutional devices on labour and financial markets. Our primary goal here is to check whether financial factors matter in determining unemployment. Second, we aim to understand whether the effects of financial arrangements depend on the labour market context, as the theoretical literature suggests. Finally, we investigate whether the empirical evidence on employment can be interpreted in the light of the distinction frequently made between market-based and bank-based finance.

The paper is organized as follows. Section 2 sets up the theoretical and empirical background for our research. Data, econometric methodology and results are presented in Section 3. In order to ensure that our results are robust to modifications in our estimated model, we consider several financial market indicators and alternative labour market characteristics. Section 4 provides additional robustness checks and discusses the policy consequences of our analysis. Section 5 offers some concluding remarks.

2 Theoretical and empirical background

The rationale for our analysis lies at the intersection of two streams of the literature. The first one deals with the financial determinants of labour demand. The second one refers to the interactions between financial and labour market institutions.

2.1 Financial determinants of labour demand

According to the new-Keynesian view, market imperfections (such as adjustment costs and information asymmetries) play a crucial role in business fluctuations. This explains why firms' labour demand depends on financial factors. Greenwald & Stiglitz (1993) and Arnold (2002) show that financial constraints induced by information asymmetries make firms' labour demand dependent on their balance-sheet position. As a consequence, employment fluctuates according to the financial pressures that firms face.

Relatively few empirical studies have been devoted to the financial determinants of labour demand[4]. Existing papers are mainly based on firm-level econometric investigations. Sharpe (1994) find that the sensitivity of American firms' labour demand to sales increases with their leverage ratio. Using a set of British firms, Nickell & Wadhwani (1991) show that employment decreases with firms' leverage ratio and increases with their market capitalization. Nickell & Nicolitsas (1999) establish that employment falls with the ratio of interest payment to cash-flow. Benito & Hernando (2008) obtain the same outcome for Spanish firms. Caggese & Cunat (2008) establish that financial constraints affect firms' employment policy and the mix between permanent and temporary employment.

Other studies examine how financial factors affect employment through their impact on firms' creation. According to Acemoglu (2001), financial constraint harms employment because it hinders the emergence of new innovating firms, which create jobs. He observes that, since the 60's, the employment rates of firms dependent on external finance has been higher in Europe than in the United States, arguing that this is due to the stronger regulation of European financial systems. Finally, Belke & Fehn (2002), Fechs & Fuchs (2003) and Belke & al. (2004) focus on venture capital. Resorting to theoretical formalizations and empirical investigations using macroeconomic data, they show that an insufficient development of venture capital prevents the emergence of new firms, thus penalizing employment.

2.2 Interactions between financial and labour markets regulation

An important theoretical debate within the economic literature concerns the sign and effects of interactions between financial arrangements and labour market institutions.

A first stream of literature focuses on the common determinants of financial arrangements and labour market institutions. On the one hand, Egrungor (2004) suggests that the opposition between bank-based and market-based finance is linked to a country's legal origins. Whereas banks act as effective contract enforcers in response to the rigidity of civil law-based economies, financial markets emerge in common law-based countries, where rules are enforced by legal institutions. On the other hand, Botero et al. (2005) and Pagano & Volpin (2005) argue that the regulation of labour is generally more stringent in countries with proportional electoral systems; these systems are also associated with weak shareholders protection and financial markets

[4]The financial determinants of capital demand and the sensitivity of investment to cash-flow have received much more attention. On this issue, see the seminal papers by Fazzari, Hubbard & Petersen (1988), Gertler & Gilchrist (1994) and Bond & Meghir (1994).

development. Taken together, these arguments establish an objective link between finance and labour market institutions. Countries who have inherited civil law legal systems should associate bank dominance with tight labour market regulation while common law countries should exhibit highly developed financial markets and flexible labour market regulation. Using a theoretical model where financial structure and labour market regulation are determined by the distribution of financial wealth, Perroti & Von Thadden (2006) reach the same conclusion. They show that economies exhibiting diffused financial wealth are characterized by highly developed financial markets and weak worker protection while economies with concentrated financial wealth should feature bank-based financial systems and strong labour regulation.

Another series of contributions investigates the implications of the interactions between financial arrangements and labour market institutions on unemployment. In a first set of papers, financial deregulation and labour market flexibilization are regarded as substitutes. In Rendon (2001), the removal of firing and hiring costs favours employment. Financial development also promotes job creation since it allows firms to finance labour adjustment costs by security issuance. As their hiring policy becomes less dependent on their internal resources, firms adjust their employment level more rapidly. Therefore, if financial development is high, the removal of labour market adjustment costs loses its effectiveness since costs can be financed by the issuance of securities. Symmetrically, if the labour market is made perfectly flexible, the access to external finance has less of an impact on employment. In Belke & Fehn (2002), a strong labour protection allows workers to partly capture the rent stemming from the entrepreneur's project. This decreases the project's rate of return below the minimum threshold defined by funders. Hence, the firm can not emerge and no labour is hired, thus generating unemployment. However, the rise in unemployment yields a decline in labour protection and a subsequent rise in the project's return above the founders' threshold. Nevertheless, if the firm is financially constrained, the adjustment is slower and the return to higher employment is delayed. When the labour market is flexible, there is no unemployment and financial deregulation becomes useless. When the financial system is frictionless, the return to employment is immediate and the deregulation of labour market loses interest.

In a second set of papers, financial deregulation and labour market flexibility are seen as complementary. Wasmer & Weil (2004) provide a thoeretical model where the liberalization of labour and/or financial markets improves markets liquidity and reduces agents' matching costs: firms and workers match more easily on the labour market, as well as firms and banks on the credit market. This yields positive effects on employment. Koskela & Stenbacka (2002) model the effects of a reduction of bank competition in an economy where workers are remunerated by a bargained base wage and a share of firms' profit. Because the firms' hiring policy is financed by borrowing, an increase in the interest rate implied by a reduction of banking competition hinders employment. But workers internalize the rise in hiring costs and bargain less harshly concerning their base wage. The moderating effect dominates when unions are powerful. Otherwise, the former effect prevails. Hence, the introduction of imperfections in the banking sector curbs the negative impact of labour market frictions. In other words, financial deregulation favours employment only if the labour market is very flexible. Deregulation becomes counter-productive if the labour market is highly regulated. Labour and financial market institutions are also seen as

complementary in the literature on human capital investment. Acemoglu & Pischke (1999) show that tight labour market institutions and credit rationing favour firms' investment in human capital yielding improvements in labour productivity. This result suggests that deregulation on both labour and financial markets may trigger productivity losses and adverse effects on employment. Unfortunately, this aspect is not formally addressed in existing theoretical models.

3 Econometric investigation

The theoretical literature reviewed in the previous section suggests that financial factors matter in determining unemployment. Moreover, the effects of financial arrangements may depend on the structure of the labour market. In this respect, the distinction between market-based and bank-based finance appears crucial.

In this section, we turn to the econometric analysis and outline in the first two sub-sections the details of the empirical model considered, as well as the data used, and the econometric methodology. Main econometric results are discussed in the last sub-section and tables of results are provided in Appendix 3 and 4.

3.1 Data and econometric model

Our panel includes annual data for 18 OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom and United States) and covers the period 1980-2004. We consider a time-series cross-sectional model that includes country fixed effects as well as a few interaction terms allowing us to investigate the interdependence across several institutional devices. The general specification of our empirical model is as follows:

$$U_{i,t} = \alpha_i + \upsilon_t + \beta \cdot U_{i,t-1} + \chi \cdot LABOUR_{i,t} + \delta \cdot FIN_{i,t} + \gamma \cdot LABOUR_{i,t} \cdot FIN_{i,t} + \phi \cdot CV_{i,t} + \epsilon_{i,t} \quad (1)$$

, where α_i is the country i fixed effect, υ_t the time specific effect, $U_{i,t}$ the standardized rate of unemployment obtained from the OECD, $U_{i,t-1}$ the lagged rate of unemployment, capturing the inertia in the unemployment dynamics, and $\epsilon_{i,t}$ the disturbance term assumed to follow the standard assumptions.

The model features a number of regressors capturing the institutional and macroeconomic characteristics of the investigated economies. Recent studies have underlined problems related to the inclusion of time-invariant variables within fixed-effect models (Amable, Demmou & Gatti (2010)). To avoid those problems, we pay particular attention to the institutional variables included in our regressions. Time-series institutional variables (instead of time-invariant indicators) are preferred whenever they are available.

$LABOUR_{i,t}$ is a set of 3 variables accounting for labour market institutions. $LMREG_{i,t}$ is the measure of employment protection legislation built by Amable, Demmou & Gatti (2010)[5].

[5]This time-series indicator is based on EPL (*Employment Protection Legislation*) scores provided by Nickell,

Contrary to the standard OECD indicator, $LMREG_{i,t}$ is a time-series variable between 0 (for the lowest level of employment protection) to 3 (for the highest level of protection). $COORD_{i,t}$ evaluates the degree of coordination in wage bargaining. Taken from Nickell, Nunziata & Ochel (2005), this variable ranges from 0 to 3 with higher scores corresponding to higher coordination. $UNION_{i,t}$ is the degree of union density, calculated by the OECD as the proportion of union members among workers.

$FIN_{i,t}$ denotes a set of three financial indicators. Currently used in the finance and growth literature, they come from the Demircüç-Kunt & Levine (2001) data set. $CAPI_{i,t}$ is a ratio of stock market capitalisation to GDP. $CREDIT_{i,t}$ is a ratio of the claims to the private sector by financial intermediaries (deposit money banks, insurance companies, private pensions, pooled investment schemes and development banks) to GDP. Both variables capture the effect of financial constraint on unemployment, as described in Rendon (2001), Acemoglu (2001) and Belke & Fehn (2002)[6]. However, the two variables can be included in the regressions simultaneously since, as explained above, intermediated and arm's length finance constitute alternative funding channels. $CONC_{i,t}$, which is the ratio of the three largest banks' asset to total banking sector assets, evaluates the concentration of the banking sector. In the theoretical literature on financial intermediation, high banking concentration is closely associated with intermediated finance since high interest rates increase banks' incentive to produce private information on borrowers. Conversely, when concentration in the banking sector is low, banks behave more as arms' length lenders. This measure, suggested by Koskela & Stenbacka (2002), is only available over the period 1980-2004. Therefore, when $CONC_{i,t}$ is included in the model, the number of observations is reduced.

$CV_{i,t}$ is a set of seven control variables, all provided by the OECD. In reference to the literature on the institutional determinants of unemployment, we include $WEDGE_{i,t}$ and $REPLACE_{i,t}$ (the tax wedge and the replacement rate for unemployment benefit respectively) as well as $PMREG_{i,t}$, an indicator of regulatory reform on product markets. $PMREG_{i,t}$ is based on the REGREFF indicator from the OECD database and summarizes regulatory provisions in seven non-manufacturing sectors: telecom, electricity, gas, post, rail, air passenger transport, and road freight. The indicator, which has been estimated by OECD over the period 1975 to 2003, ranges from 0 (for the lowest level of regulation) to 6 (for the highest level of regulation). The fourth control variable, $EXCHANGE_{i,t}$, is the real exchange rate. It accounts for the competitiveness of national products. The fifth control variable is, $RATE$, the short-term interest rate. The sixth, $GDP_{i,t}$, stands for the GDP per employee. Finally, the last control variable is $CYCLE_{i,t}$, the ratio of the flow of credit in the economy to GDP, which accounts for the impact of the

Nunziata & Ochel (2005) as well as on measures of structural reforms obtained from the FRDB Database. We use the following variables from FRDB database: the number of reforms passed each year in each country, whether they are directed towards more flexibility (by decreasing restrictions in domains such as wage setting, firing restriction, working time regulation etc.) as well as whether they apply to all, or a large majority of professional categories, contract typologies etc.

[6]Following the empirical studies by Belke & Fehn (2002), Belke & al. (2004) and Fechs & Fuchs (2003), we could have also considered the level of venture capital financing. But many venture capital data are missing for the period and the countries covered by our panel.

credit cycle[7].

The list of dependent and independent variables described above is reported in Table 1.1 in Appendix 1. Table 1.2, also included in Appendix 1, provides summary statistics for each of them.

3.2 Econometric Methodology

The most common panel data econometric techniques for estimating an equation like (1) are OLS, Between, Within, or MCG. However, it should be emphasised that the estimates of the coefficients of equation (1) obtained with such techniques can be biased for a variety of reasons, among them measurement error, reverse causation and omitted variable bias. Therefore, a suitable estimation method should be used in order to obtain unbiased, consistent and efficient estimates of these coefficients. To deal with these biases, researchers have utilised dynamic panel regressions with lagged values of the explanatory endogenous variables as instruments. Such methods have several advantages over cross-sectional instrumental variable regressions. In particular, they control for endogeneity and measurement error not only of the lag standardized rate of unemployment variable, but also of other explanatory variables. Note also that, in the case of cross-section regressions, the lagged dependent variable is correlated with the error term if it is not instrumented.

In our analysis, we employ the system GMM estimator developed by Arellano & Bover (1995), which combines a regression in differences with one in levels (see Appendix 2 for further details). Blundel & Bond (1998) present Monte Carlo evidence that the inclusion of the level regression in the estimation reduces the potential bias in finite samples and the asymptotic inaccuracy associated with the difference estimator. The consistency of the GMM estimator depends on the validity of the instruments used in the model as well as the assumption that the error term does not exhibit serial correlation. In our case, the instruments are chosen from the lagged endogenous and explanatory variables. In order to test the validity of the selected instruments, we perform the Hansen-Sargan test of over-identifying restrictions proposed by Arellano & Bond (1991). In addition, we also check for the presence of any residual autocorrelation. Finally, we perform stationarity and unit-root tests belonging to the first-(Hadri (2000), Im, Pesaran & Shin (2003)) and second-generation stationarity and unit root test (Harry, Leybourne & MacCabe (2005), Pesaran (2007)). The results suggest that all series are stationary (see Tables 3.1 to 3.10 in Appendix 3), and consequently no co-integration analysis is necessary[8].Therefore we proceed

[7] $CREDIT_{i,t}$ is a stock variable that accounts for the structural aspects of the financial system whereas $CYCLE_{i,t}$ is a flow variable that captures conjonctural effects.

[8] A common feature of the panel unit root tests by Im & al. (2003) and Pesaran (2007) is that they maintained the null hypothesis of a unit root in all panel members. Therefore, rejecting their null does not provide compelling evidence about stationarity of all panel members (as it is sometimes assumed), but only indicates that at least one panel member is stationary, with no information about how many series or which ones are stationary. This possibility for a mixed panel implies that some of the members may be stationary while others may be non-stationary (see e.g Taylor & Sarno (1998) and Taylor & Taylor (2004) for further details in the context of the PPP debate). On the contrary, the panel stationarity tests by Hadri (2000) and Harry & al. (2005) test joint stationarity of the individual series under the null. And consequently, a failure to reject their null can be

directly to the GMM estimation.

It is worth noting that Equation (1) includes several interaction terms allowing us to capture the interdependence between financial and labour market devices. Therefore after estimating this equation, we examine whether the consequences of financial market arrangements depend on the regulatory environment on the labour market, and vice versa. STATA also allows to evaluate the effects of each relevant variable for different levels of the interacted variables. This amounts to calculating the marginal effects of each variable, as well as all statistics concerning the significance of those marginal effects. In the presence of interaction terms, the overall impact of $LABOUR$ and FIN indicators on unemployment equals the marginal effect conditional on specific values of the interacted variables. From model (1), one has:

$$\begin{aligned} \frac{\partial U}{\partial LABOUR} &= \chi + \gamma \cdot \widetilde{FIN} \\ \frac{\partial U}{\partial FIN} &= \delta + \gamma \cdot \widetilde{LABOUR} \end{aligned} \tag{2}$$

,where $\widetilde{FIN}$ and $\widetilde{LABOUR}$ correspond to specific levels of labour and financial indicators that have been selected to give a clear picture of the importance and evolution of marginal coefficients. The specific levels that we have retained are minimum value, mean value minus one standard error, mean, mean plus one standard error and maximum value.

3.3 Estimation results

As we have seen, the theoretical literature on unemployment determinants generally focuses on the degree of rigidity of labour market institutions in relation to financial characteristics. Hence, in the first place we restrict our attention to labour market variables capturing the rigidity of labour regulation, that is $UNION$ and $LMREG$[9]. To ensure that our results are robust, we consider several variants of our empirical model. We proceed as follows: leaving the specification with the two labour regulation variables ($UNION$ and $LMREG$) and the seven control variables unchanged, we consider our financial variables one by one. We subsequently estimate an encompassing model including all labour and financial indicators. Doing this, we pay particular attention to the interaction terms included in our regressions. Considering interactions with one labour market variable at a time allows us to check for the robustness of the estimated coefficients across alternative specifications. We are thus able to make sure that the signs of those coefficients are not too sensitive to changes in the interacted variables.

Before turning to regressions, we test for the pooling restrictions implicit in equation (1) and investigate whether key parameters of this equation are equal across countries, implying that

interpreted unambiguously as evidence for stationnaity holding in the entire panel. The results of these last two tests are available upon request and confirm that all series are stationary. We think that a combination of these stationarity and unit-root tests might reassure the reader in the sense that they provide strong support that these series are stationary and the research can proceed to the GMM estimation.

[9]However, in the next section we will add one additional labour market dimension by taking the impact of wage coordination into account.

pooling time series and cross-sectional data is appropriate in our context. Specifically, we employ a multi-step procedure to test pooling restrictions in our system of 18 OECD members where hypotheses of interest are tested by means of a likelihood-ratio (L-R) statistic. This procedure is in the same spirit than the approach proposed by Hsiao (1986). Our results (available upon resquest) indicate that common coefficients can be assumed across countries and therefore pooling time series and cross sectional data appears to be convenient here. Besides the fixed effect specification turns out to be the more adequate in our framework.

The econometric results of the dynamic panel regressions of equation (1) by the system GMM estimator are reported in Table 4.1 (see Appendix 4) whereas Table 4.2 shows the marginal coefficients of $LABOUR$ and FIN indicators for given levels of the interacted variables. In Table 4.1 (columns [1]-[2]), we present results for a specification including $CAPI$ (ratio of stock market development to GDP) as a unique financial indicator. In columns [3]-[4] we consider $CREDIT$ (ratio of the claims to the private sector by financial intermediaries to GDP), while in columns [5]-[6] we investigate the effects of $CONC$ (concentration of the banking sector). For each of the above specifications, we interact our selected financial indicator with one labour market variable at a time ($LMREG$ or $UNION$). Finally, columns [7]-[8] present the regression results based on the encompassing model featuring all financial indicators together. Once again, we interact those indicators with $LMREG$ (column [7]) or $UNION$ (column [8]) alternatively. We comment on our results on labour market and control variables below. We then analyse the econometric evidence concerning the financial factors.

Table 4.2 reports marginal coefficients estimated by STATA on the basis of regression results presented in Table 4.1. Column [1] in Part A of Table 4.2 provides marginal coefficients for the CAPI indicator corresponding to five different levels of the interacted labour variable (i.e. $LMREG$) as specified in column [1] of Table 4.1. Symmetrically, column [1] in Part B of Table 4.2 reports the marginal coefficients of the $LMREG$ variable for given levels of the interacted financial indicator (i.e. $CAPI$). We apply the same procedure to all other columns of Table 4.2. However, one should note that no marginal coefficient can be calculated for labour market variables (specifications [7]-[8] in Part B of Table 4.2). The reason is that those variants of the model include three interactions terms for each labour indicator. Hence, we cannot isolate pertinent reference values of interacted variables enabling us to calculate marginal coefficients properly. Nevertheless, we can calculate the marginal coefficients for the financial variables. These coefficients are presented in columns [7]-[8], Part A of Table 4.2. Before commenting on these results, it is worth noting that our GMM model specifications pass all the standard diagnostic tests, whose P-values are given in the three last lines of Table 4.1. In particular, there is no evidence of residual autocorrelation or order two, and the validity of the instruments is always confirmed by Hansen-Sargan's test.

To start with, one should note that the coefficient of the lagged rate of unemployment is highly significant and positive in all regressions, highlighting a strong inertia in the evolution of employment performances. The coefficients for control variables are not systematically significant across all specifications. However, when they appear significant, they have the expected sign. The coefficients of $EXCHANGE$ (columns [1]-[2]-[4] and [8]) and $CYCLE$ (in all columns except [3]-[7]) are negative. Hence, as expected, we find that increased competitiveness and credit

flow generally imply lower unemployment. Moreover, as expected, we find that an increase in the tax wedge raises unemployment (variants [3]-[6] and [7]). The same result holds for stronger product market regulation (specifications [4]-[5]-[6]) and for higher short-term interest rate (variant [4]). The coefficient for GDP is never significant (except in specification [4], in which it is negative). This suggests that the expected positive impact of high productivity on labour demand and employment is balanced by the exclusion of low skilled workers from the labour market. Finally, as in other empirical contributions (Nickell (1997), Fiori, Nicoletti, Scarpetta & Schiantarelli (2007), Baccaro & Rei (2007) and Amable & al. (2010)), the coefficient on the replacement rate is generally insignificant.

Turning to the impact of labour market variables, our results indicate that changing labour markets' structure has contrasted effects on unemployment. On the one hand, we find that union density has no effect on unemployment. On the other hand, with the exception of specifications [1]-[2], we find an insignificant coefficient for labour market regulation. This result is in line with Nickell (1997), Layard & Nickell (1999), Belot & Ours (2001), Nickell, Nunziata & Ochel (2005), Fiori, Nicoletti, Scarpetta & Schiantarelli (2007), Baccaro & Rei (2007) and Amable & al. (2010). However, when the coefficient of $LMREG$ appears significant (in columns [1]-[2]), it is negative, which means that increased job protection contributes to lower unemployment. Moreover, marginal coefficients given in Part B of Table 4.2 (column [1]) are significant and negative for values of $CAPI$ below (or equal to) the mean level. This result is in line with Acemoglu & Pischke (1999)'s view that combining labour market regulation and tight financial constraint brings positive effects on employment.

Let us now focus on results concerning financial indicators. Our findings globally support the idea that unemployment has financial determinants and that these determinants interact with labour market institutions.

Regressions [1]-[2] and [7]-[8] investigate the consequences of increased market capitalization (variable $CAPI$). This variable appears to promote employment: the coefficients of $CAPI$ is negative and significant in specifications [1] and [2]. This result is consistent with conclusions from the theoretical literature, suggesting that financial market development has a positive bearing on employment in terms of released financial constraints. It also confirms Nickell & Wadhwani (1991)'s result that increased market capitalization has a positive impact on firms' labour demand. The result is partially confirmed by the analysis of the marginal effects of $CAPI$, provided in Part A of Table 4.2. Variants [1]-[2] indicate that increased $CAPI$ reduces unemployment if the labour market is weakly regulated (i.e. if the degree on labour regulation is lower than the means level) and weakly unionized (i.e. if the degree of union density is not higher than the means level). It has no significant effects otherwise.

If the $CAPI$ variable measures the size and importance of financial markets, the alternative $CREDIT$ indicator allows us to investigate the effects of intermediated credit. In columns [3]-[4] and [7]-[8] of Table 4.1, we find no significant effects of $CREDIT$ on employment. However, looking at the sign and significance of marginal coefficients presented in Part A of Table 4.2 (variant [4]), we find that intermediated credit reduces unemployment if the level of union density is very high (i.e. at its maximum level). This result can be interpreted according to the theoretical literature on the interactions between labour and financial markets factors: when workers

are well-protected by unions, firms are pushed to increase their productivity and monitoring by financial intermediaries becomes profitable, thus making intermediated credit favourable to employment.

Finally, we turn to the consequences of increased banking concentration (variable $CONC$). As already noted, this variable has been available for a shorter period of time, so that the number of observations is more limited. Nevertheless, the results presented in Table 4.1 (variants [5]-[6]) suggest that concentration in the banking sector has a negative direct effect on employment. The interaction terms are also generally significant. Our results are better understood by looking at the marginal effects presented in Table 4.2. Results provided in column [5] show that increased $CONC$ harms employment if the labour market is weakly regulated (i.e. when the level of labour regulation is equal to its minimum level) while it favours employment when the labour market is highly regulated (i.e. when the level of labour regulation is equal to its maximum level). Moreover, banking concentration increases unemployment when union density is very low, i.e. equal to its minimum level (column [6]). In all other cases, $CONC$ has no significant impact. The effect of banking concentration turns out to be particularly robust since the marginal coefficients of $CONC$ remain significant when all financial variables and corresponding interaction terms are included in the estimation (columns [7]-[8]). As suggested by the theoretical literature, the rationale of these results is that two opposite mechanisms are at play. On the one hand, high interest rates associated with low banking competition hinder employment. On the other hand, organized workers internalize the rise in hiring costs and bargain less harshly concerning their base wage. This moderating effect is stronger when unions are powerful and workers are more protected.

Taken together, these results suggest that intermediated finance (i.e. increased intermediated credit and increased banking concentration) plays an alternative role with respect to arm's length finance (i.e. increased market capitalisation and decreased banking concentration).

When labour market regulation and union density are low, an increase in arm's length finance (i.e. increased market capitalization and reduced banking concentration) yields positive effects on employment. However, when labour market regulation and union density are high, the positive impact of market capitalisation is less robust. In this case, employment can be raised by strengthening banking concentration (if labour market regulation is tight) or by increasing intermediated credit (if union density is high).

This provides the first evidence showing a trade-off between intermediated finance and arm's length finance in promoting employment, and that this trade-off is mediated by the labour market structure. Hence, our results indicate that the effects of financial variables on unemployment are dependent on the labour markets context. However, it is important to note that these interdependence are not symmetric since the impact of labour market institutions appears largely independent of the features of financial markets.

4 Extentions

In this section, we presents two extentions to our empirical analysis. First, we check for the robustness of empirical results by running regressions including wage coordination as an alternative labour market device. Second, we analyse the policy implications of our empirical evidence.

4.1 Robustness check: wage coordination

Many empirical contributions have shown that the degree of coordination in wage bargaining is an important determinant of unemployment. Moreover, wage coordination is admittedly one crucial factor shaping the distinction between corporatist and non-corporatist countries (Calmsfors & Driffill (1988)). This section aims to check whether coordination still matters, when considered in interaction with financial variables. Hence, we introduce the variable $COORD$ in all our regression specifications. Results are presented in Tables 4.3 and 4.4 in Appendix 4. Table 4.3 reports regressions coefficients for four variants of the empirical model: in columns [1] to [3] we interact the labour market variable $COORD$ with each financial factor in turn. Column [4] presents the results from the comprehensive model including all financial indicators and interaction terms. In Table 4.4, we provide marginal coefficients' values and statistics relative to the four specifications of the empirical model. As in the previous section, we are unable to compute sensible marginal coefficients for $COORD$ in variant [4], since the size of the marginal effect depends on the interactions of three different variables.

As in Table 4.1, the specification tests of Hansen-Sargan and Arellano & Bover (1995) respectively suggest that the model is correctly specified (see bottom of Tables 4.3). From Table 4.3 one can also see that the regression results are consistent with those presented in the previous section, concerning the control and labour market variables, in particular. Concerning the wage coordination variable $COORD$, we generally observe no significant effects on employment. This suggests that coordination does not contribute to wage moderation, contrary to the current view (Calmsfors & Driffill (1988)). However, in variant [4], the coefficient for $COORD$ is positive. This result is in the line with evidence provided by Fiori, Nicoletti, Scarpetta & Schiantarelli (2007) and Baccaro & Rei (2007). As explained by the authors, low coordination yields low bargaining power for workers, which may allow firms to avoid an excessive rise in wages.

Turning to financial variables, our regression results show that the degree of wage coordination is not neutral with respect to the way financial determinants affect unemployment. In particular, the marginal coefficients presented in Part A of Table 4.4 suggest that, for degrees of coordination below (or equal to) the mean level, stronger market capitalization favours a decrease in unemployment (specification [1]). $CAPI$ has no significant effect otherwise. Moreover, an increase in banking concentration contributes to reduce unemployment for the highest degree of coordination (specification [3]). Here again, this effect appears robust since marginal coefficients remain significant when considering all financial variables and interaction terms simultaneously (variant [4]). Compared with findings reported in Tables 4.1 and 4.2, these results indicate that the wage coordination variable behaves as the labour regulation indicator. This is consistent

with the view that wage bargaining coordination works as a form of labour protection rather than as a device ensuring real wage moderation.

More generally, the evidence presented in Tables 4.3 and Table 4.4 confirms our previous findings: boosting financial markets appear to effectively reduce unemployment, as long as the labour market has a weakly coordinated structure. However, with highly coordinated labour markets, increasing banking concentration becomes a more appropriate tool for reducing unemployment. This supports the existence of a trade-off between intermediated and market-based finance in promoting employment, which is mediated by the labour market structure.

4.2 Policy implications

Our empirical evidence indicates that the effects of financial variables on unemployment are significant and depend on the labour markets structure. Regression results suggest that the respective virtues of bank-based and market-based finance are crucially tied to the nature and strength of labour regulation. Arm's length finance (through increased capitalisation, as well as through lesser banking concentration) is advantageous in terms of employment in the presence of low levels of labour market regulation, union density and wage coordination. Higher intermediated finance (through increased intermediated credit and higher banking concentration) appears to be beneficial for employment in the presence of high levels of labour regulation, union density and wage coordination. These results provide evidence supporting the idea that a correlation exists betweeen tight institutional devices on labour and financial markets (Rajan & Zingales (1995), Egrungor (2004), Botero et al. (2005)).

In this section, we tackle the issue of the importance and size of the 'real' effects of finance. Based on our regression results, we present a few examples evaluating the employment consequences associated with given changes in financial indicators.

Let us first consider the marginal coefficients presented in Table 4.2. Those coefficients indicate that financial variables have sizeable effects on unemployment. Increasing market capitalization by 1% yields a decrease in the unemployment rate comprised between 1.56 - 1.70%, depending on the level of labour regulation (column [1]). The impact of market capitalization is of the same order when one considers high degrees of unionization (column [2]). Hence, lower capitalization of financial markets can lead to substantial employment losses. As a consequence, providing conditions for an increasing market capitalization (with respect to GDP) is one relevant policy recommandation in countries with low labour regulation. Intermediated finance ($CREDIT$) also brings significant effects on unemployment: increasing credit intermediation by one 1% reduces unemployment by 2.83% when considering highest levels of union density (column [4]). As a consequence, a decrease in intermediated credit can yield an important decline in employment in countries with high union density. Concerning the effect of $CONC$, column [5] indicates that increasing concentration by 1% pushes employment up by 3.07% (for the lowest level of labour regulation) or reduces it by 6.77% (for the highest level of regulation). In this case, strong regulation makes the effects of banking concentration favourable to employment while low regulation makes it harmfull. Hence, highly regulated countries are well-advised to implement policies that aim to increase banking concentration. Conversely, countries with relatively low

regulation are put under greater pressure following a decrease in banking concentration. Similar results can be obtained concerning the marginal coefficients presented in Table 4.4. These results suggest that financial turmoils may have significant real effects on employment.

We also investigate how changes in financial variables impact unemployment in each country of our dataset. We compute simulations on the basis of the encompassing model, presented in Table 4.1 (columns [7] and [8]) and Table 4.3 (column [4]). We select one of the three financial variables ($CAPI$, $CREDIT$ or $CONC$) and, for each year, we set it equal to its 'high level', defined as its observed level plus one standard deviation. The labour variable and the two other financial variables are kept equal to their observed value. Using our econometric estimates of the encompassing model, we compute the rate of unemployment compatible with the 'high level' of the selected financial variable. We then compare the value of the estimated unemployment rate with the observed unemployment rate.

Figures 1 and 2, in Appendix 5, are two interesting examples of simulations. In Figure 1, the selected financial variable (set equal to its 'high level') is $CONC$ and the interaction labour variable is $UNION$ while in Figure 2, the selected financial variable is $CONC$ and the interaction labour variable is $COORD$[10]. In Figure 1, the predicted unemployment rate is higher than the observed unemployment rate for many coutries in which the degree of union density is particularly low (the United States, the United Kingdom, the Netherlands, France, Germany, Canada). Conversely, the estimated unemployment rate is lower than the observed unemployment rate in countries with high union density such as Denmark, Norway, Sweden and Portugal for example. This suggests that in countries where the degree of union density is high, employment performance would have been improved with less competition in the banking sector. In Figure 2, a high level of banking concentration reduces the unemployment rate compared to its observed level in Belgium, France, Ireland, Italy, the Netherlands, Norway and Spain notably while raising it in Canada, the United Kingdom and the United States. This supports the view that reducing competition in the banking sector is a relevant policy when the degree of coordination is high whereas it worsens employment when wage bargaining is weakly coordinated.

5 Conclusion

The aim of this paper was to examine how financial market arrangements interact with labour regulation to determine unemployment by estimating a dynamic panel data model using GMM techniques over the period 1980-2004. Indeed, such techniques provide solutions to the problems of simultaneity bias, reverse causality and omitted variables, and also allow to control for individual specific effects and time effects, as well as to overcome the endogeneity bias. Our econometric estimates show that the development of arms' length finance (through increased capitalization and lower banking concentration) favours employment in the presence of low levels of labour market regulation, union density and wage bargaining coordination. At the same time, improved intermediated finance (through increased intermediated credit and higher bank-

[10] As the variable $CONC$ is missing for almost all years in the case of Finland, Figure 1 and Figure 2 do not provide simulations for this country.

ing concentration) is beneficial for employment in the presence of high levels of labour market regulation, union density and wage coordination.

Our findings suggest that financial variables impact unemployment in a way that crucially depends on the labour market context. In the presence of weakly regulated, unionized and coordinated labour markets, policies boosting market-based finance prove to be effective in enhancing employment. However, with strong labour regulation, union density and coordination in wage bargaining, reducing competition in the banking sector and promoting intermediated credit has positive consequences on employment. These estimated effects of finance appear to be significant and sizeable.

Our paper also advocates care in analyzing the effectiveness of changes on financial and labour markets. The effects of deregulation policies are not linear. For instance, while tightening labour protection decreases unemployment (for low levels of market capitalization), it also leads to a new context in which market-based finance has no more effect on employment.

To conclude, we find no evidence corroborating the existence of a simple complementarity (or substitution) across financial and labour market structures. In fact, our results suggest that a more complex interdependence exists across financial and labour determinants of unemployment. This calls for further investigations and opens up a rich research agenda.

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Appendix

APPENDIX 1: Variable description

Table 1.1: List of variables

Dependant variable	
U	Standardized rate of unemployment (OECD)
Independant variables	
$LMREG$ (0-3)	Indicator of labour market regulation, Amable & al. (2010) from Nickell, Nunziata & Ochel (2005) and the FRDB Database
$UNION$	Number of union members as percent of total workers, OECD
$COORD$ (0-3)	Index of coordination in wage bargaining, Nickell, Nunziata & Ochel (2005)
$CAPI$	Stock market capitalisation to GDP, Demircüç-Kunt & Levine (2001)
$CREDIT$	Ratio of the claims to the private sector by financial intermediaries, Demircüç-Kunt & Levine (2001)
$CONC$	Ratio of the three largest banks' asset to total banking sector assets, Demircüç-Kunt & Levine (2001)
$WEDGE$	Tax wedge, OECD
$REPLACE$	Net replacement rates on unemployment benefit, OECD
$PMREG$ (0-6)	Product market regulation indicator, OECD
$EXCHANGE$	Real exchange rate, OECD
$RATE$	Short-term interest rate, OECD
GDP	GDP per employee, OECD
$CYCLE$	Flow of credit to economy to GDP, OCDE

Table 1.2: Statistical summary for variables (1980-2004)

Variables	Mean	Max	Min	Nonmissing obs.
U	7.447	19.5	1.5	441
	(3.504)			
$LMREG$	1.140	0.558	0.1	410
	(0.558)			
$UNION$	41.996	87.4	7.4	378
	(21.068)			
$COORD$	2.051	3	1	403
	(0.578)			
$CAPI$	0.492	2.7	0.003	430
	(0.404)			
$CREDIT$	0.878	2.168	0.220	430
	(0.378)			
$CONC$	0.678	1	0.226	432
	(0.203)			
$WEDGE$	28.693	46.962	12.944	450
	(8.081)			
$REPLACE$	0.356	28	0	450
	(1.312)			
$PMREG$	4.033	6	1.108	448
	(1.285)			
$EXCHANGE$	0.002	0.266	-0.203	414
	(0.058)			
$RATE$	5.187	-2.215	17.347	450
	(3.642)			
GDP	53 912.02	80 659.9	26 558.71	450
	(9 983.803)			
$CYCLE$	10.13	46.79	-19.17	357
	(7.73)			

Standard deviations are in parentheses.

APPENDIX 2: Estimation of a Dynamic Panel Data Model using the Generalized Method of Moments (GMM)

We use the Generalized Method of Moments (GMM) estimator for dynamic panels introduced by Holtz-Eakin, Newey and Rosen (1988), Arellano and Bond (1991), and Arellano and Bover (1995) in order to investigate how labour and financial factors interact to determine unemployment. We consider the following equation:

$$y_{i,t} = y_{i,t-1} + \beta X_{i,t} + u_i + \nu_t + e_{i,t} \tag{3}$$

where $y_{i,t}$ denotes the standardized rate of unemployment obtained from the OECD, $X_{i,t}$ includes a number of regressors capturing the institutional and macroeconomic characteristics of the investigated economies (see section 3.1), u_i is the individual specific effect, ν_t the time specific effect, and $e_{i,t}$ the error term (i is individual index, and t is the time index).

The presence of the lagged dependent variable as an explanatory variable does not allow the use of standard econometric techniques. The GMM method for dynamic panels provides solutions to the problems of simultaneity bias, reverse causality and omitted variables. Besides, it allows one to control for individual specific effects u_i, and time effects ν_t as well as to overcome the endogeneity bias.

There are two types of GMM estimators for dynamic panels: (i) the first-differenced GMM estimator (Arellano & Bond (1991)); and (ii) the system GMM estimator (Blundel & Bond (1998)). The former eliminates specific individual effects through first-differencing of a single equation, and then instruments the explanatory variables using their lagged values in levels. The latter involves the estimation of a system containing both first–differenced and levels equations, where the variables are instrumented by their first differences.

The choice of lagged variables as instruments depends on the nature of the explanatory variables:

1. For the exogenous variables, their current values are used as instruments;

2. For variables which are either predetermined or influenced by previous values of the dependent variable, but not correlated with future values of the error term, lagged values for at least one period can be used as instruments;

3. For endogenous variables, only their lagged values for at least two periods can be used as valid instruments.

The use of these estimators is based on the assumption of quasi-stationary variables in the equation in levels, and no autocorrelation of the residuals. To deal with potential omitted variables bias arising from specific effects, the strategy of Arellano-Bond estimator (1991) is to take first differences. This implies the following specification:

$$y_{i,t} - y_{i,t-1} = \alpha(y_{i,t-1} - y_{i,t-2}) + \beta(X_{i,t} - X_{i,t-1}) + (\nu_{i,t} - \nu_{i,t-1}) + (e_{i,t} - e_{i,t-1}) \tag{4}$$

By construction, the error term $(e_{i,t} - e_{i,t-1})$ is correlated with the lagged variable in differences $(y_{i,t-1} - y_{i,t-2})$. The first differences of the explanatory variables of the model are instrumented through their lagged values (in levels) in order to reduce the simultaneity bias and the bias resulting from the presence of the lagged dependent variable in differences on the left-hand side.

Under the assumption that the error terms are not autocorrelated and that the explanatory variables of the model may be influenced by lagged values, but are uncorrelated with future values of the error term, the following moment conditions have to be satisfied for the equation in first differences:

$$E|y_{t-s}, (e_{i,t} - e_{i,t-1})| = 0 \text{ for } s \geq 2; t = 3, ...T \tag{5}$$
$$E|X_{t-s}, (e_{i,t} - e_{i,t-1})| = 0 \text{ for } s \geq 2; t = 3, ...T \tag{6}$$

However, this estimator suffers from the 'weakness' of its instruments, which entails considerable bias, especially for small size samples, and therefore its accuracy is asymptotically low. Specifically, the lagged values of the explanatory variables are 'weak' instruments for the equation in first differences: the GMM estimator for the first difference takes into account only the intra-individuals variations, the inter-individuals variations being removed through the differencing.

The GMM system estimator (that we use in our analysis) eliminates this problem by combining the equation in difference with an equation in levels, i.e. it estimates equation (4) (in first differences) simultaneously with equation (2) (in levels). In equation (1), the variables are instrumented using their most recent lags in first differences. Blundell and Bond (1998) tested this method using Monte Carlo simulations and found that (i) the GMM system estimator is more efficient than the GMM in differences; and (ii) the GMM in first differences produces biased coefficients for small samples when the instruments are 'weak'. For the equation in levels, the GMM system method uses additional moment conditions assuming that the explanatory variables are stationary:

$$E|(y_{t+s} - y_{t+s-1}).(u_i + e_{i,t})| = 0 \text{ for } s = 1; t = 3, ...T \tag{7}$$
$$E|(X_{t+s} - X_{t+s-1}).(u_i + e_{i,t})| = 0 \text{ for } s = 1; t = 3, ...T \tag{8}$$

Conditions (5) to (8) combined with the GMM method allow one to estimate the coefficients of model.

The consistency of the GMM Estimator depends on whether lagged values of the explanatory variables are valid instruments in the regression. We address this issue by considering two specification tests suggested by Arellano & Bond (1991) and Arellano & Bover (1995). The first test examines the null hypothesis that the error term $e_{i,t}$ is not serially correlated. The model specification is supported when the null hypothesis is not rejected. In the system specification, we test whether the differenced error term (that is, the residual of the regression in differences) exhibits second-order serial correlation. First-order serial correlation of the differenced error term is expected even if the original error term (in levels) is uncorrelated, unless the latter follows a random walk. Second-order serial correlation of the differenced residual indicates that the original error term is serially correlated and follows a moving average process at least of order one. This would imply that the proposed instruments are not valid (and that higher-order lags should be used as instruments). The second tests is the Hansen-Sargan test of over-identifying restrictions. It tests the overall validity of the instruments by analysing the sample analogue of the moment conditions used in the estimation process. Failure to reject the null hypothesis gives support to the model.

APPENDIX 3: Panel unit root test results

Table 3.1: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the standardized rate of unemployment (U)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Pesaran and Shin W-stat	-5.49643	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-0.13842	0.5550	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.2: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the degree of union density ($UNION$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-8.54382	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat-0.64937	0.7419	18	

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.3: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the ratio of stock market capitalization to GDP ($CAPI$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-4.11984	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-1.53963	0.9382	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.4: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the ratio of the claims to the private sector by financial intermediaries ($CREDIT$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-10.4463	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	0.84178	0.2000	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.5: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the ratio of the three largest banks' asset to total banking sector assets ($CONC$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-5.28200	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	0.20449	0.4190	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.6: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the ratio of the tax wedge ($WEDGE$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-6.22609	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-0.45862	0.6767	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.7: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the short-term interest rate ($RATE$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-16.1445	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-1.30699	0.9044	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.8: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the real exchange rate ($EXCHANGE$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-8.94055	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-0.64937	0.7419	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.9: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the GDP per employee (GDP)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-8.58617	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	0.41516	0.3390	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

Table 3.10: Summary of Im, Pesaran and Shin (2003) panel unit root test and Hadri (2000) panel stationarity test for the ratio of the flow of credit in the economy to GDP ($CYCLE$)

Method	**Statistic**	**P-value***	**Cross sections**
Null: Unit root for all panel members			
Im, Pesaran and Shin W-stat	-4.10866	0.0000	18
Null: no unit root in any of the series in the panel			
Hadri Z-stat	-0.74265	0.7712	18

* The tests assume asymptotic normality. Automatic selection of lags based on SIC. Newey-West bandwidth selection using a Bartlett kernel

APPENDIX 4: Estimation results

Table 4.1: Econometric results with $LMREG$ or $UNION$ in interaction terms

Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$U_{i,t-1}$	0.627***	0.626***	0.655***	0.664***	0.558***	0.719***	0.556***	0.656***
	(0.070)	(0.709)	(0.092)	(0.101)	(0.093)	(0.098)	(0.152)	(0.115)
$LMREG$	-3.649*	-3.572**	-1.452	-3.691	3.033	-1.449	6.297	-0.620
	(2.046)	(2.229)	(1.602)	(2.729)	(2.130)	(2.227)	(8.851)	(1.214)
$UNION$	-0.004	0.012	-0.053	0.070	-0.009	0.126	0.048	0.057
	(0.041)	(0.026)	(0.040)	(0.057)	(0.064)	(0.096)	(0.234)	(0.072)
$CAPI$	-1.542*	-2.016*					3.190	1.051
	(0.767)	(0.997)					(4.287)	(1.811)
$CREDIT$			0.329	2.680			0.863	-0.616
			(1.676)	(2.703)			(9.958)	(2.445)
$CONC$					3.611*	5.150**	4.199	3.744**
					(1.832)	(2.269)	(2.421)	(1.782)
$CAPI.LMREG$	-0.252						-1.779	
	(1.316)	(0.026)					(3.652)	
$CAPI.UNION$		-0.001						-0.021
		(0.026)						(0.061)
$CREDIT.LMREG$			-0.141				-0.568	
			(1.693)				(9.590)	
$CREDIT.UNION$				0.002				0 .001
				(0.082)				(0.034)
$CONC.LMREG$					-5.365**		-5.756**	
					(2.250)		(2.191)	
$CONC.UNION$						-0.136 *		-7.424 **
						(0.064)		(2.667)
$WEDGE$	0.100	0.078	0.228*	0.059	0.078	0 .252**	0.405**	0.161
	(0.089)	(0.092)	(0.131)	(0.176)	(0.105)	(0.105)	(0.194)	(0.101)
$REPLACE$	3.401	3.025	6.539	-3.489	-3.133	-4.910	0.627	-7.668
	(6.809)	(4.493)	(5.564)	(9.186)	(5.376)	(7.346)	(8.945)	(12.039)
$PMREG$	0.663	0.848	0.573	1.518**	1.463*	0.992*	0.093	0.538
	(0.608)	(0.624)	(0.812)	(0.627)	(0.717)	(0.561)	(0.713)	(0.781)
$EXCHANGE$	-4.291**	-3.577**	-2.585	-4.268***	-0.352	-0.986	-2.929	-3.831**
	(1.571)	(1.471)	(1.699)	(1.467)	(0.980)	(1.166)	(2.026)	(1.381)
$RATE$	0.111	0.116	0.092	0.156**	0.053	0.072	0.107	0.135
	(0.084)	(0.086)	(0.138)	(0.072)	(0.076)	(0.101)	(0.263)	(0.084)
GDP	0.000	0.000	0.000	-0.000	-0.000*	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$CYCLE$	-0.058**	-0.043***	-0.042	-0.072**	-0.060*	-0.088**	-0.057	-0.070***
	(0.021)	(0.019)	(0.024)	(0.025)	(0.029)	(0.031)	(0.040)	(0.020)
Number of observations	314	314	310	310	162	162	152	152
Year dummies	yes	yes	yes	yes	yes	yes	yes	yes
P-value Arellano-Bond test for AR(1)	0.003	0.047	0.014	0.006	0.082	0.071	0.043	0.094
P-value Arellano-Bond test for AR(2)	0.182	0.101	0.115	0.131	0.149	0.150	0.552	0.159
P-value Hansen-Sargan test	0.196	0.229	0.556	0.303	0.188	0.162	0.321	0.109

1. Two-step GMM Robust standard errors for finite sample computed using the correction defined by Windmeijer (2005) are in bracket.

2. *, ** and *** denote significance respectively at the 10%, 5% and 1% level.

3. The null of the Arellano-Bond test for AR(1) is the absence of residual autocorrelation of order 1 (see Appendix 2.).

4. The null of the Arellano-Bond test for AR(2) is the absence of residual autocorrelation of order 2 (see Appendix 2.).

5. The null of the Hansen-Sargan test is the validity of instruments (see Appendix 2).

Table 4.2: Econometric results with $LMREG$ or $UNION$ in interaction terms: marginal effects of financial and labour market variables

Specifications	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Part A	**Marginal effects of CAPI**							
	interacted with		interacted with		interacted with		interacted with	
	LMREG	UNION	LMREG	UNION	LMREG	UNION	LMREG	UNION
$LABOUR_{min}$	-1.567**	-1.998**					3.012	0.839
	(0.701)	(0.862)					(3.944)	(1.290)
$LABOUR_{mean-se}$	-1.693**	-1.968**					2.230	0.666
	(0.723)	(0.705)					(2.514)	(0.936)
$LABOUR_{mean}$	-1.836	-1.915**					1.237	0.250
	(1.265)	(0.767)					(1.420)	(0.948)
$LABOUR_{mean+se}$	-1.979	-1.862					0.243	-0.165
	(1.947)	(1.155)					(2.454)	(1.908)
$LABOUR_{max}$	-2.057	-1.802					-0.254	-0.801
	(2.335)	(1.732)					(3.341)	(3.618)
	Marginal effects of CREDIT							
	interacted with		interacted with		interacted with		interacted with	
	LMREG	UNION	LMREG	UNION	LMREG	UNION	LMREG	UNION
$LABOUR_{min}$			0.315	2.213			0.806	-0.603
			(1.519)	(2.431)			(9.009)	(2.147)
$LABOUR_{mean-se}$			0.252	1.378			0.556	-0.593
			(0.876)	(1.966)			(4.883)	(1.914)
$LABOUR_{mean}$			0.171	0.019			0.239	-0.568
			(0.691)	(1.332)			(1.503)	(1.416)
$LABOUR_{mean+se}$			0.090	-1.339			-0.077	-0.544
			(1.441)	(1.102)			(6.161)	(1.090)
$LABOUR_{max}$			0.041	-2.830*			-0.236	-0.506
			(1.983)	(1.537)			(8.803)	(1.272)
	Marginal effects of CONC							
	interacted with		interacted with		interacted with		interacted with	
	LMREG	UNION	LMREG	UNION	LMREG	UNION	LMREG	UNION
$LABOUR_{min}$					3.074*	3.827*	3.457	2.983*
					(1.741)	(1.924)	(2.311)	(1.464)
$LABOUR_{mean-se}$					0.664	2.723	0.193	2.364*
					(1.679)	(1.757)	(2.174)	(1.250)
$LABOUR_{mean}$					-2.292	0.162	-3.949	0.873
					(2.131)	(1.937)	2.812	(1.053)
$LABOUR_{mean+se}$					-5.249	-2.397	-8.092 *	-0.616
					(3.311)	(2.706)	3.940	(1.413)
$LABOUR_{max}$					-6.774*	-6.390	-10.172**	-2.895
					(3.880)	(4.325)	(4.584)	(2.438)
Part B	**Marginal effects of LMREG**							
	interacted with $CAPI$		interacted with $CREDIT$		interacted with $CONC$			
FIN_{min}	-3.650*		-1.484		1.817			
	(2.046)		(1.718)		(1.802)			
$FIN_{mean-se}$	-3.670*		-1.517		0.387			
	(2.047)		(1.668)		(1.548)			
FIN_{mean}	-3.757*		-1.570		-0.675			
	(2.113)		(1.779)		(1.494)			
$FIN_{mean+se}$	-3.843		-1.624		-1.738			
	(2.268)		(2.090)		(1.769)			
FIN_{max}	-4.135		-1.750		-2.331			
	(3.232)		(3.237)		(1.663)			
	Marginal effects of UNION							
	interacted with $CAPI$		interacted with $CREDIT$		interacted with $CONC$			
FIN_{min}		0.012		0.055		0.095		
		(0.040)		(0.051)		(0.091)		
$FIN_{mean-se}$		0.012		0.041		0.059		
		(0.040)		(0.046)		(0.088)		
FIN_{mean}		0.012		0.017		0.032		
		(0.039)		(0.042)		(0.088)		
$FIN_{mean+se}$		0.014		-0.006		0.005		
		(0.041)		(0.043)		(0.08)		
FIN_{max}		0.017		-0.062		-0.009		
		(0.058)		(0.063)		(0.091)		

Standard errors are in parentheses.

*, ** and *** denote significance respectively at the 10%, 5% and 1% level.

Table 4.3: Econometric results with *COORD* in interaction terms

Specifications	(1)	(2)	(3)	(4)
$U_{i,t-1}$	0.641***	0.641***	0.744***	0.647***
	(0.076)	(0.1119)	(0.132)	(0.131)
$LMREG$	-3.982*	-2.494	0.360	0.647
	(2.288)	(2.299)	(3.161)	(1.210)
$COORD$	-0.192	0.076	4.686*	4.784
	(1.258)	(1.718)	(2.680)	(2.983)
$UNION$	0.016	-0.035	0.028	-0.008
	(0.050)	(0.048)	(0.104)	(0.044)
$CAPI$	-1.351			1.541
	(1.678)			(3.819)
$CREDIT$		3.514		4.422
		(5.229)		(7.678)
$CONC$			7.823*	7.487*
			(3.800)	(3.814)
$CAPI.COORD$	-0.173			-0.445
	(1.077)			(1.732)
$CREDIT.COORD$		-1.318		-2.520
		(2.364)		(3.691)
$CONC.COORD$			-4.877**	-4.368*
			(2.300)	(2.775)
$WEDGE$	0.057	0.213	0.181	0.141
	(0.113)	(0.148)	(0.163)	(0.104)
$REPLACE$	2.670	6.971	-2.158	-3.501
	(5.803)	(10.131)	(5.971)	(11.328)
$PMREG$	0.962	0.854	1.653**	0.045
	(0.860)	(0.827)	(5.735)	(0.569)
$EXCHANGE$	-3.926**	-1.511	1.074	-2.605
	(1.684)	(2.058)	(1.978)	(1.787)
$RATE$	0.092	0.071	0.104	0.000
	(0.078)	(0.157)	(0.084)	(0.151)
GDP	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
$CYCLE$	-0.071 **	-0.028	-0.070***	-0.063**
	(0.017)	(0.027)	(0.022)	(0.027)
Number of observations	313	310	162	152
Year dummies	yes	yes	yes	yes
P-value Arellano-Bond test for AR(1)	0.006	0.070	0.095	0.097
P-value Arellano-Bond test for R(2)	0.180	0.160	0.229	0.415
P-value Hansen-Sargan test	0.126	0.610	0.126	0.303

1. Two-step GMM Robust standard errors for finite sample computed using the correction defined by Windmeijer (2005) are in bracket.

2. *, ** and *** denote significance respectively at the 10%, 5% and 1% level.

3. The null of the Arellano-Bond test for AR(1) is the absence of residual autocorrelation of order 1 (see Appendix 2).

4. The null of the Arellano-Bond test for AR(2) is the absence of residual autocorrelation of order 2 (see Appendix 2).

5. The null of the Hansen-Sargan test is the validity of instruments (see Appendix 2).

Table 4.4: Econometric results with *COORD* in interaction terms: marginal effects of financial and labour market variables

Specifications	(1)	(2)	(3)	(4)
Part A	**Marginal effects of CAPI**			
	Interacted with	Interacted with	Interacted with	Interacted with
	COORD	*COORD*	*COORD*	*COORD*
$LABOUR_{min}$	-1.525*			1.096
	(0.083)			(2.207)
$LABOUR_{mean-se}$	-1.599**			0.941
	(0.702)			(1.704)
$LABOUR_{mean}$	-1.700*			0.669
	(0.948)			(1.092)
$LABOUR_{mean+se}$	-1.801			0.396
	(1.447)			(1.316)
$LABOUR_{max}$	-1.872			0.205
	(1.846)			(1.857)
	Marginal effects of CREDIT			
	Interacted with	Interacted with	Interacted with	Interacted with
	COORD	*COORD*	*COORD*	*COORD*
$LABOUR_{min}$		2.196		1.902
		(2.983)		(4.027)
$LABOUR_{mean-se}$		1.638		1.027
		(2.111)		(2.785)
$LABOUR_{mean}$		0.861		-0.515
		(1.268)		(0.909)
$LABOUR_{mean+se}$		0 .083		-2.057
		(1.628)		(2.026)
$LABOUR_{max}$		-0.439		-3.138
		(2.353)		(3.533)
	Marginal effects of CONC			
	Interacted with	Interacted with	Interacted with	Interacted with
	COORD	*COORD*	*COORD*	*COORD*
$LABOUR_{min}$			2.945	3.118
			(1.892)	(1.884)
$LABOUR_{mean-se}$			1.153	1.602
			(1.499)	(1.322)
$LABOUR_{mean}$			-1.821	-1.071
			(1.787)	(1.047)
$LABOUR_{mean+se}$			-4.796	-3.745*
			(2.841)	(1.917)
$LABOUR_{max}$			-6.810*	-5.618*
			(3.690)	(2.720)

Part B	**Marginal effects of COORD**		
	Interacted with	Interacted with	Interacted with
	CAPI	*CREDIT*	*CONC*
FIN_{min}	-0.192	-0.226	3.580
	(1.257)	(1.441)	(2.215)
$FIN_{mean-se}$	-0.206	-0.533	2.280
	(1.235)	(1.338)	(1.711)
FIN_{mean}	-0.266	-1.031	1.314
	(1.209)	(1.618)	(1.393)
$FIN_{mean+se}$	-0.325	-1.530	0.347
	(1.292)	(2.246)	(1.170)
FIN_{max}	-0.526	-2.708	-0.191
	(2.094)	(4.139)	(1.110)

*, ** and *** denote significance respectively at the 10%, 5% and 1% level.

APPENDIX 5: Simulations

Figure 1. Predicted U with high concentration (interacted with $UNION$)

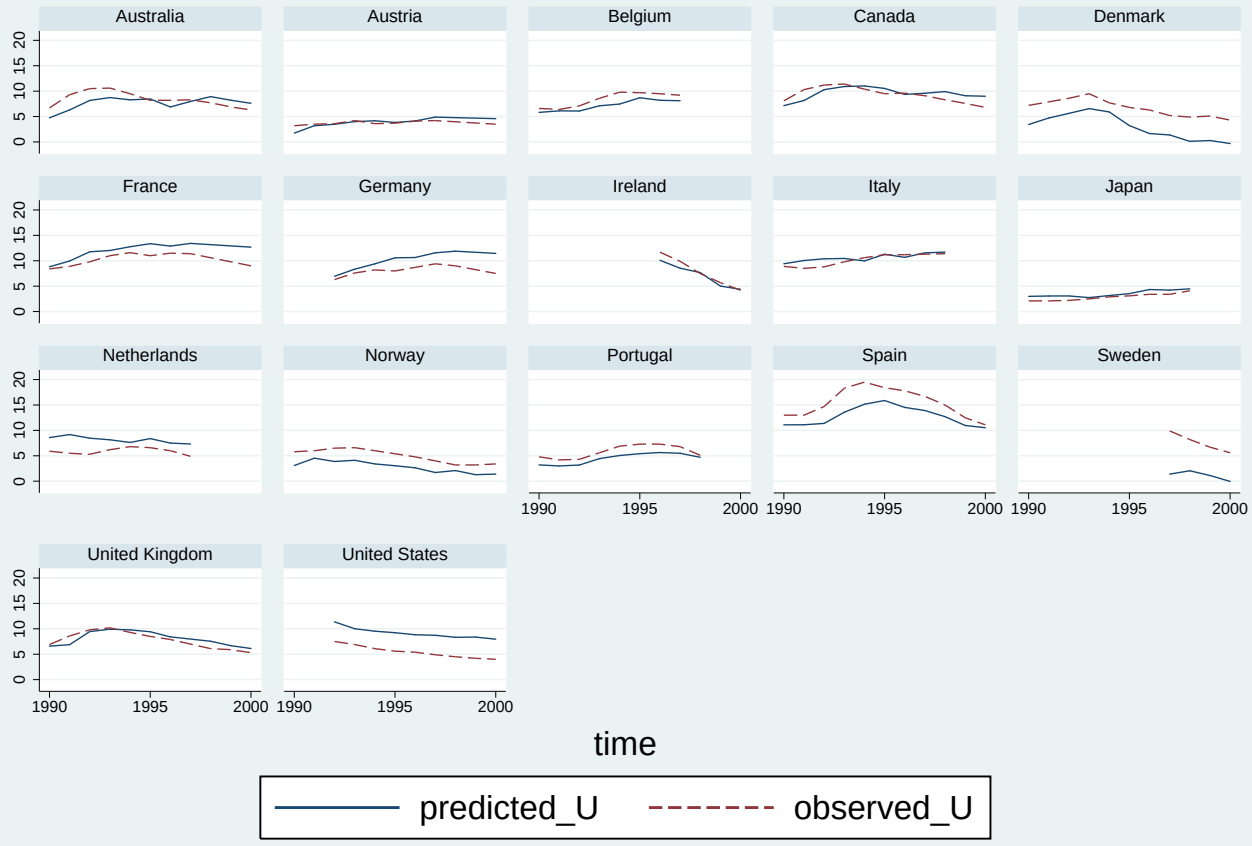
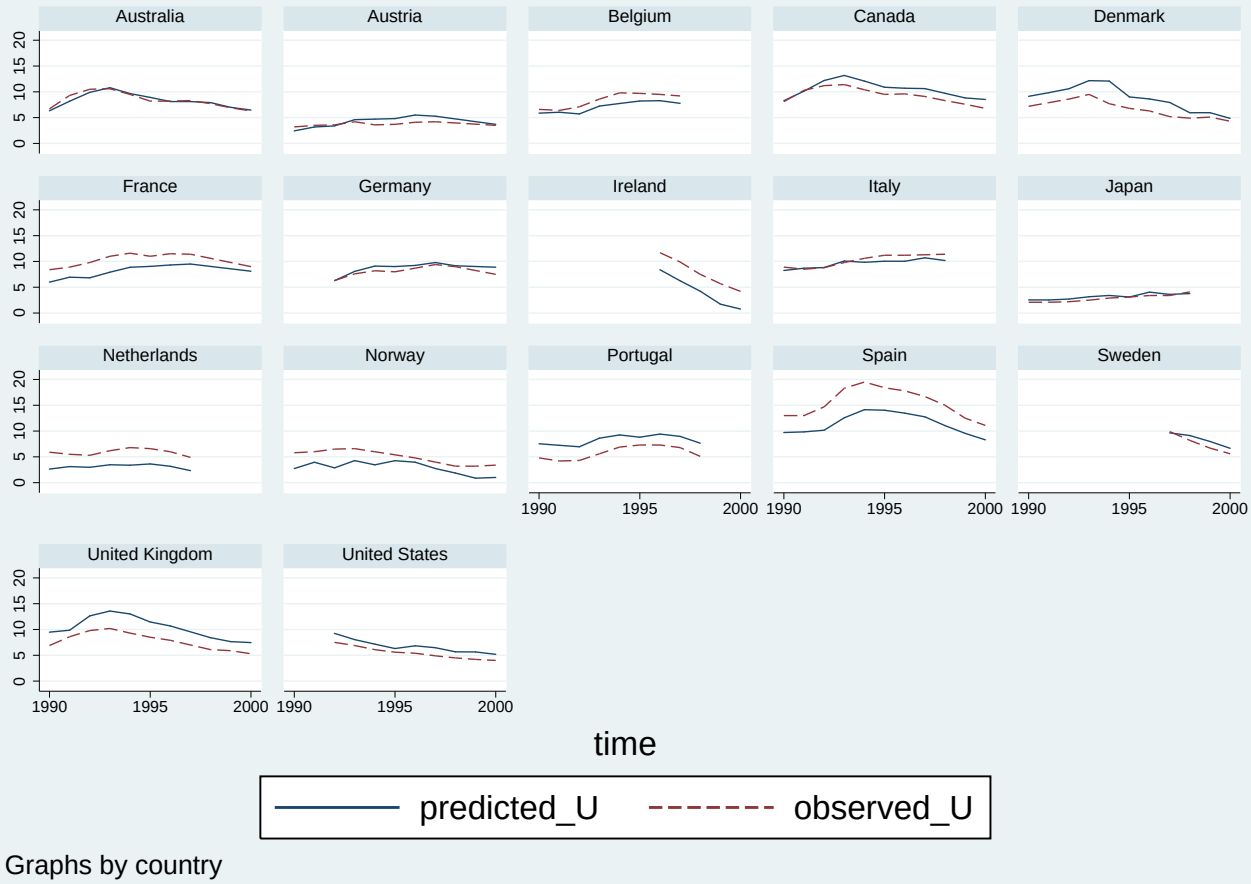


Figure 2. Predicted U with high concentration (interacted with $COORD$)



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