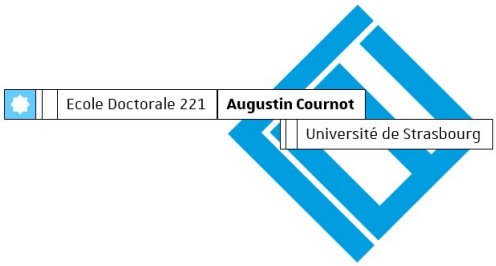

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Reading note / Note de lecture

This thesis was written entirely in English to ease the discussion and the diffusion of its results. For French readers, translated versions of the general introduction and conclusion are available. The thesis is made of four independent chapters, each one contributing to the analysis of collective bargaining on the macroeconomic performance. In order to make each chapter readable independently from the others, some elements are to be found in several chapters, especially those relating to the economic literature and the institutional context. Each chapter also contains its own contextual elements and a review of literature specific to the issue addressed in the chapter. For this reason, the general introduction remains brief on the literature, in order to avoid excessive redundancies.

⋆⋆⋆⋆⋆

Cette thèse a été rédigée intégralement en anglais afin de faciliter la discussion et la diffusion de ses résultats. Pour les lecteurs uniquement francophones, une version traduite de l'introduction générale et de la conclusion générale est proposée. La thèse est composée de quatre chapitres autonomes, chacun visant à éclairer une problématique spécifique en lien avec l'étude des négociations collectives et leurs effets sur la performance macroéconomique. Pour permettre la lecture de chaque chapitre indépendamment des autres, certains éléments sont mentionnés dans plusieurs chapitres, notamment parmi ceux ayant trait à la littérature ou la présentation du contexte institutionnel. Chaque chapitre contient également ses propres éléments de contexte et une revue de littérature spécifique à la problématique étudiée dans le chapitre. Pour cette raison, l'introduction générale demeure brève sur les éléments de littérature, dans l'objectif de limiter les redondances.

General introduction

> The 40-hour workweek
> Minimum wage
> Overtime pay
> Health care
> Workplace safety protections
>
> They're all because of unions — and it's time we recognize that.
>
> 6:06 PM - 7 sept. 2020 - Joe Biden's Twitter Account

Joe Biden's Tweet in the midst of the campaign for the U.S. 2020 presidential election highlights the role of unions in protecting workers, or rather the role *they played*. Indeed, the declining importance of unions in the U.S. economy is correlated with the declining share of labor compensation in added value, which has meant sluggish wage growth and too few improvements in workers' employment conditions (Stansbury & Summers 2017, 2020). Although less marked, the decline of trade unions also affects European countries, which are generally distinguished by labor markets with strong institutions ensuring good protection for workers. However, this decline is heterogeneous, with the case of countries with the Ghent system (Belgium, Denmark, Finland, Iceland and Sweden) being less impacted than the others (Schnabel 2013, OECD 2019).

This phenomenon is generally investigated within the more general framework of *collective bargaining*, which refers to negotiations between workers and employers - usually represented by unions and federations -, on working conditions including wages, overtime pay, bonuses, working hours, and health and safety rules in the workplace. Collective bargaining is considered as a labor market institution. The latter is defined by Boeri (2011) as a system of laws, norms and conventions that result from a collective choice and involve constraints and incentives influencing choices made by individuals regarding labor and pay. Indeed, individuals and firms consider institutions as given when making their own decisions. For instance, employers covered by an industry agreement determining overtime pay, make their decisions (e.g., whether or not to hire an additional worker) within this formal framework. These institutions, including collective bargaining, shape individuals' behavior in the labor market and are therefore structuring for the latter.

The collective bargaining systems are heterogeneous between European coun-

tries (Du Caju et al. 2008). By "heterogeneous", I mean differences in the level - or levels in the case of multi-level structures - at which bargaining takes place (firm, sectoral, regional, cross-sectoral), the way in which unions coordinate between bargaining units and between industries, the government involvement, the involvement of workers in union activities (union membership) and the coverage of firms and workers by collective agreements (bargaining coverage).

In addition to differences in social norms or traditions, another reason for this heterogeneity is that shaping collective bargaining is a key issue for policy makers, since its functioning influences macroeconomic outcomes (Aidt & Tzannatos 2008). Well-organized collective bargaining should make possible to reconcile protection for workers and flexibility for firms, while supporting productivity (Eichhorst et al. 2019). Collective bargaining also needs to be adapted to face new challenges, such as the increase in the number of temporary or self-employed workers (how to give them the opportunity to collectively negotiate their working conditions?), the growing de-unionization, or the development of home office work and the use of digital tools (how to train workers to these new practices so that they remain productive?). Future challenges are also on the agenda. For instance, how to organize collective bargaining in the face of the increasing automation of tasks, in order to avoid the divergence between productivity growth and wage growth?

This thesis contributes to the macroeconomic literature that seeks the best calibration of collective bargaining systems to yield good macroeconomic outcomes. It investigates how they interact with other institutions and how their characteristics and reforms influence countries' macroeconomic performance. Its purpose is to modestly inform decision-making on reforms aiming to shape collective bargaining or other institutions that may interact with it, such as employment protection legislation.

As pointed out by the authors of OECD (2019), collective bargaining is a complex machinery that requires "unpacking" for a proper analysis. The partial and very general indicators used in many papers in the 1990s and early 2000s are therefore no longer satisfactory for analyzing macroeconomic outcomes of collective bargaining systems (Aidt & Tzannatos 2008, Du Caju et al. 2008). Besides, many of these studies were based on databases with relatively few observations, often less than 100 (Aidt & Tzannatos 2008). Since then, the availability of macroeconomic data (country-level) became larger, in terms of variables diversity, time period or countries for which data are collected. It is in part thanks to the work of Jelle Visser and his team at the Amsterdam Institute for Advanced Labour Studies (AIAS), who provide the ICTWSS database. The latest version offers more than 200 variables de-

scribing institutional characteristics of trade unions, wage setting, state intervention and social pacts for 56 countries over the period 1960-2018. I rely on this database throughout my thesis. Nevertheless, I use this database keeping in mind, as the reader should keep in mind, that despite the availability of a wide variety of indicators to conduct empirical investigations, collective bargaining remains a complex interaction between firms, workers and the State, all of which being influenced by social and cultural norms.

In addition to the availability of richer data, there are two other reasons for the revival of the macroeconomic literature on collective bargaining. First, as in many fields of economic research, there is the possibility to use more sophisticated econometric tools allowing for more reliable and refined results, for instance by dealing with biases that could not previously be taken into account and by allowing the analysis of non-linear and state-dependence effects. Second, the experience of the Great Recession, which prompted many countries to reform their collective bargaining systems, among other labor market institutions, has given economists a wonderful research ground.

As mentioned in the title, my dissertation aims at assessing the effects of collective bargaining on *macroeconomic performance*. By macroeconomic performance, I refer to Freeman (2007), which sums up that evaluating the effects of labor market institutions - including wage-setting institutions - on macroeconomic performance relies on looking at aggregate indicators such as *"rates of growth of GDP per capita, income inequality, employment and unemployment, productivity growth, inflation, and growth of real earnings."* (p.10). In my empirical chapters with cross-country or cross-regional analyses, the dependent variables are nominal wage growth (Chapter 1), growth of GDP per capita (Chapter 3) and rates of employment (aggregate and by sub-group of workers) and unemployment (Chapter 4). In my theoretical chapter (Chapter 2), I focus on unemployment and social welfare.

To investigate the relationship between collective bargaining and the macroeconomy, I bring up four issues for which the literature is inconclusive or scarce. These latter are structured in four chapters. In Chapters 1 and 2, I study collective bargaining systems by considering their interactions with their institutional environment. In Chapter 1, I investigate the role of collective bargaining systems on the link between wage growth and the unemployment rate, i.e. the wage Phillips curve, which may have implications on the feasibility of monetary policy objectives. Chapter 2 focuses on the interaction of collective bargaining systems with the employment protection legislation (EPL), by studying theoretically how they influence outcomes of EPL reforms. Then, in Chapters 3 and 4, I focus

precisely on the institution of collective bargaining and how their changes affect the macroeconomic performance. In Chapter 3, I wonder whether the long process of decentralization of collective bargaining that began in several developed countries in the 1980s and accelerated with the Great Recession has led to stronger economic growth. Finally, in Chapter 4, I question the timing of reforms that modify collective bargaining: do they improve employment when implemented during a recession? In detail, the outline of the thesis is as follows.

Chapter 1 — Collective bargaining and wage Phillips curve

In this chapter, coauthored with Francesco De Palma, Samuel Ligonnière and Jamel Saadaoui, we explore the role of collective bargaining institutions as an alternative explanation of the Phillips curve flattening by investigating how they shape the wage Phillips curve.

Although there has been a constant debate on the relevance of the Phillips curve over the decades, the issue is back in the spotlight. The crucial question is: has the Phillips curve disappeared? Indeed, two enigmatic phenomena with regard to the theoretical predictions of the Phillips curve appeared with the Great Recession: the *missing deflation* (large contraction in GDP with strong increase in the unemployment rate, but only a small drop in core inflation) followed by the *missing inflation* during the recovery (an unemployment rate that reaches historically low levels but no high inflation). The result is a "flattened" Phillips curve.

Recent research has investigated this so-called flattening - or non-linearites - in the Phillips curve, pointing to several possible explanations: anchored inflation expectations (Bernanke 2010, Blanchard 2016, Ball & Mazumder 2019), changes in the composition of the workforce (e.g., retiring baby boomers) (Daly et al. 2016, Yellen 2017), or globalization (Forbes et al. 2020). An additional explanation refers to the downward nominal wage rigidity that would bend the Phillips curve (Forbes et al. 2020). This chapter deepens the explanation relying on downward nominal wage rigidity by investigating the role of wage bargaining institutions as shaping the slope and curvature of the wage Phillips curve, particularly in periods of slack in the labor market. Indeed, downward adjustments of wages are more likely in economies with decentralized bargaining and/or where collective agreements are not automatically extended to all workers in an industry, compared to economies whith centralized wage setting (Holden & Wulfsberg 2014, Villanueva 2015, Gnocchi et al. 2015). More precisely, we test three assumptions: *(i)* The wage Phillips curve is steeper in economies with fully decentralized wage bargaining; *(ii)* The wage Phillips curve is flat in economies with multi-employer wage bargaining; *(iii)* The influence

of wage bargaining institutions on the link between unemployment and wage growth is mainly observed in periods of high unemployment.

We use spatial and temporal heterogeneity between the collective bargaining systems of European countries to investigate the role of wage bargaining centralization on the wage Phillips curve's slope, i.e. the relationship between the unemployment gap and the growth of nominal wages. For this purpose, we rely on European regional data (NUTS-2) merged with data describing the centralization of wage bargaining in each country.

Using a specification of the wage Phillips curve adapted to regional data, our empirical strategy consists of two complementary approaches. First, we use a system generalised method of moments (GMM) to test conditional effects of the bargaining centralization on the contribution of the unemployment gap to the nominal wage growth. We find that higher levels of wage bargaining centralization (sector and above) reduce the slope of the wage Phillips curve when unemployment is high. Second, we deepen the investigation by looking for the existence of a threshold in the level of centralization at which the slope would become flat. For that, we use a panel threshold model with internal instrumental variables. Our results highlight a threshold at a level of bargaining centralization close to the sectoral level, meaning that the slope of the wage Phillips curve becomes zero after this threshold.

Chapter 2 — Collective bargaining and interactions with employment protection

In this chapter coauthored with Francesco De Palma, we provide an ex-ante evaluation of a reform implementing a scheme of unemployment insurance financing based on layoff taxes in economies with sectoral-level collective bargaining.

Unemployment insurance schemes in EU countries are mainly financed via flat-tax on payroll. This scheme increases the wage burden, do not make employers accountable for the social cost of their layoffs, creating *in fine* a double incentive to destroy jobs (Cahuc et al. 2014). Blanchard & Tirole (2008) suggest to combine the employment protection and the unemployment insurance in a coherent scheme in which unemployment benefits are funded by layoff taxes (partly based on the experience-rating (ER) system in the United States (U.S.)). This system should induce firms to internalize the fiscal cost of their layoffs. Policy advisers have repeatedly called for the generalization of this scheme, which would both protect jobs by taxing layoffs and make the financing of UI fairer and less burdensome in terms of labor costs (German Council of Economic Experts 2003, European Commission

2004, Tirole 2017).

However, while the effects of ER on U.S. labor market outcomes are well established, the potential effects in Western European labor markets are still to be evaluated. Indeed, the effects of an ER system on labor flows will be intertwined with those induced by well established labor market institutions, and especially collective (wage) bargaining systems on the profitability of hoarding labor, the expected profit for firms and ultimately, employers' decisions regarding job destruction and job creation. The existing literature on the effects of the introduction of ER in a European-style labor market characterized by rigid institutions supports the introduction of such a system because it reduces the unemployment rate (see Cahuc & Malherbet (2004), Charlot & Malherbet (2010) or L'Haridon & Malherbet (2009)). Nevertheless these studies either ignore wage bargaining or consider wages bargained on an individual basis between workers and firms.

This chapter complements the literature by considering the role of sectoral negotiations in the effectiveness of the implementation of an ER system. For this purpose, we use an equilibrium unemployment model with frictions and endogenous job destruction *à la* Mortensen & Pissarides (1999) extended with the main passive labor policies in EU countries: (i) unemployment insurance (ii) employment protection (iii) (collective) wage bargaining. Our main findings show that ER decreases unemployment and increases aggregate welfare when wage bargaining involves industry-wide unions and employers' federation, and with extended coverage of workers, as is the case in many Western European countries. Moreover, these positive effects are better when the implementation of ER is accompanied by a reduction in the stringency of existing EPL. The reform in the chapter provides a useful tool to reduce the fiscal burden (payroll tax) of hiring workers and protect employment at the same time.

In the next two chapters, I consider collective bargaining as an institution that can be reformed. I begin with Chapter 3, where I show evidence of the impact of decentralized collective bargaining on economic growth.

Chapter 3 — Collective bargaining decentralization and economic growth

In this chapter co-authored with Isabelle Terraz and Phu Nguyen-Van, we provide evidence on the relationship between decentralization process of wage collective bargaining and economic growth for 36 OECD countries over the period 1960-2017.

Following the Second World War, many countries have adopted highly centralized systems allowing the state to influence income policies through national agreements

and tripartite social pacts (e.g., this was very useful during the oil crisis of the 1970s to cope with cost pressures (Flanagan et al. 1983)). By the 1980s, debates over labor market institutions have grown in importance, especially because of the divergence in employment performance across developed countries. The comparison between European and US labor markets was intriguing and suggested that rigid institutions were partly to blame. Collective bargaining systems are considered as a key part of these institutions for their self-regulating role in the labor market by shaping the wage setting. These debates have resulted in a process of collective bargaining decentralization in many OECD countries, that is a move of negotiations and decisions over wages and employment terms closer to the individual enterprise (Visser 2016). This process have been achieved in two ways. Either by abolishing the national or sectoral levels of negotiation in favor of company level bargaining. Either by keeping the national and/or sectoral level, which set collective agreements that can be modified by agreements negotiated within the company, with more or less flexibility. The first way is called 'disorganized decentralization', while the second 'organized decentralization' (Traxler 1995).

As a result, in most of European countries, several levels of bargaining coexist with a given articulation between these levels. Often, collective agreements negotiated at national or industry level set binding minimum conditions for firm-level bargaining, implying two-tier wage bargaining structures (Boeri 2015). These structures should internalize the macroeconomic constraints while allowing a certain degree of flexibility at the company level to adjust costs, ensuring macroeconomic stability, while strengthening the resilience of the labor market. However, some empirical evidence based on survey data from European firms suggests that these objectives are not being met, in particular because there is too little room for additional negotiations within the company (Boeri 2015).

The literature on the macroeconomic effects of organized decentralization is recent and still scarce (see OECD (2019)). We contribute to it by studying the effect of organized decentralized collective bargaining on economic growth in OECD countries. For this purpose, in line with recent taxonomies of collective bargaining systems (e.g., see OECD (2019)), we classify national collective bargaining systems depending on whether they are decentralized or not, and the form of the decentralization. We represent this classification in the empirical investigation using a categorical variable, which we include in a growth equation. We estimate this growth equation using a system GMM to deal with the dynamic nature of the specification and other potential endogeneity biases. We find that organized decentralized bargaining systems with the relaxation of the 'favorability'

principle (i.e. leaving more room for additional negotiations within the company to set conditions that are less favorable to workers than those set in higher level agreements) are associated with higher economic growth relative to other systems.

Chapter 4 — What timing for collective bargaining reforms?

Should governments undertake collective bargaining reforms at any time? Or does the timing matters for their economic outcome? In this chapter I investigate whether flexibility-enhancing reforms of national collective bargaining systems have positive outcomes in terms of employment and unemployment in the short term, especially when implemented during an economic downturn.

The sovereign debt crisis, weak growth prospects, and low estimated fiscal multipliers have reduced the potential for demand-driven stimulus policies. European Union countries then turned to flexibility-enhancing structural reforms of their economies, including labor market institutions (LMIs), aimed at maintaining price competitiveness, stimulating employment, and ensuring financial sustainability. Many of these reforms were prioritized by European economic governance (Leonardi & Pedersini 2018). Part of the reforms have concerned collective bargaining systems, including *(i)* the reduction of the scope of collective bargaining (e.g., ending the mandatory extension of collective agreements to non-organized employers, reducing the length of agreements and their validity beyond expiry) *(ii)* the decentralization of bargaining by moving it closer to the firm-level (e.g., abolishing the favorability principle, allowing derogation, developing temporary clauses to renegotiate higher-level agreements at a lower level, or simply removing higher levels of bargaining) *(iii)* the reduction of the influence of trade unions (e.g., restricting the right to strike, tightening representativeness criteria or limiting the voice of trade unions in national tripartite councils) (Marginson 2015, Koukiadaki & Grimshaw 2016, Visser 2016).

However, several insights suggest that it may not be desirable to pursue these reforms in times of economic recession. Firstly, countries that today have similar collective bargaining systems, such as Portugal and the Netherlands, present very different labor market performances. This divergence can be explained by collective bargaining reforms that were carried out quickly and with little consultation between the social partners (in particular because they were the counterpart of financial aid from supranational institutions) in Portugal, whereas they were carried out over time in constant consultation between the social partners in the Netherlands (Hijzen et al. 2017). In particular, reforms lead to institutional instability regarding wage bargaining, which can be negative for short-term economic perfor-

mance because of adverse effects on trust between bargaining actors, weakening, for example, the ability to moderate labor costs (Brandl & Ibsen 2017, 2019). Taking prevailing economic conditions into account, the timing of the reform seems crucial in this context, mainly because trade unions' objectives vary over the business cycle: trade unions act more aggressively during recessions and tend to favor wages over employment at the arrival of an economic shock, explaining the counter-cyclical nature of the wage premium (Freeman & Medoff 1984, Blanchflower & Bryson 2004, Morin 2017).

While the effects of reforms concerning the minimum wage, unemployment insurance or employment protection are well documented, those concerning collective bargaining systems are not, and even less with the timing of the reforms taken into account (see Boeri et al. (2015), Addison (2016) for recent surveys). This chapter seeks to fill this gap by exploiting data on reforms of collective bargaining institutions implemented by EU countries since 2000 to evaluate their employment outcomes, depending on whether they were implemented in a period of recession or a period of expansion. For this purpose, I identified a set of reforms of collective bargaining institutions in EU countries between 2000 and 2018 and classified the reforms into three categories – changes (1) in the coverage of bargaining, (2) in the centralization of bargaining, and (3) in the capacity of trade unions to represent workers. Then, I assessed their effects on employment by relying on Local projections (LPs) *à la* Jordà (2005) to generate dynamic responses of employment rates to reforms. LPs is a growing tool in applied macroeconomic research, often used by macroeconomists as an alternative to vector autoregressions (VARs) to obtain the estimation of Impulse Responses (IR). One great advantage of LPs method is that it allows for more flexible IR estimation because it requires weaker assumptions on the dynamics of the data (Barnichon & Brownlees 2019).

The empirical analysis focuses on flexibility-enhancing reforms. The results show that reforms reducing bargaining coverage have a detrimental effect on the aggregate employment and unemployment rates in the very short term, while reforms that decentralize negotiations closer to the firm level do not have any significant effect. On the contrary, reforms that reduce the capacity of trade unions to represent workers have a short-term positive effect on employment. The timing of the reforms is crucial in these effects; for instance, reductions in bargaining coverage only have a negative effect when carried out during a recession, while weakening unions is only beneficial when the reform is implemented outside of a recession. These effects are stronger for young workers, workers with a low level of education and workers on temporary contracts.

Policy implications — The results presented in this thesis have policy implications and may contribute to the policy recommendation.

First, if policy-makers aim to adopt a collective bargaining system conducive to economic growth, they should shape it in such a way as to allow for organized decentralization, where sectoral or national bargaining set agreements that leave room for company bargaining. However, when this involves reforming them towards greater flexibility, timing is a serious matter. When they are implemented during an economic downturn, they do not have the expected beneficial effects on employment and may even be detrimental. This has also implication for economic governance in the European Union, which should consider a "positive conditionality" mechanism, as suggested by Boeri & Jimeno (2016). That is, helping countries in financial distress if they have implemented reforms during periods of economic expansion, instead of imposing reforms in the midst of a recession in return for a financial assistance. This would act as a "reward", encouraging national government to implement recommended reforms during good times.

Second, policy-makers should take the collective bargaining system into account when designing their economic policies.

When reforming other labor market institutions, such as employment protection legislation, policy-makers need to assess the potential interactions with the collective bargaining regime, which may affect the success of the reform. For instance, taxing layoffs to finance unemployment insurance so that employers internalize the fiscal cost of their job destruction should not be accompanied by a general increase in the stringency of employment protection in economies where collective bargaining is sectoral and agreements extended to all workers, at the risk of reducing the expected positive effects on job flows. However, if well designed, the reform achieve to encourage hiring (by lowering the fiscal burden of payroll tax) while protecting employment.

Central bankers should take collective bargaining systems into account when designing the monetary policy. Indeed, in economies where wage bargaining takes place at rather centralized levels (sectoral and cross-sectoral), the wage Phillips curve is quite flat when there is slack in the labor market, highlighting the existence of downward nominal rigidity.

Of course, these are recommendations based on works that each has its own set of limitations. They are therefore to be interpreted in the light of existing literature and to be confirmed with future work.

Introduction générale

> La semaine de 40 heures
> Le salaire minimum
> La rémunération des heures supplémentaires
> Les soins de santé
> Les mesures de sécurité sur le lieu de travail
>
> Tout cela existe grâce aux syndicats — et il est temps que nous le reconnaissions.
>
> 18h06 - 7 sept. 2020 - Compte Twitter de Joe Biden (traduction de l'auteur)

Le tweet de Joe Biden en pleine campagne pour l'élection présidentielle américaine de 2020 souligne le rôle des syndicats dans la protection des travailleurs, ou plutôt le rôle qu'ils *ont joué*. En effet, la diminution de l'importance des syndicats dans l'économie américaine est corrélée avec la diminution de la part de la rémunération du travail dans la valeur ajoutée, ce qui s'est traduit par une croissance salariale lente et peu d'améliorations des conditions d'emploi des travailleurs (Stansbury & Summers 2017, 2020). Bien que moins marqué, le déclin des syndicats touche également les pays européens, qui se distinguent généralement par des marchés du travail dotés d'institutions fortes assurant une bonne protection des travailleurs. Toutefois, ce déclin est hétérogène, avec des pays moins touchés que les autres, notamment ceux partageant le système de Gand (Belgique, Danemark, Finlande, Islande et Suède) (Schnabel 2013, OECD 2019).

Ce phénomène est généralement étudié dans le cadre plus général de la *négociation collective*, qui désigne les négociations entre travailleurs et employeurs - généralement représentés par des syndicats et des fédérations -, sur les conditions de travail, y compris les salaires, le paiement des heures supplémentaires, les primes, les heures de travail et les règles de santé et de sécurité sur le lieu de travail. La négociation collective est considérée comme une institution du marché du travail. Cette dernière est définie par Boeri (2011) comme un système de lois, de normes et de conventions qui résultent de choix collectifs et qui impliquent des contraintes et des incitations influençant les choix des individus en matière de travail et de rémunération. En effet, les individus et les entreprises considèrent les institutions comme données lorsqu'ils prennent leurs décisions. Par exemple, les employeurs couverts par un accord sectoriel déterminant la rémunération des heures supplémentaires, prennent leurs décisions (par exemple, s'ils doivent ou non embaucher un travailleur

supplémentaire) dans ce cadre formel. Ces institutions, dont celle des négociations collectives, façonnent le comportement des individus sur le marché du travail et sont donc structurantes pour ce dernier.

Les systèmes de négociations collectives sont hétérogènes entre les pays européens (Du Caju et al. 2008). Par "hétérogène", il est entendu des différences de niveau - ou de niveaux dans le cas de systèmes à plusieurs niveaux - auquel la négociation prend place (entreprise, branche, région, national), la manière dont les syndicats se coordonnent entre unités de négociation et branches d'activité, le rôle joué par le gouvernement, l'implication des travailleurs dans les activités syndicales (syndicalisation) et la couverture des entreprises et des travailleurs par les conventions collectives (couverture des négociations).

En plus de différences de normes sociales ou de traditions, cette hétérogénéité s'explique également par le fait que la manière de structurer les négociations collectives est une question clé pour les décideurs politiques, puisque leur fonctionnement influence les résultats macroéconomiques (Aidt & Tzannatos 2008). Un système de négociations collectives bien organisé devrait permettre de concilier protection des travailleurs et flexibilité des entreprises, tout en soutenant la productivité (Eichhorst et al. 2019). La négociation collective doit également être adaptée pour faire face à de nouveaux défis, tels que l'augmentation du nombre de travailleurs temporaires ou indépendants (comment leur donner la possibilité de négocier collectivement leurs conditions de travail ?), la désyndicalisation croissante, ou le développement du travail à domicile et l'utilisation des outils numériques (comment former les travailleurs à ces nouvelles pratiques pour qu'ils restent productifs ?). Des défis plus lointains sont également à l'agenda. Par exemple, comment organiser la négociation collective face à l'automatisation croissante des tâches, afin d'éviter une divergence trop importante entre la croissance de la productivité et la croissance des salaires ?

Cette thèse contribue à la littérature macroéconomique qui recherche le meilleur calibrage des systèmes de négociations collectives pour obtenir de bons résultats macroéconomiques. Elle étudie la manière dont ils interagissent avec d'autres institutions et comment leurs caractéristiques et les réformes qui les concernent influencent les performances macroéconomiques des pays. Son but est de modestement éclairer la prise de décision sur les réformes visant à façonner les négociations collectives ou d'autres institutions susceptibles d'interagir avec elles, comme la législation sur la protection de l'emploi.

Comme le soulignent les auteurs du rapport de l'OECD (2019), la négociation collective est un mécanisme complexe qui nécessite d'être "décortiqué" pour l'analyser pleinement. Les indicateurs partiels et très généraux utilisés dans les travaux des

années 1990 et au début des années 2000 ne sont donc plus satisfaisants pour analyser les résultats macroéconomiques des systèmes de négociations collectives (Aidt & Tzannatos 2008, Du Caju et al. 2008). En outre, nombre de ces études étaient basées sur des bases de données comportant relativement peu d'observations, souvent moins de 100 (Aidt & Tzannatos 2008). Depuis lors, la disponibilité des données pays sur les négociations collectives est devenue plus importante, en termes de diversité des variables, ainsi qu'en termes de période ou de pays pour lesquels les données sont collectées. C'est en partie grâce au travail de Jelle Visser et de son équipe de l'Institut des études avancées sur le travail d'Amsterdam (AIAS), qui fournissent la base de données ICTWSS. La dernière version propose plus de 200 variables décrivant les caractéristiques institutionnelles des syndicats, la fixation des salaires, l'intervention de l'État et les pactes sociaux pour 56 pays sur la période 1960-2018. Cette base de données est utilisée à maintes reprises dans la thèse. Néanmoins, elle est utilisée en gardant à l'esprit, tout comme le lecteur doit le garder à l'esprit en parcourant la thèse, qu'en dépit d'indicateurs plus riches pour mener des recherches empiriques, la négociation collective reste une interaction complexe entre les entreprises, les travailleurs et l'État, tous étant influencés par des normes sociales et culturelles.

En plus de la disponibilité d'un plus grande variété de données, deux autres raisons expliquent le renouveau de la littérature macroéconomique sur les négociations collectives. Premièrement, comme dans de nombreux domaines de recherche en économie, il est possible d'utiliser des outils économétriques plus sophistiqués permettant d'obtenir des résultats plus fiables et plus précis, par exemple en traitant des biais qui ne pouvaient pas être pris en compte auparavant et en permettant l'analyse d'effets non linéaires ou d'effets de dépendance à l'égard de situations particulières (par exemple, le rôle des conditions économiques initiales sur le succès d'une réforme structurelle). Deuxièmement, l'expérience de la Grande Récession, qui a incité de nombreux pays à réformer leurs systèmes de négociation collective, entre autres institutions du marché du travail, et a donné aux économistes un formidable terrain de recherche.

Comme mentionné dans le titre, la thèse vise à évaluer les effets de la négociation collective sur la *performance macroéconomique*. Par performance macroéconomique, nous nous référons à Freeman (2007), qui résume l'évaluation des effets des institutions du marché du travail - dont les institutions de négociations salariales - sur la performance macroéconomique comme l'examen d'indicateurs agrégés tels que *"taux de croissance du PIB par habitant, les inégalités de revenu, l'emploi et le chômage, la croissance de la productivité, l'inflation, et la croissance réelle des revenus."* (p.10).

Dans les chapitres empiriques comportant des analyses en panel pays ou panel régional, les variables dépendantes sont la croissance des salaires nominaux (chapitre 1), la croissance du PIB par habitant (chapitre 3) et les taux d'emploi (agrégé et par sous-groupe de travailleurs) et de chômage (chapitre 4). Le chapitre théorique (chapitre 2), quant à lui, se concentre sur le chômage et la production agrégée.

Pour étudier le lien entre les systèmes de négociations collectives et la performance macroéconomique, la thèse aborde quatre questions pour lesquelles la littérature est peu concluante et mérite d'être complétée. Ces dernières sont réparties sur quatre chapitres indépendants. Dans les chapitres 1 et 2, nous étudions les systèmes de négociations collectives en considérant leurs interactions avec leur environnement institutionnel. Dans le chapitre 1, nous analysons le rôle des systèmes de négociation collective sur le lien entre la croissance des salaires et le taux de chômage, c'est-à-dire la courbe de Phillips des salaires, qui peut avoir des implications sur la faisabilité des objectifs de politique monétaire. Le chapitre 2 se concentre sur l'interaction des systèmes de négociation collective avec la législation sur la protection de l'emploi (LPE), en étudiant théoriquement comment les premiers influencent les résultats des réformes de la LPE. Ensuite, dans les chapitres 3 et 4, nous nous concentrons précisément sur l'institution des négociations collectives et sur la manière dont ses modifications affectent la performance macroéconomique. Dans le chapitre 3, nous interrogeons le long processus de décentralisation de la négociation collective qui a commencé dans plusieurs pays développés dans les années 1980 et s'est accéléré avec la Grande Récession, afin d'observer s'il a conduit à une croissance économique plus forte. Enfin, dans le chapitre 4, nous questionnons le timing des réformes qui visent à modifier l'institution des négociations collectives : améliorent-elles l'emploi lorsqu'elles sont mises en œuvre en période de récession ? En détail, le plan de la thèse est le suivant.

Chapitre 1 — Négociations collectives et courbe de Phillips des salaires

Dans ce chapitre, rédigé en collaboration avec Francesco De Palma, Samuel Ligonnière et Jamel Saadaoui, nous explorons le rôle de l'institution des négociations collectives comme explication alternative de l'aplatissement de la courbe de Phillips, en analysant la manière dont elle influence la pente de la courbe de Phillips des salaires.

Bien que le débat sur la pertinence de la courbe de Phillips n'ait jamais réellement cessé depuis les travaux fondateurs d'Alban William Phillips, la question est à nouveau sous le feu des projecteurs. La question cruciale est la suivante : la courbe de Phillips a-t-elle disparu ? En effet, deux phénomènes énigmatiques par rapport aux

prédictions théoriques de la courbe de Phillips sont apparus avec la Grande Récession : la *déflation manquante* (forte contraction du PIB avec une forte augmentation du taux de chômage, mais seulement une faible diminution de l'inflation) suivi de l'*inflation manquante* pendant la phase de reprise économique (un taux de chômage qui atteint des niveaux historiquement bas mais pas de reprise de l'inflation). Le résultat est une courbe de Phillips "aplatie".

Des recherches récentes ont étudié ce que l'on appelle l'aplatissement - ou les non-linéarités - de la courbe de Phillips, en mettant en évidence plusieurs explications possibles : des anticipations ancrées d'inflation (Bernanke 2010, Blanchard 2016, Ball & Mazumder 2019), des changements dans la composition de la main-d'œuvre (par exemple, les baby-boomers qui partent à la retraite) (Daly et al. 2016, Yellen 2017), ou encore la mondialisation (Forbes et al. 2020). Une explication supplémentaire fait référence à la rigidité à la baisse des salaires nominaux qui viendrait "plier" la courbe de Phillips (Forbes et al. 2020). Ce chapitre approfondit cette dernière en étudiant le rôle de l'institution des négociations salariales sur la pente et la courbure de la courbe de Phillips des salaires, en particulier en période de ralentissement du marché du travail. En effet, les ajustements à la baisse des salaires sont plus probables dans les économies où la négociation est décentralisée et/ou où les conventions collectives ne sont pas automatiquement étendues à tous les travailleurs d'une branche d'activité, par rapport aux économies où la fixation des salaires est centralisée (Holden & Wulfsberg 2014, Villanueva 2015, Gnocchi et al. 2015). Plus précisément, nous testons trois hypothèses : *(i)* La courbe de Phillips des salaires est plus raide dans les économies où les négociations salariales sont totalement décentralisées ; *(ii)* La courbe de Phillips des salaires est plate dans les économies où les négociations salariales sont centralisées ; *(iii)* L'influence de l'institution des négociations salariales sur le lien entre le chômage et la croissance des salaires est principalement observée en période de chômage élevé.

Nous utilisons l'hétérogénéité spatiale et temporelle entre les systèmes de négociations collectives des pays européens pour étudier le rôle de la centralisation des négociations salariales sur la pente de la courbe de Phillips des salaires, c'est-à-dire la relation entre l'écart de chômage (différence entre le chômage effectif et le chômage moyen) et la croissance des salaires nominaux. Pour ce faire, nous nous appuyons sur des données régionales européennes (NUTS-2) associées à des données décrivant la centralisation des négociations salariales dans chaque pays.

En utilisant une spécification de l'équation de la courbe de Phillips des salaires adaptée aux données régionales, notre stratégie empirique se décline en deux approches complémentaires. Premièrement, nous utilisons une méthode des

moments généralisée (MMG) pour tester l'effet conditionnel de la centralisation des négociations sur la contribution de l'écart de chômage à la croissance du salaire nominal annuel. Nous constatons que des niveaux plus élevés de centralisation des négociations salariales (sectoriels et au-delà) réduisent la pente de la courbe de Phillips des salaires lorsque le chômage est élevé. Deuxièmement, nous approfondissons l'étude en recherchant l'existence d'un seuil dans le niveau de centralisation, à partir duquel la pente de la courbe de Phillips des salaires deviendrait plate. Pour cela, nous utilisons un modèle de seuil en panel avec des variables instrumentales internes. Nos résultats mettent en évidence un seuil à un niveau de centralisation des négociations proche du niveau sectoriel : la pente de la courbe de Phillips des salaires devient nulle après ce seuil.

Chapitre 2 — Négociations collectives et interactions avec la protection de l'emploi

Dans ce chapitre, rédigé en collaboration avec Francesco De Palma, nous présentons une évaluation *ex ante* d'une réforme mettant en œuvre un système de financement de l'assurance chômage basé sur des taxes payées par les employeurs, dans les économies où les négociations collectives sont menées au niveau sectoriel.

Dans les pays de l'Union Européenne, les régimes d'assurance chômage sont principalement financés par des cotisations forfaitaires sur les salaires. Ce mode de financement augmente le coût du travail et ne rend pas les employeurs responsables du coût fiscal de leurs décisions de licenciements, créant ainsi une double incitation à la destruction d'emplois. Blanchard & Tirole (2008) suggèrent de combiner la protection de l'emploi et l'assurance chômage dans un système cohérent dans lequel les allocations de chômage sont financées par des taxes sur les licenciements proportionnelles au coût anticipé du nouveau chômeur pour la caisse d'assurance chômage (en partie inspiré du système d'*experience-rating* (ER) en place aux États-Unis). Ce système devrait inciter les entreprises à internaliser le coût fiscal de leurs licenciements. Plusieurs appels d'experts ont demandé la généralisation de ce système, qui permettrait à la fois de protéger les emplois en taxant les licenciements et de rendre le financement de l'assurance-chômage plus équitable et moins lourd en termes de coût du travail (German Council of Economic Experts 2003, European Commission 2004, Tirole 2017).

Toutefois, si les effets d'un tel système sur le marché du travail américain sont bien établis, les effets potentiels sur les marchés du travail européens restent à évaluer. En effet, l'effet d'un système d'experience-rating sur les flux de main-d'œuvre seront étroitement liés à ceux induits par les institutions du marché du travail déjà

existantes, et notamment ceux du système de négociations collectives (salariale) sur la rentabilité de la thésaurisation de la main-d'œuvre, le profit escompté des entreprises et, en fin de compte, les décisions des employeurs concernant la destruction et la création d'emplois. La littérature existante sur les effets de l'introduction de l'experience-rating dans un marché du travail de type européen, caractérisé par des institutions rigides, soutient son introduction, puisqu'il permet de réduire le taux de chômage (voir Cahuc & Malherbet (2004), Charlot & Malherbet (2010) ou L'Haridon & Malherbet (2009)). Néanmoins, ces études soit ignorent les négociations salariales, soit considèrent des salaires négociés sur une base individuelle entre le travailleur et l'entreprise.

Ce chapitre complète la littérature en examinant le rôle des négociations sectorielles dans l'efficacité de la mise en œuvre d'un système d'experience-rating. À cette fin, nous utilisons un modèle de chômage d'équilibre avec frictions et destruction endogène d'emplois *à la* Mortensen & Pissarides (1999), étendu avec les principales politiques passives du marché travail dans les pays européens : (i) l'assurance chômage (ii) la protection de l'emploi (iii) la négociation salariale (collective). Nos principaux résultats montrent que le financement de l'assurance chômage via des taxes sur les licenciements réduit le chômage et augmente le bien-être global dans les économies où les négociations sont principalement sectorielles et que la couverture des accords est étendue à l'ensemble des travailleurs, comme c'est le cas dans de nombreux pays de l'Union Européenne. En outre, ces effets positifs sont meilleurs lorsque la mise en œuvre de l'experience-rating s'accompagne d'une réduction de la rigueur de la législation de la protection de l'emploi existante. La réforme présentée dans ce chapitre pourrait constituer un instrument utile pour réduire la charge fiscale sur les salaires tout en protégeant l'emploi.

Dans les deux prochains chapitres, nous considérons les négociations collectives comme une institution qui peut être réformée. Le premier de ces deux derniers chapitres, le chapitre 3, étudie les effets de la décentralisation des négociations collectives sur la croissance économique.

Chapitre 3 — Décentralisation des négociations collectives et croissance économique

Dans ce chapitre co-écrit avec Isabelle Terraz et Phu Nguyen-Van, nous enquêtons sur la relation entre la décentralisation des négociations collectives et la croissance économique pour 36 pays de l'OCDE sur la période 1960-2017.

Après la Seconde Guerre mondiale, de nombreux pays ont adopté des systèmes

de négociations très centralisés permettant à l'État d'influencer les politiques salariales par le biais d'accords nationaux et de pactes sociaux tripartites (par exemple, cela a été très utile pendant la crise pétrolière des années 1970 pour apporter une réponse coordonnée à la pression à la hausse des coûts de production (Flanagan et al. 1983)). Dans les années 1980, les débats sur les institutions du marché du travail ont pris de l'importance, notamment en raison des divergences dans les performances de l'emploi entre les pays développés. La comparaison entre les marchés du travail européen et américain était intrigante et suggérait que la rigidité des institutions était en partie responsable. Les systèmes de négociation collective sont considérés comme un élément clé de ces institutions pour leur rôle d'autorégulation sur le marché du travail en façonnant la fixation des salaires. Ces débats ont abouti à un processus de décentralisation des négociations collectives dans de nombreux pays de l'OCDE, c'est-à-dire à un rapprochement des négociations et des décisions sur les salaires et les conditions d'emploi de l'entreprise individuelle (Visser 2016). La décentralisation a pris deux principales formes. Soit en supprimant les niveaux de négociation nationaux ou sectoriels au profit d'une négociation au niveau de l'entreprise. Soit en maintenant le niveau national et/ou sectoriel, qui fixe les conventions collectives pouvant être modifiées par des accords négociés au sein de l'entreprise, avec plus ou moins de marges de manoeuvre. La première forme est appelée la "décentralisation désorganisée", tandis que la seconde est appelée la "décentralisation organisée" (Traxler 1995).

Par conséquent, dans la plupart des pays européens, plusieurs niveaux de négociation coexistent et s'articulent. Souvent, les conventions collectives négociées au niveau national ou sectoriel fixent des conditions minimales contraignantes pour la négociation au niveau de l'entreprise, ce qui implique des structures de négociation salariale à deux niveaux (Boeri 2015). Ces structures de négociation sont censées permettre d'internaliser les contraintes macroéconomiques tout en laissant une certaine souplesse aux niveau de l'entreprise pour ajuster ses coûts, le tout permettant d'améliorer la stabilisation macroéconomique et renforcer la résilience du marché du travail. Toutefois, certaines preuves empiriques basées sur des données d'enquête auprès des entreprises européennes suggèrent que ces objectifs ne sont pas atteints, notamment parce que trop peu de place est laissée aux négociations additionnelles au sein des entreprises (Boeri 2015).

La littérature sur les effets macroéconomiques de la décentralisation organisée est récente et encore incomplète (voir OECD (2019)). Nous y contribuons en étudiant l'effet de la décentralisation organisée sur la croissance économique dans les pays de l'OCDE. À cette fin, conformément aux taxonomies récentes des systèmes

de négociations collectives (par exemple, voir OECD (2019)), nous classons les systèmes nationaux de négociations collectives selon qu'ils sont décentralisés ou non, et selon la forme de cette éventuelle décentralisation. Nous créons une variable catégorielle à partir de cette classification, que nous incluons dans une équation de croissance pour mener notre analyse empirique. Nous estimons cette équation de croissance à l'aide de la méthode des moments généralisée (MMG) pour tenir compte de la nature dynamique de notre spécification ainsi que d'autres biais potentiels liés à l'endogénéité de nos variables indépendantes. Nos résultats suggèrent que les systèmes de décentralisation organisée via l'assouplissement du principe de "faveur" (c'est-à-dire laissant la possibilité aux négociations additionnelles au sein de l'entreprise de fixer des conditions moins favorables aux travailleurs que celles fixées dans les accords de niveau supérieur) sont associés à une croissance économique plus élevée par rapport aux autres systèmes.

Chapitre 4 — Quel timing pour réformer les négociations collectives ?

Les gouvernements devraient-ils entreprendre des réformes visant à modifier l'organisation des négociations collectives à tout moment ? Ou bien le timing a-t-il une importance en influençant la réussite de ces réformes ? Dans ce chapitre, nous examinons si les réformes des systèmes nationaux de négociations collectives visant à accroître la flexibilité ont des résultats positifs en termes d'emploi et de chômage à court terme, en particulier lorsqu'elles sont mises en œuvre en période de ralentissement économique.

La crise des dettes souveraines, les faibles perspectives de croissance et la faiblesse des multiplicateurs budgétaires estimés ont réduit le potentiel des politiques de relance axées sur la demande. Les pays de l'Union Européenne se sont alors tournés vers des réformes structurelles de leurs économies, notamment des réformes modifiant les institutions du marché du travail (IMT), dans l'objectif de maintenir la compétitivité des prix, de stimuler l'emploi et d'assurer la soutenabilité financière. Nombre de ces réformes ont été jugées prioritaires par la gouvernance économique européenne (Leonardi & Pedersini 2018). Une partie des réformes a concerné les systèmes de négociations collectives, notamment via *(i)* la réduction de la couverture des négociations collectives (par exemple, en mettant fin à l'extension obligatoire des conventions collectives aux employeurs non-affiliés, en réduisant la durée des conventions collectives et leur validité au-delà de leur expiration) ; *(ii)* la décentralisation des négociations en les rapprochant du niveau de l'entreprise (par exemple, l'abolition du principe de faveur, l'autorisation de dérogations, l'élaboration de clauses temporaires permettant de renégocier les conventions de niveau supérieur

au niveau de l'entreprise, ou simplement la suppression des niveaux de négociation intermédiaires) *(iii)* la réduction de l'influence des syndicats et leur capacité à représenter les travailleurs (par exemple, la restriction du droit de grève, le renforcement des critères de représentativité ou la limitation de la voix des syndicats dans les conseils tripartites nationaux) (Marginson 2015, Koukiadaki & Grimshaw 2016, Visser 2016).

Cependant, plusieurs éléments suggèrent qu'il pourrait ne pas être souhaitable de poursuivre ces réformes en période de récession économique. Tout d'abord, des pays qui ont aujourd'hui des systèmes de négociations collectives similaires, comme le Portugal et les Pays-Bas, présentent des performances très différentes sur le marché du travail. Cette divergence peut s'expliquer par des réformes qui ont été menées rapidement et sans grande concertation entre les partenaires sociaux au Portugal (notamment parce qu'elles étaient la contrepartie d'aides financières d'institutions supranationales), alors qu'elles ont été réalisées progressivement et en concertation constante entre les partenaires sociaux aux Pays-Bas (Hijzen et al. 2017). En particulier, les réformes entraînent une instabilité institutionnelle en matière de négociation salariale, qui peut être négative pour les performances économiques à court terme en raison des effets négatifs sur la confiance entre les acteurs de la négociation, affaiblissant, par exemple, la capacité à modérer le coût du travail (Brandl & Ibsen 2017, 2019). Quand les conditions économiques sont prises en compte, le timing des réformes semble encore plus crucial, notamment parce que les objectifs des syndicats varient au cours du cycle économique : les syndicats agissent de manière plus agressive en période de récession et ont tendance à favoriser les salaires par rapport à l'emploi à l'arrivée d'un choc économique, ce qui explique la nature contracyclique de la prime salariale syndicale (Freeman & Medoff 1984, Blanchflower & Bryson 2004, Morin 2017).

Si les effets des réformes concernant le salaire minimum, l'assurance chômage ou la protection de l'emploi sont bien documentés, ceux concernant les systèmes de négociations collectives ne le sont pas, et encore moins si l'on tient compte du timing des réformes (voir Boeri et al. (2015), Addison (2016) pour des revues récentes de la littérature). Ce chapitre cherche à combler cette lacune en exploitant les données sur les réformes des systèmes de négociations collectives implémentées par les pays de l'UE depuis 2000 pour évaluer leurs résultats en matière d'emploi, selon qu'elles ont été mises en œuvre en période de récession ou en période d'expansion. À cette fin, nous avons identifié les réformes qui ont modifié l'institution des négociations collectives dans les pays de l'Union Européenne entre 2000 et 2018 et nous les avons classé en trois catégories : modifications (1) dans la couverture des

négociations, (2) dans la centralisation des négociations et (3) dans la capacité des syndicats à représenter les travailleurs. Ensuite, nous avons évalué leurs effets sur l'emploi en recourant à des projections locales (PL) *à la* Jordà (2005) pour générer des réponses dynamiques des taux d'emploi aux réformes. Les projections locales constituent un outil de plus en plus utilisé dans la recherche macroéconomique appliquée, souvent comme alternative au modèle de vecteur autorégressif (VAR) pour obtenir l'estimation de fonctions de réponses impulsionnelles. Un grand avantage de la méthode des projections locales est qu'elle permet une estimation plus souple des fonctions de réponses impulsionnelles puisqu'elle nécessite des hypothèses moins fortes sur la dynamique des données (Barnichon & Brownlees 2019).

L'analyse empirique se concentre sur les réformes visant à accroître la flexibilité de l'institution des négociations collectives. Les résultats montrent que les réformes qui réduisent la couverture des négociations ont un effet néfaste à court terme sur le taux d'emploi agrégé et le taux de chômage, tandis que les réformes qui décentralisent les négociations au niveau de l'entreprise n'ont pas d'effet significatif. Au contraire, les réformes qui réduisent la capacité des syndicats à représenter les travailleurs ont un effet positif à court terme sur l'emploi agrégé. Les résultats mettent également en avant que le timing des réformes est crucial ; par exemple, les réductions de la couverture des négociations n'ont un effet négatif que lorsqu'elles sont mises en place en période de récession, tandis que la réduction de la capacité des syndicats à représenter les travailleurs n'est bénéfique que lorsque la réforme est mise en œuvre en dehors des périodes de récession. L'ampleur de ces effets, qu'ils soient positifs ou négatifs, sont plus importants pour les jeunes travailleurs, les travailleurs ayant un faible niveau d'éducation et les travailleurs en contrat temporaire.

Implications en termes de politique économique — Les résultats présentés dans cette thèse ont des implications de politique économique et peuvent donc contribuer à éclairer la décision politique.

Premièrement, si les décideurs politiques visent à adopter un système de négociations collectives propice à la croissance économique, il semblerait pertinent de le façonner de manière à permettre une décentralisation organisée, où les négociations sectorielles ou nationales fixent des accords qui laissent une marge de manœuvre substantielle aux négociations d'entreprise. Toutefois, lorsque cela implique de les réformer vers une plus grande flexibilité, le timing est une question importante. Lorsqu'elles sont mises en œuvre en période de ralentissement économique, elles n'ont pas les effets bénéfiques escomptés sur l'emploi et peuvent même être préjudiciables. Cela a également des implications pour la gouver-

nance économique dans l'Union Européenne, qui devrait envisager un mécanisme de "conditionnalité positive", comme le suggère Boeri & Jimeno (2016). C'est-à-dire aider les pays en détresse financière s'ils ont mis en œuvre des réformes pendant les périodes d'expansion économique, au lieu d'imposer des réformes en pleine récession en échange d'aides financières. Ce mécanisme encouragerait les gouvernements nationaux à mettre en œuvre les réformes recommandées pendant les périodes d'expansion économique.

Deuxièmement, les décideurs politiques doivent tenir compte du système de négociations collectives lors de l'élaboration de leurs politiques économiques.

Lorsqu'ils réforment d'autres institutions du marché du travail, telle que la législation sur la protection de l'emploi, les décideurs politiques devraient évaluer les interactions potentielles avec le système de négociations collectives, puisqu'elles pourraient affecter le succès des réformes. Par exemple, la taxation des licenciements pour financer l'assurance chômage afin que les employeurs internalisent le coût fiscal de leur destruction d'emplois ne doit pas s'accompagner d'un renforcement général de la rigueur de la protection de l'emploi dans les économies où la négociation collective est sectorielle et les accords étendus à tous les travailleurs, au risque de réduire les effets positifs attendus sur les flux d'emplois. Toutefois, si elle est bien conçue, la réforme parvient à encourager l'embauche (en réduisant la charge fiscale sur les salaires) tout en protégeant l'emploi.

Les banquiers centraux devraient tenir compte des systèmes de négociations collectives lors de la conception de la politique monétaire. En effet, dans les économies où les négociations salariales se déroulent à des niveaux plutôt centralisés (sectoriels et interprofessionnels), la courbe de Phillips des salaires tend à être plate lorsque le marché du travail est atone, ce qui met en évidence l'existence d'une rigidité nominale à la baisse.

Bien entendu, il s'agit de recommandations basées sur des travaux qui comportent tous leurs propres limites. Elles doivent donc être interprétées à la lumière de la littérature existante et être confirmées par des travaux futurs.

Chapter 1

Collective bargaining and wage Phillips curve

This chapter was co-authored with
Francesco De Palma, Samuel Ligonnière and Jamel Saadaoui.

Summary of the chapter

This chapter investigates the role of institutions of collective wage bargaining on the existence of non-linearities in the relationship between wage growth and unemployment - also known as the wage Phillips curve. Using regional NUTS-2 data from European countries, we show that the negative relationship between nominal wage growth and the unemployment gap becomes weaker in slack labor markets where the sectoral and/or cross-sectoral levels play an important role in collective bargaining. We highlight the sectoral bargaining as a threshold at which the wage Phillips curve becomes flat.

Classification

JEL Classification: E24, E31, E32, J50

Keywords: Phillips curve, Unemployment, Inflation, Wages, Collective bargaining

1.1 Introduction

"Does anybody doubt that if the Fed decreased unemployment rate down to 1%, it would not lead to more inflation? Phillips curve relation is complex and shifting, but it is there." This quote is from Olivier Blanchard, challenging Roger Farmer in a Twitter debate about the theoretical relevance of the Phillips curve (PC), evidencing that the latter is - once again - under the spotlight.[1] The issue motivating recent research on the PC is the following: has it disappeared? Indeed, while the negative trade-off between inflation and unemployment had already been non-existent in the 1970s following the oil crises, some empirical observations over the last decade show that the relationship between unemployment and inflation seems no longer appear in some developed countries, resulting in a so-called "flattened Phillips curve", i.e. less sensitivity of inflation to unemployment. Particularly noteworthy phenomenons were the *missing deflation* during the Great Recession (large contraction in GDP with strong increase in the unemployment rate, but only a small drop in core inflation) and the *missing inflation* during the recovery (an unemployment rate that reaches historically low levels but no high inflation).[2]

Instead of disappearing, it would rather appear that the PC is characterized by strong non-linearities (Hooper et al. 2020). Several explanations have been put forward, including the growing credibility of monetary policy that anchors inflation expectations (Bernanke 2010, Blanchard 2016, Ball & Mazumder 2019), or structural changes such as demography, involving composition effects in the workforce, e.g. baby boomers replaced by new entrants with lower wages (Daly et al. 2016, Yellen 2017), or globalization (Forbes et al. 2020). It is also possible to solve the puzzles of missing inflation or missing deflation by specifying the PC using other indicators, namely consumers' inflation expectations instead of forecasters' ones (Coibion & Gorodnichenko 2015), short-term unemployment instead of total unemployment (Ball & Mazumder 2019), or well-measured and domestically determined inflation components instead of poorly-measured and internationally determined ones (Stock & Watson 2019). Another explanation, complementary or alternative, is the existence of downward nominal wage rigidities (DNWR) that bend the PC, a point already put forward by Phillips (1958) himself.

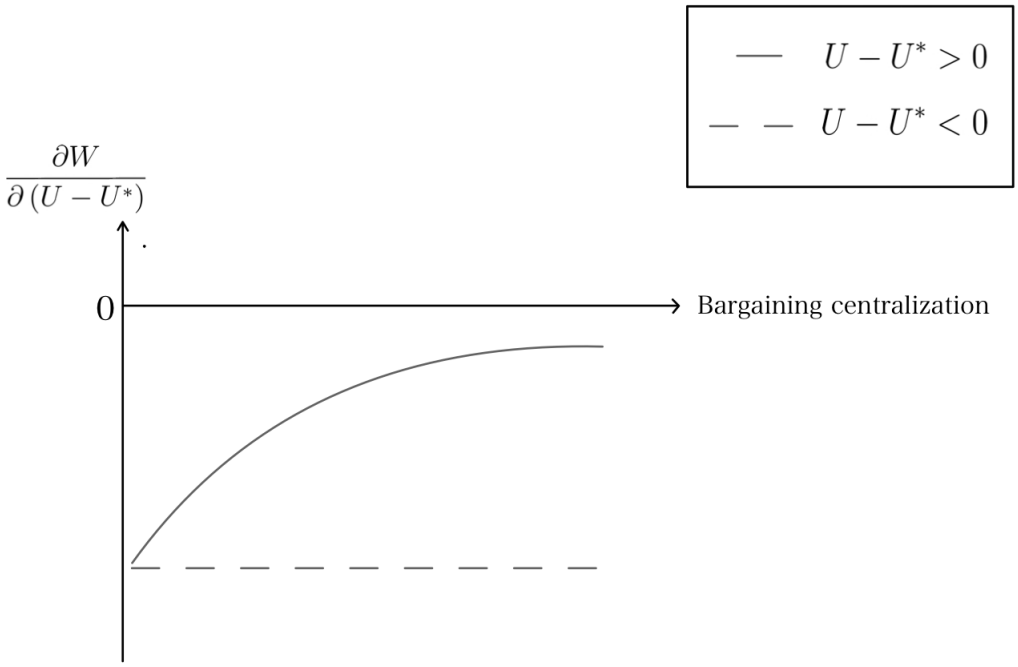
In this chapter, we propose to deepen the explanation relying on DNWR by investigating the role of wage bargaining institutions as shaping the PC slope and curvature. More precisely, we draw up three assumptions to test about the link

[1] Link: Twitter.

[2] See, e.g., Friedrich (2016) for missing deflation puzzle, and Fund (2016) for missing inflation puzzle. For a focus on euro area, see Riggi & Venditti (2015), Ciccarelli et al. (2017).

between the shape of the slope of the Phillips curve and nominal wage rigidities influenced by wage bargaining institutions : *(i)* The wage-PC is steeper in economies with fully decentralized wage bargaining; *(ii)* The wage-PC is flat in economies with multi-employer wage bargaining; *(iii)* The influence of wage bargaining institutions on the link between unemployment and wage growth is mainly observed in periods of high unemployment. Our testable assumptions are schematized in the Figure 1.1.

Figure 1.1 – A simple scheme of testable assumptions



Notes: Graph from authors. $U - U^*$ represents the unemployment gap and W the wage.

These testable relationships complement the findings of Gagnon & Collins (2019) and Forbes et al. (2020), which show that wage and price rigidities are a relevant explanation for the flattening of the PC in periods of economic slowdown and when inflation is low. Daly & Hobijn (2014) using a model of monetary policy, also present a similar result: the extent of DNWR shapes both the slope and curvature of the PC. Their simulations confirm that DNWR have shaped the dynamics of unemployment and wage growth during the past three recessions and recoveries. In this chapter, we go further by characterizing downward nominal wage rigidities through collective bargaining.

The rationale behind our testable assumptions is the following. Wage rigidities are widely recognized as a consequence of labor market institutions, in particular

collective bargaining institutions and trade unions' behavior. They could therefore be a factor shaping the wage-PC and influencing the price-PC. Stansbury & Summers (2020) highlight the decline in the bargaining power of U.S. workers relative to that of employers as an explanation for low wage growth in good labor market conditions and thus the broken relationship between unemployment and inflation. Indeed, if wage growth is slow, it may struggle to cover productivity growth, making it impossible to exert upward pressure on prices. However, regardless of country and despite a declining bargaining power, unions still generate a wage premium, i.e. the difference in wages linked to the existence of trade unions and collective agreements compared to a situation without this institutional framework (Bryson 2014). Empirical evidence reveals that the wage premium depends on the features of collective bargaining system, including the coverage of collective agreements and the level of centralization at which bargaining takes place (Gürtzgen 2009, Dahl et al. 2013). Wages are more likely to be adjusted downwards during recessions in economies where bargaining takes place closer to the company level and/or collective agreements are not automatically extended to all workers in an industry (Aidt & Tzannatos 2008, Villanueva 2015, Gnocchi et al. 2015). On the opposite, DNWR is stronger in country with high union density and centralized wage setting (Holden & Wulfsberg 2014). France is a striking example. While its labor market is characterized by "multi-employer" bargaining, i.e. employers and trade unions who set collective agreements at national or sectoral level, real wages have grown at a steady pace in a period of low price inflation started in 2013 despite the high level of unemployment (Gautier et al. 2019). On the opposite, Bulligan & Viviano (2017) argue on the basis of European data that the introduction of flexible wage schemes during the Great Recession in some countries (e.g. Italy) made the wage Phillips curve steeper.

One of the major theoretical argument lies in the counter-cyclical character of the wage premium when wages are collectively negotiated at the industry level. When a recessive shock comes, unions favor wages over employment because the marginal utility of wages remains relatively higher than the marginal utility of employment. However, once the shock has spread throughout the economy and employment has fallen and thus become scarce, the marginal utility of employment got higher and unions begin to favor employment over wages (Morin 2017).

In this chapter, we use spatial and temporal heterogeneity between the collective bargaining systems of European countries to investigate the role of wage bargaining centralization on the slope and curvature of the wage-PC. For this purpose, we merge European regional data (NUTS-2) with data describing the centralization of wage

bargaining in each country. Relying on local economic conditions (regional data) offers a large variability in the dataset and allows to observe easily the wage PC, as highlighted by Levy (2019). We exploit these data using a system GMM approach of Blundell & Bond (1998) to take into account possible endogeneity problems, particularly with respect to the dynamic specification of the wage PC. However, the aforementioned linear dynamic panel data models cannot detect the existence of threshold effects. Thus, we follow the approach of Kremer et al. (2013) to explore the existence of threshold effects in a dynamic panel data model with endogenous regressors. In this approach, we can control for the endogeneity of important control variables.

Our results show that wage growth is more sustained when wage bargaining takes place mainly at rather centralized levels, i.e. at the sectoral and/or cross-sectoral levels, compared to decentralized bargaining systems. This gap in wage growth according to the centralization of collective bargaining turns out to be stronger when the unemployment rate rises. This finding suggests that higher levels of wage bargaining centralization reduce the slope of the wage-PC when unemployment is high. This could contribute to the flattening of the PC in economies where the sectoral or national level plays an important role in wage-setting. Besides, we also find evidence showing the existence of threshold effects.We find a statistically significant threshold of bargaining centralization around a value meaning predominant sectoral bargaining with additional bargaining within companies. After this threshold, the coefficient of the wage-PC becomes non-significantly different form zero reflecting the curve's flattening.

Understanding the role played by wage bargaining institutions on the wage Phillips curve seems essential to inform decisions of central bankers. Our empirical results have economic policy implications, since they suggest that the central bank should incorporate the characteristics of collective bargaining in the labor market when designing the monetary strategy.

The chapter proceeds as follows. Section 1.2 details the data used in our empirical investigation. Section 1.3 presents the empirical methodology and main results. Section 1.4 explores the existence of threshold effects. Section 1.5 concludes.

1.2 Data

Our empirical investigation relies on a regional-level (NUTS-2) yearly dataset for 280 European regions ($N = 280$) in 30 countries over the period 1995-2019 ($T = 25$),

with gaps in observations for several regions.[3] We use regional-level data for two main reasons, which are to increase the variability in our dataset and because the (price or wage)-PC seems to be more easily observed using disaggregated data (Levy 2019, Hooper et al. 2020).

Data on the usual determinants of the Wage Phillips curve — We focus on the wage growth - i.e. the wage-PC - because price data are not available at the regional level for European regions. We construct wage growth using the annual wage per employee, which is the total compensation paid to employees divided by the number of employees. To represent labor market slack, we use the unemployment gap, which is constructed by subtracting the regional mean of the unemployment rate over the period from the actual unemployment rate.[4] This means that a growing positive unemployment gap corresponds to a deterioration in the labor market's state. We also use growth of gross value added to account for the output growth in the region and as a proxy for productivity gains. Indeed, even if the correlation between productivity growth and wage growth is not one-to-one, there is a positive and significant relationship between the two (Pasimeni 2018). We include variables representing the respective shares of industry, construction and agriculture in value added. Finally, we add two variables representing the shares of the population aged 25-64 with a low level of education (max lower secondary education) and with a medium level of education (max post-secondary) respectively. They represent a proxy for the quality of the workforce available in the region, which is a potential determinant of wage growth.

Data on the collective bargaining centralization — We consider two indicators of wage bargaining centralization (i) LEVEL, discrete measure on a 0-5 scale, which represents the predominant level where bargaining takes place in terms of workers' coverage (e.g. firm-level, sector-level, cross-sectoral-level, or mixed situation between two consecutive levels) (ii) BARGCENT, which is a composite variable taking into account the predominant level of wage bargaining and the flexibility for firm-level bargaining, if any. This flexibility captures the incidence of additional enterprise bargaining, weighted by the control of unions that signed 'higher order' agreements, the 'hierarchical ordering' of agreements, the tightness of wage norms in central and sectoral agreements, and the incidence of general and temporary opening.

The BARGCENT indicator is constructed from the variable LEVEL, and can

[3] Details of the regions by country are available in Appendix 1.6.1.

[4] We cannot use NAIRU to construct the unemployment gap since NAIRUs are not measured at the regional level.

therefore be considered a more comprehensive indicator of the centralization of negotiations, since it takes into account possible decentralization mechanisms within rather centralized systems. Indeed, in several countries, collective bargaining takes place at several levels, with a more or less strict articulation of the agreements set at each level.

These two indicators are taken from the ICTWSS database (6.1), which gathers information on institutional characteristics of trade unions, wage setting, state intervention and social pacts in 56 countries over the period 1960-2018. These indicators represent the functioning of collective bargaining at the national level and therefore are country-level data. In most countries, the rules governing collective bargaining are set at the national level. If there are regional differences in its functioning within the same country, for example because of an industry that is particularly strong in a specific region, a presence of many large firms in a specific region, or different social norms between regions, this is taken into account by the regional fixed effects as well as the variables representing the respective shares of industry, construction and agriculture in value added.

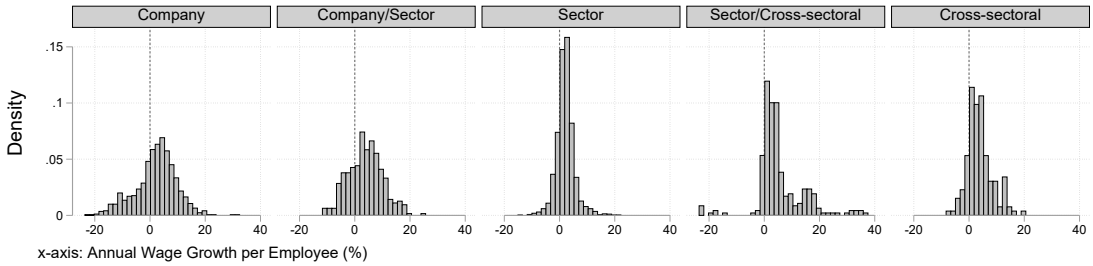
The main statistical characteristics of the variables mentioned so far are summarized in Table 1.1. Their precise description are provided in Table 1.6.

Table 1.1 – Summary statistics of variables

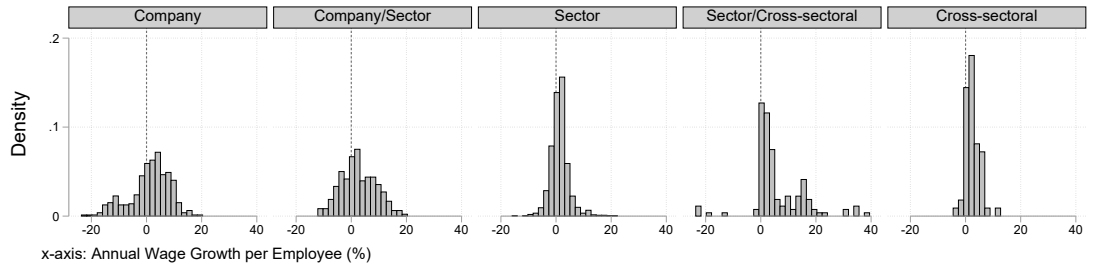
Variables	**Obs**	**Mean**	**SD**	**Min**	**Max**
Macroeconomic outcomes					
Growth of Annual Wage per Employee (%)	3 996	2.58	5.52	-23.60	37.55
Growth of Hourly Wage (%)	4 049	2.99	5.42	-19.85	51.49
Unemployment Gap (p.p.)	5,566	0.00	3.21	-14.42	14.93
Growth of Annual GVA (%)	4 486	3.44	5.76	-22.95	88.92
Share of Industry GVA in Total GVA (%)	4 526	21.76	8.73	1.67	62.61
Share of Construction GVA in Total GVA (%)	4 556	6.40	2.08	0.88	16.10
Share of Agriculture GVA in Total GVA (%)	4 546	3.14	3.27	-0.90	21.76
Share of Low-Educated Population (%)	5 315	27.39	15.31	2.40	87.70
Share of Medium-Educated Population (%)	5 315	46.88	14.75	6.90	80.30
Net Migration	5 002	4887	14837	-93666	315302
Wage bargaining institutions					
Centralization of wage bargaining (BARGCENT)	6 626	2.14	0.90	0.8	4.7
Predominant level of wage bargaining (LEVEL)	6 626	2.59	1.07	1.00	5.00
Coverage rate (%) (ADJCOV)	4 541	62.46	25.33	7.10	100.00

Figure 1.2 – Regional nominal wage growth by predominant level of bargaining, over 1995-2019

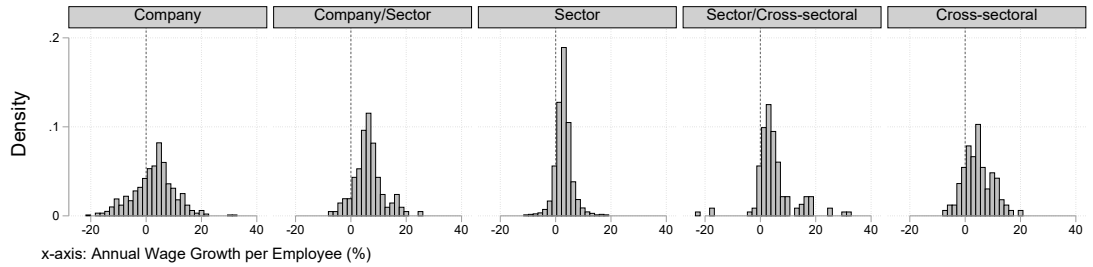
(a) Regardless sign of Unemployment Gap



(b) Positive Unemployment Gap



(c) Negative Unemployment Gap



Notes: (a) distribution of wage growth regardless the sign of the unemployment gap; (b) distribution of wage growth for positive unemployment gap ($u > u^*$); (c) distribution of wage growth for negative unemployment gap ($u < u^*$). For details about the Predominant Level of Bargaining, see Table 1.6.

Figure 1.2 shows the distribution of nominal wage growth (regional level) according to the predominant level where bargaining takes place. Fig. 1.2a does not consider a special case for the unemployment gap, Fig. 1.2b a positive unemployment gap (slack labor market), and Fig. 1.2c a negative unemployment gap (tight labor market). It shows that wage growth is more concentrated around 0 and above when negotiations take place at rather centralized levels (sector and above), as opposed to decentralized levels, where the distribution is more spread out. This difference seems to be most noticeable in the case of a positive unemployment gap, i.e. a rather slack labor market. Indeed, in the case of a negative unemployment gap (a rather tight labor market), wage growth is mainly distributed over the positive

domain for all predominant levels of bargaining.[5]

1.3 Empirical investigation

1.3.1 Baseline specification and methodology

We investigate the link between the shape and curvature of the wage-PC and collective wage bargaining institutions. For the baseline specification, we follow the standard specification in the literature, adjusted by taking into account the regional nature of our data and their limitations (see Levy (2019)). Our baseline specification is as follows:

$$\Pi^{W}_{i,c,t} = \alpha\,\Pi^{W}_{i,c,t-1} + \beta\,UGap_{i,c,t} + \theta\,Cent_{c,t} + \lambda\,[UGap_{i,c,t} \times Cent_{c,t}] + \gamma\,X^{'}_{i,c,t} + \mu_{i,c} + \nu_{t} + \epsilon_{i,c,t} \tag{1.1}$$

We include the unemployment gap via $UGap_{i,c,t}$ and wage inflation expectations via $\Pi^{W}_{i,c,t-1}$. By using the lagged wage inflation as a proxy for expectations, we follow the assumption of adaptative expectations, i.e. assuming that expectations are backward looking. To follow the theoretical framework of New Keynesian, we should add rational expectations, e.g. by adding the forward term of wage inflation. However, as suggested by Levy (2019), this specification may be subject to error bias. In addition, the evolution of wages seems to follow past inflation, as shown by Gautier et al. (2019) for the national minimum wage and industry-level minimum wages in France.[6] The lagged wage inflation also captures persistence in wage dynamics as highlighted by Galí (2011), e.g., staggered-contract models. $Cent_{c,t}$ is either the categorical variable LEVEL or the variable BARGCENT, both representing the centralization of wage bargaining. $X_{i,c,t}$ corresponds to a vector of control variables, including those described in Section 1.2, and a dummy representing eurozone membership (1 if the region belongs to eurozone, = 0 otherwise). $\mu_{i,c}$ represents the region-specific fixed effects, capturing all time-invariant region characteristics. ν_t are year dummies, to control for time effects common to all regions, as well as to deal with potential non-stationary issues and to avoid correlation across individuals in the idiosyncratic disturbances (Bond et al. 2001, Roodman 2009*a*). Finally, $\epsilon_{i,c,t}$ is the idiosyncratic error.

[5] We present the same exercise in Figure 1.4, but using the deviation of regional annual wage growth from the regional average to correct for any region-specific structural characteristics. The picture leads to the same interpretation.

[6] Since we do not have price data at the regional level, we use the lag of wage inflation.

Our coefficients of interest are β and λ, which are respectively the wage-PC's slope and the the influence of bargaining centralization on wage growth according to the unemployment gap. We rely on λ to test conditional effects of the collective bargaining centralization on the contribution of the unemployment gap to the wage growth: significant interaction means that the effect of the unemployment gap is different for different values of the bargaining centralization.

As the conditional effect of the unemployment gap on wage growth may be significant for only some values of bargaining centralization, we cannot infer simply by looking at the magnitude and significance of β or λ. Instead, we should examine the conditional effect based on the marginal effect at every observed value of the bargaining centralization (Brambor et al. 2006). Thus, we also present conditional effects with margins plot.

We first run fixed effects regression model. Then, we derive estimates of coefficient using the standard system generalized method of moments (system GMM) approach of Blundell & Bond (1998). This approach has the advantage of taking into account the dynamic specification of the wage-PC equation, i.e. it deals with the lagged wage growth that is correlated with the error term. It also takes into account other potential endogenous covariates among right-hand variables (correlated with past and possibly current realisations of the error), as well as issues of omitted variables, error measurement, and unobserved heterogeneity via fixed individual effects. For instance, there could be a problem of endogeneity of the variable representing the collective bargaining system due to the monetary policy regime, because unions can exploit the central bank's non-accommodating behaviour (inflation aversion) to reduce unemployment by moderating their wage claims (Soskice & Iversen 2000). Or unions more "wage-oriented" could bargain for higher nominal wages to maximize real wages when the central bank attaches great importance to inflation stabilization (Skott 1997). The system GMM mitigates endogeneity and isolate causal effects using a system of equations in first differences and in levels, exploiting lags of the regressors as internal instruments. The endogenous variables are instrumented by their lags in level in the first difference equation, and by their lags in first difference in the level equation. The argument is that first difference lags of endogenous variables are unlikely correlated with the contemporaneous value of the dependent variable in level, just as lags in level of endogenous variables are unlikely correlated with the contemporaneous value of the dependent variable in first difference. Finally, the system GMM is designed for situations with a small time dimension (T) and many individual units (N), as in our panel ($N = 280$, $T = 25$).

Using the GMM approach goes with issues of instruments proliferation and serial

autocorrelation of errors. Instruments may become too numerous and create overidentification in the model because they are used in differences and levels and their number grows quadratically with T. Therefore, as advised by Roodman (2009*a*,*b*), we collapse instrument matrix and limit the number of lags used. These potential issues imply a diagnosis of the GMM estimates, by checking the Hansen test of overidentification and the Arellano and Bond test of autocorrelation.

1.3.2 Results

Table 1.2 – Estimates of baseline specification and non-linearities

	(1)		(2)		(3)		(4)	
	Fixed-Effects Linear		sGMM Linear		sGMM Quadratic		sGMM Concave	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Lagged Wage Inflation	-0.048**	[0.018]	-0.021	[0.020]	-0.022	[0.020]	-0.017	[0.020]
Unemployment Gap	-0.115***	[0.042]	-0.100*	[0.051]	-0.083	[0.054]		
Growth of Annual GVA	0.735***	[0.057]	0.700***	[0.059]	0.699***	[0.059]	0.702***	[0.058]
Share Industry in GVA	-0.433***	[0.041]	-0.260***	[0.053]	-0.260***	[0.053]	-0.258***	[0.053]
Share Construction in GVA	-0.173**	[0.082]	0.107	[0.134]	0.113	[0.137]	0.075	[0.132]
Share Agriculture in GVA	-0.183*	[0.099]	0.356***	[0.091]	0.367***	[0.090]	0.359***	[0.091]
Share of low-educated	0.186***	[0.041]	0.021	[0.025]	0.021	[0.025]	0.017	[0.026]
Share of medium-educated	0.090***	[0.028]	0.129***	[0.028]	0.127***	[0.028]	0.124***	[0.028]
Eurozone	0.026	[0.705]	0.199	[0.314]	0.245	[0.314]	0.170	[0.310]
Unemployment Gap (U^2)					-0.006	[0.008]		
Unemployment Gap ((U-U*)/U)							-1.156***	[0.436]
Intercept	2.722	[2.375]	0.000	[0.000]	0.060	[1.903]	-1.104	[1.660]
Observations	3 672		3 672		3 672		3 672	
R-squared	0.577		0.517		0.518		0.520	
Year FE	YES		YES		YES		YES	
Region FE	YES		YES		YES		YES	
Number of Regions	250		250		250		250	
Number of Instruments			246		246		246	
AR(1) (p-value)			0.000		0.000		0.000	
AR(2) (p-value)			0.089		0.093		0.075	
Hansen test (p-value)			0.113		0.111		0.115	

Notes: Dependent variable is growth of annual wage per employee (in %). Columns (3)-(4) reports coefficients from system GMM estimation, with all explanatory variables considered predetermined except for year dummies, eurozone dummy and shares of low and medium educated people.
Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 1.2 presents the estimates without taking into account the bargaining centralization.

Columns (1) and (2) report the coefficients of our estimates respectively with the fixed effects panel and the system GMM, to compare the magnitude of possible biases related to endogeneity. Columns (3) and (4) present estimates of regressions considering a quadratic and a concave function of the unemployment gap, respectively the term squared of unemployment gap and unemployment gap divided by the unemployment. The coefficient associated with the concave function of the unemployment gap is significant and thus suggest the existence of non-linearities in the slope of the wage Phillips curve.

The last three rows of Table 1.2 report *p-values* of the usual tests for GMM diagnostic. First, *p-values* of the first and second-order serial autocorrelation tests suggest that error terms are not serially correlated, since we can undoubtedly reject the null of AR(1) residuals while we cannot reject the null of AR(2). Second, the *p-value* associated with Hansen's J-statistic to test for over-identifying restrictions does not reject our choice of instruments, giving support for our instrumentation strategy.

Table 1.3 presents the estimates with the bargaining centralization variables and their interaction with the unemployment gap.

Column (1) shows that when wage bargaining takes place predominantly at the sectoral and cross-sectoral levels, wage growth is stronger relative to systems where bargaining takes place predominantly within the firm. Column (2) presents interaction coefficients between the unemployment gap and each of the possible predominant level of wage bargaining. The positive coefficients indicate that a higher level of centralization (at the sectoral and cross-sectoral levels) lowers the relationship between nominal wage growth and unemployment gap - i.e. the wage-PC's slope. Specifically, the difference in slope between the centralized level (sector and above) versus the decentralized level (firm) appears for positive unemployment gaps, as shown Figure 1.3. In other words, the wage Phillips curve flattens out from a positive unemployment gap (slack labor market) in regions where bargaining is rather centralized.

Columns (3) and (4) include the composite variable BARGCENT instead of the categorical variable LEVEL to obtain estimates from a more comprehensive measure of bargaining centralization.[7] A higher level of centralization is significantly associated with higher nominal wage growth. The interaction coefficient is positive and significant, confirming that a more centralized level of wage bargaining reduces the slope of the wage PC.

[7] As detailed in Section 1.2, BARGCENT takes into account possible decentralization mechanisms in addition to the predominant level of negotiation.

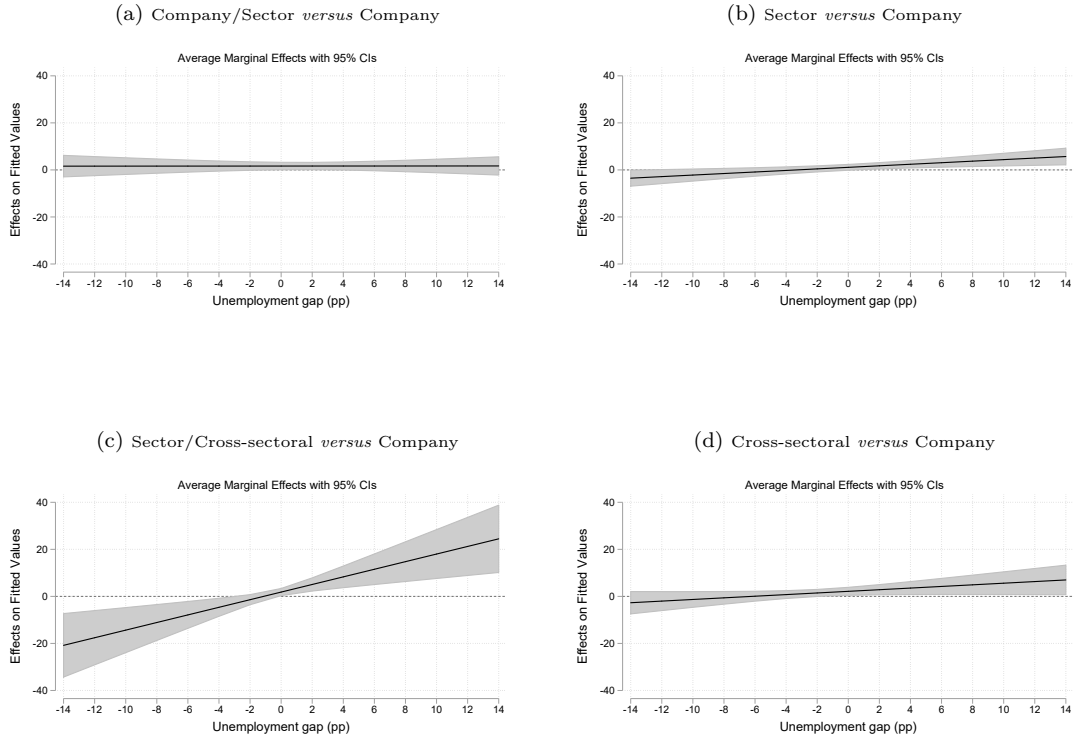
In sum, our empirical evidence support our testable assumptions: for low or moderate levels of unemployment, the level of centralization of bargaining does not influence the slope of the wage PC, but the curve flattens when unemployment becomes high in systems where the collective bargaining system is rather centralized because wages are less likely to adjust downwards.

Table 1.3 – Effects of bargaining centralization on the Wage-PC's slope

	(1)		(2)		(2)		(4)	
	LEVEL		LEVEL x UGap		BARGCENT		BARGCENT x UGap	
	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
Unemployment Gap	-0.103*	[0.053]	-0.361***	[0.117]	-0.095*	[0.053]	-0.456***	[0.107]
Measure 1 - LEVEL								
Predominant level of bargaining is								
2. Sector/Company	0.949	[0.719]	1.649**	[0.808]				
3. Sector	1.551**	[0.609]	1.098*	[0.632]				
4. Sector/Cross-Sectoral	2.209***	[0.738]	1.834**	[0.778]				
5. Cross-Sectoral	2.424***	[0.700]	2.155**	[0.868]				
Interacted with Unemployment Gap								
2. Sector/Company			0.003	[0.143]				
3. Sector			0.329***	[0.118]				
4. Sector/Cross-Sectoral			1.617***	[0.504]				
5. Cross-Sectoral			0.346*	[0.193]				
Measure 2 - BARGCENT								
Centralization of Wage Bargaining					0.829***	[0.203]	0.823***	[0.207]
Interacted with Unemployment Gap							0.174***	[0.048]
Other Control Variables	YES		YES		YES		YES	
Intercept	0.000	[0.000]	-0.208	[2.094]	0.000	[0.000]	0.000	[0.000]
Observations	3 660		3 660		3 660		3 660	
R-squared	0.519		0.514		0.522		0.514	
Year FE	YES		YES		YES		YES	
Region FE	YES		YES		YES		YES	
Number of Regions	249		249		249		249	
Number of Instruments	289		289		257		257	
AR(1) (p-value)	0.000		0.000		0.000		0.000	
AR(2) (p-value)	0.146		0.130		0.0947		0.159	
Hansen test (p-value)	0.670		0.633		0.163		0.168	

Notes: Dependent variable is growth of annual wage per employee (in %). Coefficients of control variables are not reported. All columns reports coefficients from system GMM estimation, with all explanatory variables considered predetermined except for year dummies, eurozone dummy and shares of low and medium educated people. Test of joint significance of sets of interactions of indicator variables in column (2) reports a p-value of 0.0005, meaning that the overall interaction is statistically significant.
Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 1.3 – Difference in wage PC's slope:
according to the predominant level of bargaining and the unemployment gap



Notes: Each graph compares a predominant level of bargaining relative to the reference level (company level) on its influence on the slope of the wage PC, according to the unemployment gap.
Interpretation: if the confidence interval includes 0 on the y-axis, it means that there is no significant difference in the slope of the wage PC between the predominant bargaining level considered and the reference level (company level). If the confidence interval is above 0 on the y-axis, the slope of the wage PC is less steep; if it is below, it is steeper.

We present three alternative specifications as robustness checks in Table 1.7. Our main result is robust to these three alternative specifications.

In column (1) we add two additional control variables, which are the long-term unemployment rate (> 12 months) and the net migration towards the region. We include long-term unemployment to control for possible hysteresis effects (Blanchard & Summers 1986, Ball 2009, Blanchard 2018), which would affect the evolution of the unemployment gap and wage growth, since the long-term unemployed have lower employability. Concerning net migration, we include it to control for its possible effects on the available labor force and ultimately on wages of native workers and foreign workers (Brücker et al. 2008, Ottaviano & Peri 2012).

In column (2) we present estimates using the detrended growth of the regional gross value added to focus on the cyclical evolution of the regional output[8].

Finally, in column (3) we follow Levy (2019) by relying on the growth of the hourly wage as an alternative measure for wage growth. Indeed, the average annual

[8]We use the Christiano-Fitzgerald filter (Christiano & Fitzgerald 2003).

wage per employee that we use in the baseline specification may be over- or underestimated due to workforce composition effects: in times of recession, job retention plans (e.g. through more part-time work) can provide a biased picture of the number of employees that we use to divide the total compensation and obtain the average wage per employee, leading to an underestimated value for the latter.

1.4 Testing for threshold effects

In this section we deepen the analysis of the role of collective bargaining in the slope of the wage-PC by investigating the existence of a threshold of the level of centralization at which the slope would become flat.

We follow the approach of Kremer et al. (2013). In their approach, they combine the panel threshold model of Hansen (1999) and the instrumental variable estimation of the cross-sectional model introduced by Caner & Hansen (2004) thanks to the application of the forward orthogonal deviations transformation suggested by Arellano & Bover (1995). This approach has several advantages. Firstly, we can estimate threshold values rather than impose them as underlined by Hansen (1999). Secondly, we can use a dynamic panel data model where endogeneity of important control variables is no longer an issue. Finally, by eliminating the fixed effects thanks to forward orthogonal deviations, this approach ensures that the error terms remain uncorrelated.

Thus, we follow Kremer et al. (2013) to investigate the possibility of threshold effects in the relationship between the unemployment gap and nominal wage growth. To this aim, we consider the following panel threshold model:

$$\Pi^{W}_{i,c,t} = \mu_i + \chi\Pi^{W}_{i,c,t-1} + \beta_1 Ugap_{i,c,t} I(Cent_{c,t} \leq \gamma) + \beta_2 Ugap_{i,c,t} I(Cent_{c,t} > \gamma) + \alpha_1 X_{i,c,t} + \varepsilon_{i,c,t} \tag{1.2}$$

where subscripts $i = 1, ..., n$ represents the region and $t = 1, ..., T$ index the time. μ_i is the region-specific fixed effect, and the error term is ε_{it}. $\Pi^{W}_{i,c,t}$, is the annual wage growth and $I(.)$ is an indicator function indicating the regime defined by the threshold variable, $Cent$, the bargaining centralization (BARGCENT) or the bargaining coverage (ADJCOV)[9].The bargaining coverage is generally high in countries where sectoral agreements are extended to all the employees in an industry. These extensions introduce wage rigidities (Villanueva 2015). The independent regime con-

[9]The threshold variable must be continuous. Therefore, we cannot use LEVEL as in Section 1.3.

trol variables, X include those described in Section 1.2, and a dummy representing eurozone membership (1 if the region belongs to eurozone, = 0 otherwise).

The dynamic version of the model[10] in equation (1.2) is estimated in three steps:

1. In the first step, we estimate a reduced form of the endogenous variable, $\Pi^{W}_{i,c,t-1}$, as a function of the instruments on a set of regressors restricted to 1 lag since instruments[11] can overfit instrumented variables as shown by Roodman (2009*b*). The endogenous variable, $\Pi^{W}_{i,c,t-1}$, is then replaced in the structural equation by the predicted values, $\hat{\Pi^{W}}_{i,c,t-1}$.

2. In the second step, equation (1.2) is estimated through least squares for a fixed threshold γ where, Π^{W}, replaced by its predicted values from the first step regression. We can denote the resulting sum of squares as $S(\gamma)$. This step is repeated for a strict subset of the support of the threshold variable, $Cent$.

3. In the third step, the estimator of threshold value is selected as the one with the smallest sum of squared residuals, i.e., $\hat{\gamma} = \underset{\gamma}{\operatorname{argmin}}\, S_n(\gamma)$. In accordance with Hansen (1999) and Caner & Hansen (2004), the critical values for determining the 95% confidence interval of the threshold value is given by,

$$\Gamma = \{\gamma \,:\, LR(\gamma) \geq C(\alpha)\}$$

where $C(\alpha)$ is the 95% percentile of the asymptotic distribution of the likelihood ratio statistic $LR(\gamma)$. Once $\hat{\gamma}$ is determined, the slope of the coefficients can be estimated by the GMM for the previously used instruments and the previously estimated threshold $\hat{\gamma}$.

[10] Note that the differences are forward-orthogonal deviations.
[11] Which can be $\Pi^{W}_{i,c,t-2}$ to $\Pi^{W}_{i,c,t-P}$ with $p = T - 1$.

Table 1.4 – Dynamic threshold panel regression estimation

	(1) BARGCENT		(2) ADJCOV	
Estimated threshold	2.2		66.8	
95% Confidence Interval	[2.2; 2.4]		[64.9; 68.1]	
Impact of Unemployment Gap				
Below threshold (β_1)	-0.662**	[0.273]	-0.794***	[0.204]
Above threshold (β_2)	0.2300	[0.232]	0.0115	[0.148]
Other control variables	YES		YES	
Year FE	YES		YES	
Region FE	YES		YES	
Observations	3 660		2 946	
Observations above threshold	1 432		1 343	
Number of Regions	249		249	

Notes: Dependent variable is growth of annual wage per employee (in %). Coefficients of control variables are not reported. All explanatory variables considered predetermined except for year dummies, eurozone dummy and shares of low and medium educated people.
Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

As reported in Table 1.4, we identify a threshold of 2.2 when considering the bargaining centralization (BARGCENT). Below this threshold, the wage PC's slope is negative and significant. After this threshold, the wage PC's slope is no longer significantly different from 0, i.e. the wage PC is flat. Although the value 2.2 for BARGCENT has no direct economic interpretation, it corresponds in many cases to a system of collective bargaining with a predominant level at the sectoral level and the possibility of additional negotiations at the company level.

We also find a threshold when considering the coverage rate of workers (ADJCOV). The threshold is at 66.8 %, above which the Phillips curve becomes flat.

1.5 Conclusion

In this chapter, we propose an alternative, or complementary, explanation in the academic debate on the flattening of the Phillips curve. We investigate the role of collective bargaining on the link between the unemployment gap and nominal wage growth, i.e., the wage Phillips curve.

Using European regional data merged with indicators of the centralization of collective bargaining, we study the conditional effect of the unemployment gap on nominal wage growth according to the level of centralization. We also identify the existence of a threshold in the centralization of bargaining at which the wage Phillips curve becomes flat. Overall, our results suggest that the wage Phillips curve flattens in slack labor markets where the sectoral and/or cross-sectoral levels play an important role in collective bargaining.

These results suggest that monetary authorities should consider the characteristics of collective bargaining when designing monetary policy.

1.6 Appendices

1.6.1 Additional data information

Table 1.5 – NUTS-2 regions in our panel

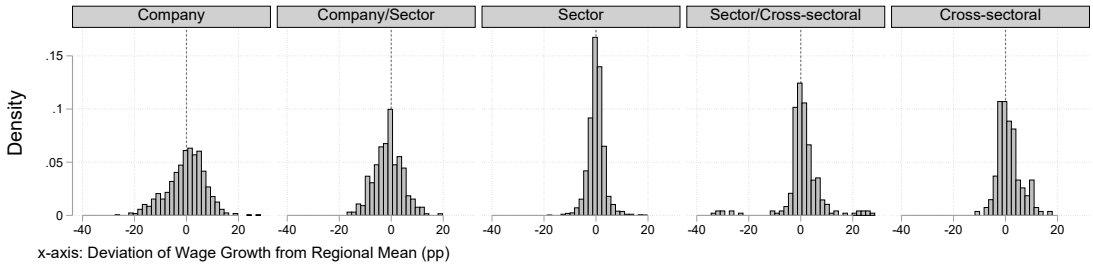
Country	Regions
Austria	Burgenland, Kärnten, Niederösterreich, Oberösterreich, Salzburg, Steiermark, Tirol, Vorarlberg, Wien
Belgium	Prov. Antwerpen, Prov. Brabant wallon, Prov. Hainaut, Prov. Limburg, Prov. Liège, Prov. Luxembourg, Prov. Namur, Prov. Oost-Vlaanderen, Prov. Vlaams-Brabant, Prov. West-Vlaanderen, Region de Bruxelles-Capitale
Bulgaria	Severen tsentralen, Severoiztochen, Severozapaden, Yugoiztochen, Yugozapaden, Yuzhen tsentralen
Croatia	Jadranska Hrvatska, Kontinentalna Hrvatska
Cyprus	Kypros
Czech Republic	Jihovychod, Jihozapad, Moravskoslezsko, Praha, Severovychod, Severozapad, Stredni Cechy, Stredni Morava
Denmark	Hovedstaden, Midtjylland, Nordjylland, Sjaelland, Syddanmark
Estonia	Eesti
Finland	Etela-Suomi, Helsinki-Uusimaa, Länsi-Suomi, Pohjois- ja Itä-Suomi
France	Alsace, Aquitaine, Auvergne, Basse-Normandie, Bourgogne, Bretagne, Centre - Val de Loire, Champagne-Ardenne, Corse, Franche-Comté, Guadeloupe, Guyane, Haute-Normandie, La Réunion, Languedoc-Roussillon, Limousin, Lorraine, Martinique, Mayotte, Midi-Pyrénées, Nord-Pas-de-Calais, Pays-de-la-Loire, Picardie, Poitou-Charentes, Provence-Alpes-Côte d'Azur, Rhône-Alpes, Ile de France
Germany	Arnsberg, Berlin, Brandenburg, Braunschweig, Bremen, Chemnitz, Darmstadt, Detmold, Dresden, Dusseldorf, Freiburg, Giessen, Hamburg, Hannover, Karlsruhe, Kassel, Koblenz, Koln, Leipzig, Lüneburg, Mecklenburg-Vorpommern, Mittelfranken Munster, Niederbayern, Oberbayern, Oberfranken, Oberpfalz, Rheinhessen-Pfalz, Saarland, Sachsen-Anhalt, Schleswig-Holstein, Schwaben, Stuttgart, Thûringen, Trier, Tûbingen, Unterfranken, Weser-Ems
Greece	Anatoliki Makedonia. Thraki, Attiki, Dytiki Ellada, Dytiki Makedonia, Ionia Nisia, Ipeiros, Kentriki Makedonia, Kriti, Notio Aigaio, Peloponnisos, Sterea Ellada, Thessalia, Voreio Aigaio
Hungary	Dél-Alföld, Dél-Dunantul, Közép-Dunantul, Közép-Magyarorszag, Nyugat-Dunanntul, Eszak-Alföld, Eszak-Magyarorszag
Ireland	Eastern and Midland, Northern and Western, Southern
Italy	Abruzzo, Basilicata, Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Liguria, Lombardia, Marche, Molise, Piemonte, Provincia Autonoma di Bolzano, Provincia Autonoma di Trento, Puglia, Sardegna, Sicilia, Toscana, Umbria, Valle d'Aosta, Veneto
Latvia	Latvija
Lithuania	Lietuva
Luxembourg	Luxembourg
Malta	Malta
Netherlands	Drenthe, Flevoland, Friesland, Gelderland, Groningen, Limburg, Noord-Brabant, Noord-Holland, Overijssel, Utrecht, Zeeland, Zuid-Holland
North Macedonia	Severna Makedonija
Norway	Agder og Rogaland, Hedmark og Oppland, Nord-Norge, Oslo og Akershus, Sor-Ostlandet, Trondelag, Vestlandet
Poland	Dolnoslaskie, Kujawsko-Pomorskie, Lubelskie, Lubuskie, Lódzkie, Malopolskie, Mazowiecki regionalny, Opolskie, Podkarpackie, Podlaskie, Pomorskie, Slaskie, Swietokrzyskie, Warminsko-Mazurskie, Warszawski stoleczny, Wielkopolskie, Zachodniopomorskie
Portugal	Alentejo, Algarve, Centro, Norte, Regiao Autonoma da Madeira, Regiao Autonoma dos Acores, Area Metropolitana de Lisboa
Romania	Bucuresti - Ilfov, Centru, Nord-Est, Nord-Vest, Sud - Muntenia, Sud-Est, Sud-Vest Oltenia, Vest
Slovakia	Bratislavsky Kraj, Stredno Slovensko, Vychodné Slovensko, Zapadné Slovensko
Slovenia	Vzhodna Slovenija, Zahodna Slovenija
Spain	Andalucia, Aragon, Canarias, Cantabria, Castilla y Leon, Castilla-la Mancha, Catalunia, Ciudad Autonoma de Ceuta, Ciudad Autonoma de Melilla, Comunidad Foral de Navarra, Comunidad Valenciana, Comunidad de Madrid, Extremadura, Galicia, Illes Balears, La Rioja, Pais Vasco, Principado de Asturias, Region de Murcia
Sweden	Mellersta Norrland, Norra Mellansverige, Smaland med oarna, Stockholm, Sydsverige, Västsverige, Ostra Mellansverige, Ovre Norrland
United Kingdom	Bedfordshire and Hertfordshire, Berkshire. Buckinghamshire and Oxfordshire, Cheshire, Cornwall and Isles of Scilly, Cumbria, Derbyshire and Nottinghamshire, Devon, Dorset and Somerset, East Anglia, East Wales, East Yorkshire and Northern Lincolnshire, Eastern Scotland, Essex, Gloucestershire. Wiltshire and Bristol/Bath area, Greater Manchester, Hampshire and Isle of Wight, Herefordshire. Worcestershire and Warwickshire, Highlands and Islands, Inner London, Kent, Lancashire, Leicestershire. Rutland and Northamptonshire, Lincolnshire, Merseyside, North Eastern Scotland, North Yorkshire, Northern Ireland, Northumberland and Tyne and Wear, Outer London, Shropshire and Staffordshire, South Yorkshire, Southern Scotland, Surrey. East and West Sussex, Tees Valley and Durham, West Central, Scotland, West Midlands, West Wales and The Valleys, West Yorkshire

Table 1.6 – Description of variables

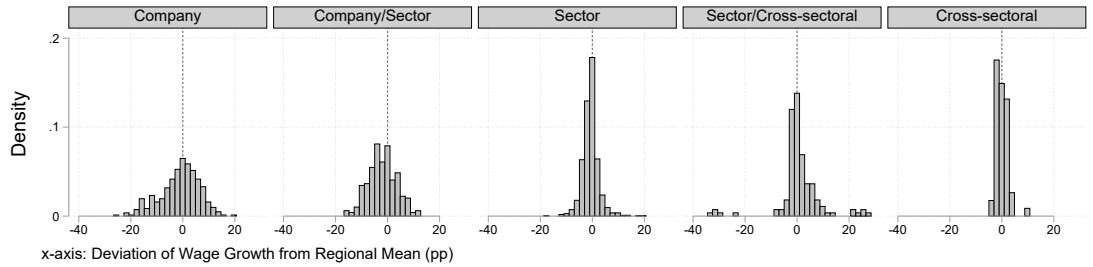
Variable name	Data-Level	Detailed description	Source
Annual Wage per Employee	Regional (NUTS-2)	Compensation of employees divided by the number of employees (15-74 years old), in in thousand euros. (all economic activities included, NACE Rev. 2)	Authors' calculations from Eurostat data
Hourly Wage	Regional (NUTS-2)	Compensation of employees divided by the number of hours worked (employed persons), in thousand euros. (all economic activities included, NACE Rev. 2)	Authors' calculations from Eurostat data
Growth of Annual Wage per Employee	Regional (NUTS-2)	Annual variation of wage per employee, in %. (computed from variable annual wage per employee)	Authors' calculations from Eurostat data
Growth of Hourly Wage	Regional (NUTS-2)	Annual variation of wage per hour worked, in %. (computed from variable annual wage per hour worked)	Authors' calculations from Eurostat data
Unemployment Rate	Regional (NUTS-2)	Total unemployment rate, considering the labor force from 15 to 74 years old, in %.	Eurostat
Unemployment Gap	Regional (NUTS-2)	Unemployment rate - Mean of Unemployment rate (calculated over the available time span). We consider the Mean of Unemployment rate as a proxy for structural unemployment rate.	Authors' calculations from Eurostat data
Growth of Annual GVA	Regional (NUTS-2)	Annual variation of gross value added, in %. (all economic activities included, NACE Rev. 2).	Authors' calculations from Eurostat data
Share of Industry GVA in Total GVA	Regional (NUTS-2)	Industry GVA/Total GVA. Total GVA corresponds to gross value added, all economic activities included, NACE Rev. 2.	Authors' calculations from Eurostat data
Share of Construction GVA in Total GVA	Regional (NUTS-2)	Construction GVA/Total GVA. Total GVA corresponds to gross value added, all economic activities included, NACE Rev. 2.	Authors' calculations from Eurostat data
Share of Agriculture GVA in Total GVA	Regional (NUTS-2)	Agriculture GVA/Total GVA. Total GVA corresponds to gross value added, all economic activities included, NACE Rev. 2.	Authors' calculations from Eurostat data
Long-term Unemployment Rate	Regional (NUTS-2)	Long-term unemployment (12 months or more) in % of total unemployed	Authors' calculations from Eurostat data
Share of Low-Educated Population	Regional (NUTS-2)	Share of 25-64 year olds which achieved a low-level of education, i.e. either early childhood education, or primary education, or lower secondary education (following the International Standard Classification of Education, 2011).	Eurostat
Share of Medium-Educated Population	Regional (NUTS-2)	Share of 25-64 year olds which achieved a medium-level of education, i.e. either upper secondary education, or post-secondary non tertiary-education (following the International Standard Classification of Education, 2011).	Eurostat
Net Migration	Regional (NUTS-2)	Net Migration towards regions, in number of people	Authors' calculations from Eurostat data
Predominant level of wage bargaining (LEVEL)	National (Country)	The predominant level at which wage bargaining takes place in terms of coverage. A level is 'predominant' if it accounts for at least two-thirds of the total bargaining coverage rate in a given year. 5 = bargaining predominantly takes place at central or cross-sectoral level negotiated at lower levels; 4 = intermediate or alternating between central and sectoral bargaining; 3 = bargaining predominantly takes place at the sector level; 2 = intermediate or alternating between sector and company bargaining; 1 = bargaining predominantly takes place at the local or company level.	ICTWSS
Centralization of wage bargaining (BARGCENT)	National (Country)	The centralization of wage bargaining is a composite variable taking into account the predominant level of wage bargaining and the flexibility for firm-level bargaining. This flexibility captures the incidence of additional enterprise bargaining, weighted by the control of unions that signed 'higher order' agreements, the 'hierarchical ordering' of agreements, the tightness of wage norms in central and sectoral agreements, and the incidence of general and temporary opening clauses. A higher value of this indicator means more flexibility for firm bargaining.	ICTWSS
Bargaining Coverage (ADJCOV)	National (Country)	employees covered by valid collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargaining, in %.	ICTWSS

Figure 1.4 – Deviation (from regional mean) of regional nominal wage growth by predominant level of bargaining, over 1995-2019

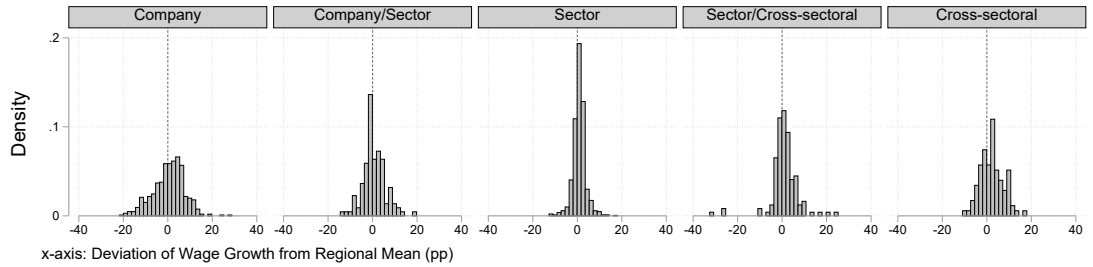
(a) Regardless sign of Unemployment Gap



(b) Positive Unemployment Gap



(c) Negative Unemployment Gap



Notes: (a) distribution of wage growth deviation form regional mean regardless the sign of the unemployment gap; (b) distribution of wage growth deviation form regional mean for positive unemployment gap ($u > u^*$); (c) distribution of wage growth deviation form regional mean for negative unemployment gap ($u < u^*$). For details about the Predominant Level of Bargaining, see Table 1.6.

1.6.2 Robustness

Table 1.7 – Robustness results

	(1)		(2)		(3)	
	Additional controls		Filtered GVA growth		Hourly Wage	
	Coef.	SE	Coef.	SE	Coef.	SE
Unemployment Gap	-0.392***	[0.116]	-0.623***	[0.136]	-0.349**	[0.141]
Centralization of Wage Bargaining	0.730***	[0.199]	1.042***	[0.199]	0.825***	[0.210]
Interacted with Unemployment Gap	0.169***	[0.048]	0.168***	[0.063]	0.134*	[0.074]
Other Control Variables	YES		YES		YES	
Intercept	0.000	[0.000]	0.000	[0.000]	-2.798	[1.785]
Observations	3 277		3 660		3 585	
R-squared	0.492		0.215		0.530	
Year FE	YES		YES		YES	
Region FE	YES		YES		YES	
Number of Regions	245		249		228	
Number of Instruments	279		257		280	
AR(1) (p-value)	0.000		0.000		0.000	
AR(2) (p-value)	0.279		0.039		0.390	
Hansen test (p-value)	0.679		0.129		0.861	

Notes: In columns (1) and (2), dependent variable is growth of annual wage per employee (in %). In column 3, dependent variable is growth of hourly wage. Coefficients of control variables are not reported. All columns reports coefficients from system GMM estimation, with all explanatory variables considered predetermined except for year dummies, eurozone dummy and shares of low and medium educated people.
Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 2

Collective bargaining and interactions with employment protection

This chapter was co-authored with
Francesco De Palma.

Summary of the chapter

Policy advisers repeatedly call on Western European countries to reform their employment protection legislation (EPL) by switching to a layoff tax model of unemployment insurance (UI) funding. This new design, partly based on the existing "experience-rating" (ER) system in the U.S., should induce firms to internalize layoff fiscal costs and hence reduce unemployment. However, its success remains uncertain in economies with a collective wage-setting system, as do those of many Western European countries. Using a matching model with endogenous job destruction, we provide an ex-ante evaluation of this policy reform's effects on labor market outcomes and aggregate welfare in firm-level and sector-level bargaining economies. Our numerical analyses yield two main results. First, compared to simply increasing firing/dismissal costs, implementing an ER system improves labor market outcomes in both types of economies. Second, the design of the reform has to be adapted to the level of wage bargaining in the economy. Because firms can adjust most of the terms and conditions of employment (including wages) in decentralized negotiations, adding ER to existing EPL yields the largest reduction in unemployment under firm-level bargaining, while with sector-level bargaining, ER is better implemented with a relaxation of existing EPL. However, if the aim is to increase aggregate welfare, it is better under both bargaining regimes to relax existing EPL when implementing ER.

Classification

JEL Classification: E10, J48, J50, J60

Keywords: Search and matching models, Collective bargaining, Experience rating, Employment protection.

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2.1 Introduction

The vast majority of Western European labor markets are characterized by the co-existence of unemployment insurance (UI) and employment protection legislation (EPL)[1]. These two frameworks are separate and uncoordinated. Existing sets of national EPL are criticized for being too strict and for creating uncertainty, leading to exacerbated segmentation, slow job reallocation and a feeling of insecurity for workers[2]. When workers lose their job, they receive unemployment benefits according to an insurance scheme financed by employee-employer payroll taxes (MISSOC Database). These payroll taxes increase the wage burden, have a disincentive effect on employment, and do not encourage employers to internalize the social costs of labor turnover. This creates a double incentive to destroy jobs (Cahuc et al. 2014).

Blanchard & Tirole (2008) have suggested combining EPL and UI in a coherent scheme in which unemployment benefits are funded by layoff taxes. Their proposal is inspired by the experience-rating (ER) system in the United States (U.S.), which internalizes some of the fiscal cost of job destruction[3]. Indeed, even if a layoff is efficient at the individual level (firm-worker pair), it generates a fiscal externality through the benefits received by the newly unemployed worker. If UI is financed by all firms via a common payroll tax, firms that dismiss workers decrease their UI contributions while simultaneously increasing the financial burden of the system, the additional fiscal cost being borne by firms that choose not to lay off workers. The main features of the proposed ER system would be to tax firms' layoffs proportionally to the expected UI cost of the newly unemployed, while reducing the existing administrative and judicial costs related to dismissals. Policy advisers have repeatedly called for the generalization of this scheme, which would both protect jobs by taxing layoffs and make the financing of UI fairer and less burdensome in terms of labor costs (German Council of Economic Experts 2003, European Commission 2004, Tirole 2017).

The effects of ER on U.S. labor market outcomes are well established. The the-

[1]The OECD (2013) defines EPL as the set of norms and procedures that employers have to follow when dismissing employees, including notification procedures, delays and lengths of notice periods, severance pay, definitions of justified and unfair dismissal, the length of trial periods, compensation or the possibility of reinstatement in cases of unfair dismissal, the definition of and additional requirements for collective dismissals, and the regulation of fixed-term contracts and temporary work agencies.

[2]See Cazes & Nesporova (2003), Postel-Vinay & Saint-Martin (2004), OECD (2013) , Boeri & Garibaldi (2009), Clark & Postel-Vinay (2009), Martin & Scarpetta (2012) and Bassanini & Garnero (2013)

[3]For a description of the ER system in the U.S., see Fath & Fuest (2005) and section 2. in Ratner (2013).

oretical insights—chiefly, decreased labor market flows (Feldstein 1976)—have been corroborated by several empirical studies of U.S. data showing that reducing the share of pooling in the financing of UI and moving closer to a completely experience-rated system reduces the job creation rate and the job destruction rate, the latter more so than the former (Anderson & Meyer 1994, Woodbury et al. 2004, Ratner 2013). However, in Western European labor markets, the effects of an ER system on labor flows will be intertwined with those induced by well established labor market institutions, and especially collective (wage) bargaining systems. Indeed, in these countries, collective bargaining institutions work on the basis of sectoral (industry-level) negotiations on wages, job security, and working-time regulation, among others, whose outcomes are often binding for lower-level agreements (OECD 2019). These agreements are generally extended compulsorily to a large proportion of employers in the sector, implying a broad coverage of workers. This framework shapes the ability of firms to adjust wages when shocks occur, which affects the profitability of hoarding labor, the expected profit for firms and ultimately, employers' decisions regarding job destruction and job creation. The negative effects implied by the high coverage of collective agreements can be all the stronger if the tax wedge is high, as shown by Murtin et al. (2014) in the cases of Spain and France. Moreover, it is not clear that this combination of EPL and wage setting institutions is beneficial for labor market flows (Bertola & Rogerson 1997, Nickell & Layard 1999, Belot & Van Ours 2004, Boeri 2011), and since ER modifies the tax wedge by changing employers' payroll tax and separation costs, this compounds the uncertainty surrounding the effects of ER on European labor market outcomes[4].

This chapter aims to resolve this uncertainty by assessing the effects on labor market outcomes of implementing an ER-based UI-EPL scheme in economies with sectoral-level collective bargaining on minimum wage conditions. We complement the literature on the effects of the introduction of ER in a European-style labor market characterized by rigid institutions (Cahuc & Malherbet (2004), Charlot & Malherbet (2010) or L'Haridon & Malherbet (2009)). Existing results support introducing ER via layoff taxes to finance UI because it reduces the unemployment rate, particularly for low-skilled workers. Nevertheless, as underlined by Baumann & Stähler (2008), these studies either ignore wage bargaining or consider wages bargained on an individual basis between workers and firms. They ignore the importance of trade unions and collective bargaining in European countries. Baumann & Stähler (2008) analyze the impact workers' unions would have on the success of

[4]More information about European collective bargaining systems and their economic implications are available in Appendix 2.6.

an ER system in Europe. They deviate from the standard Nash bargaining model by considering an insider-dominated monopoly union that sets wages. They conclude that the interaction between ER and this wage-setting process may lead to an increase in unemployment through the following combination of effects: the classical effect of EPL on labor turnover (and its ambiguous effect on unemployment) in combination with excessively high wage claims from the insider-dominated union—since low labor turnover reduces its members' marginal utility loss when wages are increased—reduces firms' incentives to create jobs. However, the assumption of an insider-dominated monopoly union is strong and may drive the results, especially through the correspondingly high wage demands. Given the heterogeneity of social dialogue regimes in Europe (Terraz & Jaoul-Grammare 2012, Andolfatto et al. 2016), we depart from Baumann and Stähler's model by not assuming any particular union objective. We model a situation in which conditions are set under sectoral agreements that cannot be replaced by lower standards for the employee at the firm level, because of the principle of "favorability" anchored in the law. This assumption implies that the wage structure is more compressed than in a system of fully decentralized bargaining within the firm. We think that this is an explicit and common feature of European labor markets, which is not related to the political choices of unions, and is as such a reasonable assumption.

To analyze the effects of ER in a labor market characterized by industry-level collective (wage) bargaining, we adopt a search-and-matching labor market framework (Mortensen & Pissarides 1994, 1999) with idiosyncratic firm productivity shocks. We adapt this model by applying it to two economies, each composed of one industry (sector): (1) an economy where wage bargaining takes place at the firm-level such that wages respond to firm-specific productivity changes, and (2) an economy where wage bargaining takes place at the sector-level such that wages for all firms in the sector are fixed at a common level based on average sector-wide productivity. These two economies are completely independent of each other and thus we analyze each one in isolation. We model restrictive EPL, consisting of taxes and other costs related to firm-initiated layoffs (trial costs, administrative procedures) and a balanced UI budget that can be financed by a standard payroll tax and/or by a layoff tax proportional to the average duration of unemployment. Using this framework, we compare labor market outcomes and aggregate welfare under sector-level and firm-level bargaining following the implementation of layoff-tax funding for UI. This comparison highlights how our analysis differs from the existing literature, which only considers firm-level bargaining. Then, in order to investigate the interaction between collective bargaining regimes and the strictness of EPL, we consider

three reform scenarios: (1) an implementation of ER with no review of existing EPL *('*Addition' scenario), (2) an implementation of ER with a relaxation of existing EPL (as advocated by Blanchard & Tirole (2003)) *('Substitution' scenario*) (3) existing EPL is made more stringent by increasing dismissal costs for the company without introducing ER *('EPL only' scenario*). Numerical exercises are performed to draw conclusions from the model. The calibration is based on data from the French labor market, which is fairly representative of Western European countries in terms of its collective bargaining system and EPL.

Our research yields two main results. First, introducing ER by financing UI through a layoff tax reduces unemployment under both bargaining regimes. This is because implementing ER has two direct effects: *(i)* it increases or maintains the strictness of EPL and *(ii)* it decreases the pooled (i.e. the common payroll tax) share of UI financing. This increases firms' (expected) profit from jobs thereby reducing job destruction (by encouraging labor hoarding) and incentivizing job creation. Second, the magnitude of the effects of ER on labor market outcomes and aggregate welfare depends on its implementation design and the bargaining regime. In an economy with sectoral bargaining and extended worker coverage, it is better to relax EPL when adopting ER. On the other hand, in an economy with firm-level negotiations, it is advisable to adopt ER without relaxing existing EPL if the objective is to reduce unemployment, but EPL should be relaxed if the objective is to increase aggregate welfare. These results follow essentially from the possibility/impossibility of adjusting wages to the productivity of each firm and hence the possibility of reducing wages in response to an economic shock. Indeed, under a sector-level bargaining regime, wage rigidity exacerbates the effects of ER-associated changes in separation costs.

The chapter proceeds as follows. Section 2.2 outlines the model. Section 2.3 presents an ex-ante quantitative evaluation of the implementation of ER. Recommendations on which reform design to adopt in the two bargaining regime are formulated in Section 2.4. Section 2.5 concludes.

2.2 The model

Our model represents two economies that are completely independent of each other. Both consist of one industry (sector) with a frictional labor market where firms are subject to specific productivity shocks (Mortensen & Pissarides 1994, 1999). As in Jimeno & Thomas (2013), wage negotiations occur in one economy at the firm-level and at the sector-level in the other. This framework is useful to compare labor

market outcomes under firm-level bargaining to those under sector-level bargaining. We also introduce an EPL combining the traditional legal costs of dismissals and a layoff tax to fund UI, whose amount is proportional to the expected average cost of the unemployment spell. This tax is how the *ER system* is implemented in the model, as in Cahuc & Malherbet (2004) and L'Haridon & Malherbet (2009).

2.2.1 Main assumptions

Time is continuous with an infinite horizon. The economy is composed of a single sector, consisting of a complete labor market with a unit mass of risk-neutral workers and a mass of risk-neutral firms[5]. They discount the future at an exogenous rate $r > 0$. Each firm offers one job. This job may be vacant, in which case the firm incurs a cost $\kappa > 0$ which corresponds to the cost of searching for a worker in a market with frictions. The job may also be occupied by a worker, in which case it produces goods at a level of productivity ϵ which differs between firms. Productivity levels vary according to a stationary distribution G between $[\underline{\epsilon}, \overline{\epsilon}]$. Jobs begin at the highest productivity level, $\epsilon = \overline{\epsilon}$. Jobs can be randomly hit, according to a Poisson process, by a specific productivity shock at the exogenous rate $\delta > 0$. If the new productivity value ϵ from the G distribution is less than an endogenous productivity threshold level ϵ_d below which jobs are unprofitable, the job is destroyed and the worker becomes unemployed. Otherwise, the job is maintained.

Frictions in the labor market lead to the coexistence of unemployed workers and job vacancies. The number of matches is captured by a standard matching function $m = m(u, v)$, where u is the number of unemployed workers and v is the number of job vacancies. We assume that the function m is continuous, non-negative, increasing in u and v, homogeneous of degree 1 and satisfies $m(0, v) = m(u, 0) = 0$. The only job-seekers are the unemployed; there is no on-the-job searching. Job-seeking intensity is constant and exogenous. The constant returns assumption yields

— the matching probability for job vacancies: $\dfrac{m(u,v)}{v} = m(\dfrac{1}{\theta}, 1) \equiv q(\theta)$ with $q'(\theta) \leq 0$

— the matching probability for unemployed workers: $\dfrac{m(u,v)}{u} = m(1, \theta) \equiv \theta q(\theta)$ with $(\theta q(\theta))' \geq 0$

with $\theta = \dfrac{v}{u}$ representing labor market tightness. A tighter labor market implies a

[5] As we are not interested in the insurance aspects of ER, risk neutrality for workers and firms is a reasonable assumption. This is widely accepted in the literature on matching models moreover (see. Pissarides (2000), Rogerson et al. (2005)).

higher vacancy to unemployment ratio, which increases the chances of finding a job and shortens unemployment durations.

Firms operate in an institutionalized labor market, combining the main passive labor policies in EU countries, UI and EPL, and (collective) wage bargaining[6]. This institutionalized environment influences firms' incentives for job creation and job destruction.
The UI/EPL scheme is modeled through three costs/taxes:

— **A payroll tax** τ to finance UI, paid by firms for as long as the job is occupied.

— **A layoff tax** ϕ to finance UI, paid by firms for each layoff and proportional to the expected duration of unemployment. This is the ER mechanism in the model and is called the *ER tax*.

— **The cost of layoffs,** c paid by firms for each layoff, consisting of the administrative and judicial costs associated with dismissals. These payments are made to a third party, not involved in the worker-employer relationship. They are not monetary transfers from employers to workers, since as pointed out by Lazear (1990) and Burda (1992), these kinds of transfers do not affect the relevant decision variables in the model.

Note that we consider increases in ϕ and c as increases in the stringency of EPL, since they increase the cost of separations for employers.
Wage bargaining regimes are compared by modeling two distinct and independent economies:

— **An economy with a firm-level bargaining regime:** fully decentralized bargaining within the firm and uncoordinated wage bargaining between employers and workers.

— **An economy with a sector-level bargaining regime:** sectoral wage bargaining between a trade union and an employers' federation in which wages are set for all workers in the sector.

The economy's bargaining regime is denoted by $b = \{f, s\}$: f for firm-level bargaining and s for sector-level bargaining.

[6] Although workers are risk-neutral in the model, and therefore UI is not necessary, we include it to assess the effect of ER on labor market outcomes.

2.2.2 Value functions

For a firm, the present-discounted value of a job's expected profit depends on its state. Let J_v^b be the value of a vacant job. Initially, (before any specific productivity shock), the job's value is $J_o^b(\bar{\epsilon})$. A continuing job (one that has survived a productivity shock) has a value $J_e^b(\epsilon)$.

The value of a vacant job satisfies

$$rJ_v^b = -\kappa + q(\theta^b)\left[J_o^b(\bar{\epsilon}) - J_v^b\right] \tag{2.1}$$

At each moment in time, a vacant job implies a search cost $\kappa > 0$ for the firm. A vacant job is matched by an unemployed worker with probability $q(\theta^b)$. In the event of a match, the firm gains the difference between the value of a starting job and the value of a vacant job $J_o^b(\bar{\epsilon}) - J_v^b$.

The value of a starting job satisfies

$$rJ_o^b(\bar{\epsilon}) = \bar{\epsilon} - (1+\tau)w_o^b(\bar{\epsilon}) + \delta\int_{\epsilon_d^b}^{\bar{\epsilon}} J_e^b(x)\mathrm{d}G(x) + \delta G(\epsilon_d^b)\left[J_v^b - c - \phi\right] - \delta J_o^b(\bar{\epsilon}) \tag{2.2}$$

The value for the employer of each starting job is equal to the sum of the instantaneous profit $\bar{\epsilon} - (1+\tau)w_o^b(\bar{\epsilon})$ and the average gain from a change in the job's state $\delta\int_{\epsilon_d^b}^{\bar{\epsilon}} J_e^b(x)\mathrm{d}G(x) + \delta G(\epsilon_d^b)\left[J_v^b - c - \phi\right] - \delta J_o^b(\bar{\epsilon})$. We denote $w_o^b(\bar{\epsilon})$ the wage bargained for the new match. This wage is subject to a payroll tax τ. After a productivity shock, if the productivity ϵ is higher than the threshold productivity ϵ_d^b, the job remains profitable and is worth $J_e^b(\epsilon)$. On the contrary, if the new productivity is lower than the productivity threshold, the job becomes vacant and the firm has to pay the sum of the costs incurred by a layoff $c + \phi$ and thus obtains an expected value $J_v^b - c - \phi$.

The value of a continuing job satisfies

$$rJ_e^f(\epsilon) = \epsilon - (1+\tau)w_e^f(\epsilon) + \delta\int_{\epsilon_d^f}^{\bar{\epsilon}} J_e^f(x)\mathrm{d}G(x) + \delta G(\epsilon_d^f)\left[J_v^f - c - \phi\right] - \delta J_e^f(\epsilon) \tag{2.3}$$

$$rJ_e^s(\epsilon) = \epsilon - (1+\tau)w_e^s + \delta\int_{\epsilon_d^s}^{\bar{\epsilon}} J_e^s(x)\mathrm{d}G(x) + \delta G(\epsilon_d^s)\left[J_v^s - c - \phi\right] - \delta J_e^s(\epsilon) \tag{2.4}$$

Each continuing job has survived a productivity shock and produces at ϵ (the new productivity level). The firm has to pay the negotiated continuing wage w_e^b, which depends on the new specific productivity in the firm-level bargaining economy but does not in the sector-level bargaining economy. The continuing job remains subject to further productivity shocks, which would imply the payment of layoff costs if it were to be destroyed.

For workers, the present discounted value of their expected income stream depends on their position. Let W_u^b be the value if they are unemployed, W_o^b be the value if they have just started a job and W_e^b be the value if they are occupying a continuing job.

The expected income stream of an unemployed worker satisfies

$$rW_u^b = z + \theta^b q(\theta^b) \left[W_o^b(\bar{\epsilon}) - W_u^b \right] \tag{2.5}$$

Unemployed workers are actively seeking a job. At each moment, they receive a net gain z from unemployment benefits and expect to move into employment with probability $\theta^b q(\theta^b)$. In the event of a match, unemployed workers gain the difference between the value of being a new worker and the value of being unemployed $W_o^b(\bar{\epsilon}) - W_u^b$.

The expected income stream of a worker in a starting job satisfies

$$rW_o^f(\bar{\epsilon}) = w_o^f(\bar{\epsilon}) + \delta \int_{\epsilon_d^f}^{\bar{\epsilon}} W_e^f(x)\, \mathrm{d}G(x) + \delta G(\epsilon_d^f) W_u^f - \delta W_o^f(\bar{\epsilon}) \tag{2.6}$$

$$rW_o^s(\bar{\epsilon}) = w_o^s(\bar{\epsilon}) + \delta \left(1 - G(\epsilon_d^s)\right) W_e^s + \delta G(\epsilon_d^s) W_u^s - \delta W_o^s(\bar{\epsilon}) \tag{2.7}$$

Newly hired workers earn a wage that depends on the productivity level of a new match $w_o^b(\bar{\epsilon})$. They face the risk of the job changing state: resisting the productivity shock and remaining productive at a new level above the productivity threshold, or dropping below the productivity threshold and being destroyed.

The expected income stream for a worker in a continuing job satisfies

$$rW_e^f(\epsilon) = w_e^f(\epsilon) + \delta \int_{\epsilon_d^f}^{\bar{\epsilon}} W_e^f(x)\, \mathrm{d}G(x) + \delta G(\epsilon_d^f) W_u^f - \delta W_e^f(\epsilon) \tag{2.8}$$

$$rW_e^s = w_e^s + \delta G(\epsilon_d^s)\left[W_u^s - W_e^s\right] \tag{2.9}$$

Workers whose jobs have survived a productivity shock earn a wage w_e^b. In the economy with firm-level bargaining, this wage has been negotiated based on the new level of productivity after the idiosyncratic shock $w_e^f(\epsilon)$. In the economy with sector-level bargaining, this wage does not depend on the new productivity level w_e^s. Continuing workers in both regimes still face the risk of their jobs changing state.

2.2.3 Wage bargaining

The EPL, which governs turnover costs, requires a two-tier wage bargaining process: for the starting wage and the continuing wage. The starting wage is negotiated at the time of hiring by *outsiders*. They are not yet protected by the EPL. The continuing wage is negotiated by workers who have already signed a contract, the *insiders*. They can use the EPL to strengthen their position in wage bargaining[7].

In the economy with firm-level bargaining, wages are set within each company, in negotiations between a single employer and a single worker, leading to an individualized wage. In the economy with sector-level bargaining, the continuing wage is set out in an agreement negotiated between a sector-wide employer federation and a sector-wide trade union and corresponds to a minimum wage in the sector that is binding for firms, i.e. firms cannot opt out of the agreement and individually adjust the wage after a firm-specific shock.

Starting wage — Negotiations for the starting wage have the same features in the two bargaining regimes. The surplus of a new match between a firm and a worker is divided according to standard Nash bargaining, since the recruitment process involves the unemployed worker and the employer only, with no trade union intervention. Under the standard assumptions of Nash bargaining, the worker's fallback position is unemployment. Starting wages are thus pro-cyclical with labor market tightness θ. The assumption of pro-cyclical starting wages is supported by empirical studies showing that starting wages are more pro-cyclical than continuing wages are (see Pissarides (2009) for a detailed survey). Moreover, in the economy under sector-level bargaining, we choose to assume an individually negotiated starting wage to emphasize the importance of the binding sectoral minimum wage (the continuing wage) in firms' decisions on job destructions.

[7] See Mortensen & Pissarides (1999).

Continuing wage — The negotiation process for the continuing wage depends on the bargaining regime. In the economy with firm-level bargaining, wages are renegotiated each time a specific productivity shock occurs and take the new productivity level into account. In the economy with sector-level bargaining, the negotiations produce a common wage agreement that depends on the sector-wide average productivity level, covers all workers, and does not adjust to firm-specific productivity when a shock occurs. This sector-level bargaining framework can be interpreted as a situation in which sector-level agreements set standards for workers that firm-level agreements cannot undercut. Moreover, the sectoral union takes the number of jobs that covered by the wage agreement as a given and does not internalize the effect of wages on employment. We argue that many Western European countries extend collective bargaining agreements to entire sectors (Visser 2013) and that internalizing the effects of wages on employment is too big a task for unions, given the heterogeneity of firms in the sector and the impossibility of reaching an agreement that suits all of them (Martins 2014). In short, the mechanism is as follows: firms set the productivity threshold under which jobs are destroyed based on the sector-level wage agreement and in the process, determine the level of employment.

2.2.3.A Decision rules

Job creation decision — The number of jobs is determined by firms according to the expected profit from a new vacancy. Assuming free entry, the firm creates a vacancy as soon as the value of a vacancy is positive. At equilibrium, neither firm enters the market and creates a vacancy. Thus, as free entry requires that all rents from a new vacancy creation are zero, the job creation condition is

$$J_v^b = 0 \tag{2.10}$$

By integrating this condition in the value of a vacant job (Eq. 2.1), it follows that

$$J_o^b = \frac{\kappa}{q(\theta^b)} \tag{2.11}$$

At equilibrium, the average cost of a vacant job must be equal to the expected profit of a new match.

Job destruction decision — Firms decide to terminate a job when its expected value drops below the termination costs $c + \phi$. Below the productivity threshold ϵ_d, laying off the worker and paying the termination costs is in a firm's interest. Besides, since

the value of a job is positively related to the productivity level ϵ, there is a single level of productivity below which the job becomes unprofitable. The job destruction condition is therefore

$$J_e^b(\epsilon_d^b) = -(c + \phi) \tag{2.12}$$

2.2.3.B Starting wage

Firms and workers seek to associate because of the economic surplus they both gain. A new match makes the job productive and allows the firm to save on vacancy costs while the worker earns a wage that is higher than unemployment benefits. The starting wage derives from the sharing of the surplus of the new match

$$S_o^b(\bar{\epsilon}) = J_o^b(\bar{\epsilon}) - J_v^b + W_o^b(\bar{\epsilon}) - W_u^b \tag{2.13}$$

The surplus is shared between the firm and the worker in a Nash bargaining game with symmetric bargaining powers[8]. The starting wage agreement maximizes the product of the worker's and the firm's starting surplus, such that

$$w_o^b(\bar{\epsilon}) = argmax \left[W_o^b(\bar{\epsilon}) - W_u^b\right] \left[J_o^b(\bar{\epsilon}) - J_v^b\right] \tag{2.14}$$

This results in the following Nash sharing rules

$$W_o^b(\bar{\epsilon}) - W_u^b = \frac{1}{2+\tau} S_o^b(\bar{\epsilon}) \tag{2.15}$$

$$J_o^b(\bar{\epsilon}) - J_v^b = \frac{1+\tau}{2+\tau} S_o^b(\bar{\epsilon}) \tag{2.16}$$

We note that the employer's share of the surplus is larger even though the bargaining powers are identical. What explains this imbalance? The payroll tax τ creates a distortion in the sense that a one-unit increase in a worker's wage leads to a $1 + \tau$ increase in the firm's labor cost, since the employer pays the payroll tax. This leads to a joint loss for the worker and the firm. However, the Nash bargaining solution takes into account the effect of the wage agreement on the size of the surplus that is shared and thus minimizes the distortion created by the payroll tax τ given the

[8] As in Pissarides (2000). We assume a fixed bargaining power to ensure it does not alter the effects of the reforms under study. Moreover, the consequences of union bargaining power in a right-to-manage model are already well known, and in this paper, the bargaining power affects the magnitude/extent but not the nature/direction of the results. Thus, for the sake of simplicity, we do not consider the effects of bargaining power when setting up the ER reform.

identical bargaining power of the two negotiators. As a result, wages are kept low to minimize the joint loss and the firm's larger share of the surplus enables it to pay the payroll tax.
After some manipulations, we obtain the following equation for the starting wage in equilibrium[9]

$$w_o^b(\bar{\epsilon}) = \frac{1}{2}\left[\frac{1}{1+\tau}(\bar{\epsilon} - \delta(c+\phi) + \theta^b\kappa) + z\right] \tag{2.17}$$

The starting wage decreases as the turnover costs c and ϕ increase and is weighted by the frequency of productivity shocks, and thus corresponds to an *outsider* wage. This negative relationship is explained by two effects. First, the employer anticipates the payment of turnover costs for future layoffs and negotiates a lower wage in return. Second, the future employee does not have the benefit of EPL to reinforce their position in the bargaining process. As expected, the starting wage depends positively on the unemployment benefit z and labor market tightness θ^b, which both improve the worker's fallback position in the negotiation and help them to obtain a higher wage. The starting wage also decreases as the payroll tax rate τ increases, meaning that the worker supports part of it.

2.2.3.C Continuing wage

Firm-level bargaining regime — Continuing wage negotiations take place while the job exists. The worker is protected by the separation costs $(c+\phi)$, i.e. the employer has to pay these costs if the negotiation fails. This implies that the surplus of a continuing job is

$$S_e^f(\epsilon) = J_e^f(\epsilon) - J_v^f + c + \phi + W_e^f(\epsilon) - W_u^f \tag{2.18}$$

The continuing wage agreement shares this surplus by solving the following Nash maximization problem

$$w_e^f(\epsilon) = argmax\left[W_e^f(\epsilon) - W_u^f\right]\left[J_e^f(\epsilon) - J_v^f + c + \phi\right] \tag{2.19}$$

This leads to the following Nash sharing rules

$$W_e^f(\epsilon) - W_u^f = \frac{1}{2+\tau}S_e^f(\epsilon) \tag{2.20}$$

[9]Details of the derivations are provided in a technical appendix, which is available on request.

$$J_e^f(\epsilon) - J_v^f + c + \phi = \frac{1+\tau}{2+\tau} S_e^f(\epsilon) \tag{2.21}$$

After some manipulations, we obtain the following equation for the continuing wage in equilibrium[10]

$$w_e^f(\epsilon) = \frac{1}{2}\left[\frac{1}{1+\tau}(\epsilon + r(c+\phi) + \theta^f \kappa) + z\right] \tag{2.22}$$

The continuing wage depends on the new firm-specific productivity ϵ after the shock. Moreover, it differs from the starting wage in that it is positively related to the separation costs c and ϕ: insiders take advantage of employment protection to negotiate higher wages, while outsiders cannot.

Sector-level bargaining regime — The sector-wide employers' federation and the sector-wide union aim to maximize the aggregate surplus of the n^s firm-worker pairs covered by the wage agreement. The negotiators agree on a wage that applies to the n^s firm-worker pairs, that is, a common wage that does not depend on the specific productivity of each firm, such that $w_e^s(\epsilon) = w_e^s$.
The aggregate surpluses of the workers and firms covered by the wage agreement are respectively

$$n^s \left(W_e^s - W_u^s\right) \tag{2.23}$$

$$n^s \frac{1}{1 - G(\epsilon_d^s)} \int_{\epsilon_d^s}^{\bar{\epsilon}} [J_e^s(\epsilon) - J_v^s + c + \phi] \, \mathrm{d}G(\epsilon) \tag{2.24}$$

For the sake of comparability with the firm-level bargaining case, we assume that ϵ_d^s and n^s are given for the negotiators. The continuing wage solves the following Nash problem

$$w_e^s = argmax \left[W_e^s - W_u^s\right] \left[\frac{1}{1 - G(\epsilon_d^s)} \int_{\epsilon_d^s}^{\bar{\epsilon}} [J_e^s(\epsilon) - J_v^s + c + \phi] \mathrm{d}G(\epsilon)\right] \tag{2.25}$$

After some manipulations, we obtain the following equation for the continuing wage

[10] Details of the derivations are provided in a technical appendix, which is available on request.

in equilibrium[11]

$$w_e^s = \frac{1}{2}\left[\frac{1}{1+\tau}[E(\epsilon|\epsilon \geq \epsilon_d^s) + r(c+\phi) + \theta^s\kappa] + z\right] \tag{2.26}$$

with $E(\epsilon|\epsilon \geq \epsilon_d^s) \equiv \frac{1}{1-G(\epsilon_d^s)} \int_{\epsilon_d^s}^{\bar{\epsilon}} \epsilon \, \mathrm{d}G(\epsilon)$ the average productivity across surviving jobs.

The sector-level continuing wage depends positively on the average productivity of firms in the sector. Employers covered by this agreement cannot adjust the continuing wage to the job's specific productivity.

2.2.4 Job creation and job destruction

For each bargaining regime, we derive two new expressions: a job creation condition and a job destruction condition. These conditions will provide solutions for ϵ_d^b and θ^b, which are then used in the wage equations and the Beveridge curve equation to solve for wages and unemployment.

2.2.4.A Job creation condition

As the job creation characteristics (free entry, new match surplus, starting wage) are the same in both bargaining regimes, the job creation conditions also have the same structure in the two economies.
Using the new match surplus equation (Eq. 2.13), the starting wage equation (Eq. 2.17), the free-entry condition (Eq. 2.10) and after some mathematical manipulations, we obtain the job creation condition, which defines labor market tightness:[12]

$$(r+\delta)\frac{\kappa}{q(\theta^b)} = \frac{1}{2}\left[\bar{\epsilon} - \delta(c+\phi) - (1+\tau)z - \theta^b\kappa\right] + \frac{1+\tau}{2+\tau}\delta E(S_e^b) \tag{2.27}$$

with $E(S_e^b) = \int_{\epsilon_d^b}^{\bar{\epsilon}} S_e^b(x) \, \mathrm{d}G(x)$ the expected value of the surplus.

The job creation condition implies that the average cost of a vacant job (LHS) and the expected profit of a newly created job (RHS) must be equal[13]. The average

[11] Details of the derivations are provided in a technical appendix, which is available on request.
[12] Details of the derivations are provided in a technical appendix, which is available on request.
[13] The job creation condition means that there is a single solution for θ. Indeed, the left-hand side (LHS) of Eq. 2.27 is increasing in θ (because $q(\theta)' < 0$) while the right-hand side (RHS) is decreasing in θ.

cost of a vacant job increases with labor market tightness: greater tightness reduces the probability of finding an unemployed worker for a job vacancy and therefore makes vacancies last longer and thus increases their average cost. The expected profit from a newly occupied job decreases as the labor market becomes tighter: greater tightness makes it easier for unemployed workers to find a job and therefore improves their position and their reservation wage. The expected profit is also negatively related to the separation costs c and ϕ. The link with labor market tightness is as follows: all other factors being equal, an increase in the separation costs reduces firms' expected profits and thus the number of vacancies they post, leading to a loosening of the labor market.

2.2.4.B Job destruction condition

Firm-level bargaining regime — Using the existing job value (Eq. 2.3), the job destruction rule (Eq. 2.12), the continuing wage equation (Eq. 2.22) and after some mathematical manipulations, we obtain the job destruction condition, which defines the destruction productivity threshold. This condition is[14]

$$\epsilon_d^f = (1+\tau)z - r(c+\phi) + \theta^f \kappa - \frac{\delta}{r+\delta}\int_{\epsilon_d^f}^{\bar{\epsilon}} x - \epsilon_d^f \, \mathrm{d}G(x) \tag{2.28}$$

The productivity threshold is positively related (i.e. labor hoarding is negatively related) with three components of the equation: the payroll tax τ, which increases the cost of labor, making the job less profitable for the firm; unemployment benefits z, which improve the worker's non-working position and allows them to negotiate a higher wage, making the job less profitable for the firm; and labor market tightness θ^f coupled with the vacancy cost κ, a proxy of the search cost—in other words, the job's opportunity cost for the employer. The productivity threshold is negatively related (i.e. labor hoarding is positively related) with two components: the separation costs c and ϕ, which directly discourage employers from destroying the job; and the expected change in specific productivity $\frac{\delta}{r+\delta}\int_{\epsilon_d^f}^{\bar{\epsilon}} x - \epsilon_d^f \, \mathrm{d}G(x)$, which encourages employers to maintain the job on the basis of an expected improvement in local productivity conditions.

Sector-level bargaining regime — Under sector-level bargaining, the productivity threshold depends (positively) on the average productivity of jobs in the sector. The latter is linked to the productivity threshold because wages renegotiated under

[14] Details of the derivations are provided in a technical appendix, which is available on request.

the sector-level regime adjust less well to specific productivity shocks than those renegotiated under the firm-level regime. This tends to increase the number of job destructions since jobs become unprofitable at a faster rate. The job destruction condition under sector-level bargaining is[15]

$$\epsilon_d^s = \frac{1}{2}\left[E(\epsilon|\epsilon \geq \epsilon_d^s) + (1+\tau)z - r(c+\phi) + \theta^s\kappa\right] - \frac{\delta}{r+\delta}\int_{\epsilon_d^s}^{\bar{\epsilon}} x - \epsilon_d^s \, \mathrm{d}G(x) \quad (2.29)$$

with the factor $\frac{1}{2}$ indicating that the productivity threshold of firms in the sector-level bargaining regime is less sensitive to variations in the separation costs c and ϕ.

2.2.5 Unemployment

The unemployment rate evolves with the difference between the flows into and out of unemployment, respectively $\delta G(\epsilon_d^b)(1-u^b)$ and $\theta^b q(\theta^b)u^b$:

$$\dot{u}^b = \delta G(\epsilon_d^b)(1-u^b) - \theta^b q(\theta^b)u^b \quad (2.30)$$

Inflows and outflows being equal in steady state, and thus $\dot{u} = 0$, the unemployment rate can be expressed as

$$u^b = \frac{\delta G(\epsilon_d^b)}{\delta G(\epsilon_d^b) + \theta^b q(\theta^b)} \quad (2.31)$$

This last expression can be interpreted as a Beveridge curve describing a decreasing and convex relationship between u and v. The unemployment rate is negatively related to labor market tightness and positively related to the productivity threshold.

2.2.6 Unemployment insurance fund

To close the model and analyze the effects of implementing ER, we model a balanced UI budget. Unemployment benefit payments uz are financed by the payroll tax τ and the ER tax ϕ paid by employers on layoffs. The ER tax can be used as an instrument of employment policy, in which case fiscal balance is ensured by adjusting the payroll tax. When the payroll tax rate is greater than 0, the financing of UI is partly shared between firms. When the payroll tax rate is equal to zero, the ER system is "complete", i.e., unemployment benefits are funded exclusively by

[15] Details of the derivations are provided in a technical appendix, which is available on request.

dismissing firms. The budgetary rule is therefore

$$u^b z = \tau^b \overline{w_o^b} n_o^b + \tau^b \overline{w_e^b} n_e^b + \delta G(\epsilon_d^b)(1-u^b)\phi \tag{2.32}$$

n_o^b corresponds to the share of new workers and n_e^b represents the share of continuing workers. Knowing that $n_e^b = (1-u^b)(1-G(\epsilon_d^b))$, we deduce that $n_o^b = (1-u^b)G(\epsilon_d^b)$.[16] Besides, $\overline{w_o^b}$ and $\overline{w_e^b}$ are the average values of wages, such that $\overline{w_o^b} = w_o^b(\bar{\epsilon})$, $\overline{w_e^f} = \frac{1}{1-G(\epsilon_d^f)} \int_{\epsilon_d^f}^{\bar{\epsilon}} w_e^f(x) \mathrm{d}G(x)$[17] and $\overline{w_e^s} = w_e^s$. This leads to the following expression for the payroll tax[18]

$$\tau^b = \frac{u^b z - \phi \delta G(\epsilon_d^b)(1-u^b)}{(1-u^b)[G(\epsilon_d^b)\overline{w_o^b} + (1-G(\epsilon_d^b))\overline{w_e^b}]} \tag{2.33}$$

An unemployed worker imposes a financial cost on the UI fund. The ER system makes it possible to have this cost carried, at least partially, by the dismissing firm. In order to obtain an expression for the ER-tax ϕ, it is necessary to define the expected cost of an unemployed worker for the unemployment insurance fund H. This cost is proportional to the length of the unemployment spell, that is, it depends on the job-finding rate, such that

$$rH^b = z + \theta^b q(\theta^b)[0 - H^b] \tag{2.34}$$

This expected cost increases with the level of unemployment benefits z and decreases as the job-finding rate increases $\theta^b q(\theta^b)$.

Since the ER system can be complete or partial, we define the ER index ρ, which represents its degree of completeness, namely the proportion of the expected cost of an unemployed worker financed by their former employer. The ER tax is thus equal to $\phi^b = \rho H^b$. By inserting $H^b = \frac{\phi^b}{\rho}$ into Eq. 2.34, we get the following expression for the ER tax[19]

$$\phi^b = \frac{\rho z}{r + \theta^b q(\theta^b)} \tag{2.35}$$

[16] Proof. $n_o^b = (1-u^b) - n_e^b = (1-u^b) - (1-u^b)(1-G(\epsilon_d^b)) = (1-u^b)(1-1+G(\epsilon_d^b)) = (1-u^b)G(\epsilon_d^b)$

[17] This expression comes from calculating the average of a set of continuous functions over an interval: $m = \frac{1}{b-a}\int_a^b f(x)\mathrm{d}x$. In our case: $\overline{w_e^f} = \frac{1}{G(\bar{\epsilon}) - G(\epsilon_d^f)} \int_{\epsilon_d^f}^{\bar{\epsilon}} w_e^f(x)\mathrm{d}G(x) = \frac{1}{1-G(\epsilon_d^f)} \int_{\epsilon_d^f}^{\bar{\epsilon}} w_e^f(x)\mathrm{d}G(x)$

[18] Details of the derivations are provided in a technical appendix, which is available on request.

[19] Details of the derivations are provided in a technical appendix, which is available on request.

The ER tax increases with the level of unemployment benefits z. It also increases with the degree of completeness of the ER system ρ, since the more complete the system is, the smaller the pooled component of UI funding is, and therefore the more directly each firm funds its dismissals. Finally, it is negatively related to the job-finding probability and thus with labor market tightness θ^b.

2.2.7 Equilibrium

We consider a steady-state equilibrium, in which firms and workers are subject to uncertainty in their individual experiences but all aggregate variables are stationary. We characterize the equilibrium under both bargaining regimes. In both cases, the steady-state equilibrium is described by the five endogenous variables $(u, \theta, \epsilon_d, \tau, \phi)$ and two wages (w_o, w_e) that satisfy the job creation and job destruction conditions, the two wage equations, the flow equilibrium condition for unemployment, and the equations for the payroll and the ER tax.

Common to both bargaining regimes —

· Labor market tightness (job creation condition)

$$(r+\delta)\frac{\kappa}{q(\theta^b)} = \frac{1}{2}\left[\overline{\epsilon} - \delta(c+\phi) - (1+\tau)z - \theta^b\kappa\right] + \frac{1+\tau}{2+\tau}\delta E(S_e^b) \tag{2.36}$$

· Payroll tax

$$\tau^b = \frac{u^b z - \phi^b \delta G(\epsilon_d^b)(1-u^b)}{(1-u^b)[G(\epsilon_d^b)\overline{w_o^b} + (1-G(\epsilon_d^b))\overline{w_e^b}]} \tag{2.37}$$

· Experience-rating tax

$$\phi^b = \frac{\rho z}{r + \theta^b q(\theta^b)} \tag{2.38}$$

· Unemployment rate

$$u^b = \frac{\delta G(\epsilon_d^b)}{\delta G(\epsilon_d^b) + \theta^f q(\theta^b)} \tag{2.39}$$

Economy with firm-level bargaining —

· Productivity threshold (job destruction condition)

$$\epsilon_d^f = (1+\tau)z - r(c+\phi) + \theta^f \kappa - \frac{\delta}{r+\delta}\int_{\epsilon_d^f}^{\bar{\epsilon}} x - \epsilon_d^f \, \mathrm{d}G(x) \tag{2.40}$$

Economy with sector-level bargaining —

· Productivity threshold (job destruction condition)

$$\epsilon_d^s = \frac{1}{2}\left[E(\epsilon|\epsilon \geq \epsilon_d^s) + (1+\tau)z - r(c+\phi) + \theta^s \kappa\right] - \frac{\delta}{r+\delta}\int_{\epsilon_d^s}^{\bar{\epsilon}} x - \epsilon_d^s \, \mathrm{d}G(x) \tag{2.41}$$

2.3 Quantitative analysis of the reform

The equilibrium outcomes following the implementation of ER depend on multiple factors with opposite effects. Theoretically, all other factors held constant, implementing an ER tax increases separation costs for firms, which is akin to making EPL stricter. Increasing the strictness of EPL leads to labor hoarding and thus decreases the job destruction rate, but also reduces the expected profit of jobs for employers and thus their incentive to create jobs. Furthermore, changes in EPL strictness will affect the negotiated wages, with different reactions depending on the bargaining regime. Indeed, as argued by Cahuc (2014), wages adjust more readily to increased EPL strictness when they are flexible than when they are downward rigid. Besides, the implementation of an ER tax to fund UI implies a payroll subsidy, since the UI budget has to be balanced. This decrease in the payroll tax will be factored into wage negotiations and will affect wage levels differently depending on the bargaining regime. The effects on labor costs and therefore on employers' incentives to create and destroy jobs are therefore ambiguous. This complexity and the seemingly ambiguous impact of an ER tax on labor market outcomes requires quantitative analysis.

To clarify what the effects of implementing the ER tax are, we analyze the three reform scenarios listed in Table 2.1.

Table 2.1 – Three reform scenarios

	Reform scenario		
	Addition	**Substitution**	**EPL only**
Idea	The ER tax is added to existing EPL	The ER tax replaces existing EPL	Existing EPL is maintained but with higher firing costs
Model	$\Delta\rho > 0 \rightarrow c + \phi$	$\Delta\phi = -\Delta c \rightarrow \Delta\rho > 0$	$\Delta c > 0$
Interpretation	Policymakers implement an ER tax to finance UI without relaxing existing EPL	Policymakers implement an ER tax to finance UI and relax existing EPL	Policymakers increase the stringency of EPL without implementing ER

Two of the scenarios ('Addition' and 'Substitution') involve introducing an ER tax to finance UI, while the third ('EPL only') simply represents an increase in the stringency of EPL. In the 'addition' scenario, the ER tax is introduced without revising existing EPL, which increases separation costs for firms and is thus akin to increasing the stringency of EPL. In the 'substitution' scenario, the ER tax is implemented, but existing EPL is relaxed in parallel. In the 'EPL only' scenario, no ER tax is introduced; the reform simply involves increasing the stringency of existing EPL.

The 'substitution' scenario is close to what Blanchard & Tirole (2008) propose. However, there are several reasons why we also simulate the 'addition' and 'EPL only' scenarios. First, the 'addition' scenario allows us to take into account the joint effects of the payroll subsidy and the increase in separation costs induced by the ER tax, which can have opposite effects on labor flows and especially on job creation, the magnitude of which may depend on the wage bargaining regime. Moreover, reforming existing EPL would be very difficult in many European countries, as the regulations are well-established and many citizens are attached to them, and thus it is reasonable to assume that many policy-makers will choose not to reduce the strictness of existing EPL when implementing ER, at least initially. Second, the 'EPL only' scenario is useful for two reasons: it complements the work of Jimeno & Thomas (2013), who do not model labor turnover costs, and it provides a better understanding of the effects of ER by subtracting its payroll subsidy effects and thus serves as a benchmark.

We simulate the three reform scenarios in the economy with firm-level bargaining and in the economy with sector-level bargaining. In order to assess the effects of each reform on labor market outcomes, we compare the *post-reform* position with a *pre-reform position* in which there is no ER tax financing of UI, only the payroll tax and the existing costs of layoffs (existing EPL).

2.3.1 Calibration and pre-reform position

Parameters are calibrated based on data from the French labor market, which in terms of labor market institutions—especially the collective bargaining structure and EPL—is fairly representative of Western European countries. As the French economy is characterized by the strong role of sectoral negotiations (see. Appendix 2.6), we calibrate the model in the sector-level bargaining regime as a baseline.

We start by setting parameters to standard values in the literature. The period is set to one quarter with a discount rate r set to 0.01. The G distribution of specific productivity shocks is assumed to be uniform between [0,1] and the productivity of a new match $\bar{\epsilon}$ is set to 1. We use a Cobb-Douglas specification for the matching function, $m(u,v) = Au^{\alpha}v^{1-\alpha}$, which implies a job finding rate[20] of $\theta q(\theta) = A\theta^{1-\alpha}$. α corresponds to the elasticity of the matching function and is set to 0.5 as in most of the literature (Petrongolo & Pissarides 2001). The matching efficiency parameter A[21] set to 0.180, the vacancy cost κ set to 0.4116 and the productivity shock frequency δ set to 0.0154 are calibrated to reproduce the following moments of the French economy: an unemployment rate of 9.4% (OECD), a labor market tightness of 0.562 (average value from Q1-2005 to Q1-2017; DARES), a job-finding probability estimated at 0.135 (Hairault et al. 2015) and a payroll tax (to finance UI) of 5.0% (Pôle Emploi, 2018). Finally, the unemployment benefits z and the set of costs associated with layoffs c, respectively set to 0.6269 and 1.7739 are chosen to fit the following features of the French UI system and the EPL: unemployment benefits equal to 71% of the average wage (the average replacement ratio in France, Unedic, 2016) and layoff costs approximately equal to 50% of the average annual wage (Kramarz & Michaud 2010). The values are summarized in Table 2.2.

[20] $\theta q(\theta) = \frac{m(u,v)}{u} = \frac{Au^{\alpha}v^{1-\alpha}}{u} = A(\frac{v}{u})^{1-\alpha} = A(\theta)^{1-\alpha}$.

[21] $A = \frac{\theta q(\theta)}{(\theta^*)^{1-\alpha}}$ with $\theta q(\theta) = 0.135$ the target value of the job-finding rate and $\theta^* = 0.562$ the target labor market tightness, we obtain: $A = 0.180$.

Table 2.2 – Parameter values (quarterly data) - Baseline: sector-level bargaining regime

Labor Market Parameters	Notation	Value	**Calibration Targets**	Notation	Value	**Source**
Baseline Parameters						
Matching efficiency	A	0.180	Unemployment rate	u	0.094	OECD
Elasticity of matching function	α	0.5	Labor market tightness	θ	0.562	av. Q1-2005/Q1-2017; DARES
New match productivity	$\bar{\epsilon}$	1	Payroll tax	τ	0.05	Pole Emploi, 2018
Interest rate	r	0.01	Job-finding rate	$\theta q(\theta)$	0.135	Hairault et al. (2015)
Calibrated Parameters						
Vacancy cost	κ	0.4116				
Productivity shock frequency	δ	0.0154				
Unemployment benefits	z	0.6269				
Policy parameters						
Firing cost	c	1.7739				
Experience rating index	ρ	0				

Table 2.3 – Pre-reform position

Variable	Notation	**Bargaining regime**	
		Sector-level (baseline)	Firm-level
Unemployment rate (%)	u	**9.700**	**9.220**
Labor market tightness	θ	**0.528**	**0.535**
Productivity threshold	ϵ_d	**0.914**	**0.870**
Average starting wage	$\overline{w_o}$	**0.866**	**0.870**
Average continuing wage	$\overline{w_e}$	**0.866**	**0.860**
Labor cost of starting job	$\overline{w_o}(1+\tau)$	**0.933**	**0.933**
Labor cost of continuing job	$\overline{w_e}(1+\tau)$	**0.934**	**0.923**
Payroll tax	τ	**0.077**	**0.073**
Budget (%)	B/Y	**7.100**	**6.740**
Experience rating index	ρ	**0.000**	**0.000**

Table 2.3 presents the labor market outcomes of the pre-reform situations under the two bargaining regime. The labor market performs better under firm-level bargaining than under sector-level bargaining, particularly in terms of the unemployment rate, which is a primary concern for policy-makers. This is due to greater labor market tightness and a lower productivity threshold in the firm-level bargaining economy, meaning more job creation and less job destruction. These results show that decentralized negotiations at the firm level allow firms to partially adjust wages to their idiosyncratic productivity in the event of a shock. This limits the decrease in job profitability following a shock and therefore increases expected job profitability for employers. Conversely, the unemployment rate is higher in the sector-level bargaining economy because of firms' inability to adjust wages following an idiosyncratic shock, since they have to pay the industry-wide collectively negotiated wage: firms' profits fall faster after a shock and the productivity threshold, the lower limit below which a job becomes unprofitable, is reached more quickly. These results complement those of Jimeno & Thomas (2013), showing that the labor market performs better under firm-level bargaining than under sector-level bargaining. While Jimeno and Thomas's model does not include EPL, a central feature of European labor markets, our analysis shows that the main result still holds when EPL is taken into account.

The other variables of interest to analyze in our model are the negotiated wages, since they are a direct result of the economy's bargaining regime. The starting wage negotiated by outsiders is lower in the economy with sector-level bargaining. This is because the tighter labor market leads competing outsiders to accept lower wages. The continuing wage on the other hand is higher under sector-level bargaining. This wage premium stems from unions leveraging higher separation costs and unemploy-

ment benefits to obtain higher wages: the inability to save jobs in the event of a negative shock by lowering wages forces employers to accept the insiders' wage demands.

Finally, by relating the cost of unemployment $B = uz$ to the economy's aggregate output (net of labor turnover costs) $Y = (1-u)\left[\overline{\epsilon} + \int_{\epsilon_d}^{\overline{\epsilon}}(x-\overline{\epsilon})\mathrm{d}G(x)\right] - k\theta u - \delta G(\epsilon_d)(1-u)c$, we obtain the size of the UI budget. Unemployment insurance is costlier under sector-level bargaining than under firm-level bargaining, notably because of higher unemployment and thus lower net output. Taking the differences in wage levels into account, this implies that the payroll tax is higher in the sector-level bargaining economy, leading to higher labor costs. Logically, since the pre-reform position does not include ER, the ER index is equal to 0.

2.3.2 Addition scenario: ER added to existing EPL

In this scenario, policymakers implement an ER-tax to finance UI without relaxing existing EPL. The ER tax ϕ is implemented by increasing the ER index ρ, used as a policy instrument. In other words, as soon as the ER index $\rho > 0$, the separation costs become $c + \phi$. We start by analyzing the effects on labor market outcomes of complete ER, with $\rho = 1$. This implies that UI is no longer financed by the payroll tax ($\tau = 0$) and thus that the financing of UI ceases to be mutualized; the ER index of 1 means that employers individually bear all the costs of any layoffs through the ER tax.

Table 2.4 – Comparative statics - Post-reform position - Addition scenario

Variable	Notation	**Bargaining regime**			
		Sector-level		Firm-level	
		Pre-reform value	Abs. change	Pre-reform value	Abs. change
Unemployment rate (%)	u	9.700	**-0.500**	9.220	**-0.900**
Labor market tightness	θ	0.528	**-0.027**	0.535	**-0.029**
Productivity threshold	ϵ_d	0.914	**-0.076**	0.870	**-0.113**
Average starting wage	$\overline{w_o}$	0.866	**-0.001**	0.870	**-0.004**
Average continuing wage	$\overline{w_e}$	0.866	**0.039**	0.860	**0.026**
Labor cost of starting job	$\overline{w_o}(1+\tau)$	0.933	**-0.064**	0.933	**-0.062**
Labor cost of continuing job	$\overline{w_e}(1+\tau)$	0.934	**-0.025**	0.923	**-0.033**
Budget (%)	B/Y	7.100	**-0.378**	6.740	**-0.620**

Note: 'Abs. change' gives the absolute change relative to the pre-reform position (in percentage points for the unemployment rate and the budget). The layoff tax ϕ is equal to 4.563 under sector-level bargaining and 4.541 under firm-level bargaining.

Table 2.4 presents the absolute changes in labor market outcomes after the reform. The results can be analyzed in two parts: *(i)* the effects induced by the 'addition' scenario itself, and *(ii)* the effects induced by the bargaining regime.

(i) Adding an ER tax to existing EPL reduces unemployment. The underlying mechanism is as follows. The introduction of an ER tax on top of existing EPL increases separation costs for employers. Their expected profit from jobs decreases and they therefore create fewer jobs, i.e. post fewer vacant jobs. At a given unemployment rate, the decline in the number of job vacancies decreases labor market tightness, but only by a small amount. Indeed, the negative impact of higher separation costs on job creations is partly offset by the positive impact of a lower payroll tax on the expected profitability of jobs. Furthermore, the increase in separation costs has a positive effect on labor hoarding, implying less job destruction. Since this positive effect on labor hoarding is not directly counteracted by an opposite effect, it is stronger than the negative effect on job creation, leading to a fall in the unemployment rate.

(ii) The decline in unemployment is greater in the economy with firm-level bargaining. This is due to a greater decline in job destruction under firm-level bargaining than under sector-level bargaining, while the decrease in job creation is almost identical in the two bargaining regimes. The key mechanism here is the ability firms have under firm-level but not under sector-level bargaining to adjust wages to their new specific productivity. Indeed, after a negative productivity shock, employers face a trade-off between paying separation costs and letting less productive workers keep their jobs (labor hoarding). The decrease in workers' productivity makes them less profitable, but this decrease is attenuated under firm-level bargaining by employers' ability to renegotiate workers' wages down to partially compensate for their new (lower) productivity. Therefore, the trade-off is more likely to fall in favor of labor retention than under sector-level bargaining, where wages cannot be adjusted to a firm's idiosyncratic productivity. This difference is accentuated by the larger increase in the average continuing wage under sector-level bargaining, which mitigates the decrease in labor costs due to the lower payroll tax.

To sum up, internal flexibility (the possibility of firm-specific adjustments) enhances the decrease in unemployment induced by implementing an ER tax without relaxing existing EPL.

2.3.3 Substitution scenario: ER as a substitute for existing EPL

In this scenario, policymakers implement an ER tax to finance UI and simultaneously relax existing EPL. The ER tax ϕ replaces firing costs c, such that $\Delta\phi = -\Delta c$, making the ER index positive ($\Delta\rho > 0$). We analyze the effects on labor market outcomes of a complete substitution of c by ϕ with $\rho < 1$, i.e. the system is not

completely experience-rated[22]. Therefore, UI remains partly financed by the payroll tax ($\tau > 0$) and thus remains partly mutualized.

Table 2.5 – Comparative statics - Post-reform position - Substitution scenario

Variable	Notation	**Bargaining regime**			
		Sector-level		Firm-level	
		Pre-reform value	Abs. change	Pre-reform value	Abs. change
Unemployment rate (%)	u	9.700	**-0.354**	9.220	**-0.332**
Labor market tightness	θ	0.528	**0.043**	0.535	**0.041**
Productivity threshold	ϵ_d	0.914	**-0.002**	0.870	**-0.003**
Average starting wage	$\overline{w_o}$	0.866	**0.026**	0.870	**0.025**
Average continuing wage	$\overline{w_e}$	0.866	**0.026**	0.860	**0.024**
Labor cost of starting job	$\overline{w_o}(1+\tau)$	0.933	**-0.002**	0.933	**-0.001**
Labor cost of continuing job	$\overline{w_e}(1+\tau)$	0.934	**-0.002**	0.923	**-0.002**
Budget (%)	B/Y	7.100	**-0.454**	6.740	**-0.419**

Note: 'Abs. change' gives the absolute change relative to the pre-reform position (in percentage points for the unemployment rate and the Budget). The ER index ρ is 0.413 under sector-level bargaining and 0.415 under firm-level bargaining.

Table 2.5 shows the absolute changes in labor market outcomes after the reform. As in the 'addition' scenario, we analyze the results in two parts: *(i)* the effects induced by the 'substitution' scenario itself, and *(ii)* the effects induced by the bargaining regime.

(i) Introducing the ER tax as a substitute for existing EPL reduces unemployment. The underlying mechanism is as follows. Introducing ER while relaxing existing EPL avoids increasing separation costs for employers and therefore does not decrease the expected profit of jobs and job vacancy postings. At the same time, the ER tax partially replaces the payroll tax, which makes jobs more profitable and increases job creation. Moreover, this increase in profitability makes jobs more resistant to idiosyncratic shocks, and thus reduces the job destruction rate (even though separation costs remain unchanged).

(ii) The decline in unemployment is slightly greater in the economy with sector-level bargaining. All labor market outcomes vary similarly in the two bargaining regimes. Indeed, since separation costs do not vary, whether or not wages can be adjusted to productivity following a shock is irrelevant. The only change of importance here is in the payroll tax. However, since the UI budget is balanced, the reduction in the payroll tax that accompanies the introduction of ER is greater under sector-level bargaining because the pre-reform job destruction rate is higher

[22]In this scenario, the ER tax ϕ is used as an instrument, implying that the ER index ρ is endogenous. In the post-reform situation, the values are as follows: $c = 0$, $\phi = 1.7739$ and $\rho = 0.41$.

than under firm-level bargaining. This greater reduction in the payroll tax implies a greater increase in job creation in the economy with sectoral negotiations. As for wages, they increase in the same proportion under both bargaining regimes.

In summary, when the ER-tax is implemented in parallel with a relaxation of existing EPL, the bargaining regime is a weaker determinant of the extent of the reform's effects.

2.4 Which reform scenario to recommend?

We successively assessed the effects of implementing ER by addition and by substitution. It appears that both approaches are effective if the main objective is to reduce the unemployment rate. In this section, we go further, by establishing which approach should be recommended under a given collective bargaining regime, depending on whether the objective is primarily to reduce unemployment or more broadly to increase welfare.

The 'addition' scenario we tested involves a complete ER system ($\rho = 1$) while 'substitution' leads to a partial ER system ($\rho = 0.41$). In order to properly compare the effects of the two reform scenarios on labor market outcomes, we have to do this at similar levels of individualized UI financing, i.e. at similar values of the ER index ρ. We therefore simulate the 'addition' scenario up to an ER index of 0.41, which corresponds to the maximum ER index reached in the 'substitution' scenario (full substitution). The changes in labor market outcomes in these two scenarios are compared with those in the 'EPL only' scenario, where for the sake of comparison, separation costs c are increased by the same amount as the value of the ER tax ϕ in the 'addition' scenario[23]. The 'EPL only' scenario is a relevant benchmark because it allows the effects of the increase in separation costs to be isolated from those of its interactions with the bargaining regime. Furthermore, investigating the effects of a partial ER system (an ER index below 1) on labor market outcomes is practically relevant. For example, in the ER system currently in place in the U.S., the pooled share of UI financing is around 40 % (Cahuc et al. 2014). In the U.S. moreover, unemployment benefits are lower and paid over a shorter period of time than they are in Western European countries, making it easier for companies to bear the costs of workforce management (Margolis & Fougère 2000).

[23]For example: if in the addition scenario, a given ER index ρ yields an ER tax ϕ equal to X, we increase c by X in the 'EPL only' scenario, ρ and ϕ remaining equal to 0.

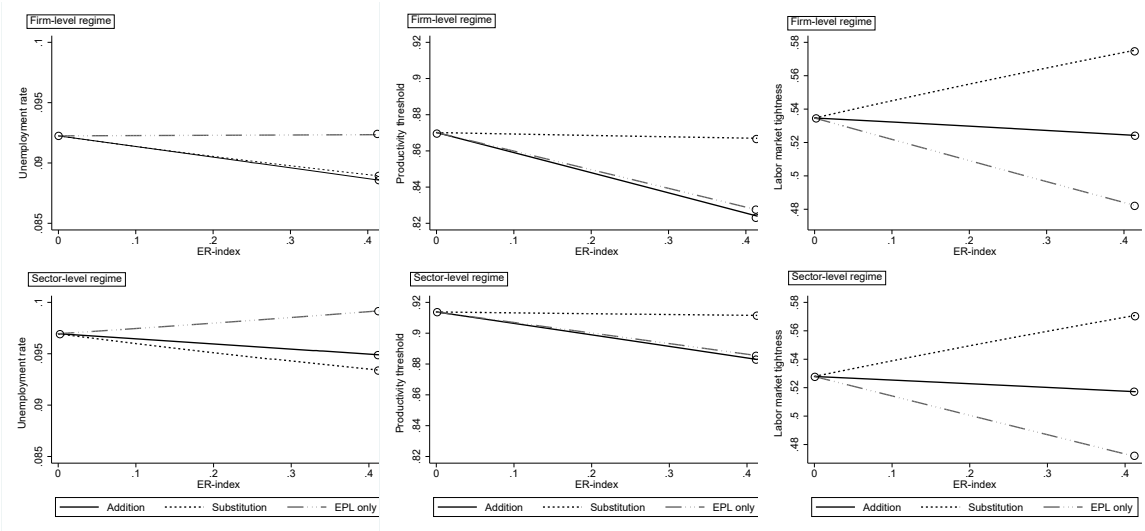
2.4.1 From an unemployment perspective

Figure 2.1 illustrates the evolution of labor market outcomes as a function of the ER index in the three reform scenarios[24]. The first recommendations these data suggest are: if the main objective is to reduce the unemployment rate, the 'addition' approach is recommended under firm-level bargaining and the 'substitution' approach is recommended under sector-level bargaining, whereas the 'EPL only' approach leads to an increase in unemployment, especially under sector-level bargaining.

If the objective is to limit job destruction, the best results are obtained in the 'addition' and 'EPL only' scenarios, where there is a net decrease in the productivity threshold for job destruction. This decrease is particularly marked in the economy with firm-level bargaining. This comparison highlights the role of internal wage flexibility, suggesting that when employers can adjust wages in the event of specific productivity shocks, this enhances the positive effects of an increase in separation costs on labor hoarding.

However, by looking at the impact of the reforms on job creation, the 'substitution' approach gives the best results, with a strong increase in labor market tightness, whereas in the 'addition' and 'EPL only' scenarios, labor market tightness decreases (particularly so in the 'EPL only' scenario). The magnitude of the effects on job creation are greater in all three scenarios under sector-level bargaining .

Figure 2.1 – Evolution of labor market outcomes as a function of to the ER index



[24] Table 2.6 compares the absolute changes between the pre-reform position and the post-reform position ($\rho = 0.41$) for the three scenarios and two bargaining regimes.

Table 2.6 – Evolution of labor market outcomes at an ER index of 0.41

Variable	Notation	**Bargaining regime**					
		Sector-level			Firm-level		
		Addition	Substitution	EPL only	Addition	Substitution	EPL only
Unemployment rate (%)	u	-0.205	**-0.354**	0.223	**-0.367**	-0.332	0.010
Labor market tightness	θ	-0.011	**0.043**	-0.056	-0.010	**0.041**	-0.052
Productivity threshold	ϵ_d	**-0.031**	-0.002	-0.028	**-0.046**	-0.003	-0.043
Average starting wage	$\overline{w_o}$	0.001	**0.026**	-0.026	0.001	**0.025**	-0.024
Average continuing wage	$\overline{w_e}$	0.016	**0.025**	-0.011	0.012	**0.024**	-0.012
Labor cost of starting job	$(1+\tau)\overline{w_o}$	**-0.026**	-0.002	-0.025	**-0.026**	-0.001	-0.024
Labor cost of continuing job	$(1+\tau)\overline{w_e}$	**-0.010**	-0.002	-0.008	**-0.014**	-0.002	-0.012
Budget (%)	B/Y	-0.159	**-0.454**	0.380	-0.263	**-0.419**	0.202

2.4.2 From a welfare perspective

Here, we propose a simple analysis of the welfare effects of each reform scenario. So far, we have analyzed the effects on the main variables describing labor market performance, with a focus on the change in the unemployment rate after implementing the reform. However, the variables move in different directions and with different magnitudes, making it difficult to describe the overall effectiveness of each reform scenario. To address this weakness, we consider an aggregate welfare function $Y = (1-u)\left[\overline{\epsilon} + \int_{\epsilon_d}^{\overline{\epsilon}}(x-\overline{\epsilon})\mathrm{d}G(x)\right] - k\theta u - \delta G(\epsilon_d)(1-u)c$. This corresponds to the aggregate output Y net of the loss component of labor turnover costs, i.e. search costs related to job vacancies $kv = k\theta u$ and firing costs $\delta G(\epsilon_d)(1-u)c$ not used to finance UI[25].

As Figure 2.2 illustrates, the aggregate welfare decreases in the addition scenario as the ER-index increases, more sharply so for ER indexes above 40%. The evolution is different under sector-level bargaining, where welfare evolves non-monotonously, increasing with the ER index at relative low values of the latter but decreasing once the ER index passes above 60%. The mechanism is as follows. The fall in the level of unemployment and the decrease in vacancy costs have a positive effect on welfare. However, the decrease in unemployment also increases total layoff costs because c is not reduced in this scenario. The second effect clearly dominates under firm-level bargaining (mainly because of the large decrease in the unemployment rate), while the two effects offset each other under sector-level bargaining, leading to just a small variation in welfare. In the substitution scenario, aggregate welfare increases under both bargaining regimes. Indeed, the decrease in unemployment (which is similar in both bargaining systems) and the disappearance of dismissal costs (c) have a

[25]The ER-related layoff cost is not taken into account since it funds the unemployment benefits and is therefore not a loss cost.

positive effect on welfare, which is stronger than the negative effect of the increased vacancy costs.

As Figure 2.3 shows, whatever the bargaining regime, the substitution scenario is preferable if the objective is to increase aggregate welfare. One of the main explanations is that firing costs c are a pure waste and therefore substituting them for an ER scheme is always preferable from an aggregate welfare point of view, for a given reduction in the unemployment rate.

Our welfare analysis modifies the recommendations made when the planner's objective is to reduce the unemployment rate as follows. Under firm-level bargaining, while the decrease in unemployment is greatest in the addition scenario, the substitution approach leads to the better outcome in terms of welfare.

Figure 2.2 – Welfare evolution - Addition and substitution scenarios

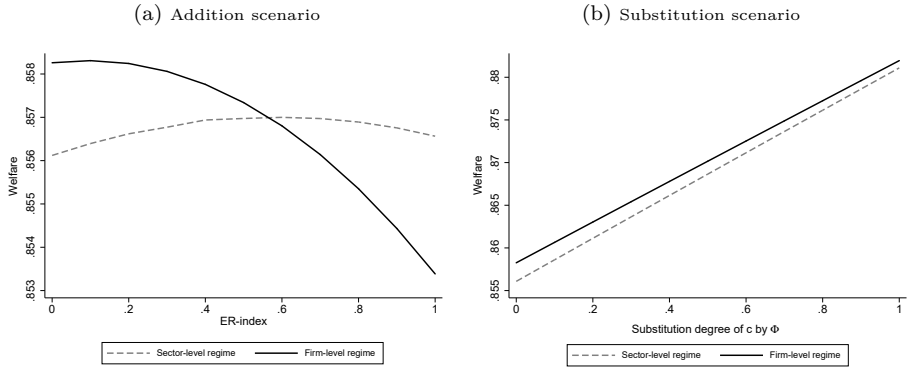
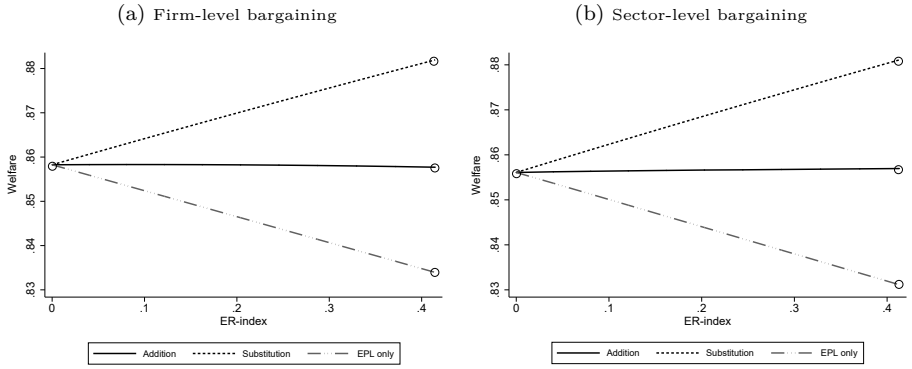


Figure 2.3 – Welfare evolution - Which scenario to recommend?



2.5 Conclusion

Using an equilibrium unemployment model with frictions and endogenous job destruction (Mortensen & Pissarides 1994, 1999), we have highlighted the effects on labor market outcomes of employment protection reforms based on the U.S.

experience-rating system under firm-level and sector-level wage bargaining regimes. Both negotiation regimes allow for Nash bargaining, but with different features. Firm-level bargaining offers internal flexibility, with wages determined on an individual basis and no role for unions. Under sector-level bargaining on the contrary, there is no internal flexibility and trade unions negotiate a common wage with employers that applies to all firms in the sector. We have assessed the effects of ER on labor market outcomes, considering three reform scenarios: (1) an ER tax to fund UI is implemented without relaxing the stringency of existing EPL *('Addition' scenario)*. (2) an ER tax to fund UI is implemented alongside a relaxation of EPL (as advocated by Blanchard & Tirole (2003)) *('Substitution' scenario)*. (3) existing EPL is made more stringent without introducing an ER tax *('EPL only' scenario)*.

Our numerical exercises confirm findings in the existing literature demonstrating that ER is effective in an economy where wage bargaining is decentralized. However, the main contribution of this chapter is to show that ER is also effective when wage bargaining is centralized, involving an industry-wide union and an industry-wide employers' federation, and with extended coverage of workers, as is the case in many Western European countries. More specifically, we outline four findings: (i) introducing ER decreases unemployment under both bargaining regimes; (ii) when wages are bargained at the firm-worker level and the objective is to reduce unemployment, it is preferable to introduce ER without altering existing EPL; (iii) when wages are bargained at the sector-union level, introducing ER while reducing the stringency of existing EPL does better in terms of unemployment reduction; (iv) when the planner's objective is to increase aggregate welfare, the implementation of ER should be accompanied in both bargaining regimes by a relaxation of existing EPL.

From an unemployment perspective, the advantage of the addition strategy under firm-level bargaining comes from the possibility companies have of adjusting wages downward in periods of economic turbulence, shifting part of the increase in separation costs onto workers, meaning that the ER system's positive effect on labor hoarding is not offset by strong hiring disincentives. The compulsory extension of wage agreements under sector-level bargaining prevents such specific wage adjustments in the event of shocks, reducing the magnitude of the positive effects of ER in reform scenarios that lead to an increase in separation costs for employers and giving the advantage to reforms in which ER replaces the existing employment protection system. From a broader perspective, the welfare analysis has the advantage of taking into account turnover costs and makes a clear case for the substitution approach under both bargaining regimes.

Given that industry-level negotiations are predominant in most Western European economies, this analysis suggests that introducing an ER system would be effective in terms of reducing unemployment and increasing welfare. However, policymakers must choose the right reform design by assessing potential interactions with existing EPL and wage bargaining institutions in their economies.

Our work can be extended in several ways. Firstly, for the sake of comparability, we consider that the main difference between the two bargaining regimes is the degree of wage flexibility. In some cases however, sectoral agreements allow for a little flexibility by offering a panel of agreements from which employers and workers can draw (Ibsen & Keune 2018). Thus, including a pay-scale schedule in wage bargaining, as in Cai et al. (2014), could enrich the results. Secondly, we modeled two exclusive bargaining regimes, while in some economies company agreements complement collective agreements set at the sectoral level, sometimes with the possibility of opting out of the latter. Lastly, the analysis of aggregate welfare should be interpreted cautiously because EPL influences technological choices and investments, and therefore the aggregate output (Samaniego 2006, Bartelsman et al. 2016). These induced effects may nuance the results obtained in the addition scenario.

2.6 Appendices

2.6.1 Description of European collective bargaining systems and their economic implications

The model we present in Section 2.2 aims to reflect institutional wage-setting arrangements in many European countries, namely wage bargaining predominantly at the sector level with procedures for extending sectoral agreements to all workers. This is the case in Austria, Belgium, France, Finland, Iceland, Italy, Luxembourg, the Netherlands, Portugal, Slovenia and Spain. This section aims to describe the main features of these arrangements to justify our modeling choices. We also briefly present the main macroeconomic effects of collective bargaining systems to provide a comprehensive overview and outline why it is important to take these systems into account when choosing how to reform other labor market institutions.

The collective bargaining systems in Western European labor markets are characterized by two main features: the predominant level where wage bargaining takes place and the worker coverage rate of collective agreements. Wage negotiations between parties can take place at the firm level, the sector/industry level or the cross-sectoral/national level, and the agreements can be binding for lower level negotiations. In most cases, lower level agreements can only offer more favorable terms for workers[26]. The coverage rate of a negotiated agreement is the percentage of workers whose contract is framed by the agreement out of the total number of workers with a right to bargain. Generally, in countries where wage negotiations take place mainly at the industry level, with binding minimum wages set by type of occupation, the coverage rate exceeds the rate of unionized workers because collective agreements are mandatorily extended to non-organized employers. This is the case in a number of Western European countries, as shown in the Figure 2.4 and the classification in Table 2.7. This contrasts with the situation in more liberal economies, in particular the U.S., where wage bargaining takes place mainly at the firm level and with very low worker coverage.

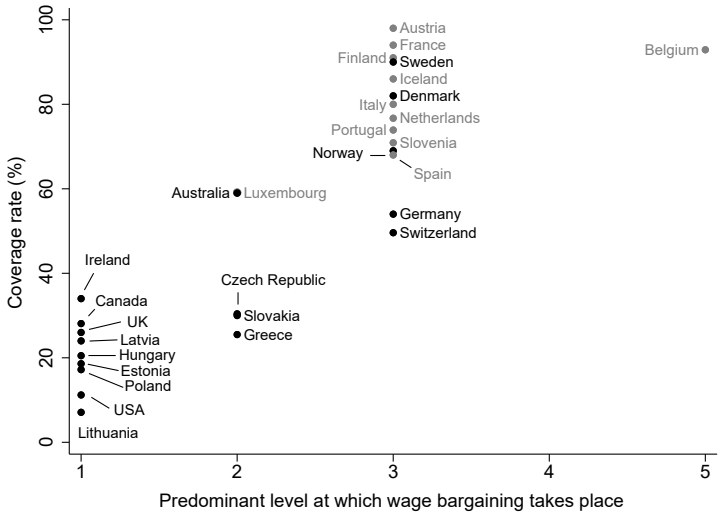
This institutional arrangement for wage negotiations has several economic implications. The extension mechanisms, by setting occupation-specific minimum wages throughout an industry, lead to a compression of the wage distribution[27]. This has positive and negative effects (Villanueva 2015). On the positive side, it reduces wage inequality, and also gender wage gaps at the bottom of the wage distribution. On

[26] Even if some exceptions laid down in the law are allowed in extreme cases.

[27] Wage dispersion is lower in economies with more centralized bargaining structures. See OECD (1997), Aidt & Tzannatos (2002), Rycx (2003), OECD (2004, 2018).

the negative side, it increases labor costs for all covered firms, reducing employment growth, chiefly because the sector-specific minimum wages are not necessarily appropriate for all firms (Martins 2014). As a corollary, this creates wage rigidities that limit the ability of firms to adapt to economic shocks by aligning wages with productivity (Gnocchi et al. 2015, OECD 2016, Izquierdo et al. 2017). Theoretical models predict that if collectively bargained wages are higher because of sector-wide agreements and if they cannot be adjusted to changes in job-specific productivity, this weakens the sector's competitiveness, as reflected by a higher unemployment rate due to more job destruction and less hiring (Jimeno & Thomas 2013). Ronchi & di Mauro (2017) support these theoretical insights and empirical observations by showing that firms' responses to the Great Recession in the EU were shaped by wage negotiation setups: economies with more centralized bargaining systems with high coverage rates because of automatic extension have experienced worse downward wage rigidity, job destructions and falls in profit than have those with decentralized bargaining systems.

Figure 2.4 – Bargaining coverage and level of wage-setting in 2018



Notes: Data from ICTWSS (Version 6.1). The coverage rate (%) corresponds to employees covered by valid collective (wage) bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargain. Wage bargaining takes place:
5 = predominantly at the central level;
4 = between the central and industry levels or alternately between the two;
3 = at the sector or industry level;
2 = between the sector and firm level or alternately between the two;
1 = at the local or firm level.

Table 2.7 – Mandatory extension of collective agreements to non-organized employers (0-3) in 2018

0	1	2	3
Canada	Czech Republic	Australia	Austria
Denmark	Estonia	Netherlands	Belgium
Greece	Germany	Portugal	Finland
Sweden	Hungary	Slovakia	France
UK	Ireland	Slovenia	Iceland
USA	Latvia	Switzerland	Italy
	Lithuania		Luxembourg
	Norway		Spain
	Poland		

Notes: Data from ICTWSS (Version 6.1).
3 = extension is virtually automatic and general;
2 = extension is widespread, but government has discretionary power;
1 = extension is rather exceptional;
0 = no extension mechanism.

Chapter 3

Collective bargaining decentralization and economic growth

This chapter was co-authored with
Isabelle Terraz and Phu Nguyen-Van.

Summary of the chapter

This chapter studies the relationship between the wage collective bargaining system and economic growth for 36 OECD countries over the period 1960-2017. Since the 1980s, many OECD countries have decentralized their collective bargaining systems. Some countries have adopted a disorganized decentralization, by removing the intermediate bargaining level to allow all terms and conditions of employment to be negotiated at the company level. Others have adopted organized decentralization, where bargaining at the company level is framed by collective agreements set at higher bargaining levels. We investigate the effects of these decentralization strategies on economic growth by relying on a growth model augmented with a categorical variable representing collective bargaining systems in terms of centralization. We use a system GMM approach to control for potential endogeneity issues. Our results suggest that organized decentralized bargaining systems with the relaxation of the 'favorability' principle are associated with higher economic growth relative to other systems.

Classification

JEL Classification: J51, O40, O43

Keywords: Economic growth, Collective bargaining, Country-level panel analysis

3.1 Introduction

What effect does the decentralization of collective bargaining have on economic growth? In this chapter, we answer this question by assessing the effects of wage bargaining decentralization on economic growth for OECD countries over the period 1960-2017.

Collective bargaining plays an important role for the regulation of labor markets, since it frames relations between workers and employers regarding the negotiation of wages and other terms of employment. When properly designed, collective bargaining systems should contribute to obtain good employment performance, productivity gains, while ensuring workers purchasing power via higher wages (Eichhorst et al. 2019). For economic reasons (e.g., moderating labor cost) or political considerations (e.g., post-Pinochet Chile, 1980 Turkey military coup), many developed countries have reformed their collective bargaining systems over time, notably with steps towards decentralization since the 1980s (Katz 1993, Visser 2013, Eichhorst et al. 2019). Decentralization can be defined as moving negotiations and decisions over wages and employment terms closer to the individual firm (Visser 2016). However, among countries that have decentralized collective bargaining, two decentralization strategies stand out. Some countries abolished the national or sectoral levels of negotiation in favor of negotiation at company level ('disorganized decentralization'). Others have kept national and/or sectoral levels, which set collective agreements that can be modified - with more or less flexibility - by agreements negotiated within the company ('organized decentralization').[1]

These various decentralization processes have led to heterogeneous collective bargaining systems across developed countries, especially in the level(s) where bargaining takes place (Du Caju et al. 2008). Indeed, for countries that have adopted systems of organized decentralization, the collective bargaining system can be described as a combination between the predominant level of bargaining (e.g. firm level, industry level or national level) and the articulation with possible other levels, in particular the flexibility left to lower levels to opt-out from agreements set at higher levels (Visser 2016).

Recently, questions have been raised about organized decentralized systems and their ability to improve countries' macroeconomic performance. These systems should internalize the macroeconomic constraints while allowing a certain degree of flexibility at the company level to adjust costs, ensuring macroeconomic stability while strengthening the resilience of the labor market. However, relying on survey

[1]The terms "organized decentralization" was introduced by Traxler (1995).

data from European firms, Boeri (2015) argues that when these systems do not leave enough flexibility for firm-level bargaining, they may fail in allowing wages to be adapted to workers' productivity and wage moderation to be implemented in times of recession. Some forms of organized decentralization therefore seems to combine flaws of fully centralized systems with those of fully decentralized systems, leaving ambiguous the dominance of one system over the others in terms of macroeconomic performance. So far, the literature remains inconclusive about the impact of bargaining centralization on macroeconomic performance (see Aidt & Tzannatos (2008) for a review), while the literature on the influence of organized decentralized bargaining systems is very sparse (OECD 2019).

This chapter attempts to fill this gap by analyzing the relationship between collective bargaining systems and economic growth. We focus on economic growth for two main reasons: (1) it is a comprehensive indicator of macroeconomic performance, particularly suited to assess the effects of collective bargaining systems on long-term economic performance (2) it has received little attention in the existing empirical literature on the consequences of collective bargaining centralization, most of the studies focusing on indicators such as (un)employment rate, inflation, or nominal or real wage growth (Aidt & Tzannatos 2008). For this purpose, we rely on an economic growth model augmented with a variable describing collective bargaining systems in terms of bargaining centralization to exploit panel data including 36 OECD countries over the period 1960-2017. We use a standard system GMM approach of Blundell & Bond (1998) to deal with potential endogeneity issues.

The originality of our work is twofold. First, we rely on a panel with many observations, whereas it is a literature that until recently was composed of papers with very few observations and rarely panel data, affecting the reliability of estimates (Aidt & Tzannatos 2008). Second, following recent proposals of collective bargaining systems classification (see, e.g., OECD (2019) and Garnero (2020)), we elaborate a typology of collective bargaining systems according to their centralization. This allows us to assess how decentralization of collective bargaining matters for growth, taking into account the existence of organized decentralization mechanisms.

Our main result shows that organized decentralized bargaining systems with the relaxation of the favorability principle are significantly associated with higher economic growth relative to other systems. This result is consistent across a variety of sensitivity tests regarding the instrumentation strategy in the GMM framework, and when we use an alternative measure for the classification of collective bargaining systems. This alternative measure suggests that the best growth-performing system is when wage bargaining takes place at both cross-sectoral and firm levels, with firm

agreements specifying or deviating from central agreements.

The chapter proceeds as follows. Section 3.2 outlines the literature related to the role of collective bargaining centralization on macroeconomic performance. Section 3.3 provides an overview of the trend towards decentralized collective bargaining in OECD countries since the 1980s. Section 3.4 presents the empirical framework, including data, estimation strategy, results and their discussion. Section 3.5 concludes.

3.2 Related literature

Labor market institutions, including unions and collective bargaining, shape incentives and constraints of economic actors and thus are a potential determinant of economic growth (Acemoglu et al. 2005, Acemoglu 2012). There are few studies that explicitly investigate the link between centralization of collective bargaining and economic growth, while there are many on the link with other indicators of macroeconomic performance, such as inflation, employment, or unemployment. We therefore present an overview of the main findings about the effects of centralization, showing that the results are not unequivocal and need to be completed.

The paper of Calmfors & Driffill (1988) is often considered as a pioneer work for the literature investigating the relationship between centralization of wage setting and macroeconomic performance. The authors argue that the relationship between centralization and macroeconomic performance is depicted by a hump-shaped curve: the centralized (national) or fully decentralized (individual firms) systems perform better than systems with an intermediate level of centralization (sectoral) in term of unemployment. The mechanism is quite intuitive. When unions negotiate to reach a centralized wage agreement, they take into account the macroeconomic implications of their actions and therefore internalize the effects of excessive wage claims on inflation, leading to low real wages. At the opposite, unions negotiating at a decentralized level are aware that the individual firm faces elastic demand (assumption of competitive product markets) and therefore that higher wages are likely to have a negative impact on employment. This high employment-wage elasticity moderates their wage claims, leading to low real wages. In between, unions know that firms can encompass a large part of wage increases into prices since goods in one sector are more substitutable with each other than with those in other sectors. Moreover, unions remain too small to be prompted to internalize the external effects. Therefore, they claim for higher wages, leading to high real wage. This leads to better employment performance for both centralized and decentralized levels compared to

the intermediate level.

This concave and non-monotonous relationship between centralization of wage negotiations and unemployment have been extensively discussed in the literature. Dowrick (1993) shows evidence of the existence of a U form with respect to productivity growth in OECD countries, where intermediate levels of bargaining (industry) are associated with slower productivity growth. OECD (1997) extends Calmfors and Driffill's work by taking into account the 1986-1996 period, but does not found systematic evidence of a U-shaped relationship regarding employment or unemployment. More precisely, they show that countries with centralized and coordinated systems have lower unemployment rates, while regarding inflation, they perform in a similar manner than countries with intermediate systems. OECD (2006), with again an extended period of time (1983-2003), confirms that highly centralized or highly coordinated wage bargaining systems are associated to lower unemployment, suggesting the absence of a U-inverted relationship. Driffill (2006) himself discussed the debates that followed his initial work with Lars Calmfors, admitting that it is necessary to take into account other determinants than bargaining centralization to conclude on the effects on the unemployment, including informal bargaining coordination and union density. From a meta-analysis exercise relying on a large sample of papers, Aidt & Tzannatos (2008) conclude that evidence of such a hump-shaped curve remain weak.

As a result of the decentralization process initiated in the 1980s, many collective bargaining systems, particularly in the European Union, are characterized by a *two-tier* structure. These are structures where firm-level bargaining supplements multi-employer (i.e. industry or nation-wide) agreements. These multi-employer agreements are binding, e.g., by imposing wage floors or other employment conditions that cannot be adjusted within the firm (Boeri 2014, 2015). In theory, these systems should allow wage and employment renegotiation within the firm when a shock occurs, while keeping some coordination between bargaining units and therefore avoid an excessive wage dispersion. If these two characteristics are effectively combined, the system allows for good macroeconomic adjustment to global shocks (coordinated wage adjustment through multi-employer agreements) and microeconomic adjustment (downward adjustment of wages within the firm) when there is a firm-level shock. However, Boeri (2014) shows that actual two-tier structures bring together the disadvantages of fully centralized and fully decentralized systems. Indeed, he presents empirical evidence from European firm-level survey data showing that they do not provide incentive to operate downwards adjustments of wages or hours worked, while reducing the involvement of firms in collective bargaining. For

instance, he shows that at the beginning of the Great Recession (2007-2009), about 90% of employers (on average) indicated constraints to adjust wage downward because of multi-employer collective wage agreements in two-tier bargaining systems as existing in France, Greece, Italy, Spain, and Portugal.

Other recent studies have investigated the effects of these organized decentralized systems. OECD (2019) finds a positive relationship between organized decentralization and employment performance and productivity, compared to other systems. Garnero (2020) relies on an original taxonomy of bargaining systems in terms of centralization and coordination in 36 OECD countries over the period 1980-2015 (the same as in OECD (2019)) to show that coordinated bargaining systems - including organized decentralized ones - are associated to better employment performance than fully decentralized systems.

The conditions for the success of organized decentralized systems is also a topic of discussion. Ibsen & Keune (2018) investigate the organized decentralization process in Germany, Netherlands and Denmark. After noting differences in the flexibility left to negotiation at the firm level, particularly with extensive recourse to opening clauses allowing derogations from superior agreements in Germany, they conclude that two-tier bargaining systems require an articulation that preserves a regulatory function of higher-levels agreements to yield satisfactory outcomes. An important criteria of a successful two-tier system relies on the capacity of higher levels negotiators (trade unions and employer associations) to discipline the lower levels to ensure that they apply decisions took in higher levels agreements (Traxler 2003). In other words, the influence of centralized bargaining on macroeconomic performance depends on the extent to which decentralized bargaining units comply with national or sectoral collective agreements. Yet, Garnero (2018) shows with the Italian example that compliance is not always fully respected: 10% of Italian workers are paid about 20% less than the minimum wage provided for in the collective agreements that concern them. In addition, the renegotiation of agreements at the firm level is mainly done in medium and large companies. For example, Boeri (2014) shows that over the period 2007-2009 in two-tier systems, more than 50% of firms with more than 200 employees had signed firm-level agreements, while only 15% of firms with fewer than 20 workers had done so. This may be due to the non-existence of trade union representation in small firms. In sum, the existing evidence on organized decentralization systems shows that it can deliver good economic performance, but when the scope for renegotiation left at the firm level is significant, well defined and when the higher levels succeed in playing their regulatory role (Boeri 2014, OECD 2019).

As much of the literature presented so far suggests, bargaining systems with organized decentralization must allow flexibility in setting firm agreements. The aim of flexibility is to enhance synchronization between wages and productivity, especially in countries where there are large productivity disparities between regions and industries. Indeed, theory predicts that if wages fail to adjust to changes in local-specific productivity, it pushes less productive firms out of the market, leading to more job destruction and less job creation and thus a higher unemployment rate (Jimeno & Thomas 2013). However, centralized levels of bargaining take less into account the firm-specific needs than decentralized negotiations within the firm, especially labor productivity (OECD 2019). Guimaraes et al. (2017) describe a phenomenon of "upward nominal wage rigidity" with the example of collective bargaining in Portugal: following new wage agreements set at the sectoral level and extended to the whole industry, firms are mandatory to increase wages of their workers to comply with the agreement, which reduces hiring rate and increases separation rate in firms the most affected by these changes. This is a phenomenon that can be all the stronger when the representativeness of employers' associations in sectoral negotiations is weak, since it increases the chances that agreements will not be suitable for all firms (Hijzen & Martins 2016).

By shaping labor market flexibility, centralization of wage bargaining institutions plays an important role in recessionary episodes that economies face (Addison 2016). Using a panel of 19 OECD countries over four decades (1970s-2000s), Gnocchi et al. (2015) show that wage bargaining institutions shape the business cycle: flexible wage bargaining institutions, i.e. wage bargaining systems allowing for wage adjustment at a lower level, imply a lower unemployment volatility. Overall, they show that a flexible wage bargaining process (regarding coordination, government involvement, level of bargaining, and coverage of wage agreements extension) increase the responsiveness of real wages to changes in labor productivity or unemployment, that smooths the business cycle. Boeri & Jimeno (2016) showed that the divergence in unemployment rate developments between EU countries following the Great Recession is partly due to differences in labor market institutions that condition firms' adjustment to shocks, including wage-bargaining institutions, and their interaction with the nature and amplitude of shocks.

3.3 Overview of collective bargaining decentralization

This section provides an overview of the trend towards decentralized collective bargaining in OECD countries since the 1980s, to present a more complete picture of the phenomenon we are analyzing in the chapter.

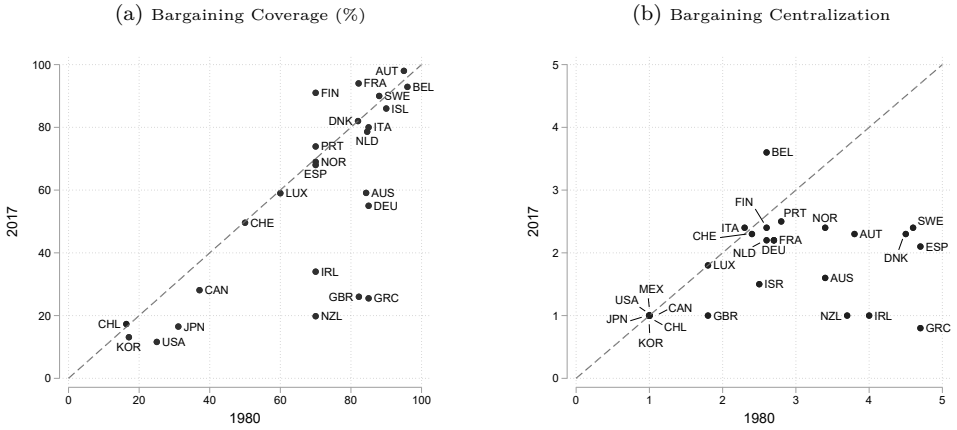
Figure 3.1 depicts changes in the influence of collective bargaining between 1980 and 2017 through two indicators: (i) the bargaining coverage, i.e. percentage of employees covered by a collective agreement among employees with the right to negotiate (ii) the centralization of wage bargaining, i.e. the level at which negotiations take place, knowing that several levels can be involved (national, sectoral, enterprise) with a given hierarchy between these levels. More precisely, all countries below the 45 degree-line have a lower bargaining centralization in 2017 than in 1980.

While there has been a general decline in the coverage of workers and the centralization of bargaining, it remains heterogeneity between countries. The decline in collective bargaining coverage is not widespread across countries. Some OECD countries (Canada, Chile, Japan, Korea, the US) have a coverage rate below 50 percent since 1980. They are countries historically seen as liberal market economies, that is where coordination of economic actors is achieve mostly through the market, with negotiations at the company level (Hall & Soskice 2001). In other OECD countries, collective bargaining historically took place between employers' federations and trade unions at the national or sectoral level, with sometimes a significant government intervention.

However, in many of these countries a process of decentralization of collective bargaining has been undertaken. In New-Zealand, Ireland or Greece, decentralization was strong, since they moved from centralized (sectoral and cross-sectoral) negotiation systems in the 1980s to fully decentralized systems in 2017, i.e. they followed a disorganized decentralization. This is the result of reforms carried out by governments in a quite radical way and and can be associated with disorganized decentralization (Visser 2016). Austria, Denmark, Spain and Sweden also had highly centralized systems in 1980, but went less far in decentralization, moving to sectoral negotiations coupled with common additional enterprise bargaining on wages that specify, or deviate from higher agreements. Norway, which was initially highly centralized, gave more weight to sectoral negotiations, while maintaining national agreements establishing the bargaining framework (which is defined by legislation in most other countries), with negotiations at company level that must respect the principle of favorability (already existing in 1980). Finally, among the countries

where sectoral bargaining was already the norm in 1980 - Australia, Germany, Finland, France, Israel, Netherlands, or Portugal -, have, for the most part, increased the flexibility left to firm-level negotiations.

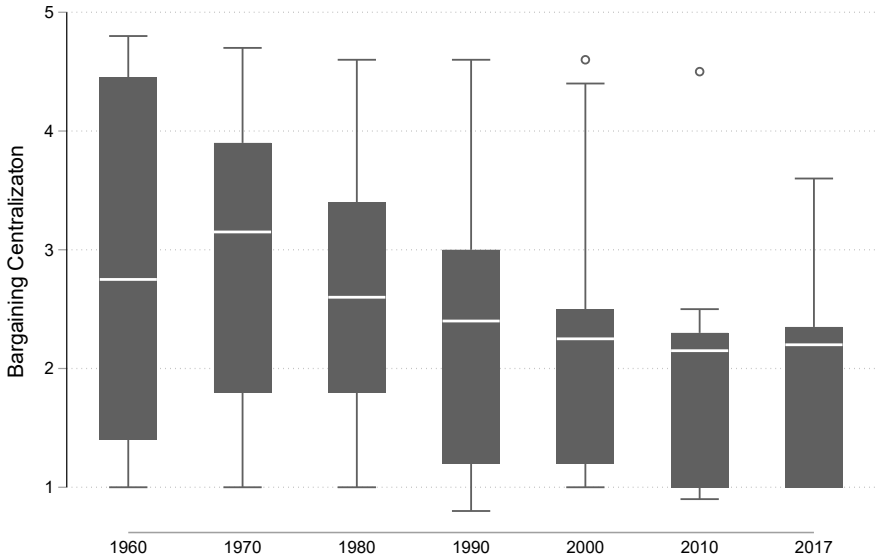
Figure 3.1 – Influence of collective bargaining - 1980 *versus* 2017



Notes: Authors' calculations based on variables 'Adjcov' and 'Bargcent' in ICTWSS database. The centralization of wage bargaining ('Bargcent') corresponds to a composite variable taking into account the predominant level of bargaining, the incidence of additional enterprise bargaining and control of higher levels over these additional bargaining, the 'space' that central or sectoral agreements leave for such additional bargaining to take place, and the degree to which agreements can deviate through the use of 'opening clauses. A higher value for the indicator means more centralization.

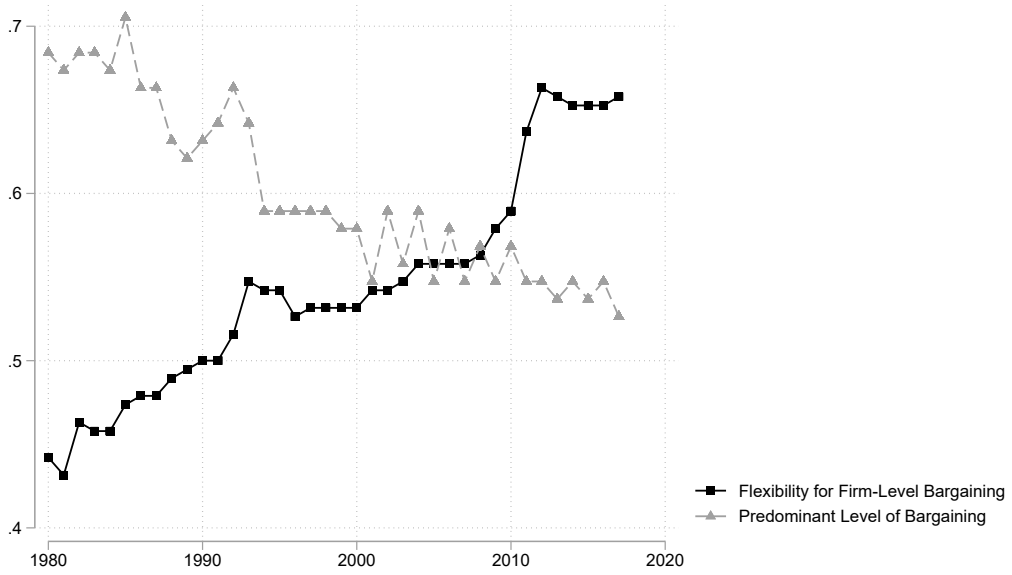
Figure 3.2 makes explicit the trend towards decentralization of wage bargaining by showing how the distribution of wage bargaining centralization between countries evolves over time. The median increased between the 1960s and 1970s, before falling sharply between the 1970s and 1990s, a period when decentralization was strong in several countries. Decentralization then continued, but to a lesser extent. The Great Recession seems to have compelled countries to collectively implement similar decentralization reforms, since the scope of the distribution appears to be strongly reduced in 2010 compared to previous periods. Moreover, the lower bound of the distribution has been lowered, notably via the existence of clauses for renegotiating company agreements during severe recessions, even in countries where firm bargaining is widespread. Over the last few years, several governments have stopped some of the decentralization schemes implemented during the crisis, leading to widen the distribution and increase the median.

Figure 3.2 – Distribution of wage bargaining centralization, over time



Notes: Authors' calculations based on variable 'Bargcent' in ICTWSS database. The centralization of wage bargaining ('Bargcent') corresponds to a composite variable taking into account the predominant level of bargaining, the incidence of additional enterprise bargaining and control of higher levels over these additional bargaining, the 'space' that central or sectoral agreements leave for such additional bargaining to take place, and the degree to which agreements can deviate through the use of 'opening clauses. A higher value for the indicator means more centralization.
Some countries only have observations available from 1980 or present gaps. To avoid a change in distribution due to the incorporation of new countries, we exclude them from the dataset. The countries excluded from this figure are : Chile, Czech Republic, Spain, Estonia, Greece, Hungary, Iceland, Lithuania, Latvia, Mexico, New Zealand, Poland, Portugal, Slovakia, Slovenia, Turkey.

Figure 3.3 – Joint evolution of flexibility for firm-level bargaining and predominant level of bargaining, over time



Notes: Authors' calculations based on variable 'Level', 'rAEB', 'Art', 'FAV', 'WSSA', 'OCG' and 'OCT' in ICTWSS data. The Predominant Level of Bargaining corresponds to the predominant level at which wage bargaining takes place in terms of coverage. It corresponds to the variable LEVEL in Table 3.3 transformed on a scale between 0 and 1, with 1 meaning more centralization. The flexibility for firm-level bargaining corresponds to a composite variable capturing the incidence of additional enterprise bargaining, weighted by the control of unions that signed 'higher order' agreements, the 'hierarchical ordering' of agreements, the tightness of wage norms in central and sectoral agreements, and the incidence of general and temporary opening clauses. A higher value of this indicator means more flexibility for firm-level bargaining. The values corresponds to the average of each indicator across the countries in our panel.
Some countries only have observations available from 1980 or present gaps. To avoid a change in distribution due to the incorporation of new countries, we exclude them from the dataset. The countries excluded from this figure are : Canada, Chile, Czech Republic, Estonia, Hungary, Ireland, Iceland, Japan, Korea, Lithuania, Latvia, Mexico, New Zealand, Poland, Slovakia, Slovenia, Turkey.

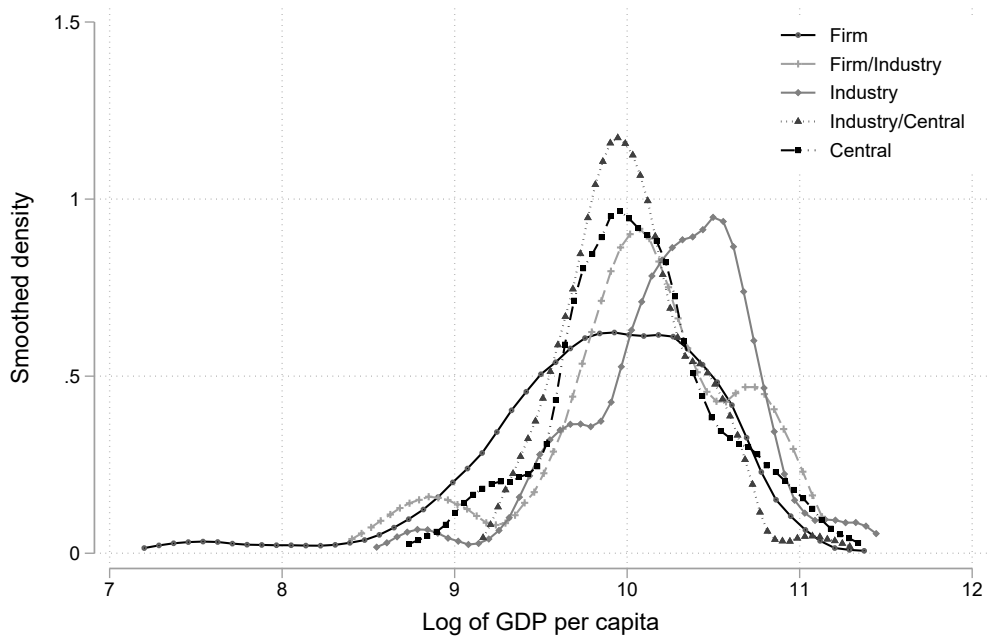
Figure 3.3 compares the evolution of the predominant level of wage bargaining with the evolution of the flexibility for firm-level bargaining, both expressed as an average across OECD countries. Trends reveal the extent of organized decentralization strategies. Indeed, the predominant level of wage determination has been decreasing at an accelerated pace since the mid-1980s and this is accompanied with greater flexibility for firm-level bargaining, where some mechanisms allow for firm-level negotiations supplementing industry level wage setting. We note a significant increase in the flexibility for firm-level bargaining after 2010. This can be explained by the introduction in several European countries (Greece, Portugal, Italy, Spain, France) of the right to lower wages and some employment conditions with respect to floors set in multi-employer agreements as a response to the Great Recession.

For instance, a reform of the Spanish labor market was implemented in 2012, extending the prevalence of firm level collective agreements over higher levels agree-

ments: collective bargaining agreements at the firm level will prevail on agreements set at the sector or regional level on issues related to wages, working time schedules and job organization if reasons include economic, technical, production or organizational objectives. This reform was introduced "to restore competitiveness by aligning labor costs more closely with productivity and allow employers to exploit more easily internal flexibility measures as an alternative to dismissals in the presence of adverse company shocks, thereby preserving jobs and reducing employment losses in bad times." (OECD 2014, p.12).

Figure 3.4 plots a glance at the relationship between the level of collective bargaining and the *per capita* income. The dispersion of *per capita* income is much greater for countries with a predominant level of bargaining at the firm level. Distributions of *per capita* income are tighter in countries where bargaining is predominantly at the industry level, central level or both. Moreover, systems of collective bargaining where negotiation predominantly take place at the industry level have the higher mean in terms of *per capita* income. This figure should be considered as giving an intuition, which we explore in more detail in our empirical analysis.

Figure 3.4 – Distribution of *per capita* income by predominant level of bargaining



Notes: Kernel density estimates. The Predominant Level of Bargaining corresponds to the predominant level at which wage bargaining takes place in terms of coverage. It corresponds to the variable LEVEL in Table 3.3.

3.4 Empirical framework

In this section, we present the data and our methodology to assess the effects of centralization of collective bargaining on economic growth in OECD countries. We begin with a description of the macroeconomic data considered as the main determinants of economic growth in the literature. Then, we detail our classification of collective bargaining systems in terms of centralization, from which we create a categorical variable used in the empirical investigation. We conclude the section by presenting the estimation strategy then the results.

3.4.1 Data

This section provides details on annual data in our panel database. We use two types of variables: *(i)* standard macroeconomic variables in the literature on economic growth, *(ii)* a variable denoting collective bargaining systems in terms of centralization in each country. The time span is 1960-2017. We consider 36 OECD countries: Australia, Austria, Belgium, Canada, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Mexico, Norway, Poland, Portugal, Republic of Korea, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

Data on the main determinants of economic growth — We use data from the Penn World Table (9.1) and the OECD. The dependent variable is the log of GDP *per capita*. Following Mankiw et al. (1992), Caselli et al. (1996), Bassanini & Scarpetta (2002) and Arnold et al. (2011), we choose a list of independent variables related to the driving forces of economic growth. We include the lagged GDP *per capita*, as in the standard Barro growth model, to check for convergence across countries over time towards a common level of real GDP *per capita*. Besides, we add proxies for labor and capital inputs, respectively with investment (gross capital formation, as a share of GDP in 2011 constant prices), capital depreciation and population growth. We also consider the contribution of human capital by an index taking into account average years of schooling and rate of return to education. Finally, we add government consumption (as a share of GDP in 2011 constant prices), exports and imports (summarized in the indicator of trade openness), and inflation variability.[2]

[2]R&D expenditure are often added as a separate variable in the growth equation estimates, due to their time-delayed effects relative to other capital expenditure. However, the recent series of aggregate variables we use do not allow us to separate R&D expenditure from the aggregate

Their main statistical characteristics are summarized in Table 3.1.

Table 3.1 – Summary statistics - Economic variables

Variable	Obs	Mean	SD	Min	Max
GDP per capita (log)	1888	10.00	0.58	7.36	11.34
Investment Expenditure (% of GDP)	1888	22.31	5.13	7.63	44.82
Human Capital Index	1888	2.86	0.53	1.22	3.81
Population growth (%)	1880	0.76	0.82	-2.15	4.23
Depreciation rate (%)	1888	3.70	0.70	2.1	6.97
Inflation (%)	1787	12.08	57.10	-4.48	1281.44
Government Expenditure (% of GDP)	1888	21.11	6.83	8.00	69.91
Trade Openness (%)	1888	62.35	48.81	5.66	395.41

Notes: For a more detailed motivations for this selection of variables and their detailed description, see Appendix 3.6.1, with precise definitions and sources in Table 3.5.

Data on the collective bargaining systems — We complete the database with a a categorical variable called *BargSystem* denoting collective bargaining systems in terms of centralization.

We construct the variable *BargSystem* using data from ICTWSS database (6.1), which is a database that includes variables on institutional characteristics of trade unions, wage setting, state intervention and social pacts for the 36 countries of our panel between 1960 and 2017. We retain four variables, LEVEL, FAV, OCG and OCT, respectively denoting the predominant level of wage bargaining, the favorability principle, the existence of opening clauses in sectoral agreements and temporary opening clauses in any agreements. Their definition are available in Table 3.3. Then, we use these four variables to classify collective bargaining systems into five categories, described in Table 3.2.

"gross capital formation". We therefore tested with older data, whether the failure to take into account R&D expenditure as a separate variable affected the estimates of the growth equation. The results presented in Table 3.8 in Appendix 3.6.3 suggest that is not.

Table 3.2 – Classification of bargaining systems

Value of BargSystem	Bargaining System	Details
1	Fully decentralized system	Bargaining takes place predominantly at the local or firm level, with no role for sectoral agreements.
2	Largely decentralized system	Firm-level bargaining is well implemented, with a marginal role for sectoral agreements.
3	Organized decentralized system through relaxation of favorability principle	National or sectoral agreements exist, but are not binding for firm negotiations, i.e. that the latter are not coerced to offer more favorable conditions to workers.
4	Organized decentralized system through opening clauses	National or sectoral agreements exist and the favorability principle applies, but national or sectoral agreements contain general or temporary opening clauses, leaving flexibility for firm negotiations.
5	Not decentralized system	National or sectoral agreements play an important role and leave little or no flexibility for firm negotiations, if any.

The rationale behind this classification is as following. Visser (2016) proposes to measure the level of collective bargaining decentralization on the basis of two features: (1) The level where most negotiations take place in terms of workers' coverage: centralized, industry/sector, company[3]; (2) The frequency and spread of company agreements, the articulation between sectoral and company bargaining in terms of coercive nature of the agreements, and the existence and use of derogatory clauses (general and/or temporary opening clauses) that leave actual wages to be negotiated at company level. According to this framework, as well as on the classification of decentralization (organized versus disorganized) defined by Traxler (1995), we assume that collective bargaining systems may be either highly decentralized, decentralized in an organized manner, or not decentralized.

Then, we refine this first classification by taking into account the existence of systems where firm-level bargaining is the dominant form, but the sector-level also plays a role. Thus, following the classification in OECD (2019) and Garnero (2020), we consider a system "largely decentralized", which is an intermediate category between highly decentralized systems and organized decentralized systems.

Secondly, according to Ibsen & Keune (2018) and OECD (2019), an organized decentralized system may take two forms:

1. National or sectoral agreements define the general framework, while setting minimum conditions that firm-level negotiations can supplement or derogate from. Firm negotiations are articulated with agreements from higher levels

[3]A bargaining level is considered predominant when it provides two-thirds of the coverage of agreements in a given year.

through the 'favorability' principle, according to which lower level agreements can only improve the standards set in higher level agreements. It can be either strictly applied, or circumscribed to certain elements of employment terms, or it can be reversed by allowing the possibility for firm-level negotiators to set lower standards.

2. National or sectoral agreements define conditions for deviations at lower levels via *opening* or *opt-out* clauses. This is a "controlled" form of derogation (i.e. specified in national or sectoral agreements) via

   (a) opening clauses that allow firm agreements to renegotiate contractual wages or non-wage issues set in higher level agreements;

   (b) temporary opt-out clauses that allow renegotiation or suspension of contractual wages or non-wage issues (from any bargaining level) in the event of economic difficulties.

It is worth noting that opening clauses are the main tool used in countries where the favorability principle is applied and collective agreements are mandatory extended to all workers.

Following these descriptive features, we extend our classification by specifying organized decentralization systems through their modalities, either by the non-existence or inversion of the favorability principle (*organized decentralized system through relaxation of favorability principle*), or the coexistence of the favorability principle and general or temporary opening clauses (*organized decentralized system through opening clauses*).

We separate systems with opening clauses from those with the relaxation of the favorability principle for descriptive aspect, but also for economic reasons. Indeed, there is some recent empirical evidence that the flexibility allowed by opening clauses does not reduce job destruction during recessions. For instance, Brändle & Heinbach (2013) have shown that opening clauses in collective agreements in Germany, which are the main tool of decentralization, do not have a significant effect on job destruction. Also, poorly regulated opening clauses can be used by firms as a tool for downward wage competition. Especially if they are administratively complicated to use (e.g. because of paperwork or worker representation), they will be used mainly by large firms, to the detriment of small ones (OECD 2019).

Details of our classification methodology are provided in Appendix 3.6.2.

Table 3.3 – Description of the collective bargaining variables

Variable name	Notation	Detailed description
Predominant level of wage bargaining	LEVEL	The predominant level at which wage bargaining takes place in terms of coverage. A level is 'predominant' if it accounts for at least two-thirds of the total bargaining coverage rate in a given year. 5 = bargaining predominantly takes place at central or cross-industry level negotiated at lower levels; 4 = intermediate or alternating between central and industry bargaining; 3 = bargaining predominantly takes place at the sector or industry level; 2 = intermediate or alternating between sector and company bargaining; 1 = bargaining predominantly takes place at the local or company level.
Favorability principle	FAV	3 = favourability is inversed, terms in lower level agreements take precedence; 2 = hierarchy between levels is undefined and a matter for the negotiating parties (not fixed in law); 1 = lower-level agreements must by law offer more favorable terms, but derogation is possible under defined conditions; 0 = hierarchy between agreement-levels is strictly applied and defined in law: lower-level agreements can only offer more favourable terms.
Opening clauses in sectoral collective agreements	OCG	2 = sectoral agreements contain opening clauses, allowing the renegotiation of contractual wages at enterprise level; 1 = sectoral agreements contain opening clauses, allowing the renegotiation of contractual non-wage issues (working time, schedules, etc) at enterprise level; 0 = agreements contain no opening clauses.
Temporary (crisis-related) opening clauses in collective agreement.	OCT	1 = agreements (at any level) contain crisis-related opening clauses, defined as temporary changes, renegotiation or suspension of contractual provisions, under defined hardship conditions. 0 = agreements contain no opening clauses.

3.4.2 Estimation strategy

Our main objective is to determine the impact of collective bargaining systems in terms of centralization on economic growth. For this purpose, we conduct cross-country growth regressions based on a specification following theoretical standard neoclassical models of growth dynamics (Durlauf et al. 2009). It includes a convergence factor and the basic determinants of the steady state *per capita* income: accumulation of physical capital, population growth and capital depreciation. We extent this selection of growth determinants with the human capital and a set of other additional macroeconomic variables, listed in Table 3.1. Finally, we augment the growth model by the variable denoting the collective bargaining systems. Our baseline specification is as follows:

$$Y_{i,t} = \alpha Y_{i,t-1} + \beta X_{i,t}^{'} + \gamma BargSystem_{i,t} + \mu_i + \epsilon_{i,t} \tag{3.1}$$

where $Y_{i,t}$ is the log of the GDP per capita of country i in period t, $X_{i,t}$ a vector of independent variables related to main determinants of economic growth for developed countries, and $BargSystem_{i,t}$ the categorical variable denoting collective bargaining systems. μ_i corresponds to the country-specific fixed effects and $\epsilon_{i,t}$ the error term. Finally, we follow the standards in the literature by relying on 5-year non-overlapping time intervals. More precisely, our timing convention implies that the main determinants of economic growth and the variable denoting collective bargaining systems, $X_{i,t}$ and $BargSystem_{i,t}$, are measured as the average (or mode for $BargSystem$) over the period from $t-1$ to $t-5$.

To deal with our dynamic panel specification, we rely on use the system generalized method of moments (GMM) estimator of Blundell & Bond (1998).[4] The latter addresses the endogeneity issue implied by the lagged dependent variable and other potentially endogenous covariates in the right hand side, as well as issues related to omitted variables, error measurement, unobserved panel heterogeneity, and fixed effects. It mitigates endogeneity and isolate causal effects via a system of equations in first differences and in levels, exploiting lags of the regressors as internal instruments. It is particularly suitable to deal with panel dataset with short time dimension (T) and a larger country dimension (N). That is why we artificially

[4]In order to choose between difference or system GMM, we followed *rule-of-thumb* proposed by Blundell et al. (2001): estimating Eq. 3.1 with pooled OLS and fixed-effects approach, considering pooled OLS estimates for the autoregressive coefficent as an upper-bound estimate and the fixed-effects one as a lower bound. Then, we estimated our model by the difference GMM and obtained an estimate coefficient close to the fixed effects one, suggesting that the difference GMM estimate is downward biased because of weak instrumentation and we should prefer a system GMM estimator.

reduce the time series dimension of our sample by using non-overlapping 5-years average/mode for independent variables, also useful to capture long-run relationships and avoid fluctuations of business-cycle frequencies.[5] This structure contributes to mitigate the problems of reverse causality or simultaneity between independent variables and growth. Moreover, to control for common time effects and to counteract a potential non-stationary issue, we include time dummies (Bond et al. 2001). Time dummies are also useful to avoid correlation across individuals in the idiosyncratic disturbances, as advised for dynamic panel models (Roodman 2009*a*).

Two main issues derive from the use of GMM, which are the proliferation of instruments and the serial autocorrelation of errors. The proliferation of instruments, due to the use of instrumental variables in differences and levels but also because their number grows quadratically with T, may create overidentification in the model. Moreover, the finite sample properties of GMM estimators are sensitive to how much moment conditions are used (Windmeijer 2005, Bun & Windmeijer 2010). Thus, following Roodman (2009*a*,*b*), we collapse instrument matrix and limit the number of lags used. To make sure our model involves an adequate number of instruments, we check the Hansen test. Finally, to be sure that the errors are not serially correlated, we check the Arellano and Bond autocorrelation test.

3.4.3 Results

Table 3.4 reports the coefficients associated to the estimation of our growth equation augmented with our variable of interest *BargSystem*, denoting collective bargaining systems in terms of centralization.

The estimated coefficients of main determinants of economic growth are consistent with the literature on growth.[6] Indeed, the coefficient associated to the lag of *per capita* income is significantly positive and lower than one, suggesting a conditional convergence process. Moreover, estimates confirm the importance of human capital in economic growth, as well as price instability (standard deviation of inflation) and public spending, both having a significant and negative effect.

Regarding our variable of interest, *BargSystem*, coefficients associated to its different categories should be read in comparison with the reference category, which is the fully decentralized system. We observe that organized decentralized system through relaxation of favorability principle is associated to a significantly higher growth of *per capita* income relative to other collective bargaining systems denoted

[5] We use the mode for categorical variables related to collective bargaining, which better reflects the changes related to reforms. Indeed, using the average can reduce amplitude of variations.

[6] See Appendix 3.6.1 for a brief discussion on the main determinants of growth in the literature.

in our classification. Our results suggest that countries that have adopted a strategy of organized decentralization of their collective bargaining have seen a positive effect on their economic growth, but only when this is accompanied by flexibility regarding the hierarchy between agreements at different levels, i.e. when favorability principle is inversed or not strictly applied.

Using definition of two-tier bargaining systems provided by Boeri (2015), that are systems where multi-employer agreements (at central, industry or regional level) coexist with firm-level agreements, we can argue that they provide satisfactory outcomes in terms of GDP growth only when higher levels agreements are not binding for firm or local-level agreements. Our results are consistent with Boeri's conclusion that two-tier systems are better able to deliver positive economic results if higher levels agreements do not dominate firm-level ones and that wage floors are set by statutory minimum wages instead of resulting from centralized collective bargaining.

The last four rows of Table 3.4 report *p-values* of the usual GMM diagnostic tests. First, we present *p-values* of the first and second-order serial autocorrelation tests. We can reject the null of AR(1) residuals while we cannot reject the null of AR(2), suggesting that error terms are not serially correlated. Second, we report the *p-value* associated with Hansen's J-statistic to test for over-identifying restrictions. For all specifications presented here, Hansen's test does not reject our choice of instruments, giving support for our instrumentation strategies. Third, we present the *p-value* of difference-in-Hansen tests of exogeneity of instrument, which do not reject the null of exogeneity, i.e. validate instruments used in our framework.

A major concern with GMM estimates is the potential sensitivity of the results to the instrumentation strategy. Table 3.4 columns (2)-(5) represent various specifications in terms of instrumentation strategies to check the sensitivity of our results, by varying restrictions on the maximum number of lags for instruments. The coefficient associated to organized decentralized system through relaxation of favorability principle remains positive and significant at 5 percent level in all the specifications.

We also present another form of robustness check using an alternative variable to denote collective bargaining systems. It is a categorical variable (7 categories) provided by the ICTWSS database and representing the combination of levels at which collective bargaining over wages takes place.[7] Since we do not use this variable when building our categorical variable *BargSystem*, it can be considered as an alternative measure to *BargSystem*. The estimates are reported in Table 3.9 in Appendix 3.6.4. They show that collective bargaining systems where wage bargaining takes place at both cross-sectoral and firm levels, with firm agreements specifying or deviating

[7]More details on the variable are provided in Appendix 3.6.4.

from central agreements, are significantly associated to a higher growth of *per capita* income relative to other systems. This result confirms our main finding, while at the same time clarifying it by highlighting the importance of a flexible articulation between the centralized bargaining level and firm-level bargaining.

Table 3.4 – The effect of collective bargaining system on growth

	(1)		(2)		(3)		(4)		(5)	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Lagged GDP per capita (log)	0.698***	[0.065]	0.741***	[0.052]	0.791***	[0.042]	0.786***	[0.041]	0.816***	[0.035]
Investment	0.391	[0.308]	0.476	[0.287]	0.647***	[0.220]	0.541**	[0.206]	0.548***	[0.182]
Human Capital Index	0.259***	[0.091]	0.219***	[0.078]	0.174**	[0.064]	0.151***	[0.053]	0.113**	[0.047]
Population growth + Depreciation rate	2.169	[2.306]	0.250	[1.580]	-1.049	[1.295]	0.430	[1.468]	-0.390	[1.090]
Inflation	-0.001***	[0.000]	-0.001***	[0.000]	-0.001***	[0.000]	-0.001***	[0.000]	-0.001***	[0.000]
Government expenditure	-0.884***	[0.247]	-0.734***	[0.197]	-0.552***	[0.166]	-0.565***	[0.135]	-0.513***	[0.128]
Trade openness	0.028	[0.038]	0.027	[0.037]	0.028	[0.035]	0.045*	[0.026]	0.047**	[0.022]
2. Largely decentralized system	-0.029	[0.060]	-0.026	[0.060]	-0.029	[0.054]	-0.050	[0.044]	-0.045	[0.030]
3. Organized decentralized system (favorability)	0.119***	[0.043]	0.101**	[0.038]	0.083**	[0.038]	0.095**	[0.042]	0.070**	[0.030]
4. Organized decentralized system (opening clauses)	0.056	[0.052]	0.028	[0.045]	-0.001	[0.041]	0.015	[0.039]	-0.002	[0.030]
5. Not decentralized system	0.025	[0.075]	-0.012	[0.067]	-0.042	[0.059]	-0.020	[0.056]	-0.044	[0.041]
Intercept	2.354***	[0.424]	2.110***	[0.396]	1.755***	[0.302]	1.793***	[0.304]	1.645***	[0.248]
Observations	327		327		327		327		327	
Number of countries	36		36		36		36		36	
Time Dummies	YES		YES		YES		YES		YES	
Number of instruments	33		44		55		66		128	
Max lags for instruments	1		2		3		4		No restriction	
AR(1) (p-value)	0.000		0.000		0.000		0.000		0.000	
AR(2) (p-value)	0.840		0.869		0.749		0.994		0.895	
Hansen test (p-value)	0.086		0.551		0.880		0.999		1.000	
Diff-in-Hansen tests (p-value)	0.113		1.000		1.000		1.000		1.000	

Notes: Dependent variable is log of GDP *per capita*. System GMM estimation. All explanatory variables are considered predetermined except for year dummies. Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.5 Conclusion

Since the 1980s, there has been a trend towards organized decentralization of collective bargaining among developed countries. These systems emerged through the interaction of a strategy of bringing wage and employment determination closer to the firm to make the labor market more flexible and resilient, with resistance from unions that wanted to keep some bargaining terms at higher levels. The macroeconomic effects of such systems are still an open question in the literature, requiring more empirical evidence. In this chapter, we contribute to this literature by investigating the effect of collective bargaining systems on economic growth in OECD countries over a long period from 1960 to 2017.

For this purpose, we propose a classification of collective bargaining systems into 5 categories according to their characteristics in terms of centralization. Using the system-GMM method to take into account the dynamic nature of our growth equation and control for possible endogeneity problems, we show that organized decentralized bargaining systems with the relaxation of the 'favorability' principle are associated with higher economic growth relative to other systems.

Our work could be expanded by investigating the transmission channels between the collective bargaining system and economic growth. For instance, the organization of collective bargaining could influence the ability of the different levels of negotiations to act as rent seekers and thus influence firms' investment. Or another example, they could ensure wage stability, helping to stabilize inflation and firm expectations.

3.6 Appendices

3.6.1 Data description

We specify our economic growth equation by relying on Solow growth model (Solow 1956) augmented by human capital and other drivers highlighted in the literature.

The seminal empirical works of Barro (1991) and Mankiw et al. (1992) confirm the importance of taking into account the physical capital accumulation, the human capital, the share of government consumption in GDP and the population growth. Barro (2003) examines the determinants of economic growth in a panel of 87 developing and developed countries over the period 1965-1985. He finds that economic growth is positively and significantly affected by average number of years of education, investment, rule of law, democracy, trade openness and terms of trade. It is negatively and significantly affected by the initial level of GDP *per capita*, life expectancy, fertility rate, government consumption and inflation rate. Bassanini & Scarpetta (2002) focus on the determinants of economic growth in a panel of OECD countries. They estimate a first baseline regression with the following explanatory variables: lag of GDP *per capita*, physical capital accumulation, human capital stock and population growth. They also estimate extended regressions with the following additional variables: measures of inflation (rate and standard deviation), indicators of government size and financing (ratio of general government current nominal tax and non-tax receipts in nominal GDP, ratio of direct to indirect tax receipts, ratio of government nominal final consumption expenditure to nominal GDP, and ratio of government real fixed capital formation to real GDP), measures of R&D intensity (gross domestic expenditure on R&D as a percentage of GDP, business sector expenditure on R&D as a percentage of GDP, difference between gross domestic expenditure on R&D and business sector expenditure on R&D as a percentage of GDP), indicators measuring financial development (private credit of deposit money banks provided to the private sector as a percentage of GDP, stock market capitalization as a percentage of GDP) and indicators of the exposure of countries to foreign trade (a weighted average of export intensity and import penetration). The variables with significant coefficient in most specifications are the lag of GDP *per capita*, the physical capital accumulation, the human capital stock, the inflation variability (standard deviation), the degree of trade openness, the government consumption, the financial sector development and the R&D activities.

Relying on these results and taking into account data availability and our set of developed countries (OECD countries), we have selected the variables presented in

Table 3.5 to specify our growth equation.

Table 3.5 – Description of usual determinants of economic growth

Variable name	Detailed description	Source
GDP per capita	GDP per capita – constant prices 2011 (millions US dollars) Real GDP using national-accounts growth rates. As argued in PWT 8.0 - User Guide, this indicator is well suited to study (output--based) growth rates over time and across countries as *"Dependent variable in (cross-country) growth regressions"*	PWT 9.1
Human Capital Index	Human capital index based on average years of schooling and rate of return to education (from works of Cohen & Soto (2007), Barro & Lee (2013) and Cohen & Leker (2014). For details, see 'Human capital in PWT 9.0'.	PWT 9.1
Population growth	Population growth in percentage (%)	PWT 9.1
Depreciation rate	Average depreciation rate of the capital stock (%)	PWT 9.1
Investment expenditure (share of GDP)	Ratio *Gross capital formation (private and public) / real GDP* – constant prices 2011 It includes 4 assets: structures (including residential and non-residential), machinery (including computers, communication equipment and assets (including software, other intellectual property other machinery), trans--port equipment and other products, and cultivated assets), following the SNA 2008. For details, see PWT 9.0 - User Guide.	PWT 9.1
Government expenditure (share of GDP)	Ratio *Government final consumption expenditure / real GDP* – constant prices 2011	PWT 9.1
Trade openness	Ratio *(Exports + Imports) / real GDP* – constant prices 2011	PWT 9.1
Inflation	Annual growth rate of prices Inflation is measured by consumer price index (CPI).	OECD

3.6.2 Classification of collective bargaining systems

In order to build the variable *BargSystem*, we use information provided by the ICTWSS database. We focus on the variables described in Table 3.3. Their main statistical characteristics are presented in Table 3.6.

Here are the criteria to be met by the different collective bargaining systems in our typology:

1. **Fully decentralized collective bargaining system**
   - LEVEL = 1 — Predominant level of wage bargaining is the local or company level

2. **Largely decentralized collective bargaining system**
   - LEVEL = 2 — No predominant level of wage bargaining, but a mix between sector and company bargaining
3. **Organized decentralized collective bargaining system through relaxation of favorability principle**
   - LEVEL > 2 — Predominant level of wage bargaining is the sector/industry level, or higher levels
   - FAV > 1 — No hierarchy between higher and lower level agreements (it is up to the negotiating parties to agree), or inversed principle of favorability (lower level agreements may offer less favorable conditions to workers)
4. **Organized decentralized collective bargaining system through opening clauses**
   - LEVEL > 2 — Predominant level of wage bargaining is the sector/industry level, or higher levels
   - FAV < 2 — Lower level agreements can only offer more favorable conditions to workers, or in rare cases and under certain conditions less favorable conditions
   - OCG > 0 — Sectoral agreements contain opening clauses, allowing the renegotiation of contractual wages or non-wage issues at enterprise level
   - OCT = 1 — Any level agreements contain crisis-related opening clauses, allowing temporary changes/suspension of contractual wage or non-wage issues under defined hardship condition (we consider OCT and OCG as substitutable in the definition of derogations via opening clauses)
5. **Not decentralized collective bargaining system**
   - LEVEL > 2 — Predominant level of wage bargaining is the sector/industry level, or higher levels
   - FAV < 2 — Lower level agreements can only offer more favorable conditions to workers, or in rare cases and under certain conditions less favorable conditions
   - OCG = 0 — Sectoral agreements contain no opening clauses
   - OCT = 0 — Sectoral agreements contain no opening clauses

Table 3.6 – Summary statistics - Bargaining system variables

Variable	Obs	Mean	SD	Min	Max
Predominant level of wage bargaining	1761	2.61	1.34	1	5
Favorability principle	1337	0.85	0.87	0	3
Opening clauses in sectoral collective agreements	1374	0.21	0.52	0	2
Temporary opening clauses in collective agreement	1636	0.07	0.26	0	1

Table 3.7 – Details of classification by country and year

BargSystem	Country and year
1	Canada (1960-2017); Chile (1975-2017); Estonia (1991-2017); Hungary (1994-1996/2000-2017); Ireland (1960-1969/1973/1977/1981-1986/2009-2017); Japan (1960-2017); Latvia (1991-2017); Lithuania (1991-2017); Mexico (1980-2017); New Zealand (1992-2017); Poland (1990-2017); Korea (1960-2017); Turkey (1984-2017); United Kingdom (1994-2017); United States (1960-2017)
2	Australia (1996-2017); Czech Republic (1995-2017); Greece (2012-2017); Hungary (1989-1993/1997-1999); Israel (1988-2017); Luxembourg (1960-1976/1978-2017); Slovakia (2002-2017); Turkey (1960-1979); United Kingdom (1987-1993)
3	Denmark (1960-2017); France (2017); Greece (2011); Ireland (1970-1972/1974-1976/1978-1980/1987-2008); Israel (1960-1987); Netherlands (1960-2017); Norway (1960-2017); Spain (2011-2017); United Kingdom (1960-1986)
4	Austria (1984-2017); Belgium (1976/1982/2009-2010); Finland (1993-2017); France (2008-2016); Germany (1984-2017); Greece (2010); Italy (2009-2017); Portugal (2012-2017); Spain (1997-2010); Slovenia (2009-2010); Sweden (2009-2010); Switzerland (1993/1996-2017)
5	Australia (1960-1995); Austria (1960-1983); Belgium (1960-1975/1977-1981/1983-2008/2011-2017); Czech Republic (1991-1994); Finland (1960-1992); France (1960-2007); Germany (1960-1983); Greece (1975-2009); Iceland (1980-2015); Italy (1960-2008); Luxembourg (1977); New Zealand (1960-1991); Portugal (1978-2011); Slovakia (1993-2001); Slovenia (1990-2008/2011-2017); Spain (1977-1996); Sweden (1960-2008/2011-2017); Switzerland (1960-1992/1994-1995)
No data	Chile (1960-1974); Czech Republic (1960-1990); Estonia (1960-1990); Greece (1960-1974); Hungary (1960-1988); Iceland (1960-2017); Latvia (1960-1990); Lithuania (1960-1990); Mexico (1960-1979); New Zealand (1968); Poland (1960-1989); Portugal (1960-1977); Slovakia (1960-1992); Slovenia (1960-1989); Spain(1960-1976); Turkey (1980-1983)

3.6.3 Research and development issue

We assess the importance of estimating our growth equation with R&D as a specific variable, i.e. not included in the variable representing investment expenditure as in our database and therefore in our specification. For this purpose, we rely on the version 8.1 of the Penn World Table database (in this chapter, we use the version 9.1). This earlier version does not include R& D expenditure in gross capital formation but as a specific variable, unlike the current version 9.1. Indeed, the PWT 8.1. relies on the definitions of the 1993 version of the System of National Accounts (SNA), while the PWT 9.1. relies on the 2008 version, which directly includes R& D expenditure in gross capital formation. For the sake of comparability between both databases, we reduce our time span is from 1986 to 2011. Moreover, we use 4-year averages instead of the 5-year averages, to have a sufficiently high T.

Table 3.8 – Consideration of R&D in economic growth specification

	(1)		(2)		(3)	
	PWT 8.1 *without* R&D		PWT 8.1 *with* R&D		PWT 9.1	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Lagged GDP per capita (log)	0.863***	[0.052]	0.896***	[0.053]	0.862***	[0.065]
Investment	1.039***	[0.332]	0.675**	[0.298]	0.761*	[0.427]
Human Capital Index	0.054	[0.061]	0.079	[0.070]	0.061	[0.089]
Population growth + Depreciation rate	0.870	[3.163]	-3.285	[2.567]	-0.961	[3.143]
Inflation (s.d.)	-0.001***	[0.000]	-0.001***	[0.000]	-0.001***	[0.000]
Government expenditure	0.490	[0.445]	0.272	[0.521]	0.279	[0.291]
Trade openness	0.014	[0.029]	0.002	[0.040]	0.024	[0.040]
R&D expenditure			0.014	[0.026]		
Intercept	0.965*	[0.503]	0.893	[0.541]	1.141*	[0.569]
Observations	236		208		236	
Number of countries	36		35		36	
Number of instruments	21		23		21	
Time Dummies	YES		YES		YES	
AR(1) (p-value)	0.003		0.014		0.004	
AR(2) (p-value)	0.394		0.506		0.905	
Hansen test (p-value)	0.098		0.294		0.112	

Notes: Dependent variable is log of GDP *per capita*. System GMM estimation. All explanatory variables are considered predetermined except for year dummies. Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

3.6.4 Alternative measure: combination of bargaining levels

The variable *Combination of Bargaining Levels* is provided by the ICTWSS database. It is a categorical taking the following values:

1. Enterprise (company, or units);
2. Sectoral (separate branches of the economy) and company, with company agreements that specify, or deviate from, sectoral agreements, guidelines or targets;
3. Sectoral (separate branches of the economy), with sectorally determined binding norms or ceilings to be respected by all further agreements;
4. Cross-sectoral (entire economy or private sector) and company, with company agreements that specify/deviate from central agreements;

5. Cross-sectoral (entire economy or private sector), sectoral and company, with company agreements that specify/deviate from sector agreements, and sector agreements that specify/deviate from central agreements;

6. Cross-sectoral (entire economy or private sector) and sectoral, with sectoral agreements that specify, or deviate from, central agreements, guidelines or targets;

7. Cross-sectoral (entire economy or private sector, with centrally determined binding norms or ceilings to be respected by all further agreements.

Table 3.9 – Alternative measure for the effects of collective bargaining system on growth

	(1)		(2)	
	Coef.	S.E.	Coef.	S.E.
Lagged GDP per capita (log)	0.745***	[0.048]	0.843***	[0.032]
Investment	0.598**	[0.293]	0.590***	[0.155]
Human Capital Index	0.201**	[0.076]	0.085**	[0.035]
Population growth + Depreciation rate	1.075	[1.802]	0.486	[1.029]
Inflation	-0.001***	[0.000]	-0.001***	[0.000]
Government expenditure	-0.690***	[0.225]	-0.248**	[0.096]
Trade openness	0.015	[0.032]	0.045**	[0.018]
2. Sectoral and company (specifying or deviating)	0.037	[0.047]	0.002	[0.027]
3. Sectoral (binding)	0.022	[0.054]	-0.003	[0.034]
4. Cross sectoral and company (specifying or deviating)	0.086**	[0.042]	0.065**	[0.024]
5. Cross-sectoral, sectoral and company (specifying or deviating)	0.045	[0.041]	0.022	[0.030]
6. Cross-sectoral and sectoral (specifying or deviating)	0.031	[0.050]	-0.032	[0.031]
7. Cross-sectoral bargaining (binding)	0.071	[0.053]	0.002	[0.029]
Intercept	2.035***	[0.325]	1.341***	[0.250]
Observations	316		316	
Number of countries	35		35	
Time Dummies	YES		YES	
Number of instruments	36		147	
Max lags for instruments	1		No restriction	
AR(1) (p-value)	0.000		0.000	
AR(2) (p-value)	0.765		0.530	
Hansen test (p-value)	0.269		1.000	
Diff-in-Hansen tests (p-value)	0.267		0.899	

Notes: Dependent variable is log of GDP *per capita*. System GMM estimation. All explanatory variables are considered predetermined except for year dummies. Robust standard errors are in brackets. Statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Chapter 4

Reforms of collective bargaining: what timing?

Summary of the chapter

This chapter investigates whether flexibility-enhancing reforms of national collective bargaining systems have positive outcomes in terms of employment and unemployment in the short term, especially when implemented during an economic downturn. The analysis consists in applying local projections to a novel panel database of reforms of collective bargaining institutions in EU countries in the period 2000–2018. There is no evidence that making collective bargaining institutions more flexible during a recession has a positive effect on employment or unemployment in the short term. More specifically, reforms that reduce bargaining coverage have negative short-term effects, particularly on the employment of young people and low-educated workers, and are associated with a decline in the share of temporary jobs. The results do not support the idea that collective bargaining institutions should be reformed during a recession to boost employment.

Classification

JEL Classification: E24, E32, J08, J21, J50

Keywords: Employment, Unemployment, Short-term effects, Labor market, Collective bargaining, reforms

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4.1 Introduction

"The Great Recession has not been kind to collective bargaining."
(Visser 2016, p.3)

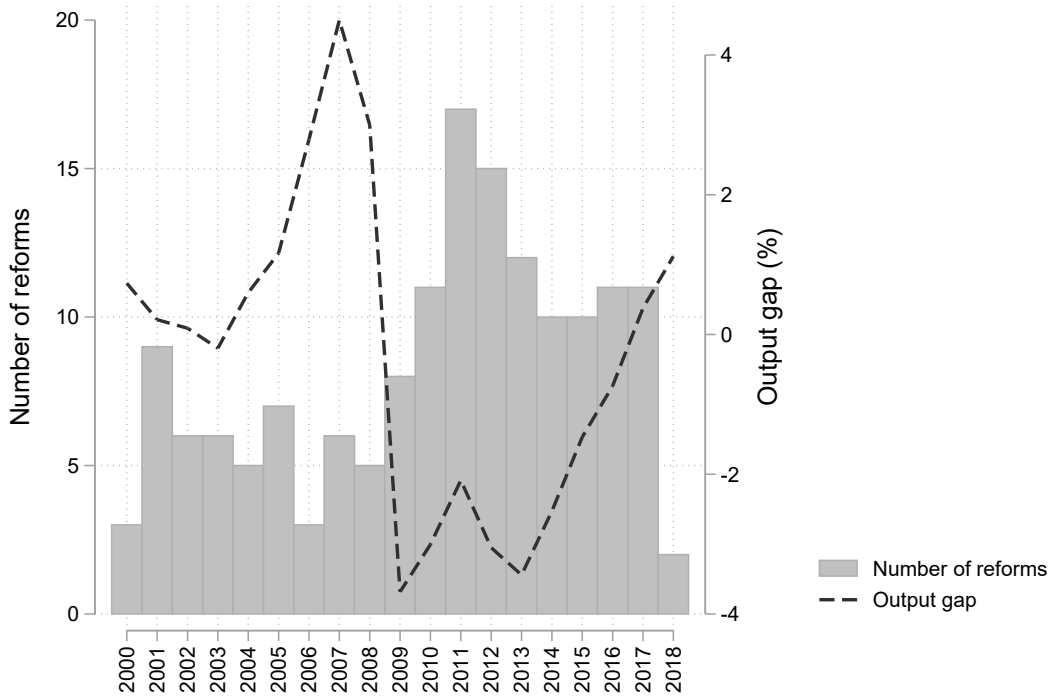
During the Great Recession, many European labor markets were reformed with the aim of maintaining price competitiveness to limit unemployment. The reforms mainly facilitated workforce management, by weakening job protection (facilitating adjustment by quantities) and increasing the flexibility of wages and employment conditions (facilitating price adjustment). Many of these reforms were prioritized by European economic governance (the European Central Bank, International Monetary Fund, European Commission and national governments) both in the European Semester, through their inclusion in the Macroeconomic Imbalance Procedure, and by setting them as conditions for financial assistance (Leonardi & Pedersini 2018).[1] As a result, collective bargaining institutions have undergone major changes, as pointed out by Visser (2016) and illustrated in Figure 4.1. Did these reforms carried out during the economic crisis increase or decrease employment? This chapter provides some evidence to answer this question.

Collective bargaining refers to negotiations between workers' representatives, usually organized in trade unions, and employers on several aspects of employment contracts, such as wages, overtime pay, bonuses, working hours, and health and safety rules in the workplace. Political considerations notwithstanding, the trade unions' main objective is to defend the interests of their members, or of all workers when the agreements they negotiate apply to the whole workforce through administrative extension procedures. This objective leads to a compression of nominal wages and therefore to real wage rigidity (Holden & Wulfsberg 2008, Babecky et al. 2010, Guimaraes et al. 2017). It is this rigidity that motivated the collective bargaining reforms undertaken during the Great Recession, namely *(i)* reducing the scope of collective bargaining (e.g., ending the mandatory extension of collective agreements to non-organized employers, reducing the length of agreements and their validity beyond expiry); *(ii)* decentralizing bargaining by moving it closer to the firm-level (e.g., abolishing the favorability principle, allowing derogation, developing temporary clauses to renegotiate higher-level agreements at a lower level, or simply removing higher levels of bargaining) *(iii)* reducing the influence of trade unions (e.g., restricting the right to strike, tightening representativeness criteria or

[1] One of the goals of the European Semester is to implement '*structural reforms, to create more jobs and growth*' (see. The European Semester: why and how).

limiting the voice of trade unions in national tripartite councils).[2]

Figure 4.1 – Number of collective bargaining reforms by year - over the business cycle



Notes: Author's calculations from LABREF and AMECO data. The output gap corresponds to the difference between actual and potential GDP (at 2010 reference levels) divided by the potential GDP - in %.

It is far from clear however that shifts from inclusive to more exclusive collective bargaining systems are beneficial, especially during economic recessions. Several arguments can be made that changing the structure of collective bargaining during a recession does not necessarily yield the expected outcomes in the short term. As argued by Brandl & Ibsen (2017), the institutional stability of collective bargaining is needed to moderate unit labor cost growth. Their theoretical argument, which motivates my research question, comes from the literature on institutional economics (Knight & Jack 1992, Hall & Soskice 2001, Baccaro & Simoni 2010, Pierson 2011). Changing the way institutions work alters the distribution of power between the main protagonists, who struggle to retain as much of it as possible. These struggles reduce the capacity for collective action and the ability of institutions to function as they should. More specifically, reforms of collective bargaining institutions alter horizontal arrangements (between bargaining units at the same level) and/or vertical arrangements (between different levels of bargaining) and thus alter power relations within the system itself, with workers' representatives given new missions

[2]See Marginson (2015), Koukiadaki & Grimshaw (2016) and Visser (2016).

and responsibilities. As a result, they have only a very vague idea of the potential gains and losses of signing agreements, which sometimes involve significant transaction costs. In the end, workers' representatives struggle to fulfill one of their main roles, which is to reduce uncertainty by negotiating stable agreements that ensure stable labor cost growth, stable agreements being crucial for employers' workforce planning (Zagelmeyer 2005). This argument gains even more weight when placed in perspective with path dependency theories. Indeed, according to neo-institutionalist thinking and historical dependence, wage bargaining institutions should be characterized by inertia, i.e. not change much. However, they are often altered by rather abrupt reforms, sometimes imposed by supranational institutions, which amplify institutional instability and its potentially adverse effects (Marginson 2015).

Taking prevailing economic conditions into account, the timing of the reform is crucial in this context, mainly because trade unions' objectives vary over the business cycle. Unions are more aggressive during recessions, which explains why wage premiums are countercyclical (Freeman & Medoff 1984, Bratsberg & Ragan Jr 2002, Blanchflower & Bryson 2004). As outlined theoretically by Morin (2017), the cyclicality of trade unions' objectives is also driven by the trade-off they face between employment and wages. The trade unions' marginal rate of substitution fluctuates endogenously. When unemployment is low, unions focus on wages because the marginal utility of increasing wages is high. This arbitration remains when a recession hits. However, once the shock has spread and unemployment is high, trade unions focus on employment.

While the literature on the effects of trade unions and collective bargaining on economic performance is extensive, there is still very little evidence on the short-term economic effects of collective bargaining reforms, and even less with the timing of the reforms taken into account (see Addison (2016) for a recent survey). Yet this is a key issue in the shaping of economic policies during economic crises.[3] Exploiting data on reforms of collective bargaining institutions implemented by EU countries since 2000, this chapter evaluates their employment outcomes, depending on whether they were implemented in a period of recession or a period of expansion. The chapter approaches the question from a macroeconomic perspective by analyzing the short-term effects on the employment and unemployment rates — the aggregate values, and by age, level of education and type of contract. For this purpose, I built an original database of all the reforms of national collective bargaining systems

[3]Mario Draghi stressed the need for further research on the evaluation of structural reforms in the euro area, declaring: *"we should evaluate how the design of reforms and the overall policy mix affect the impact of structural policies, especially during a downturn"* - Frankfurt on 18 October 2017, speech at the conference entitled "Structural reforms in the euro area".

carried out between 2000 and 2018 in EU countries and classified them using a typology that allows their effects to be analyzed in detail. I assess their impacts on employment using local projections (LP) (Jordà 2005), an approach that is robust to misspecification, allows for non-linearities and cross-sectional dependence, and addresses uncertainties on possible interactions between the reforms considered and the macroeconomic environment. I explore the sensitivity of the results to alternative empirical strategies, including changes in lags, addition of controls and substitution of the reform variables. Finally, although endogeneity does not seem to be an important issue in this study, I present instrumental variable (IV) estimates as a precaution, using original instruments based on geographically close reforming countries and how minimum wages are set in the domestic country.

The main findings are that reforms to make wage bargaining institutions more flexible should not be introduced during an economic recession, as these types of reforms have a detrimental effect on employment in the first few years after their implementation. The results also suggest that the most affected groups are young and low-educated workers, by both the negative effects of reforms that reduce bargaining coverage and by the positive effects of trade union reforms that reduce their capacity to represent workers. One possible transmission channel for the negative effects is the decline in the share of temporary jobs in total employment.

My work has implications for economic governance in the EU. When policymakers request collective bargaining reforms from national governments, a crucial consideration is the timing of these reforms. Indeed, when they are implemented during an economic downturn, they do not have the expected beneficial effects on employment and may even be detrimental. It might be worth considering a "positive conditionality" mechanism, as suggested by Boeri & Jimeno (2016).

The chapter proceeds as follows. Section 4.2 outlines the literature related to my research question. Section 4.3 presents the data used in the empirical investigation. The empirical methodology is described in Section 4.4. Section 4.5 presents the results. Section 4.6 discusses the issue of endogeneity. Section 4.7 concludes.

4.2 Related literature

This chapter is part of a renewed literature on the impact of structural reforms on the economy and the labor market. Many studies have shown that the characteristics of the tax system, employment protection legislation (EPL), activation policies and wage determination are key determinants of the employment and unemployment rates, with Nickell & Layard (1999) and Blanchard & Wolfers (2000) often seen as

pioneering papers.

From a theoretical standpoint, studies inspired by recent *Mortensen-Pissarides*-style labor market modeling show that labor market deregulation may have short-term negative effects because the layoffs they imply occur immediately, while positive effects on hiring and firm creation take some time to percolate through the system (Cahuc et al. 2014, Cacciatore et al. 2016). Also involved in the effect of labor market reforms is membership of a common currency area, as is the case for several of the EU countries analyzed in this paper. Galí & Monacelli (2016) show that the success of reforms that increase wage flexibility depends on how prices evolve. That is, if in order to increase price competitiveness, wage flexibility is increased through wage bargaining decentralization but prices do not fall accordingly, the result will be a decline in purchasing power and no gain in competitiveness. However, price evolution in the Eurozone is shaped by the European Central Bank (ECB), whose mandate is to ensure price stability throughout the euro area, without regard to the situation in particular countries. This may explain the poor success, at least in the short term, of the adjustment programs imposed on some southern countries. In the same vein, Cacciatore et al. (2016) demonstrate that labor reforms do not lead to deflation and therefore do not require interest rates to be lowered in subsequent years.

While many studies of the influence of collective bargaining and trade unions have investigated the influence of bargaining coverage, bargaining centralization, and unionization – with sometimes conflicting results (see Aidt & Tzannatos (2008) and chapter 3 in OECD (2019) for a complete review), very few analyze the specific effects of reforms of features of collective bargaining systems. Gnocchi et al. (2015) show from a panel of 19 OECD countries that reforms of wage-setting institutions that make the labor market more flexible strengthen the correlation between wages and productivity over the business cycle and increase unemployment volatility. Fiori et al. (2012) theoretically and empirically explore potential synergies between product and labor market reforms and their effects on employment. They find that product market deregulation yields better employment outcomes when workers have strong bargaining powers. The theoretical mechanism is as follows. When workers have little bargaining power, real wages are already at levels conducive to full employment in the labor market, leaving little room for the positive effects of product market reforms, unlike when workers have strong bargaining powers.

Many collective bargaining reforms aim to maintain or enhance firms' competitiveness by allowing employers to use internal flexibility mechanisms, in particular the ability to easily adjust labor costs to productivity changes and thus avoid ex-

ternal flexibility (i.e. dismissals). As summarized by Sánchez et al. (2017), the key channels through which these reforms can rapidly influence activity in "normal times" (i.e. outside of a severe recessions) are (i) an increased responsiveness of wages to local labor and product markets, (ii) a decrease in real wages for low-skilled workers, increasing the corresponding labor demand, but with an ambiguous effect on aggregate disposable income and consumption, (iii) higher markups because of lower labor costs, which for firms dependent on internal financing leads to more investment, (iv) lower prices because of lower labor costs, which increases demand via net exports. These effects promote employment. However, this ignores some of these reforms' other effects. Brandl & Ibsen (2017, 2019) highlight an aspect neglected by most studies, which is the institutional instability that reforms of collective bargaining systems induce. These authors show that institutional changes limit the capacity of these systems to moderate unit labor cost growth in subsequent years, whether or not the reforms are protection-raising or flexibility-enhancing. As major determinants of these adverse effects, they point to the detrimental influence of these changes on trust between negotiating parties and the more uncertain nature of the negotiating environment. Hijzen et al. (2017) also point to these potential adverse effects when they compare existing collective bargaining systems in the Netherlands and Portugal. Both systems are now similar but their outcomes are different: the Portuguese system performs less than the Dutch system. According to the authors, one reason is the pace at which changes, especially the bargaining decentralization, have taken place. In the Netherlands, reforms were gradually implemented in a climate of consensual labor relations (after the Wassenaar agreement of 1982). On the contrary, in Portugal, after a status quo for several decades, they implemented abrupt reforms in response of the Great Recession.

The effect of labor market reforms may also depend on the state of the economy when they are implemented and this is an issue that has been investigated several times recently using LPs. However, these papers focus mainly on EPL reforms, showing that flexibility-enhancing reforms decrease employment when they are implemented during an economic downturn and increase employment during periods of positive growth (Bassanini & Cingano 2019, Duval et al. 2020).

The present chapter addresses some of the same questions as Bouis et al.'s (2012). The latter assesses – among other institutional reforms – the effects of administrative extensions of bargaining agreements, measured by the difference between the coverage rate of workers and union density in OECD country-level panel data over the period 1983–2007. Using a quantitative measure of this "excess" coverage by collective agreements, they consider a strong decline in this indicator to be equiva-

lent to a reform shock. They estimate impulse response functions (IRF) and show that decreases in administrative extensions of collective agreements reduce unemployment and increase employment, especially for the oldest workers. They also present some evidence that reductions in "excess" coverage have beneficial effects on the employment of most workers regardless of whether the economy is in recession or expansion.

Excess coverage as a proxy for administrative extensions of collective agreements is in many ways a good indicator of institutional reforms – in particular because it is a continuous and non-subjective variable – but it has some limitations. Indeed, union density and collective bargaining coverage rates are relatively stable in many countries, and in that sense vary slowly. In addition, when the coverage rate varies, lack of data makes it difficult to know exactly why, e.g. whether it may be due to withdrawal from employers' associations (Villanueva 2015, Visser 2016). Also, during crises prior to the Great Recession, the unionization rate decreased more than bargaining coverage did, thus increasing excess coverage without any relaxation of the procedures for extending agreements (Visser 2016). It therefore seems more appropriate to use excess coverage in a static perspective than to identify reforms. This chapter has two major contributions compared to Bouis et al. (2012). First, it takes into account all the reforms that may concern collective bargaining, not only those related to the bargaining coverage. Second, it identifies the reforms by those enshrined in law and not by quantitative indicators alone.

4.3 Data

In this section I present and justify my choices of data and variables for the empirical analysis. I consider the 28 member states of the European Union, namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom[4]. The time span is 2000-2018.[5]

4.3.1 Macroeconomic aggregates

I use several macroeconomic aggregates. First, the dependent variable is either the employment rate – the proportion of the working age population (15–64 years old) in work - or the unemployment rate – the proportion of the labor force (15–74

[4]the United Kingdom is included as I consider membership as of 2017.
[5]The time period considered is bounded by data availability.

years old) out of work. This choice of dependent variables stems from the research question of how collective bargaining reforms have affected firms' labor adjustments. Indeed, changes in employment/unemployment rates largely reflect firms' hiring and firing decisions from a macroeconomic perspective. Second, I consider several control variables in the different specifications, namely the output gap to control for cyclical fluctuations, the yield curve to capture financial instability, the change in total government expenditure (excluding interest) to control for fiscal stimulus, and the short term interest rate to adjust for monetary policy. Finally, I consider additional control variables to account for changes in the institutional environment of the labor market, including changes in EPL and expenditure related to labor market policies. The latter include expenditures on public employment services and administration, on training, on employment incentives, on sheltered and supported employment, on direct job creation, on start-up incentives, and on early retirement and out-of-work income maintenance and support. Table 4.1 presents the main statistical characteristics of the variables.

Table 4.1 – Summary statistics - Macroeconomic variables

Variable	Obs	Mean	SD	Min	Max
Dependent variables					
Employment rate of 15–64-year-olds (%)	529	64.48	6.30	48.80	77.40
Unemployment rate of 15–74-year-olds (%)	532	8.83	4.35	1.90	27.50
Temporary employment rate (%)	527	11.41	6.72	1.00	33.95
Employment rate of 15–24-year-olds (%)	530	34.47	12.68	11.84	70.02
Employment rate of 25–54-year-olds (%)	530	78.25	5.34	61.04	87.66
Employment rate of 55–64-year-olds (%)	530	45.96	11.87	20.81	78.15
Employment rate of low-educated adults (%)	421	53.12	9.55	26.28	73.13
Employment rate of secondary-educated adults (%)	421	74.06	5.41	54.07	86.74
Employment rate of tertiary-educated adults (%)	421	84.44	3.34	68.54	91.05
Control variables - Baseline specification					
Output gap (%)	531	-0.30	3.40	-15.90	13.86
Yield Curve (%)	500	1.61	2.10	-6.98	21.93
Change in government expenditure (excluding interest) (%)	503	2.62	5.44	-28.03	40.88
Short-term interest rate (%)	521	0.17	2.64	-9.52	25.21
Control variables - Additional					
Strictness of employment protection – Regular contracts	388	2.62	0.51	1.57	4.10
Strictness of employment protection – Temporary contracts	388	1.69	0.91	0.13	4.75
Expenditure on labor market policies (%)	364	1.72	1.00	0.15	4.30

Notes: The detailed definition and source of each variable are provided in Table 4.9.

4.3.2 Tracking reforms of collective bargaining institutions in the European Union

The variable of interest is the implementation of a collective bargaining reform.[6] To build a dataset of reforms of collective bargaining systems in all EU countries between 2000 and 2018, I used three main sources of data. The first is the LABREF database provided by the European Commission. This database, validated by the Economic Policy Committee (EPC) of the Economic and Financial Affairs Council (ECFIN), consists of information collected by the Directorate-General for Economic and Financial Affairs (DG ECFIN) from publicly available national and international sources. It describes reforms in several policy fields: labor taxation, unemployment benefits, other welfare-related benefits, active labor market policies, job protection, early withdrawal, wage-setting, working time and immigration/mobility. I focus on wage-setting reform data, which were initially grouped into 5 categories: statutory minima, social pacts, bipartite or tripartite framework agreements on wage-setting, regulation by the government of the wage bargaining framework (e.g. extension of collective agreements, representativeness of social partners, etc.), public wages, or other. From there, I identified and classified reforms that fall into one of the following three categories:[7]

1. Reduction of the coverage of collective bargaining (e.g., abolition of extension procedures or the period of validity of collective agreements after expiry)

2. Decentralization of bargaining toward the firm-level (e.g., abolition of higher-level (national-, sectoral-level) agreements, new derogation possibilities for company agreements, suspension of the favorability principle)

3. Weakening of trade unions' role in worker representation (e.g., non-unionized workers allowed to negotiate and sign agreements)

Beyond the descriptive value of this classification, the rationale for breaking down reforms into three categories is as follows. First, the aim of these reforms may be to change a single feature of a collective bargaining system. According to Visser (2016), a collective bargaining system is defined by three main features: *(i)* the scope

[6] I focus on reforms written in law. Reforms may be also implemented in more informal ways, such as through informal agreements between trade unions and employer federations or changes in social norms. It is difficult to obtain data on the former, and the latter is a long-term process that is beyond the scope of this study of short-term effects.

[7] These categories are those proposed by Marginson (2015) to classify recent reforms of the collective bargaining systems in Europe, whose common features allow them to be grouped into three categories.

of collective bargaining: its coverage and the mechanisms that extent agreements to non-organized firms and workers; *(ii)* the vertical structure of collective bargaining: multi-employer or single-employer (the level(s) at which bargaining takes place, the relationship between these levels, existence of opening clauses and the involvement or not of non-union bodies in negotiations) *(iii)* horizontal bargaining coordination between bargaining units: how wage policies are synchronized between units via wage norms, guidelines, patterns and recommendations issued by central organizations or the State (e.g. the SMIC in France affects how wage policies are coordinated). Second, some of the macroeconomic effects of the different features of collective bargaining systems are unclear. This is mainly because the effects do not all seem to go in the same direction and sometimes stem from interactions between different components (Aidt & Tzannatos 2008). For instance, high union density is only detrimental to employment if coordination between bargaining units in the labor market is weak. Grouping reforms into categories isolates the effects of each component to ensure they are precisely attributed. It also adds refined evidence to the existing literature on the macroeconomic effects of collective bargaining systems and changes in these systems.

I validated and completed the dataset using the ICTWSS database. The latter provides a large set of variables describing the institutional characteristics of trade unions, wage setting, state intervention and social pacts in 55 countries between 1960 and 2018. I selected categorical variables that characterize elements related to either the coverage of agreements, bargaining centralization or the capacity of trade unions to represent workers[8]. More precisely, I verified whether the reforms identified through the LABREF database match a variation of the relevant categorical variables in the ICTWSS database. Finally, I consulted information provided by ETUI, describing national industrial relations, to check the consistency of the database by ensuring all major reforms had been included. In addition to the above-mentioned categories of reform, I identified what I call national changes, i.e. changes in national minimum wages or social pacts and tripartite agreements. For instance, in Belgium in 2007, the social partners set the wage standard (i.e. the maximum wage increase) for 2007-2008 at 5%. Another example is the introduction of national legislation on equal pay for men and women. These are not reforms of collective bargaining systems, but correspond to decisions that generally arise from these systems, and may influence employment.

I distinguish flexibility-enhancing reforms that decrease the institutional wedge from protection-raising reforms that increase the institutional wedge. The institu-

[8]The variables are described in more detail in the ICTWSS Codebook..

tional wedge is defined by Boeri & Van Ours (2013) as a wedge between labor's marginal productivity and reservation wage of workers, leading to a mismatch between labor supply and labor demand. For each category of reform, I created two binary variables: one to assess whether the reform increased the institutional wedge (1 if it did, 0 otherwise) and the other to assess whether it decreased the institutional wedge (1 if it did, 0 otherwise). This approach translated collective bargaining reforms into six binary variables. For national changes, I similarly created one dummy variable (1 if yes, 0 otherwise). Table 4.2 gives an overview of the classification.

A few points should be noted regarding the construction of the reform dataset. Sometimes, reforms in opposite directions succeed each other a few years apart. This usually happens after elections that lead to a change in political orientation. A telling example is Slovakia, which amended its rules on administrative extensions of collective agreements in 2007 (allowing sectoral collective agreements to be extended without company consent), in 2010 (reinstating the requirement of company consent) and in 2014 (removing the company consent requirement). In rare cases, reforms of collective bargaining systems are a package with aspects that increase the institutional wedge and others that reduce it. When these cases arose, I decided on the general direction of the reform by looking at other elements of reform in the same year. In summary, the normative choices made in creating this reform dataset are evidently subject to discussion. Details of the classification by category, country, year, and change in institutional wedge are provided in Table 4.8.

Table 4.2 – Summary of the reform classification and examples

Category	Description	Examples
Category 1. Modification of collective bargaining coverage	Reforms that modify the coverage of bargaining agreements. Characteristics included: extension mechanisms, continued application of collective agreements after expiration, etc.	- *Wedge increase* **Slovakia (2014)** - Change of extensions rules for collective agreements: employer's consent is no longer a condition for extension. - *Wedge decrease* **Portugal (2011)** - Suspension by the government of close-to-automatic extensions for wage agreements.
Category 2. Modification of bargaining centralization/decentralization	Reforms that modify the horizontal arrangement of the different components of collective bargaining Characteristics included: levels at which bargaining takes place, possibility of derogation, favorability principle, etc.	- *Wedge increase* **Ireland (2015)** - Re-establishment of a sectoral wage setting system through the creation of a framework for Sectoral Employment Orders. - *Wedge decrease* **Greece (2010)** - Introduction of the possibility of derogating from higher level agreements.
Category 3. Modification of union strength	Reforms that change the role of trade unions in worker representation. Characteristics included: right to strike, representativeness criteria, role of trade unions in national competitiveness councils, etc.	-*Wedge increase* **Latvia (2007)** - Formation of trade unions facilitated and membership opened to all potential workers, including students and the unemployed. - *Wedge decrease* **Italy (2013)** - Agreement hardening representativity conditions for trade unions: sectoral collective bargaining only open to those that can justify representation of more than 5% of the workforce (on the basis of membership and election results).

Notes: Based on the author's reform dataset and classification.

The construction of the reform dataset was completed as follows. Since the purpose of the chapter is to assess the reforms' effects on employment depending on their timing relative to the business cycle, I categorized the reforms according to whether they were implemented during "good times" or "bad times". I considered economies to be "slack" (bad times) when the output gap was less than -1 and "non-slack" (good times) otherwise.[9] The distribution of the reforms by category and direction of wedge change and in terms of their timing in the business cycle is reported in Table 4.3.

[9]The results are qualitatively similar for thresholds of 0 and -0.5 to differentiate "good times" and "bad times". They are available on request.

Table 4.3 – Distribution of reforms

	Category 1	Category 2	Category 3
	Modification of bargaining coverage	Modification of bargaining centralization	Modification of union strength
Total	55	46	55
Wedge increasing	34	11	27
- Good times	19	7	19
- Bad times	15	4	8
Wedge decreasing	21	35	28
- Good times	7	11	11
- Bad times	14	24	17

Notes: Based on the author's reform dataset and classification.

4.4 Empirical methodology

In this section, I present the methodology I use to assess the dynamic macroeconomic effects of flexibility-enhancing reforms of collective bargaining systems depending on the state of the economy in the business cycle. I analyzed the new dataset of country-level reforms of collective bargaining institutions covering EU countries over the period 2000-2018 using local projections (LPs) (Jordà 2005). Local projections are a sequence of regressions of the dependent variable shifted several steps ahead, yielding an IRF representing the evolution of a macro variable following structural shocks. I explain the motivations for using LPs to address the research question below. I then present the baseline specification and the subgroup specifications.

First of all, as is common in macroeconomics, analyzing the effects of structural reforms presents an identification challenge (Nakamura & Steinsson 2018). Collective bargaining systems are not exogenous and not randomized between countries. They are the result of social preferences and norms with specific historical paths and are regularly modified through reforms, implemented before/during/after cyclical economic fluctuations and accompanied by demand-driven stimulus trough expansionary fiscal and monetary policies. It is therefore difficult to know if a change in the employment rate stems from these numerous factors or a given reform. The LP method is convenient for including multiple control variables and therefore allows the various employment-affecting factors acting in parallel to the reforms to be controlled for.

There may be nonlinearities or threshold effects in the way collective bargaining reforms affect employment outcomes. This may be due, for instance, to interactions between collective bargaining and other features of the labor market, such as employment protection, minimum wages and unemployment insurance. Indeed, OECD (2004) has pointed out that "the impact of the organization of collective bargaining

on labor market performance appears to be contingent upon other institutional or policy factors and these interactions need to be clarified in order to provide robust policy advice".

Another challenge is to properly identify reforms and their implementation date, which may be later than their inclusion in legislative texts. This challenge is made harder by differences between *de jure* and *de facto* practices: the letter of the law is not necessarily applied to the letter. Collective bargaining reforms may also take time to implement because they often come at the end of a collective agreement or apply only from the following round of works council elections onward. This is why estimating the dynamic effects of a reform over subsequent years, as LP does, is crucial.

Finally, another method that is used to analyse the propagation of structural shocks is structural vector autoregression (SVAR) (Sims 1980). The conventional wisdom is that SVAR is more efficient and LP is more robust to misspecification, but requires a measure of the shock. I chose LP for this analysis as state-dependence is easily incorporated (useful to account for differences between periods of expansion and recession) and the approach is more robust to misspecification because the coefficients of the IRF are estimated directly for each time horizon and not recursively[10].

4.4.1 Main specifications

Baseline specification — The main objective is to assess how reforms of collective bargaining systems affect the employment rate and the unemployment rate in the short term at the country level. Using Jordà's (2005) method, LPs are performed from year 0, when the collective bargaining reform is implemented, and employment effects are observed from year 1 to year 5. The baseline LP specification is:

$$Y_{i,t+h} = \theta_h CBR_{i,t} + X'_{i,t}\varphi_h + \gamma_i + \gamma_t + \varepsilon_{i,t+h} \tag{4.1}$$

for $h = 1, ..., 5$ and where $Y_{i,t+h} = y_{i,t+h} - y_{i,t}$ with $y_{i,t}$ corresponding either to the employment rate or the unemployment rate - depending on the specification used - in country i and year t. The reform variable, $CBR_{i,t}$, is 0 if no reform has been implemented, 1 otherwise. $X_{i,t}$ is a vector of control variables, including two lags of the change in employment or unemployment, two lags of dummies representing

[10]While Ramey (2016) argues that the two approaches can lead to different conclusions when applied to the same problem, Plagborg-Møller & Wolf (2019) show that under certain conditions, linear LPs and SVARs estimate the same IRF for population parameters.

collective bargaining reforms implemented in previous years, the current and lagged output gap (control for cyclical fluctuations), the current and lagged yield curve (control for financial instability), a dummy representing national changes in minimum wage agreements/legislation during the year or the previous year, and finally, membership of the euro area. γ_i and γ_t are the fixed effects for country and year, respectively. $\varepsilon_{i,t+h}$ is an error term. The number of lags was chosen based on the Akaike information criterion (AIC) and the Bayesian information criterion (BIC).

The parameter of interest is θ_h, which quantifies the impact of collective bargaining reforms on the cumulative change in the employment (or unemployment) rate at each year horizon from year 1 ($h = 1$), which is assumed to be the year in which the first effects of the reforms can be observed. Equation 4.1 is estimated via a fixed effects estimator that accounts for heteroscedasticity by clustering at the country-level. (Breusch-Pagan/Cook-Weisberg testing for heteroscedasticity strongly rejected the null of constant variance.)

Interaction with the Business Cycle — I consider the economy to be "slack" (bad times) when the output gap is less than -1 and "not slack" (good times) otherwise. The distribution of reforms by category and direction of wedge change according to their positioning in the business cycle is harmonious, as shown in the table Table 4.3. Incorporating the LP specification to account for state dependence, I consider the following regression model:

$$Y_{i,t+h} = \theta_{1h} CBR_{i,t} \times slack_{i,t} + \theta_{2h} CBR_{i,t} \times (1 - slack_{i,t}) + X'_{i,t}\varphi_h + \gamma_i + \gamma_t + \varepsilon_{i,t+h} \quad (4.2)$$

where *slack* is a variable indicating the state of the economy with respect to the business cycle, with $slack = 1$ in "bad times" and $slack = 0$ in "good times".

4.4.2 Subgroup specifications

Changes in aggregate employment rates may mask heterogeneous variations in population subgroups, divided for instance by age, level of education, or job status (permanent vs. temporary) (Cahuc et al. 2014). Boeri et al. (2015) note that the effects of minimum wage increases or changes in bargaining coverage can differ between population groups, being particularly detrimental for low-productivity workers – i.e. young and unskilled workers – but beneficial for more senior workers. Moreover, young and low-skilled workers are more likely to be on temporary con-

tracts (ter Weel 2018).[11] Arguably also, firms' first workforce adjustment strategy when facing institutional instability is to not renew temporary contracts and freeze their hiring plans.

For all these reasons, I analyze the effects of the reforms on components of the aggregate employment rate: the share of temporary contracts in total employment, the employment rates by age (15–24, 25–54 and 55–64 years), and education-level (low, secondary and tertiary).[12]

This exercise provides evidence as to whether collective bargaining reforms affect certain categories of workers more strongly than others. The specifications are similar to those of Eq. (4.1) (without interaction with the business cycle) and Eq. (4.2) (interaction with the business cycle), with some modifications:

(i) $y_{i,t}$ corresponds to the employment rate of the subgroup considered in the analysis – i.e. either the temporarily employed, 15–24-year-olds, 25–54-year-olds, 55–64-year-olds, the low-educated, the secondary-educated, or the tertiary-educated – in country i and year t.

(ii) $X_{i,t}$ is supplemented by two additional control variables which represent the strictness of employment protection for regular contracts and the strictness of employment protection for temporary contracts. This accounts for the fact that, for example, governments often reduce constraints on the use of temporary jobs in order to boost youth employment (OECD 2006). More generally, fixed-term employment is replaced by permanent employment when protection of the latter is loosened (Cahuc et al. 2016).

(iii) When the dependent variable is the rate of temporary employment, I add the employment rate of 15–64-year-olds as an explanatory variable, to account for size effects related to the proportion of workers in the population.

4.5 Results

The results obtained on the transitory employment effects of collective bargaining reforms are first presented at the aggregate level, and then for the different subgroups, i.e., by type of contract, age and level of education.

[11] See also the OECD - Temporary Employment data.
[12] As imperfect proxies for seniority and for skills, respectively.

4.5.1 Main results

Figure 4.2 shows the cumulative IRF of the employment rate to the implementation of collective bargaining reforms, with 90% confidence bands. It shows that reforms of collective bargaining systems have mixed effects on the employment rate in the short-run. The first row of IRFs illustrates the effects of the reforms without taking timing into account. The bottom rows show what the effects are when interactions with the business cycle are accounted for. Figure 4.3 presents the results of a similar exercise but investigating changes in the unemployment rate.[13] The estimates are listed in Table 4.10 and Table 4.11.

No interaction with the business cycle — Implementing a reform that decreases bargaining coverage *(category 1)* has statistically significant negative effect on employment in the first two years after the reform, with a decrease of up to 0.94 percentage points (pp) in the employment rate compared with a no reform scenario [Fig. 4.2a]. However, reforms that decentralize negotiations closer to the firm-level *(category 2)* do not have a significant effect on the employment rate in the first five years after their implementation [Fig. 4.2b]. Conversely, reforms that reduce trade unions' ability to represent workers *(category 3)* have a statistically significant positive effect on employment of up to 0.59 pp in the first two years after implementation [Fig. 4.2c]. The results for the unemployment rate point in the same direction: reforms that reduce bargaining coverage *(category 1)* increase unemployment in the following year [Fig. 4.3a], while reforms that weaken unions reduce unemployment [Fig. 4.3c]. In addition however, the unemployment rate decreases significantly in the medium term – i.e. 4–5 years after implementation – when the reform restricts bargaining coverage *(category 1)* [Fig. 4.3a].

Interaction with the business cycle — Reforms do not have the same effect depending on the prevailing economic climate when they are implemented. The negative effect of lowering bargaining coverage *(category 1)* exists only when the reform is implemented during "bad times" [Fig. 4.2a]. On the contrary, weakening unions by altering their capacity to represent workers *(category 3)* only has a beneficial short-term effect on employment in "good times" [Fig. 4.2c]. Analysis of the unemployment rate reveals that reforms that reduce bargaining coverage *(category 1)* increase unemployment in the following year only in 'bad times', while the positive medium-term effect is observed regardless of the timing of the reform [Fig. 4.3a].

[13]The employment rate and the unemployment rate are correlated aggregates but differ in the way they are constructed and in what they define. The state of the labor market is often better reflected by the employment rate because its measurement is less biased by possible underlying mechanisms, such as unemployment registration procedures and the precise criteria used to define "unemployment" in official statistics.

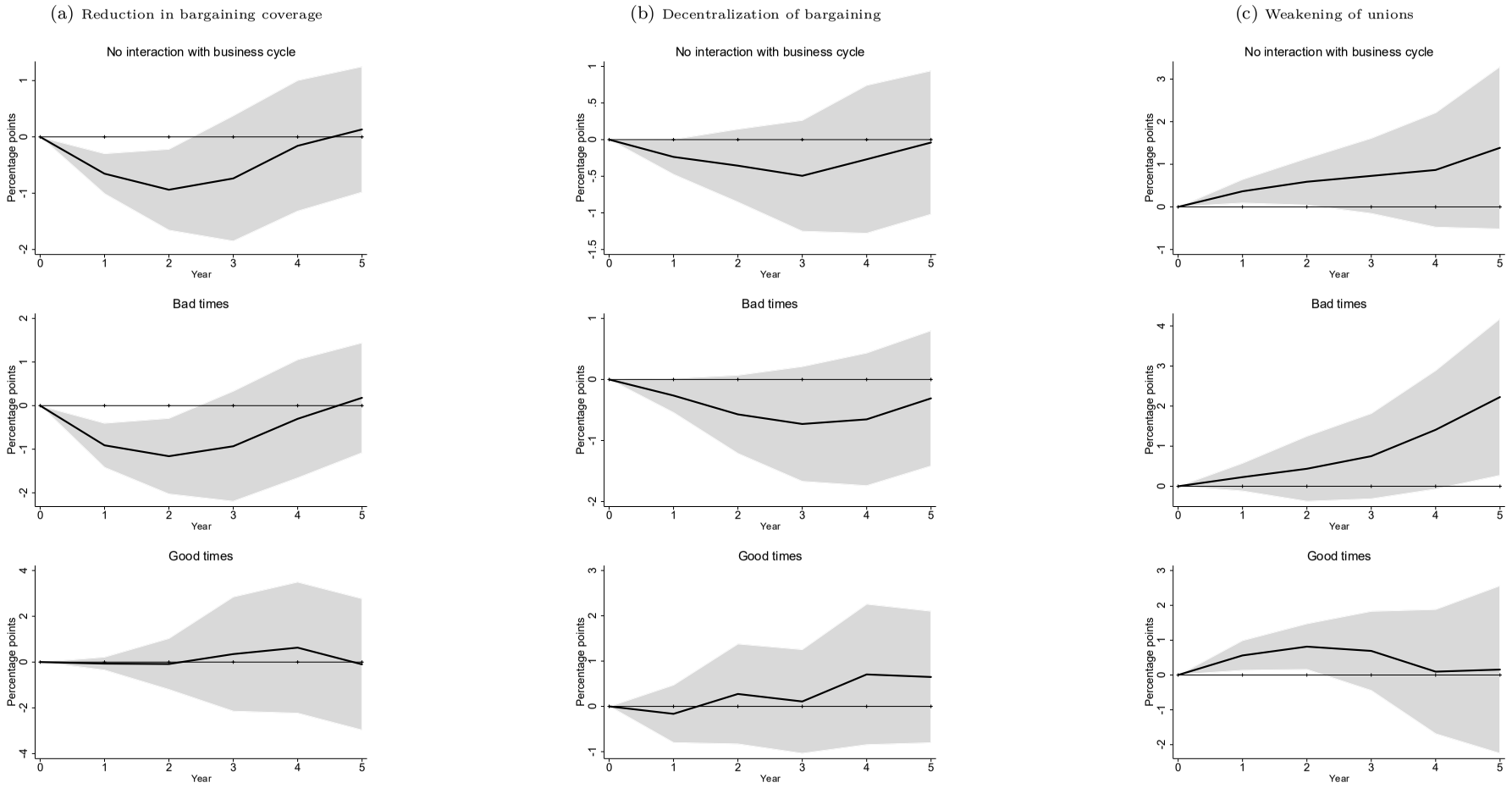
Taken together, these results suggest that reforming collective bargaining in times of economic recession does not boost employment, at least in the short term. It may even have a negative effect in the very short-term, if the reform reduces the coverage of workers by collective agreements. While procedures that extend coverage are detrimental to employment growth and are likely to have accentuated the increase in unemployment following the global financial crisis, as shown by Martins (2014), the results presented here suggest that repealing them during a recession has a negative impact on aggregate employment in the very short term. The effect on the unemployment rate is more ambiguous: a rise in the very short term followed by a fall a few years after the reform. Nevertheless, these results do not contradict the theoretical literature on the short-term negative effects of structural reforms Cahuc et al. (2014), Boeri et al. (2015), although they do diverge from Bouis et al.'s 2012 findings of a positive short term effect of reductions in "excess" coverage.

The findings related to the baseline specification shown in Figure 4.2 and Figure 4.3 should be interpreted with caution, mainly because the estimated effects on (un)-employment may be partly those of other reforms carried out at the same time. Specification and sensitivity checks are presented in Appendix 4.8.5.

A first check is to include potentially influential parameters as control variables. Indeed, collective bargaining was not the only labor market institution reformed during the period considered. National EPLs were modified and governments introduced or withdrew certain employment policies (e.g., policies to facilitate employment of women and members of disadvantaged groups). There is a large body of evidence that these changes affected employment (see Boeri et al. (2015) for a literature review). This is controlled for by adding three variables: changes in total public expenditure on labor market policies, changes in indexes of the strictness of employment protection regarding individual and collective dismissals (for regular contracts) and temporary contracts.[14] The main results on the changes in the employment rate are robust to the inclusion of these controls. With this specification furthermore, reforms introduced in "good times" that reduce bargaining coverage now seem to have a detrimental effect on employment, but with a somewhat longer time lag, i.e. only from three years after the reform. These results are presented in Figure 4.11. For the unemployment rate, the main results are similarly robust to the addition of the control variables. However it seems that the result for the effect of a decline in bargaining coverage only holds in "bad times", with unemployment increasing in the very short term and then decreasing after five years. Reforms that weaken unions reduce the unemployment rate in the very short term, regardless

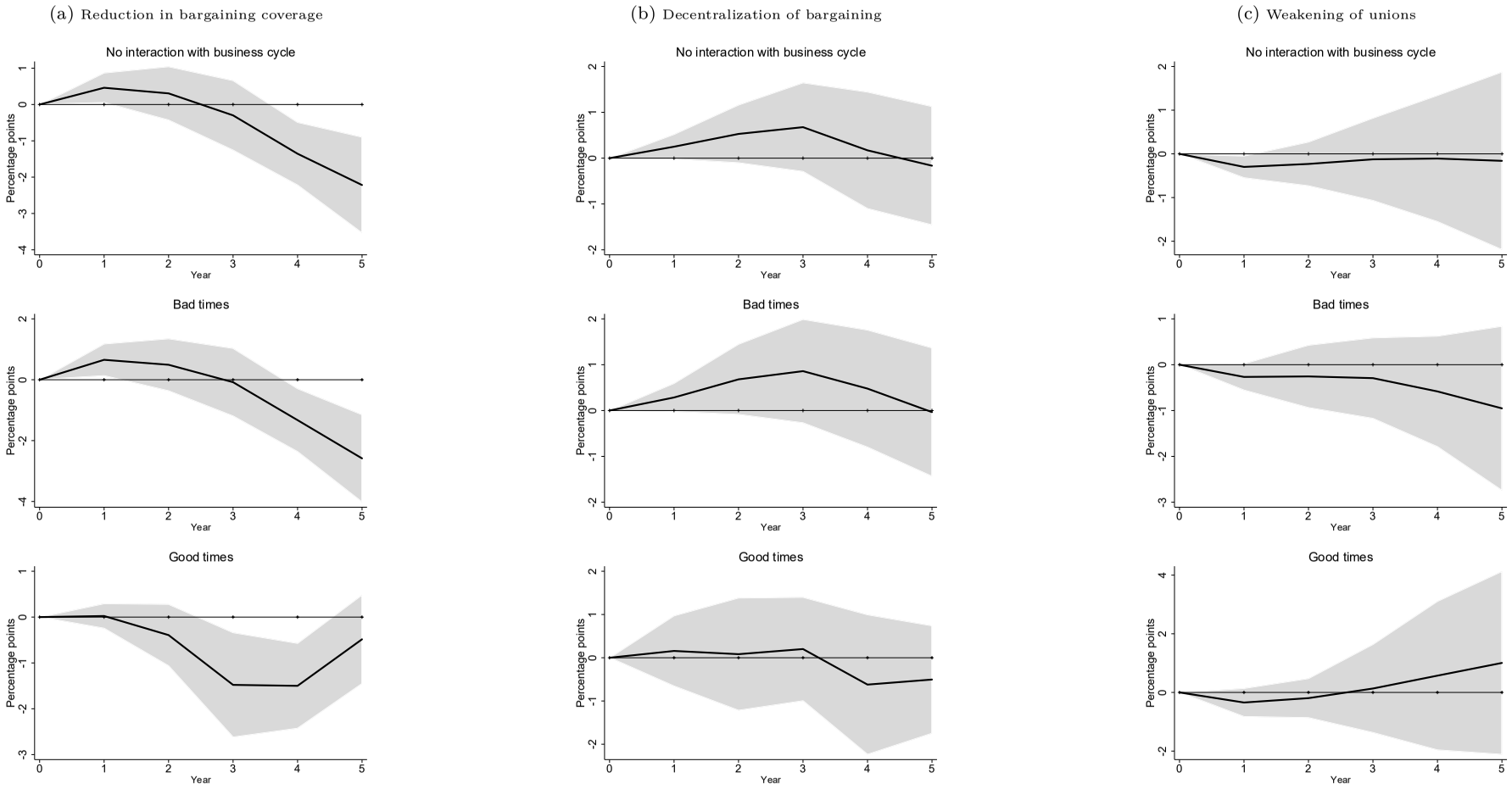
[14] See Table 4.9 for details.

Figure 4.2 – Impact of CB reforms that decrease the institutional wedge on aggregate employment



Notes: The figures show the cumulative impulse responses of the employment rate of 15–64-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1). The corresponding estimates are listed in Table 4.10.

Figure 4.3 – Impact of CB reforms that decrease the institutional wedge on aggregate unemployment



Notes: The figures show the cumulative impulse responses of the unemployment rate of 15–74-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show effects on unemployment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on unemployment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1). The corresponding estimates are listed in Table 4.11.

of when in the business cycle they are implemented. The results are presented in Figure 4.12.

A second check is to assess the sensitivity to the number of lags. Although the baseline specification includes two lags, in accordance with the AIC and BIC, it is important to check that the results do not disappear when the number of lags is changed. I therefore present the estimates of the modified baseline specification with 1 or 3 lags. The results for the employment rate are unchanged, but for the unemployment rate, the differences highlighted are no longer statistically significant. The results are presented in Figure 4.20 to Figure 4.23.

A final check is to replace the binary variables representing the collective bargaining reforms with three variable indicators from the ICTWSS database: a categorical variable defining mandatory extension of collective agreements to non-organized employers (as a proxy for reforms that modify bargaining coverage), an index measuring bargaining centralization (as a proxy for reforms that modify bargaining centralization) and a summary measure of the formal authority of unions in setting wages (as a proxy for reforms that modify union strength).[15] An advantage of this final check is that variation in the indicators also provides information on the intensity of the reforms: a larger variation in the indicator means a more substantial change in the collective bargaining institution. The main results for the employment rate are robust to the use of these indicators as a proxy for reforms. These are presented in Figure 4.38. However, the unemployment results do not hold when these indicators are used. These results are presented in Figure 4.39.

Other social norms and policies relating to education or retirement are also likely to affect the employment and unemployment rates, but I consider them to be fairly stable over time, at least over the rather short period considered in this chapter, and are therefore captured by the country fixed effects.

4.5.2 Subgroup results

Temporary Employment — Table 4.4 provides estimates of the impact of collective bargaining reforms on the share of temporary employment in total dependent employment. Reforms that reduce bargaining coverage *(category 1)* have a negative effect on the share of temporary jobs in the short term, especially between the second and fourth year after the reform, regardless of whether the reform is launched in "bad times" or "good times". This result may be consistent with the hypothesis that the institutional instability associated with this type of reform freezes hiring, since in many countries with pronounced duality in the labor market, most hirings

[15] All of these variables are defined more precisely in the ICTWSS Codebook.

are on temporary contracts. However, reforms that decentralize collective bargaining *(category 2)* or reduce the strength of trade unions *(category 3)* do not have a significant effect on temporary employment.

Employment by Age Group — Table 4.5 brings together three subtables, each of which presents the estimated effects of a given type of collective bargaining reform on the employment rate by age group. Table 4.5a shows that the negative employment effects of reforms that reduce bargaining coverage *(category 1)* are mainly felt by young workers (employment rate of 15–24-year-olds). Table 4.5b shows that decentralizing bargaining *(category 2)* has no significant effect in any age group. Table 4.5c presents estimates suggesting that the positive short-term effects of reforms that weaken unions *(category 3)* are concentrated in 15–54-year-olds, but do not benefit older workers. This may be because older workers tend to be more unionized than younger workers (Schnabel 2013), and are therefore less likely to benefit from reforms that reduce the ability of unions to represent workers. However, this is only a tentative interpretation as the results here are not conclusive. This positive effect of reduced trade union involvement in wage-setting is in keeping with Bertola et al.'s 2007 findings that countries with influential trade unions have lower employment rates for young workers.

Employment by Education-Level — Table 4.6 presents the results in terms of levels of education. Table 4.6a shows that reforms that reduce bargaining coverage *(category 1)* affect all types of workers in the short run, but more or less intensely: low-educated workers are the most strongly affected, followed by the tertiary-level educated, and to a lesser extent the secondary-level educated. Table 4.6b shows that reforms that decentralize bargaining closer to the firm level have no significant effect *(category 2)*, while Table 4.6c shows that reforms that reduce the ability of trade unions to represent workers *(category 3)* increase employment for all workers, with the low-educated benefiting the most.

To summarize, these findings suggest that the effects of collective bargaining reforms differ by type of contract, worker age, and level of education. Although other categories are also affected, the effects are strongest for temporary workers, who tend also to be younger and have a lower level of education.

I present robustness checks for these estimates by subgroups. Along the same lines as for the main results (aggregate employment and unemployment), I add control variables – here, only total expenditure on labor market policies, since employment protection is already present in the specification – (see Figure 4.13 to Figure 4.19), investigate sensitivity to the number of lags (see Figure 4.24 to Figure 4.37), and use ICTWSS variables as substitutes for the reform dummies (see Figure

4.40 to Figure 4.42). The results are all robust to the addition of the extra control variable. In terms of sensitivity to the number of lags, most of the results are robust, with some nuances in the estimation by age subgroup. First, regarding reforms that reduce bargaining coverage, only the results for youth employment (15–24-year-olds) are maintained. Moreover, the effects of weakening unions become insignificant with only 1 lag. Finally, the use of ICTWSS variables instead of the reform dummies only marginally modifies the results for youth employment (15–24-year-olds), while the changes in the employment rate of 25–54-year-olds become non-significant. As for the subgroups by level of education, the negative short-term effects of reductions in bargaining coverage – here the relaxation of extension procedures – remain significant for the low-educated. However, only reforms that reduce the formal authority of trade unions affect temporary employment.

Table 4.4 – Effects of CB reforms on temporary employment - OLS estimates

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**					
	No interaction with business cycle	-0.61*	-1.29**	-1.47***	-0.50	0.30
		(0.32)	(0.46)	(0.42)	(0.69)	(1.05)
	R^2	0.387	0.432	0.434	0.392	0.393
	Observations	290	268	246	225	204
	Bad times	-0.61	-1.14**	-1.42***	-0.32	0.54
		(0.36)	(0.52)	(0.49)	(0.80)	(1.20)
	Good times	-0.62	-1.86**	-1.89**	-1.70*	-1.16
		(0.43)	(0.73)	(0.67)	(0.83)	(0.87)
	R^2	0.387	0.434	0.435	0.394	0.396
	Observations	290	268	246	225	204
Category 2	**Decentralization of bargaining**					
	No interaction with business cycle	-0.06	-0.07	0.16	0.49	0.59
		(0.17)	(0.28)	(0.24)	(0.37)	(0.56)
	R^2	0.371	0.405	0.410	0.395	0.401
	Observations	290	268	246	225	204
	Bad times	-0.09	-0.13	0.10	0.62	0.74
		(0.17)	(0.36)	(0.32)	(0.44)	(0.63)
	Good times	-0.01	0.10	0.31	0.19	0.27
		(0.25)	(0.32)	(0.40)	(0.49)	(0.65)
	R^2	0.372	0.406	0.411	0.396	0.402
	Observations	290	268	246	225	204
Category 3	**Weakening of unions**					
	No interaction with business cycle	0.11	0.06	0.18	0.13	-0.49
		(0.18)	(0.27)	(0.37)	(0.63)	(0.88)
	R^2	0.372	0.405	0.410	0.390	0.395
	Observations	290	268	246	225	204
	Bad times	-0.07	-0.27	-0.21	-0.08	-1.25
		(0.26)	(0.41)	(0.38)	(0.72)	(1.15)
	Good times	0.30	0.45	0.68	0.40	0.35
		(0.20)	(0.38)	(0.67)	(0.96)	(0.93)
	R^2	0.374	0.409	0.414	0.391	0.406
	Observations	290	268	246	225	204

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the rate of temporary employment. The control variables are the twice-lagged values of *(i)* the change in the rate of temporary employment; *(ii)* the reform variables (category 1, category 2, category 3, national change); *(iii)* the employment rate of 15–64-year-olds; and the contemporaneous and twice-lagged values of *(iv)* the output gap; *(v)* the yield curve; *(vi)* the short-term interest rate; *(vii)* real total government expenditure excluding interest; *(viii)* indexes of the strictness of employment protection for permanent and temporary contracts ; and the contemporaneous value of *(ix)* euro zone membership. "Bad times" means implementation of the reform when the output gap is < -1. "Good times" means implementation of the reform when the output gap is > -1. The corresponding IRFs are shown in Figure 4.4.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.5 – Effects of CB reforms on employment - by age group - OLS estimates

(a) Reduction in bargaining coverage

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of 15–24-year-olds					
No interaction with business cycle	-0.74**	-1.97**	-2.27*	-2.09	-1.81
	(0.35)	(0.86)	(1.17)	(1.58)	(1.62)
R^2	0.515	0.593	0.612	0.619	0.659
Observations	293	271	249	228	207
Bad times	-1.09***	-1.98*	-2.08*	-1.72	-1.43
	(0.33)	(0.98)	(1.20)	(1.67)	(1.82)
Good times	0.01	-1.92	-3.69*	-4.65	-4.34*
	(0.69)	(1.20)	(2.12)	(2.73)	(2.42)
R^2	0.517	0.593	0.612	0.620	0.660
Observations	293	271	249	228	207
Employment Rate of 25–54-year-olds					
No interaction with business cycle	-0.41*	-0.24	0.38	0.73	1.33
	(0.23)	(0.47)	(0.78)	(0.76)	(0.92)
R^2	0.696	0.692	0.693	0.711	0.752
Observations	293	271	249	228	207
Bad times	-0.43	-0.08	0.48	0.92	1.62
	(0.29)	(0.53)	(0.87)	(0.88)	(1.06)
Good times	-0.37	-0.86	-0.38	-0.58	-0.66
	(0.35)	(0.54)	(1.04)	(1.09)	(1.14)
R^2	0.696	0.693	0.693	0.712	0.753
Observations	293	271	249	228	207
Employment Rate of 55–64-year-olds					
No interaction with business cycle	-0.61	-0.43	-0.03	0.34	0.57
	(0.61)	(0.68)	(0.90)	(1.12)	(1.21)
R^2	0.471	0.556	0.585	0.628	0.666
Observations	293	271	249	228	207
Bad times	-0.99	-0.58	-0.13	0.05	0.41
	(0.73)	(0.83)	(0.99)	(1.21)	(1.36)
Good times	0.22	0.17	0.71	2.37*	1.65
	(0.73)	(0.55)	(1.08)	(1.22)	(1.50)
R^2	0.477	0.557	0.585	0.629	0.666
Observations	293	271	249	228	207

(b) Decentralization of bargaining

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of 15–24-year-olds					
No interaction with business cycle	-0.23	-0.33	0.20	-0.02	0.12
	(0.29)	(0.45)	(0.61)	(0.84)	(0.93)
R^2	0.512	0.584	0.604	0.615	0.655
Observations	293	271	249	228	207
Bad times	-0.11	-0.40	0.08	-0.53	-0.39
	(0.32)	(0.48)	(0.79)	(0.93)	(1.00)
Good times	-0.49	-0.15	0.43	1.00	1.13
	(0.54)	(1.25)	(1.20)	(1.58)	(1.64)
R^2	0.513	0.584	0.604	0.616	0.657
Observations	293	271	249	228	207
Employment Rate of 25–54-year-olds					
No interaction with business cycle	-0.03	-0.08	-0.26	0.12	0.46
	(0.15)	(0.31)	(0.43)	(0.58)	(0.54)
R^2	0.692	0.692	0.693	0.71	0.749
Observations	293	271	249	228	207
Bad times	0.01	-0.04	-0.17	-0.09	0.48
	(0.18)	(0.35)	(0.48)	(0.55)	(0.66)
Good times	-0.13	-0.20	-0.46	0.56	0.44
	(0.37)	(0.66)	(0.81)	(1.04)	(0.71)
R^2	0.693	0.692	0.693	0.711	0.749
Observations	293	271	249	228	207
Employment Rate of 55–64-year-olds					
No interaction with business cycle	-0.25	-0.20	-0.36	-0.34	0.06
	(0.36)	(0.42)	(0.68)	(0.86)	(0.84)
R^2	0.466	0.556	0.586	0.628	0.665
Observations	293	271	249	228	207
Bad times	-0.15	-0.51	-0.59	-0.36	0.02
	(0.38)	(0.60)	(0.92)	(0.93)	(0.85)
Good times	-0.48	0.58	0.13	-0.30	0.14
	(0.49)	(0.40)	(0.62)	(1.16)	(1.37)
R^2	0.467	0.56	0.587	0.628	0.665
Observations	293	271	249	228	207

(c) Weakening of unions

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of 15–24-year-olds					
No interaction with business cycle	0.74**	1.40**	2.03**	2.07*	2.01
	(0.33)	(0.58)	(0.85)	(1.15)	(1.25)
R^2	0.517	0.59	0.613	0.621	0.661
Observations	293	271	249	228	207
Bad times	0.24	1.20	1.96	2.29	2.51
	(0.38)	(0.74)	(1.21)	(1.53)	(1.54)
Good times	1.31**	1.63**	2.12**	1.81	1.50
	(0.52)	(0.73)	(0.99)	(1.16)	(1.21)
R^2	0.521	0.591	0.613	0.621	0.661
Observations	293	271	249	228	207
Employment Rate of 25–54-year-olds					
No interaction with business cycle	0.57***	0.84**	0.79	0.75	0.51
	(0.17)	(0.35)	(0.54)	(0.63)	(0.73)
R^2	0.703	0.699	0.696	0.712	0.749
Observations	293	271	249	228	207
Bad times	0.34*	0.66	0.89	1.15	0.99
	(0.18)	(0.50)	(0.74)	(0.72)	(0.84)
Good times	0.84**	1.05**	0.67	0.26	-0.01
	(0.30)	(0.37)	(0.51)	(0.82)	(0.81)
R^2	0.705	0.699	0.696	0.713	0.750
Observations	293	271	249	228	207
Employment Rate of 55–64-year-olds					
No interaction with business cycle	0.14	0.66*	0.74	0.90	1.31
	(0.32)	(0.33)	(0.74)	(1.13)	(1.21)
R^2	0.464	0.559	0.588	0.631	0.670
Observations	293	271	249	228	207
Bad times	0.26	0.46	0.77	1.35	1.94
	(0.33)	(0.32)	(0.87)	(1.52)	(1.56)
Good times	0.01	0.90	0.70	0.34	0.62
	(0.47)	(0.53)	(0.75)	(0.87)	(1.04)
R^2	0.465	0.56	0.588	0.632	0.672
Observations	293	271	249	228	207

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the employment rate of the age-group considered. The control variables are the twice-lagged values of *(i)* the change in the employment rate of the considered age group; *(ii)* the reform variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; *(vii)* indexes of the strictness of employment protection for permanent and temporary contracts ; and the contemporaneous value of *(viii)* euro zone membership. "Bad times" means implementation of the reform when the output gap is < -1. "Good times" means implementation of the reform when the output gap is > -1. The corresponding IRFs are shown in Figure 4.5 to Figure 4.7.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.6 – Effects of CB reforms on employment - by education level - OLS estimates

(a) Reduction in bargaining coverage

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of Low-level Educated Adults					
No interaction with business cycle	-1.20**	-1.06*	-0.10	0.95	0.92
	(0.43)	(0.57)	(1.04)	(1.13)	(1.44)
R^2	0.526	0.599	0.631	0.648	0.660
Observations	283	262	241	220	199
Bad times	-1.26**	-0.83	-0.32	0.78	0.72
	(0.50)	(0.53)	(1.09)	(1.28)	(1.62)
Good times	-1.06	-1.95	1.49	2.13	2.37*
	(0.76)	(1.40)	(1.19)	(1.35)	(1.24)
R^2	0.526	0.600	0.632	0.648	0.661
Observations	283	262	241	220	199
Employment Rate of Secondary-level Educated Adults					
No interaction with business cycle	-0.43**	-0.65	-0.14	0.01	0.20
	(0.18)	(0.42)	(0.77)	(0.71)	(0.88)
R^2	0.639	0.677	0.688	0.719	0.760
Observations	283	262	241	220	199
Bad times	-0.49*	-0.67	-0.06	0.09	0.12
	(0.25)	(0.54)	(0.87)	(0.84)	(1.02)
Good times	-0.30	-0.59	-0.70	-0.61	0.77
	(0.34)	(0.42)	(1.22)	(1.00)	(0.90)
R^2	0.639	0.677	0.688	0.719	0.760
Observations	283	262	241	220	199
Employment Rate of Tertiary-level Educated Adults					
No interaction with business cycle	-0.70***	-0.86***	-0.53	-0.37	0.46
	(0.15)	(0.29)	(0.74)	(0.68)	(0.85)
R^2	0.557	0.618	0.666	0.703	0.765
Observations	283	262	241	220	199
Bad times	-0.82***	-1.02**	-0.57	-0.32	0.46
	(0.23)	(0.38)	(0.82)	(0.78)	(0.95)
Good times	-0.42	-0.23	-0.19	-0.72	0.49
	(0.34)	(0.63)	(0.87)	(0.82)	(0.79)
R^2	0.558	0.619	0.666	0.703	0.765
Observations	283	262	241	220	199

(b) Decentralization of bargaining

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of Low-educated Adults					
No interaction with business cycle	-0.28	-0.52	-0.01	0.33	0.83
	(0.28)	(0.40)	(0.66)	(0.79)	(0.78)
R^2	0.512	0.597	0.631	0.646	0.662
Observations	283	262	241	220	199
Bad times	0.01	-0.26	0.10	0.27	0.76
	(0.32)	(0.46)	(0.70)	(0.75)	(0.91)
Good times	-1.01*	-1.27	-0.30	0.49	1.00
	(0.50)	(0.78)	(1.21)	(1.62)	(1.28)
R^2	0.517	0.599	0.631	0.647	0.662
Observations	283	262	241	220	199
Employment Rate of Secondary-educated Adults					
No interaction with business cycle	-0.09	-0.16	-0.55	-0.23	0.14
	(0.19)	(0.28)	(0.50)	(0.66)	(0.64)
R^2	0.635	0.675	0.690	0.719	0.760
Observations	283	262	241	220	199
Bad times	0.09	-0.12	-0.62	-0.41	0.11
	(0.18)	(0.27)	(0.49)	(0.64)	(0.69)
Good times	-0.54	-0.26	-0.36	0.21	0.2
	(0.47)	(0.75)	(0.93)	(1.09)	(0.98)
R^2	0.639	0.675	0.690	0.720	0.760
Observations	283	262	241	220	199
Employment Rate of Tertiary-educated Adults					
No interaction with business cycle	-0.03	-0.12	-0.16	0.13	0.54*
	(0.14)	(0.30)	(0.36)	(0.47)	(0.28)
R^2	0.540	0.610	0.665	0.702	0.766
Observations	283	262	241	220	199
Bad times	-0.05	-0.22	-0.20	-0.11	0.40
	(0.13)	(0.37)	(0.43)	(0.47)	(0.30)
Good times	0.01	0.17	-0.05	0.73	0.88
	(0.46)	(0.49)	(0.67)	(0.97)	(0.70)
R^2	0.54	0.611	0.665	0.704	0.767
Observations	283	262	241	220	199

(c) Weakening of unions

	Year 1	Year 2	Year 3	Year 4	Year 5
Employment Rate of Low-educated Adults					
No interaction with business cycle	0.52	1.67***	1.55**	1.11	1.70
	(0.40)	(0.42)	(0.73)	(1.12)	(1.21)
R^2	0.514	0.613	0.64	0.649	0.665
Observations	283	262	241	220	199
Bad times	0.34	1.18**	1.67*	1.77	2.14
	(0.37)	(0.50)	(0.92)	(1.54)	(1.67)
Good times	0.73	2.25***	1.41	0.31	1.21
	(0.60)	(0.58)	(0.92)	(1.19)	(1.07)
R^2	0.515	0.616	0.640	0.651	0.666
Observations	283	262	241	220	199
Employment Rate of Secondary-educated Adults					
No interaction with business cycle	0.42*	0.64	0.57	0.49	0.86
	(0.21)	(0.42)	(0.58)	(0.74)	(0.89)
R^2	0.640	0.679	0.689	0.720	0.762
Observations	283	262	241	220	199
Bad times	0.30	0.56	0.60	0.65	1.47
	(0.26)	(0.55)	(0.71)	(0.98)	(1.16)
Good times	0.56*	0.73	0.54	0.30	0.21
	(0.32)	(0.48)	(0.57)	(0.80)	(0.67)
R^2	0.641	0.679	0.689	0.720	0.764
Observations	283	262	241	220	199
Employment Rate of Tertiary-educated Adults					
No interaction with business cycle	0.65***	0.76**	0.83	0.79	0.72
	(0.18)	(0.33)	(0.50)	(0.63)	(0.66)
R^2	0.561	0.619	0.671	0.706	0.766
Observations	283	262	241	220	199
Bad times	0.44**	0.40	0.70	0.90	0.95
	(0.17)	-0.38	-0.52	-0.68	-0.80
Good times	0.88**	1.16**	0.98	0.67	0.50
	(0.36)	(0.45)	(0.78)	(0.95)	(0.76)
R^2	0.564	0.622	0.671	0.706	0.767
Observations	283	262	241	220	199

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the employment rate of the considered education-level group. The control variables are the twice-lagged values of *(i)* the change in the employment rate of the considered education-level group; *(ii)* the reform variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; *(vii)* indexes of the strictness of employment protection for permanent and temporary contracts; and the contemporaneous value of *(viii)* euro zone membership. "Bad times" means implementation of the reform when the output gap is < -1. "Good times" means implementation of the reform when the output gap is > -1. The corresponding IRFs are shown in Figure 4.8 to Figure 4.10.
The statistical significance levels are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.6 Endogeneity

In the estimates presented so far, I control for a variety of factors that could lead to unreliable estimations. These include lagged employment growth, the output gap, the yield curve, indicators of fiscal and monetary policies and euro membership. In addition, I control for country fixed effects – which account for countries' time-invariant characteristics (geographic, historical path, social norms) that could affect both the adoption of collective bargaining reforms and employment growth, and year fixed effects that control for time effects across countries. Biases due to omitted variables should therefore not be an important problem here.

Nevertheless, there could still be endogeneity problems related to reverse causality and simultaneity. The (un)-employment rate, which reflects the state of the labor market, could trigger the implementation of a reform. Reforms may be easier to push through in a recession, when trade union resistance may be weaker, and harder in times of expansion (Goerke & Madsen 2004, Brandl & Traxler 2010). Conversely, insider-oriented unions may be less resistant in times of employment expansion because institutional changes in the labor market pose less of a threat to insiders. If these potential endogeneity problems do exist and are not addressed in the empirical strategy, then OLS estimates of the relationship between (un)-employment changes and collective bargaining reforms will be biased.

I argue, however, that there are several reasons why reverse causality and simultaneity should not be a problem here. Firstly, I exclude contemporaneous effects of the reform variable (the impulse variable) in the response functions. It is reasonable to assume indeed that the effect of a reform is only felt with a one-period lag since its implementation by collective bargaining actors may not be immediate and uniform in all sectors. Secondly, employment in period $t+1$ cannot affect the decision to introduce the reform, which is usually taken in the year before the reform is introduced. It seems even less likely that the employment rate of a subgroup in period $t+1$ should influence the implementation of a national collective bargaining reform in period $t-1$. Following Bassanini & Cingano (2019), I investigate the severity of the reverse-causality issue by augmenting Eq. (4.1) with forward values of the collective bargaining reform variable.[16] Indeed, an effect of future reforms on current employment rates would be evidence of reverse causality. Estimates of forward terms are reported in Table 4.12. The only significant forward term – at a significance level of 10% – is the one corresponding to a weakening of

[16] I do not apply local projections in this exercise, i.e. I do not consider different h horizons, but only $h = 1$.

unions. There is therefore no evidence of reverse causality.

Instruments — In spite of the above arguments against major endogeneity problems, I use an instrumentation strategy to obtain potentially more reliable estimates.

I use an instrument for each category of reform. For categories 1 and 2 – respectively reduction in bargaining coverage and bargaining decentralization – I construct an indicator representing the average level of collective bargaining reform in the same category in nearby countries (countries with which it shares a land border). Since this is an average of one or more dummy variables – depending on the number of bordering countries – this implies that the instrumental variable ranges from 0 to 1. For instance, if country A shares a border with two countries, country B and country C, and country B implements a category 1 reform in 2013, then the instrumental variable for the category 1 CBR associated with country A and year 2013 will be equal to 0.5. Thus, for a given country and year, the more bordering countries implement a collective bargaining reform in the reform category considered, the more the instrumental variable tends toward one. To construct the instrumental variables, I use geographic data (GeoDist) provided by CEPII, which include dummy variables indicating whether two countries are contiguous (see Mayer & Zignago (2011) for more details).

The economic argument for the use of these instruments is twofold. Firstly, it is plausible that neighboring governments look to each other for information on the consequences of reforms implemented abroad. This is a proposal tested by Buera et al. (2011), who show that experiences of structural reforms in neighboring countries influence domestic policymakers' beliefs and domestic reforms as a result. Secondly, several recently proposed classifications of collective bargaining regimes show that countries with similar characteristics often follow the same trends (see Delahaie et al. (2015); Visser (2016) and OECD (2019)). It emerges that groups of countries with common features in their industrial relations and collective bargaining systems are generally geographically close.

These instrumental variables (IVs) seem to meet the two requirements for being good instruments. Firstly, their changes are associated with changes in CBR – i.e. reforms in a given country are often associated with those in bordering countries, because of the similarity of social dialogue regimes (see first stage in Table 4.7 (a) - (b)) – but do not directly lead to changes in y – i.e. in the (un)-employment rate of the country. Secondly, collective bargaining reforms in neighboring countries are unlikely to directly affect domestic employment. I argue that they are orthogonal to any country-specific characteristics that may simultaneously drive both the employ-

ment rate and collective bargaining reform, and should be distributed independently of the error process.

Unfortunately, these instruments do not provide good first stage estimates of category 3 reforms, i.e. restrictions of unions' capacity to represent workers. I therefore turned to a categorical variable representing how the minimum wage is set in a given country, as defined by the variable "NMS" in the ICTWSS Codebook. The variable can take unit values from 0 to 9.[17]. As explained in the codebook: *"This coding reflects the (increasing) degree of government intervention and discretion in setting the minimum wage, or – reversely – the degree to which the government is bound in its decisions by unions and employers, and/or a fixed or pre-determined rule"*. This variable can be seen as a proxy for the way in which unions are involved in the determination of the national minimum wage or industrial minimum wages, and therefore partly reflects the ability of unions to represent workers in setting wages. The highly descriptive nature of this variable suggests that it is not directly related to changes in the employment rate and can therefore be used as an instrument.

I use IV estimation with a binary endogenous regressor. This implies that the first stage is a probit model and this is similar to a linear regression with endogenous treatment effects allowed to run as an IV estimation with a binary endogenous regressor. Although the standard IV method is valid under the assumption that the conditional moment restriction is verified, my choice here adds more structure to account for the binary nature of the endogenous regressor (Cameron & Trivedi 2010). Note that it delivers maximum likelihood estimates, which outperform both two-stage-least-squares and GMM estimators in finite samples (Cameron & Trivedi 2010). For information, I present the first stage tables of a standard IV analysis in Table 4.13 and Table 4.14, with all the usual tests on the relevance and strength of the instruments as well as endogeneity tests. It is clear that not taking into account the binary nature of the suspected endogenous CBR variable makes first stage estimates unsuitable, especially for category 2 and category 3 reforms.

[17] 0 = No statutory minimum wage, no sectoral or national agreements; 1 = Minimum wages set by (sectoral) collective agreements or tripartite wage boards in (some) sectors; 2 = Minimum wages are set by national (cross-sectoral or inter-occupational) agreements ("autonomous agreements") between unions and employers; 3 = the national minimum wage is set by agreements (as in 1 or 2) but extended and made binding by laws or Ministerial decrees; 4 = the national minimum wage is set through tripartite negotiations; 5 = the national minimum wage is set by the government after (non-binding) tripartite consultations; 6 = The minimum wage is set by judges or expert committees, as in the award system; 7 = the minimum wage is set by the government, bound by a fixed rule (index-based minimum wage); 8 = the minimum wage is set by the government based on a fixed rule (index-based minimum wage) or target (growth, employment, poverty), but the government can (and sometimes does) take discretionary decisions; 9 = the minimum wage is set by the government, without a fixed rule

Results — Table 4.7 presents LP-IV estimates with a binary endogenous regressor for aggregate employment [Tab. 4.7a] and aggregate unemployment [Tab. 4.7b]. The negative estimated effects on aggregate employment in the short term of reforms that reduce bargaining coverage *(category 1)* are always significant. Moreover, a significant positive effect appears five years after the reform. Reforms that reduce unions' capacity to represent workers *(category 2)* have positive effects on employment that appear with a longer delay, i.e. from the fourth year after the reform's implementation. Similarly, the coefficient of reforms that decentralize bargaining *(category 3)* becomes positive and significant in the fifth year after the reform.

Regarding effects on aggregate unemployment, there is still a significant short-term negative effect (an increase in the unemployment rate) associated with reforms that reduce bargaining coverage *(category 1)* . The positive effect (a lower unemployment rate) after four and five years is also still significant. However, the effects of reforms that weaken unions *(category 3)* differ from the OLS estimates, with a strong increase in unemployment followed by a strong decrease in the medium term. Finally, mirroring the effect on aggregate employment, reforms that decentralize bargaining *(category 2)* are associated with a fall in unemployment five years after the reform.

There are two important points to be made about these IV estimates. They are up to three times larger than the OLS estimates, although the signs are mostly the same, suggesting that the OLS estimates may be biased toward the origin and should be regarded as lower bounds. However, the Wald test p-values reported in Table 4.7 confirm that the endogeneity of the collective bargaining reform variables is not obvious. This is confirmed by standard endogeneity tests whose p-values do not reject the null hypothesis that the regressor is exogenous (see Table 4.13 and Table 4.14). Associated with the above argument tempering the problems of endogeneity, these results indicate that the OLS estimates are more reliable than the IV estimates.

Table 4.7 – Effects of CB reforms on employment and unemployment - IV estimates

(a) Aggregate Employment

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**	-1.28***	-2.23**	0.21	2.60	4.48***
		(0.30)	(1.06)	(2.18)	(2.35)	(0.58)
	Wald test (p-value)	0.05	0.25	0.67	0.32	0.00
	Observations	396	369	342	315	288
	First stage					
	IV	1.79***	1.90***	1.82***	1.56**	1.22***
		(0.48)	(0.52)	(0.54)	(0.71)	(0.24)
	Likelihood-ratio test (p-value)	0.00	0.00	0.00	0.00	0.00
Category 2	**Decentralization of bargaining**	0.86	0.60	0.58	1.63	2.39**
		(0.54)	(1.72)	(1.10)	(1.57)	(1.20)
	Wald test (p-value)	0.06	0.60	0.33	0.28	0.08
	Observations	396	369	342	315	288
	First stage					
	IV	0.74**	0.87**	1.01***	1.01***	1.01***
		(0.30)	(0.36)	(0.36)	(0.35)	(0.35)
	Likelihood-ratio test (p-value)	0.04	0.02	0.01	0.02	0.03
Category 3	**Weakening of unions**	-0.12	-0.90	3.18	4.77*	3.92
		(0.34)	(0.90)	(3.13)	(2.52)	(2.48)
	Wald test (p-value)	0.12	0.12	0.49	0.32	0.38
	Observations	396	369	342	315	288
	First stage					
	IV	0.12***	0.11**	0.09**	0.10**	0.10***
		(0.04)	(0.04)	(0.04)	(0.05)	(0.04)
	Likelihood-ratio test (p-value)	0.00	0.01	0.03	0.05	0.04

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the employment rate (15–64-year-olds). The control variables include the twice-lagged values of *(i)* the change in the employment rate; *(ii)* the reforms variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; and the contemporaneous value of *(vii)* euro zone membership. The p-value of the Wald test is an indication of the endogeneity of CBR: CBR can be considered endogenous if the null hypothesis is rejected. The p-value of the likelihood-ratio test is an indication of the joint significance of the regressors in the first stage.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

(b) Aggregate Unemployment

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**	1.00*	1.28	-1.86	-6.26***	-7.34***
		(0.59)	(2.51)	(1.40)	(0.40)	(0.41)
	Wald test (p-value)	0.41	0.71	0.23	0.00	0.00
	Observations	396	369	342	315	288
	First stage					
	IV	1.71***	1.87***	1.79***	1.59***	2.01***
		(0.49)	(0.56)	(0.54)	(0.23)	(0.24)
	Likelihood-ratio test (p-value)	0.00	0.00	0.00	0.00	0.00
Category 2	**Decentralization of bargaining**	-0.18	0.08	0.11	-1.21	-3.66**
		(0.39)	(0.57)	(0.75)	(1.57)	(1.66)
	Wald test (p-value)	0.13	0.28	0.27	0.37	0.10
	Observations	396	369	342	315	288
	First stage					
	IV	0.82**	0.90**	1.01***	0.97***	0.97***
		(0.35)	(0.36)	(0.37)	(0.36)	(0.31)
	Likelihood-ratio test (p-value)	0.04	0.02	0.01	0.02	0.03
Category 3	**Weakening of unions**	0.63	2.18***	3.31***	-4.79***	-5.33***
		(0.42)	(0.66)	(1.09)	(0.56)	(0.51)
	Wald test (p-value)	0.04	0.00	0.01	0.00	0.00
	Observations	396	369	342	315	288
	First stage					
	IV	0.12***	0.12**	0.10**	0.17***	0.20***
		(0.05)	(0.05)	(0.05)	(0.05)	(0.06)
	Likelihood-ratio test (p-value)	0.00	0.01	0.03	0.05	0.04

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the unemployment rate (15–74-year-olds). The control variables include the twice-lagged values of *(i)* the change in the unemployment rate; *(ii)* the reforms variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; and the contemporaneous value of *(vii)* euro zone membership. The p-value of the Wald test is an indication of the endogeneity of CBR: CBR can be considered endogenous if the null hypothesis is rejected. The p-value of the likelihood-ratio test is an indication of the joint significance of the regressors in the first stage.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.7 Conclusion

In this chapter, I have investigated the impact of collective bargaining reforms on aggregate employment and unemployment rates as well as on the employment rates of subgroups of workers (with permanent vs temporary contracts and by age group and education level). In keeping with the recent literature, I used local projections (Jordà 2005) to estimate the effect of structural reforms on the economy and evaluate their success depending on the initial economic conditions. I identified a set of reforms of collective bargaining institutions in EU countries between 2000 and 2018 and classified the reforms into three categories – changes (1) in the coverage of bargaining, (2) in the centralization of bargaining, and (3) in the capacity of trade unions to represent workers – to allow a refined analysis of their effects.

The empirical analysis focuses on reforms that reduce the institutional wedge and results suggest that reforms that reduce bargaining coverage have a detrimental effect on the aggregate employment rate in the very short term, i.e. in the first two years after the reform is implemented. They also increase the unemployment rate in the first year after the reform, but lead to a fall in unemployment in the medium term. On the other hand, reforms that decentralize negotiations closer to the firm level do not have a significant effect on employment or unemployment in the short term. On the contrary, reforms that reduce the capacity of trade unions to represent workers have a short-term positive effect on employment. The timing of the reforms is important; for instance, reductions in bargaining coverage only have a negative effect when carried out during a recession, while weakening unions is only beneficial when the reform is implemented outside of a recession.

The analysis in terms of subgroups shows that the intensity of these effects differs between classes of workers. The negative effect of a reduction in bargaining coverage is particularly strong for young workers and workers with a low level of education. The decline in the ratio of temporary employment to total dependent employment also suggests that workers on temporary contracts are more affected. Young and low educated workers are also those who benefit most in terms of employment from reforms that weaken unions, provided these reforms are implemented outside periods of recession.

I conducted several robustness tests. Some results proved sensitive, while those for aggregate employment, youth employment and employment of workers with low levels of education, held under all tests. I also used an instrumentation strategy to obtain IV estimates to investigate a potential endogeneity problem related to the variable representing the reforms. The main results are unchanged, but there are

several indications that the OLS estimates are more reliable.

The overall result of this chapter suggest that flexibility-enhancing reforms of collective bargaining systems should not be introduced in the midst of an economic downturn, since they do not have a positive effect on employment in the short term. While increasing the flexibility of collective bargaining may have some positive macroeconomic outcomes, governments need to consider the timing of institutional changes to achieve their goals. From an economic policy perspective, the results of this chapter add evidence in support of Boeri & Jimeno (2016)' proposal that UE supranational authorities should encourage countries to carry out institutional reforms under good macroeconomic conditions, via a "positive conditionality" mechanism for instance.

4.8 Appendices

4.8.1 Reforms' details

Table 4.8 – Categories of reform by country and year

	Wedge-increasing	**Wedge-decreasing**
Category 1. Modification of bargaining coverage	Austria (2006, 2015, 2016); Belgium (2013); Bulgaria (2001, 2010); Cyprus (2016); Czech Republic (2000, 2005); Germany (2008, 2010, 2012, 2013, 2015, 2017); Spain (2005, 2016); Finland (2001, 2010); France (2010, 2013); Greece (2001); Ireland (2017); Italy (2005); Lithuania (2004); Latvia (2002); Luxembourg (2007); Netherlands (2015, 2016); Portugal (2004, 2017); Slovakia (2014); Slovenia (2012, 2015)	Cyprus (2012); Czech Republic (2004); Spain (2011, 2012); Estonia (2012); France (2017); Greece (2011); Croatia (2014); Ireland (2013); Lithuania (2017); Netherlands (2001); Portugal (2011, 2012, 2014); Romania (2011); Slovakia (2003, 2004, 2010, 2016); Slovenia (2006, 2010)
Category 2. Modification of bargaining centralization	Austria (2010, 2013); Belgium (2017); Germany (2007); Finland (2001, 2011); Ireland (2015); Luxembourg (2014); Netherlands (2002, 2009); Poland (2005)	Austria (2005, 2009, 2011); Belgium (2009); Bulgaria (2013); Denmark (2004); Spain (2001, 2003, 2006, 2010, 2011, 2012); Finland (2000, 2008, 2016); France (2016, 2017, 2018); Greece (2010, 2017); Hungary (2011); Italy (2009, 2011, 2013); Luxembourg (2012); Netherlands (2005, 2010); Poland (2002, 2009); Portugal (2003, 2009, 2012); Romania (2011); Slovakia (2001, 2010)
Category 3. Modification of union strength	Austria (2007); Cyprus (2000, 2001, 2002, 2003, 2015); Czech Republic (2008); Germany (2002); France (2013); Greece (2014); Ireland (2014, 2015); Lithuania (2003, 2005, 2008, 2013, 2014), Latvia (2007, 2017); Luxembourg (2015); Netherlands (2013); Poland (2001, 2015); Romania (2003, 2016); Slovakia (2013); Sweden (2011)	Belgium (2011); Bulgaria (2012); Czech Republic (2011); France (2007, 2009, 2012, 2015, 2016, 2017, 2018); United Kingdom (2016); Greece (2008, 2011, 2017); Croatia (2012, 2014); Hungary (2011, 2012); Ireland (2009, 2012); Italy (2013, 2014); Lithuania (2012); Latvia (2014); Malta (2011); Poland (2002); Slovakia (2007, 2011)

4.8.2 Data details

Table 4.9 – Description of macroeconomic variables

Variable name	Detailed description	Source
Employment rate of 15–64-year-olds	Proportion of 15- to 64-year-olds in employment - in %	Eurostat
Unemployment rate of 15–74-year-olds	Proportion of 15- to 74-year-olds out of employment based on the International Labour Office (ILO) definition - in %	Eurostat
Temporary employment rate	Proportion of wage and salary workers whose job has a pre-determined termination date - in %	OECD
Employment rate of 15–24-year-olds	Proportion of 15- to 24-year-olds in employment - in %	OECD
Employment rate of 25–54-year-olds	Proportion of 25- to 54-year-olds in employment - in %	OECD
Employment rate of 55–64-year-olds	Proportion of 55- to 64-year-olds in employment - in %	OECD
Employment rate of low-educated adults	Proportion of adults without upper-secondary education in employment - in % Note: This ratio only considers 25–64-year-olds .	OECD
Employment rate of secondary-educated adults	Proportion of adults with upper-secondary (but not tertiary) education in employment - in % Note: This ratio only considers 25–64-year-olds.	OECD
Employment rate of tertiary-educated adults	Proportion of adults with tertiary education in employment - in % Note: This ratio only considers 25–64-year-olds.	OECD
Output gap	Difference between actual and potential gross domestic product (at 2010 reference levels) divided by the potential GDP - in %	AMECO
Yield Curve	Difference between nominal long-term interest rates and nominal short-term interest rates - in %	AMECO
Change in government expenditure (excluding interest)	Change in real total government expenditure excluding interest, deflator GDP (ESA 2010) - in %	AMECO
Short-term interest rate	Real short-term interest rate, deflator GDP - in %	AMECO
Strictness of employment protection – Regular contracts	Index of the strictness of employment protection relating to individual and collective dismissals for workers with regular contracts.	OECD
Strictness of employment protection – Temporary contracts	Index of the strictness of employment protection relating to temporary contracts.	OECD
Labor market policy expenditures	Total public expenditure on labor market policies as a proportion of GDP - in %. Including expenditures in the following areas: public employment services and administration, training, employment incentives, sheltered and supported employment, direct job creation, start-up incentives, early retirement, and out-of-work income maintenance and support.	OECD

4.8.3 OLS - Estimation tables

Table 4.10 – Effects of CB reforms on employment - OLS estimates

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**					
	No interaction with business cycle	-0.65***	-0.94**	-0.74	-0.16	0.13
		(0.22)	(0.44)	(0.68)	(0.71)	(0.68)
	R^2	0.606	0.597	0.611	0.636	0.666
	Observations	396	369	342	315	288
	Bad times	-0.91***	-1.16**	-0.93	-0.30	0.18
		(0.31)	(0.53)	(0.77)	(0.83)	(0.77)
	Good times	-0.07	-0.08	0.35	0.63	-0.10
		(0.18)	(0.68)	(1.52)	(1.75)	(1.75)
	R^2	0.608	0.598	0.612	0.636	0.667
	Observations	396	369	342	315	288
Category 2	**Decentralization of bargaining**					
	No interaction with business cycle	-0.24	-0.36	-0.49	-0.27	-0.04
		(0.15)	(0.30)	(0.46)	(0.62)	(0.60)
	R^2	0.600	0.593	0.611	0.636	0.666
	Observations	396	369	342	315	288
	Bad times	-0.26	-0.57	-0.73	-0.65	-0.31
		(0.17)	(0.39)	(0.57)	(0.66)	(0.68)
	Good times	-0.16	0.27	0.11	0.71	0.65
		(0.39)	(0.67)	(0.70)	(0.95)	(0.89)
	R^2	0.600	0.595	0.612	0.638	0.667
	Observations	396	369	342	315	288
Category 3	**Weakening of unions**					
	No interaction with business cycle	0.37**	0.59*	0.73	0.87	1.39
		(0.17)	(0.34)	(0.54)	(0.82)	(1.16)
	R^2	0.601	0.595	0.612	0.638	0.672
	Observations	396	369	342	315	288
	Bad times	0.23	0.44	0.75	1.41	2.23*
		(0.21)	(0.50)	(0.65)	(0.90)	(1.19)
	Good times	0.56**	0.82*	0.69	0.10	0.16
		(0.26)	(0.40)	(0.70)	(1.09)	(1.47)
	R^2	0.602	0.595	0.612	0.640	0.675
	Observations	396	369	342	315	288

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the employment rate (15–64-year-olds). The control variables include the twice-lagged values of *(i)* the change in the employment rate; *(ii)* the reforms variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; and the contemporaneous value of *(vii)* euro zone membership. "Bad times" means implementation of the reform when the output gap is < -1. "Good times" means implementation of the reform when the output gap is > -1.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.11 – Effects of CB reforms on unemployment - OLS estimates

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**					
	No interaction with business cycle	0.46*	0.31	-0.3	-1.35**	-2.22**
		(0.25)	(0.45)	(0.59)	(0.53)	(0.80)
	R^2	0.686	0.671	0.685	0.711	0.732
	Observations	396	369	342	315	288
	Bad times	0.65*	0.49	-0.08	-1.33**	-2.58***
		(0.32)	(0.52)	(0.68)	(0.63)	(0.88)
	Good times	0.02	-0.39	-1.48**	-1.50**	-0.48
		(0.17)	(0.41)	(0.70)	(0.57)	(0.59)
	R^2	0.687	0.671	0.685	0.711	0.733
	Observations	396	369	342	315	288
Category 2	**Decentralization of bargaining**					
	No interaction with business cycle	0.25	0.53	0.68	0.17	-0.16
		(0.17)	(0.39)	(0.59)	(0.78)	(0.79)
	R^2	0.685	0.672	0.686	0.708	0.724
	Observations	396	369	342	315	288
	Bad times	0.29	0.68	0.86	0.48	-0.03
		(0.19)	(0.47)	(0.69)	(0.78)	(0.85)
	Good times	0.16	0.08	0.20	-0.62	-0.50
		(0.50)	(0.79)	(0.73)	(0.98)	(0.76)
	R^2	0.685	0.673	0.687	0.709	0.725
	Observations	396	369	342	315	288
Category 3	**Weakening of unions**					
	No interaction with business cycle	-0.30*	-0.23	-0.12	-0.11	-0.16
		(0.15)	(0.31)	(0.58)	(0.88)	(1.24)
	R^2	0.685	0.67	0.685	0.708	0.724
	Observations	396	369	342	315	288
	Bad times	-0.27	-0.26	-0.29	-0.58	-0.95
		(0.18)	(0.42)	(0.54)	(0.74)	(1.09)
	Good times	-0.34	-0.19	0.13	0.57	1.01
		(0.30)	(0.41)	(0.92)	(1.54)	(1.90)
	R^2	0.685	0.670	0.685	0.709	0.727
	Observations	396	369	342	315	288

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the unemployment rate (15–74-year-olds). The control variables include the twice-lagged values of *(i)* the change in the unemployment rate; *(ii)* the reforms variables (category 1, category 2, category 3, national change); and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; and the contemporaneous value of *(vii)* euro zone membership. "Bad times" means implementation of the reform when the output gap is < -1. "Good times" means implementation of the reform when the output gap is > -1.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

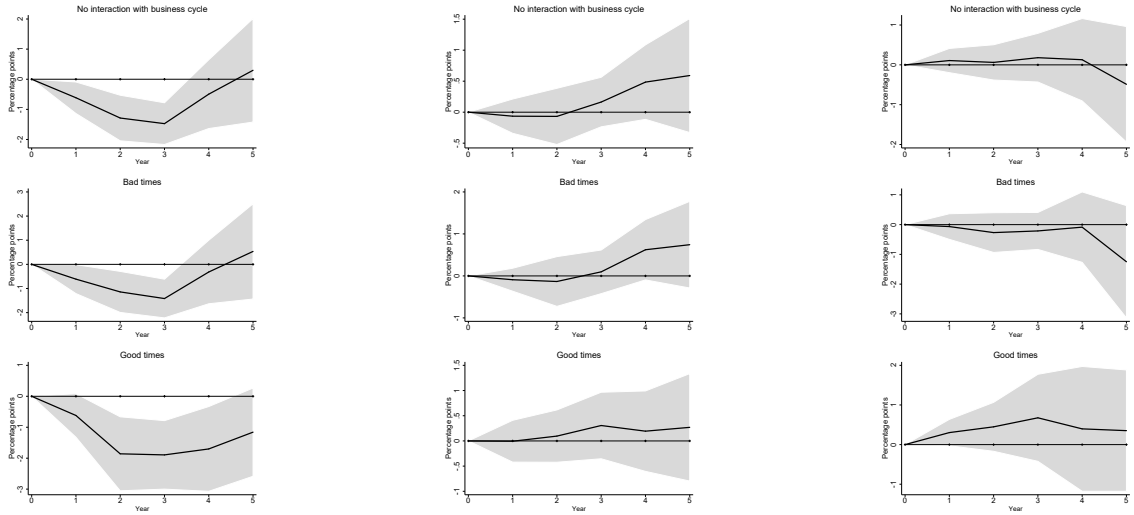
4.8.4 OLS - IRFs

Figure 4.4 – Impact of CB reforms that decrease the institutional wedge on temporary employment

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



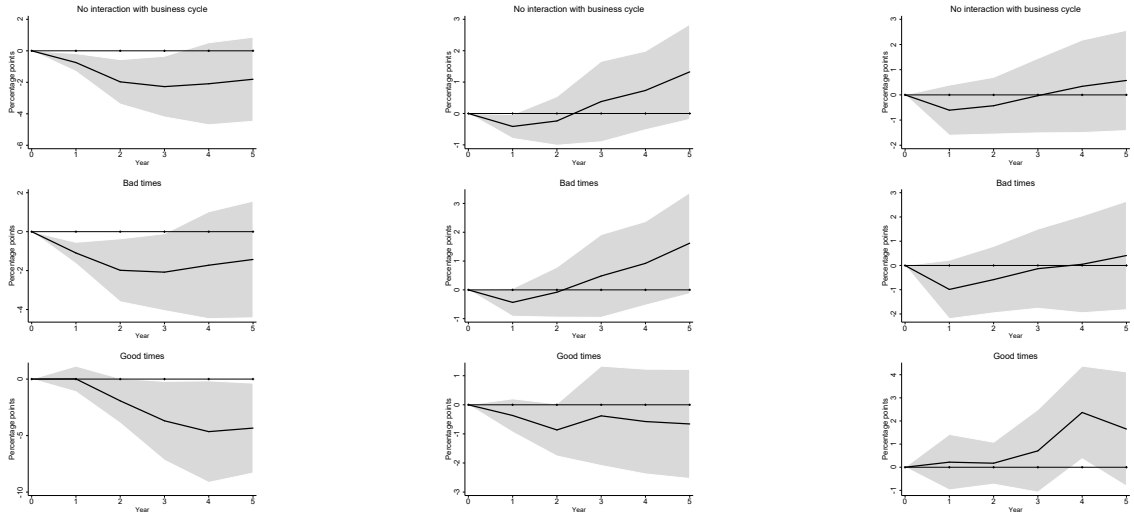
Notes: The figures show the cumulative impulse responses of the temporary employment rate (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on temporary employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on temporary employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.5 – Impact of CB reforms that reduce bargaining coverage on employment - by age group

(a) Employment Rate of 15–24-year-olds

(b) Employment Rate of 25–54-year-olds

(c) Employment Rate of 55–64-year-olds



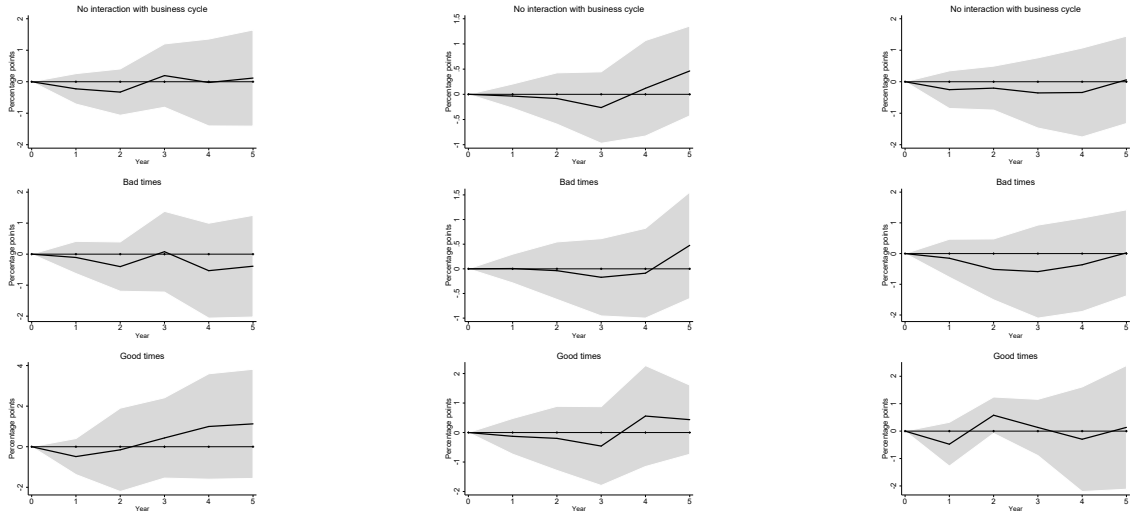
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that reduces bargaining coverage. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.6 – Impact of CB reforms that decentralize bargaining on employment - by age group

(a) Employment Rate of 15–24-year-olds

(b) Employment Rate of 25–54-year-olds

(c) Employment Rate of 55–64-year-olds



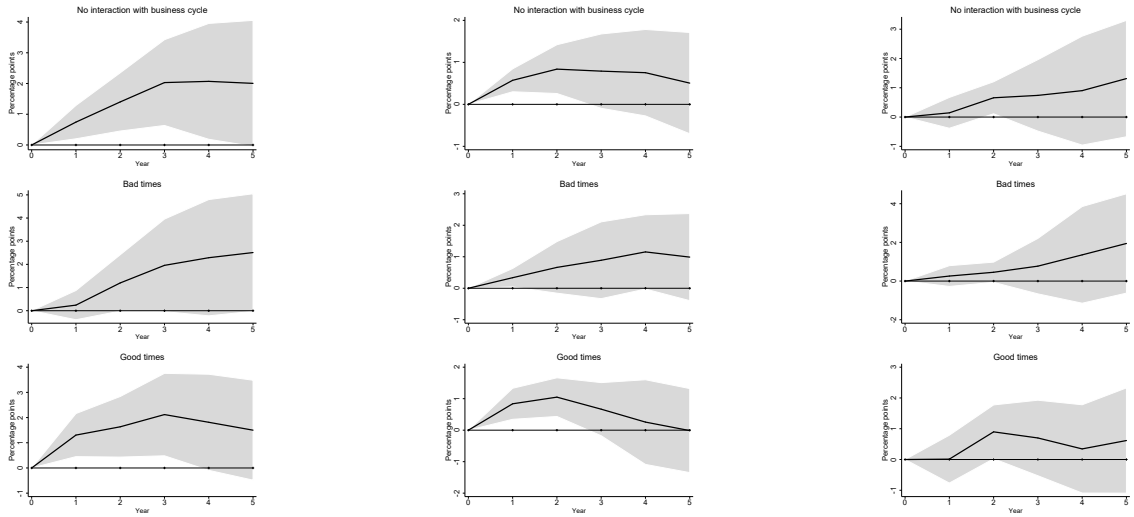
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that decentralizes bargaining. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.7 – Impact of CB reforms that weaken unions on employment - by age group

(a) Employment Rate of 15–24-year-olds

(b) Employment Rate of 25–54-year-olds

(c) Employment Rate of 55–64-year-olds



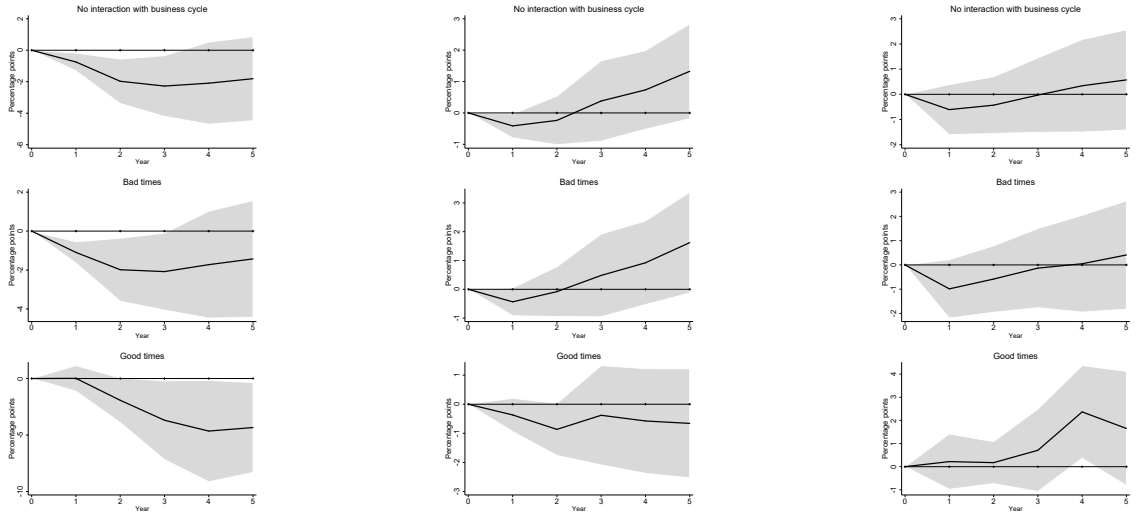
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that weakens unions. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.8 – Impact of CB reforms that reduce bargaining coverage on employment - by education level

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



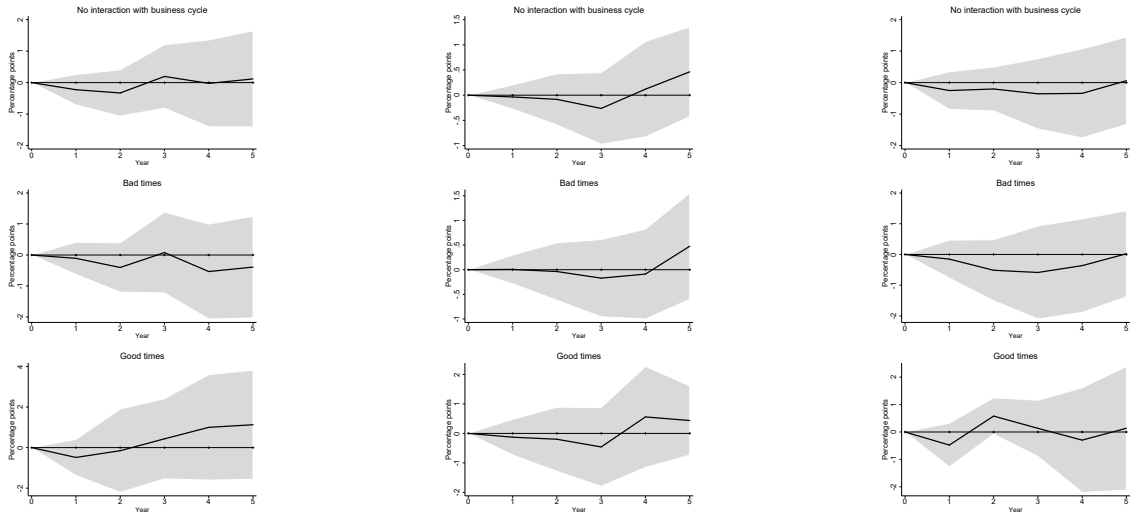
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education level groups to a reform of the collective bargaining system that reduces bargaining coverage. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.9 – Impact of CB reforms that decentralize bargaining on employment - by education level

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



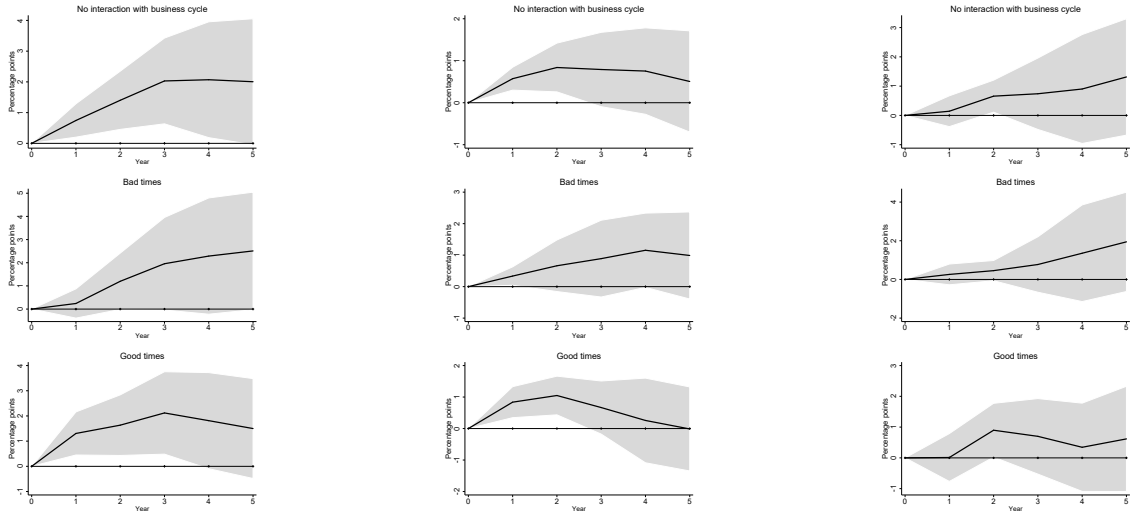
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education level groups to a reform of the collective bargaining system that decentralizes bargaining. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.10 – Impact of CB reforms that weaken unions on employment - by education level

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that weakens unions. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

4.8.5 OLS - Robustness

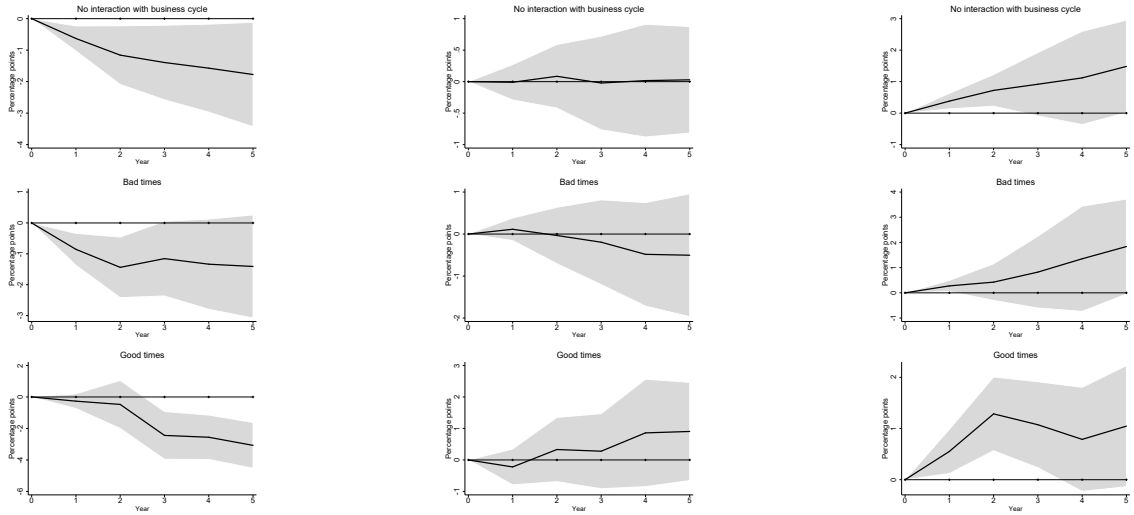
4.8.5.A Additional controls

Figure 4.11 – Impact of CB reforms that decrease the institutional wedge on aggregate employment - Additional controls

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



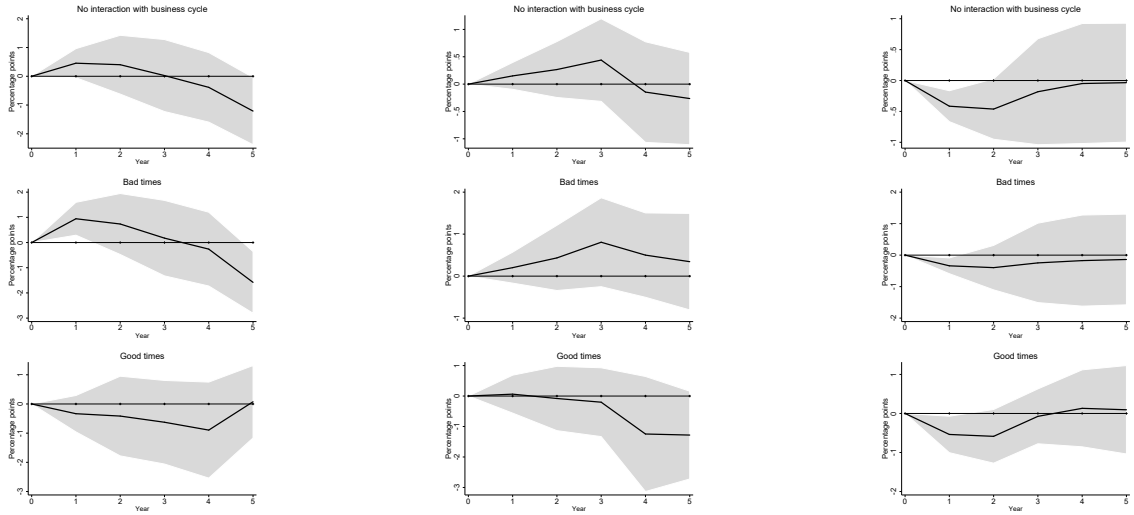
Notes: The figures show the cumulative impulse responses of the employment rate of 15–64-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification plus three additional control variables: (1) the strictness of employment protection for permanent jobs, (2) the strictness of employment protection regarding the use of temporary contracts, and (3) total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.12 – Impact of CB reforms that decrease the institutional wedge on aggregate unemployment - Additional controls

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



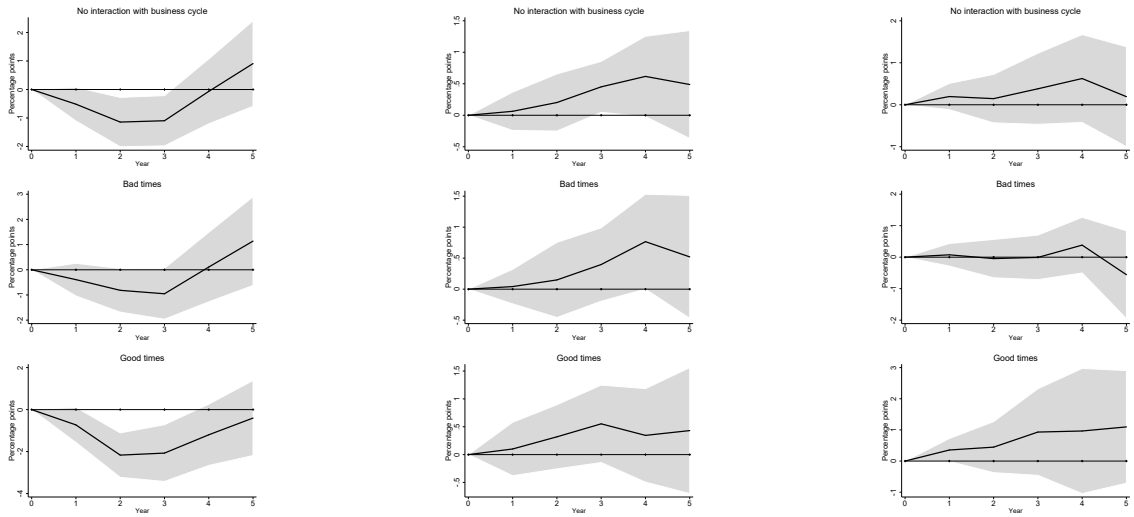
Notes: The figures show the cumulative impulse responses of the unemployment rate of 15–74-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification plus three additional control variables: (1) the strictness of employment protection for permanent jobs, (2) the strictness of employment protection regarding the use of temporary contracts, and (3) total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on unemployment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on unemployment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.13 – Impact of CB reforms that decrease the institutional wedge on temporary employment - Additional controls

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



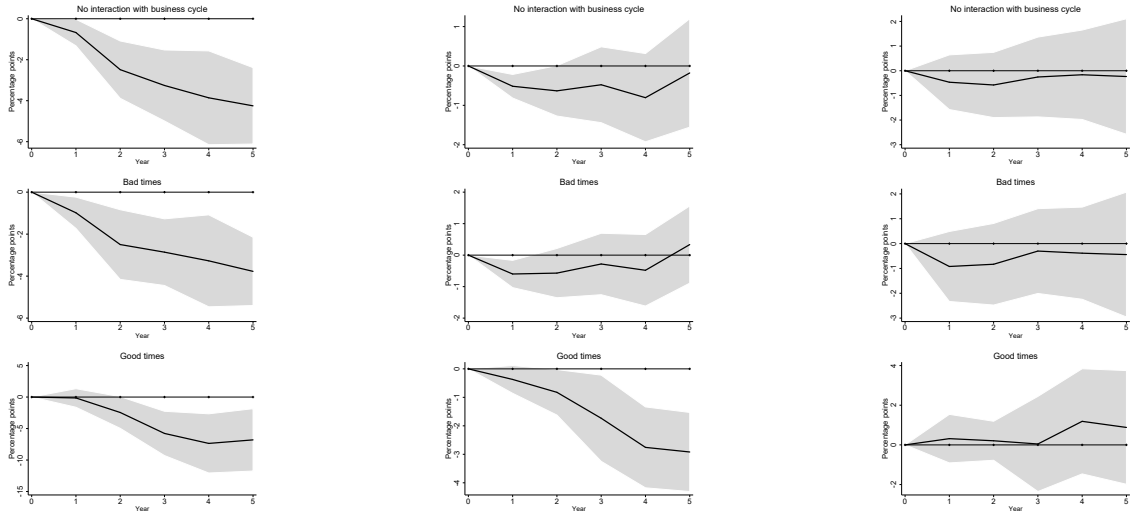
Notes: The figures show the cumulative impulse responses of the temporary employment rate (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the subgroup specification for temporary employment plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on temporary employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on temporary employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.14 – Impact of CB reforms that reduce bargaining coverage on employment - by age group - Additional controls

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



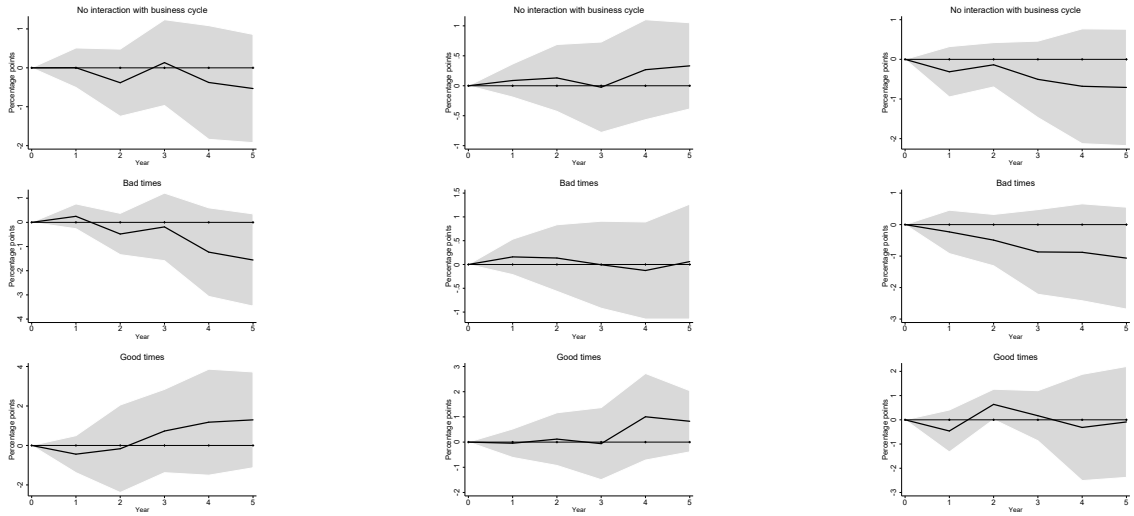
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.15 – Impact of CB reforms that decentralize bargaining on employment - by age group - Additional controls

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



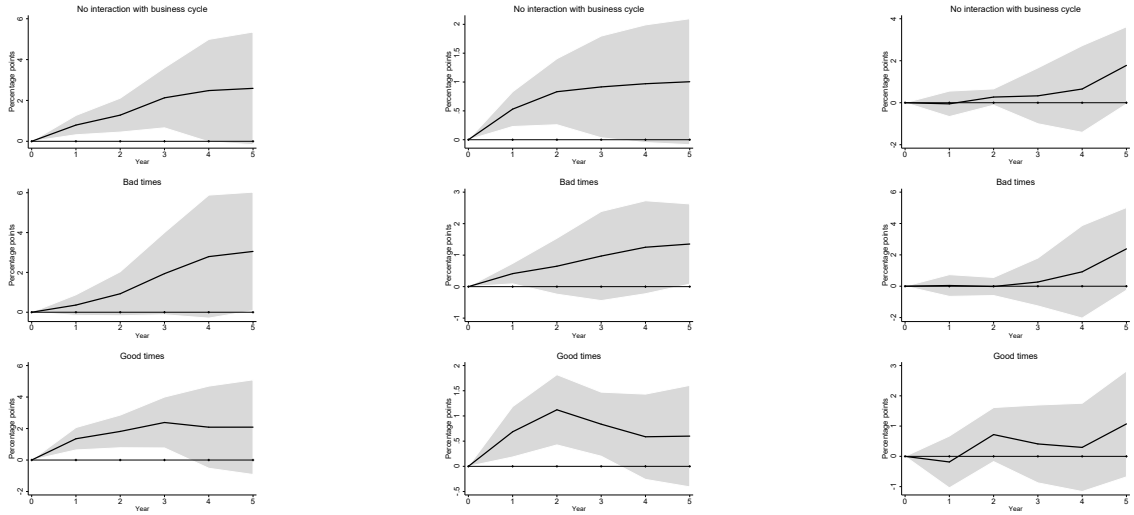
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.16 – Impact of CB reforms that weaken unions on employment - by age group - Additional controls

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



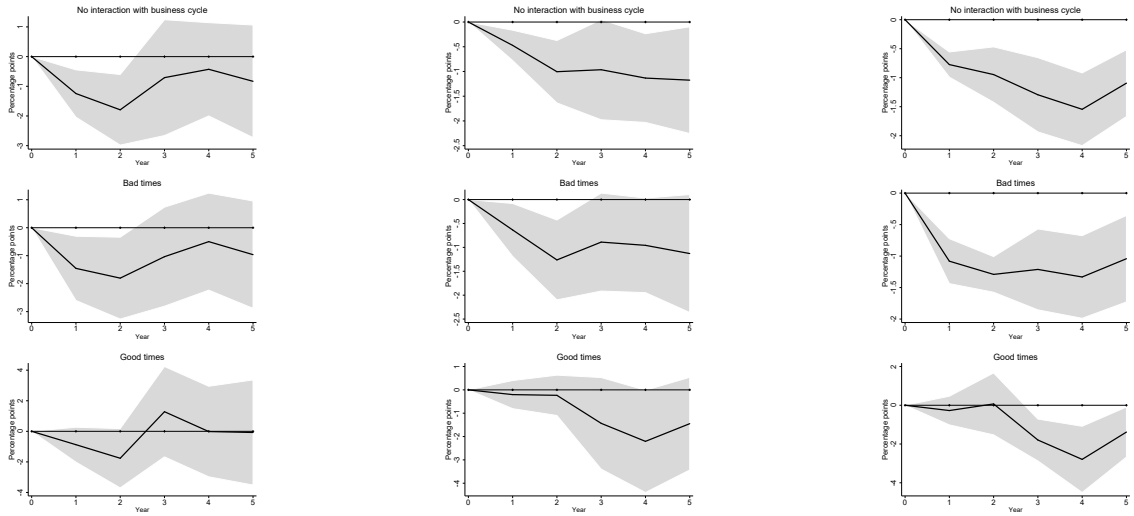
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.17 – Impact of CB reforms that reduce bargaining coverage on employment - by education level - Additional controls

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



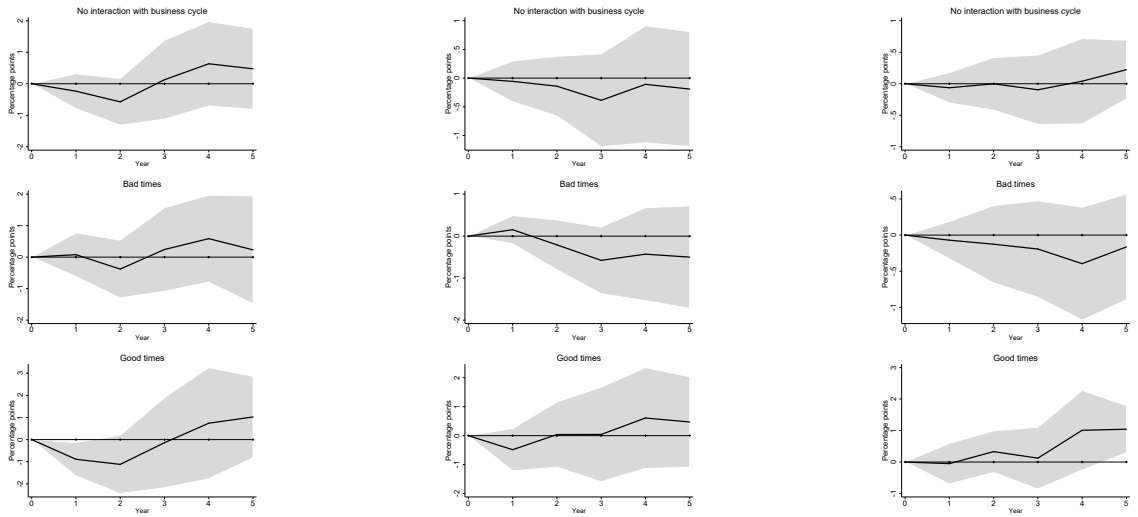
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.18 – Impact of CB reforms that decentralize bargaining on employment - by education level - Additional controls

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



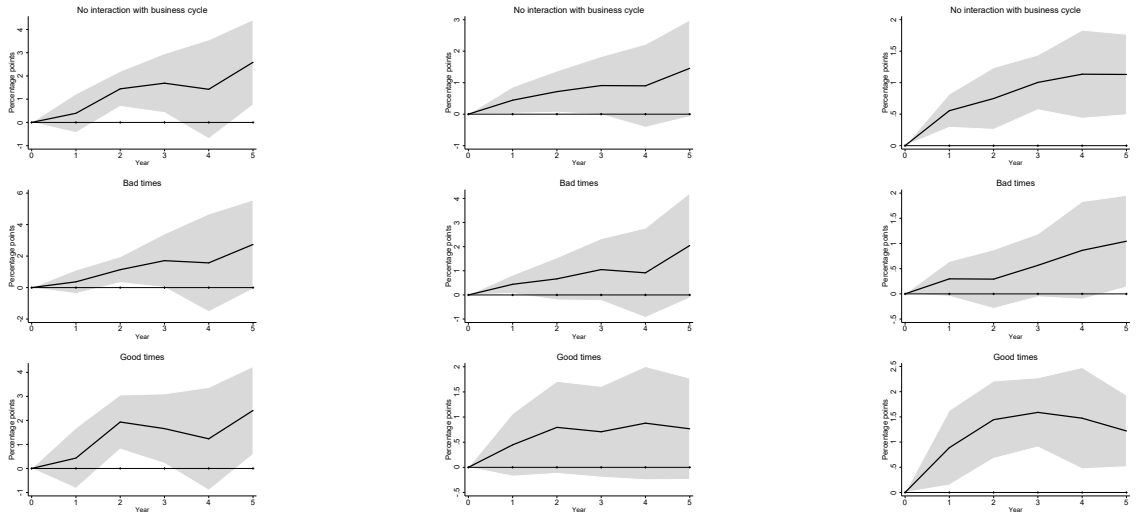
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.19 – Impact of CB reforms that weaken unions on employment - by education level - Additional controls

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the subgroup specification for employment by age group plus an additional control variable: total expenditure on labor market policies. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

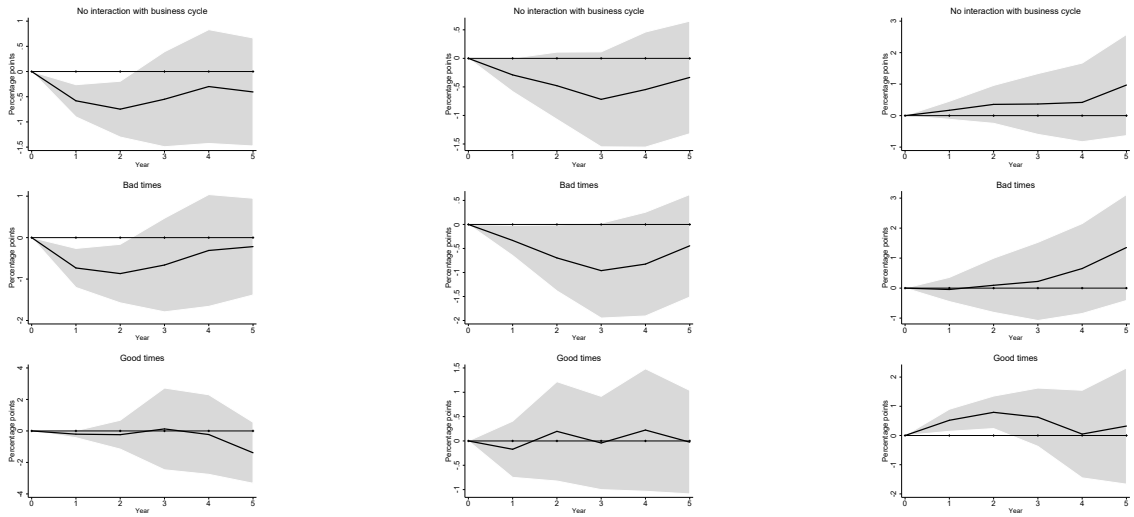
4.8.5.B Sensitivity to the number of lags

Figure 4.20 – Impact of CB reforms that decrease the institutional wedge on aggregate employment - 1 lag

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



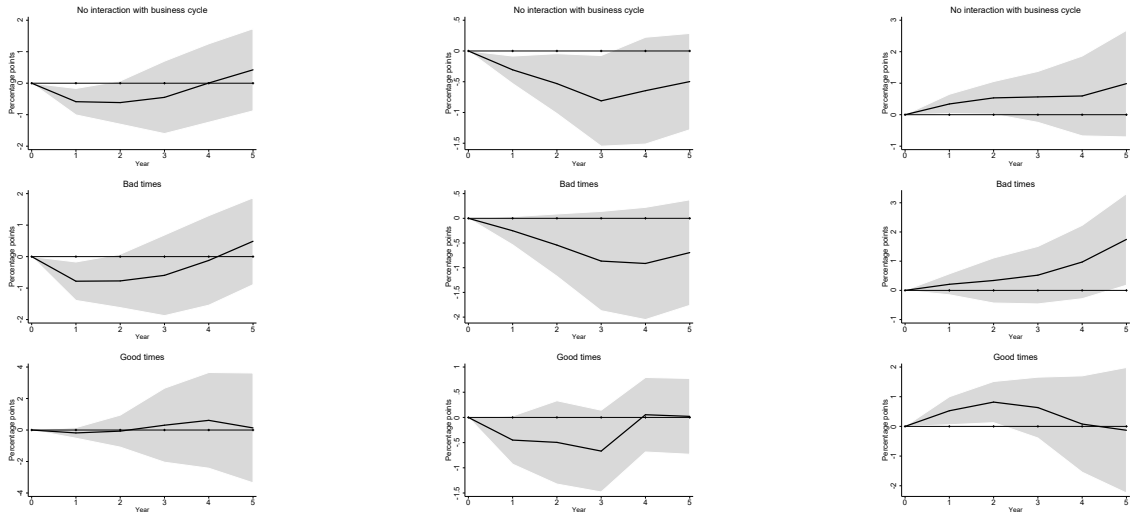
Notes: The figures show the cumulative impulse responses of the employment rate of 15–64-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.21 – Impact of CB reforms that decrease the institutional wedge on aggregate employment - 3 lags

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



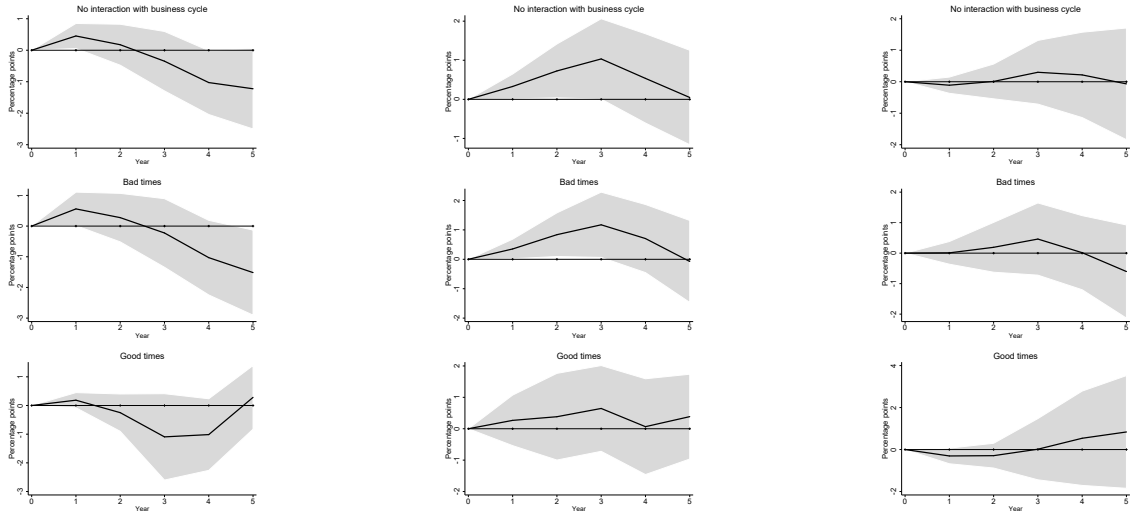
Notes: The figures show the cumulative impulse responses of the employment rate of 15–64-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.22 – Impact of CB reforms that decrease the institutional wedge on aggregate unemployment - 1 lag

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



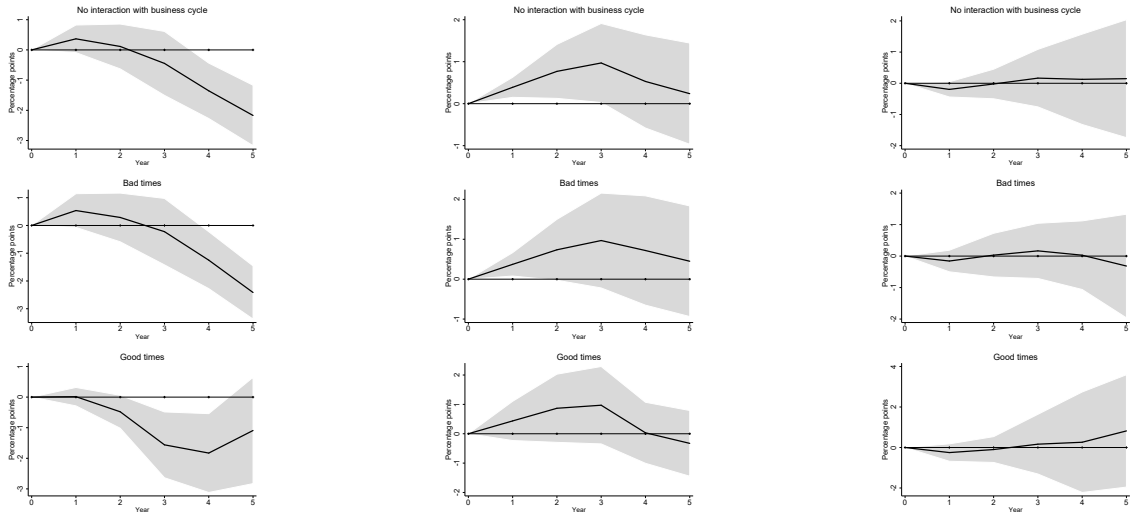
Notes: The figures show the cumulative impulse responses of the unemployment rate of 15–74-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on unemployment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on unemployment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.23 – Impact of CB reforms that decrease the institutional wedge on aggregate unemployment - 3 lags

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



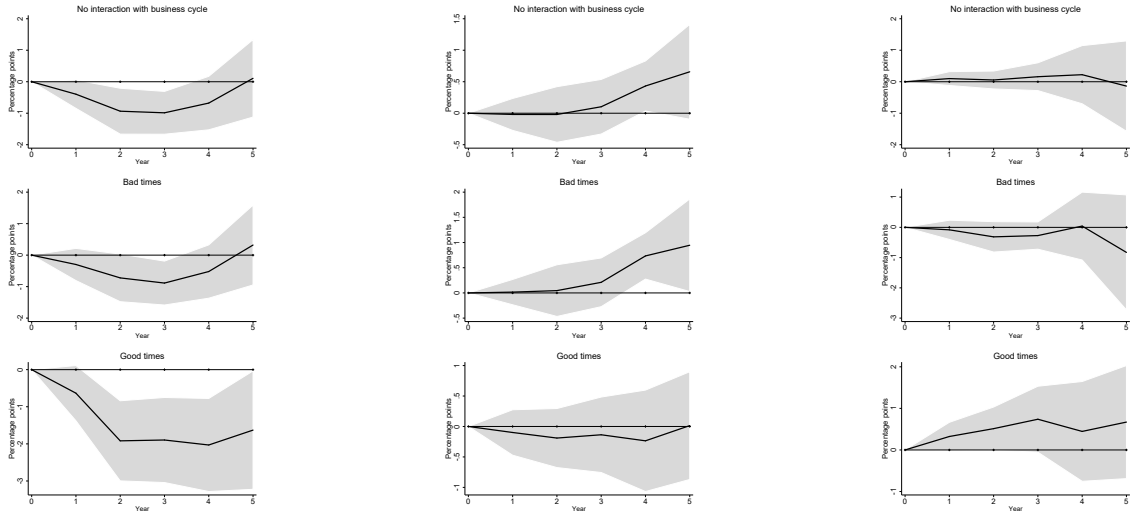
Notes: The figures show the cumulative impulse responses of the unemployment rate of 15–74-year-olds (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on unemployment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on unemployment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.24 – Impact of CB reforms that decrease the institutional wedge on temporary employment - 1 lag

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



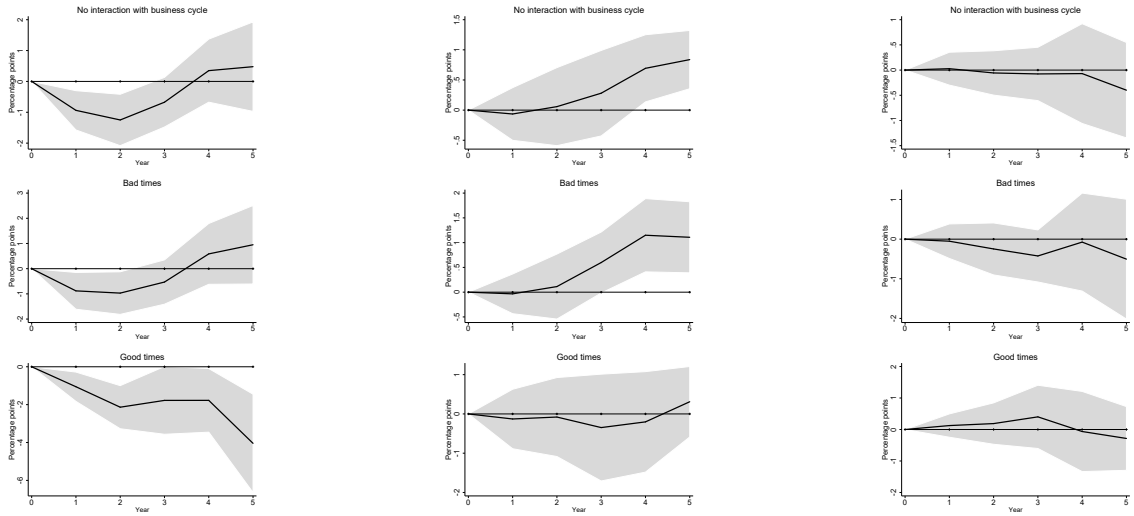
Notes: The figures show the cumulative impulse responses of the temporary employment rate (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on temporary employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on temporary employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.25 – Impact of CB reforms that decrease the institutional wedge on temporary employment - 3 lags

(a) Reduction in bargaining coverage

(b) Decentralization of bargaining

(c) Weakening of unions



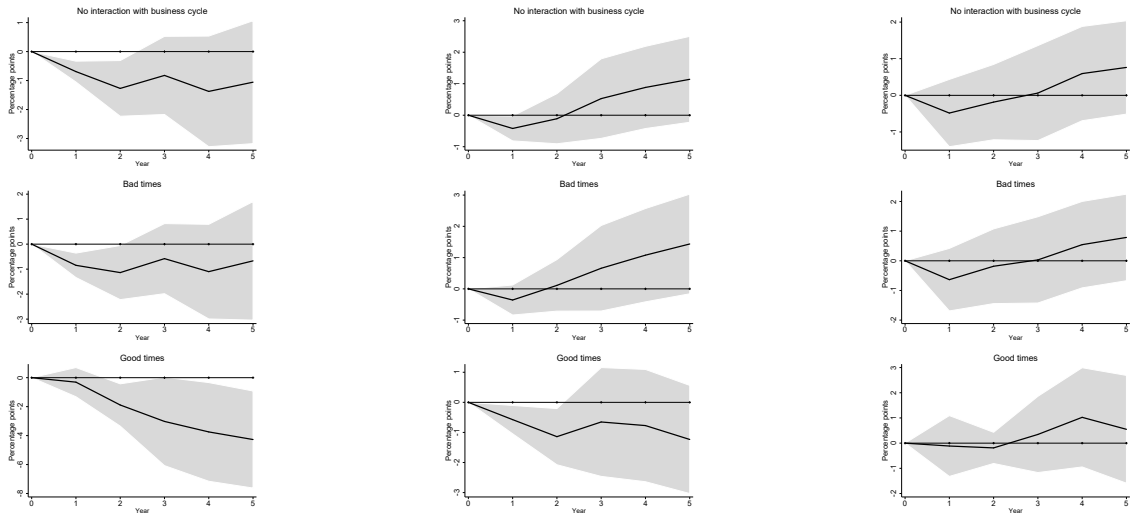
Notes: The figures show the cumulative impulse responses of the temporary employment rate (in percentage points) to a reform of the collective bargaining system that decreases the institutional wedge. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on temporary employment (a) of reforms that reduce bargaining coverage, (b) of reforms that decentralize bargaining, and (c) of reforms that weaken unions. Each part of the figure contains three subpanels, showing the effects on temporary employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.26 – Impact of CB reforms that reduce bargaining coverage on employment - by age group - 1 lag

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



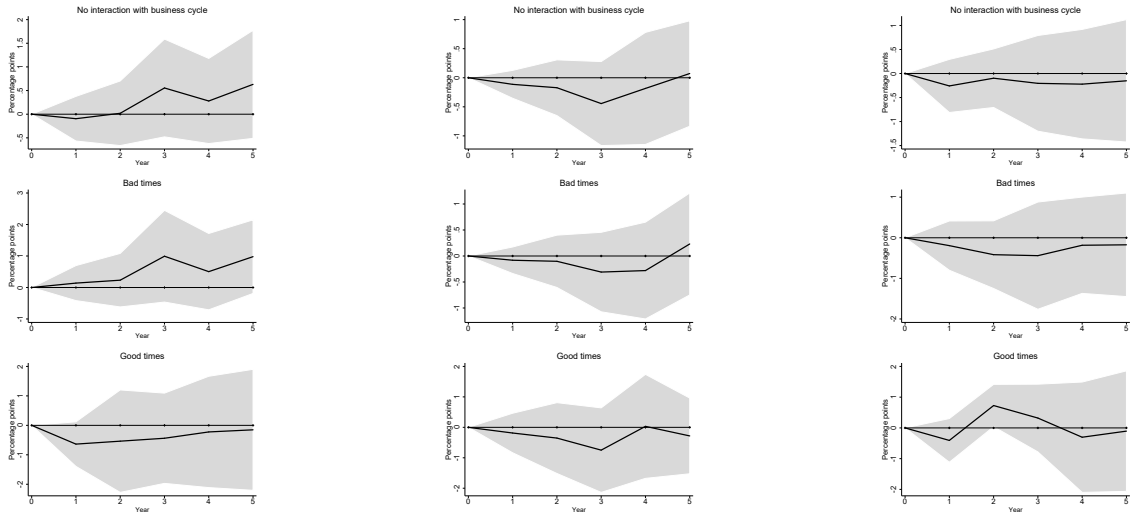
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.27 – Impact of CB reforms that decentralize bargaining on employment - by age group - 1 lag

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



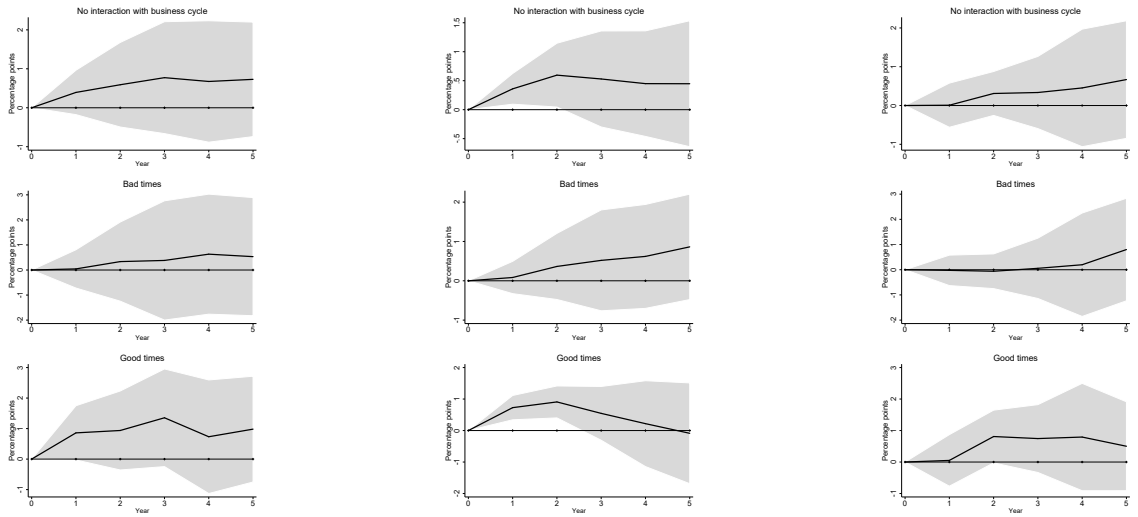
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.28 – Impact of CB reforms that weaken unions on employment - by age group - 1 lag

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



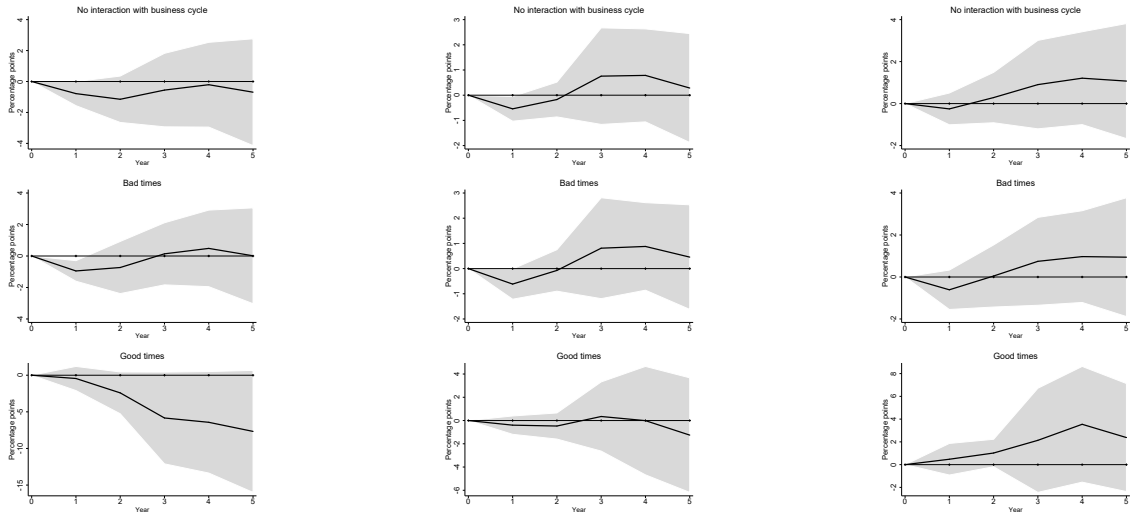
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.29 – Impact of CB reforms that reduce bargaining coverage on employment - by age group - 3 lags

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



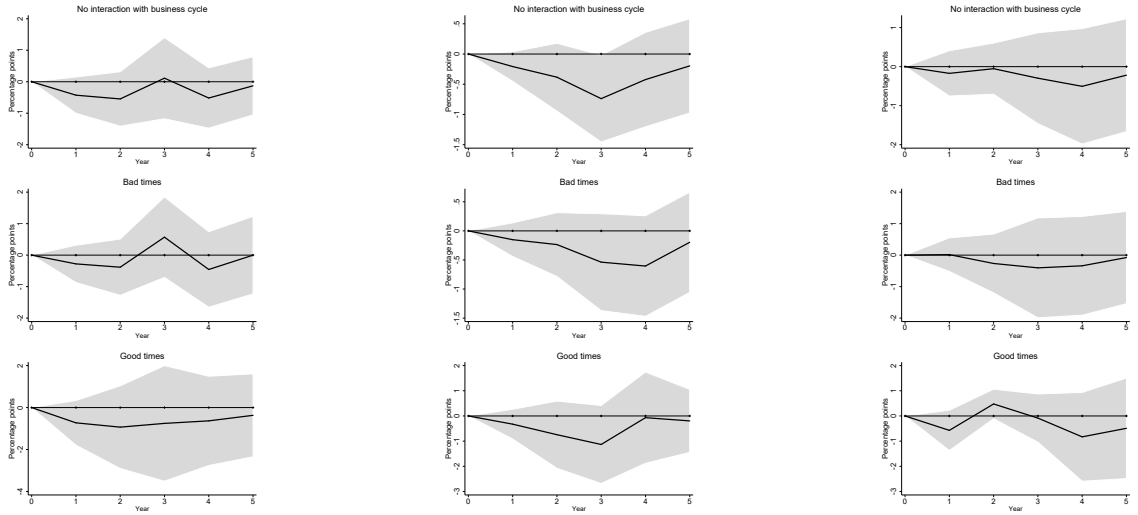
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.30 – Impact of CB reforms that decentralize bargaining on employment - by age group - 3 lags

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



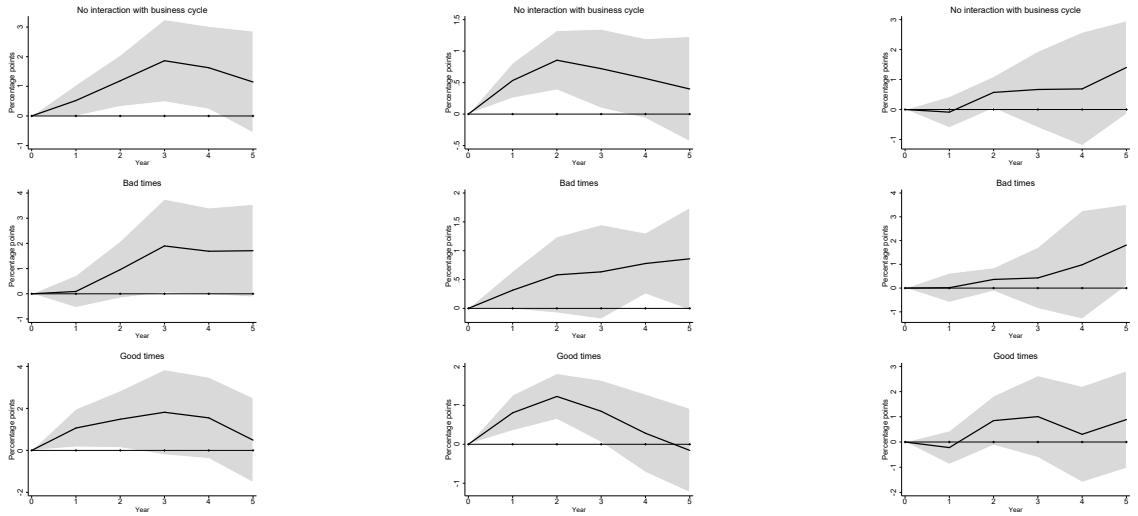
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.31 – Impact of CB reforms that weaken unions on employment - by age group - 3 lags

(a) Employment rate of 15–24-year-olds

(b) Employment rate of 25–54-year-olds

(c) Employment rate of 55–64-year-olds



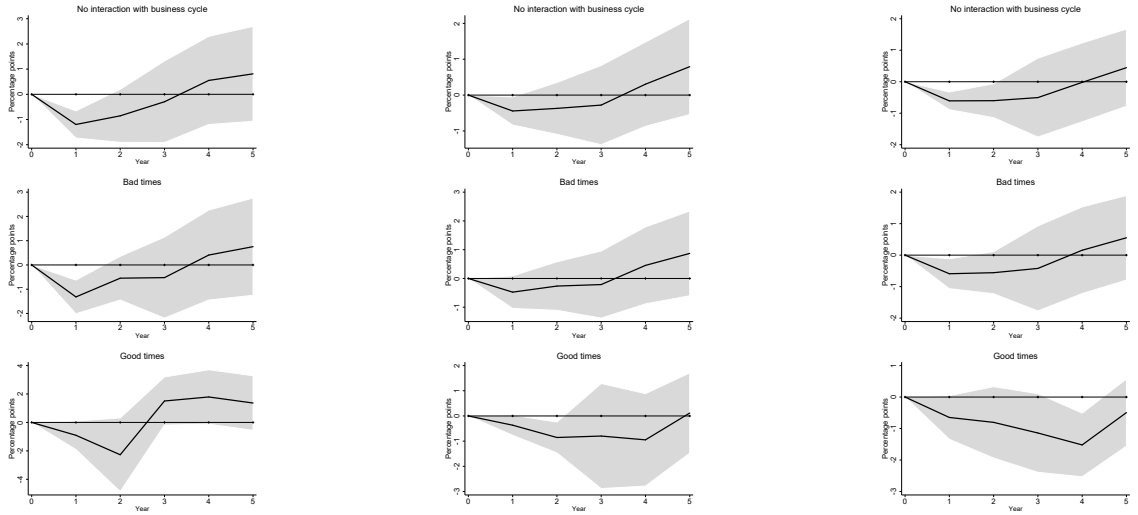
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of 15–24-year-olds, (b) of 25–54-year-olds, and (c) of 55–64-year-olds. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.32 – Impact of CB reforms that reduce bargaining coverage on employment - by education level - 1 lag

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



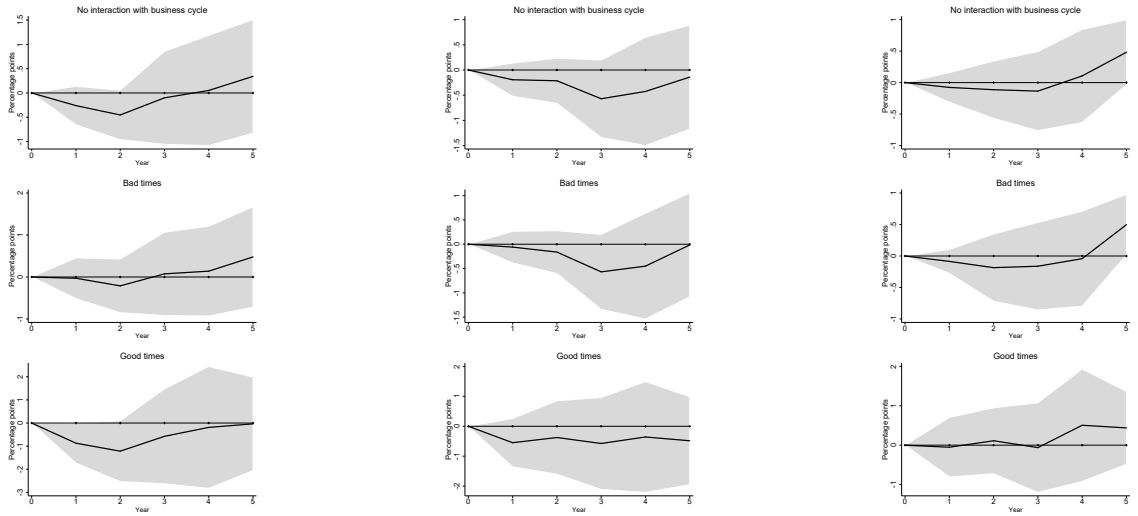
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.33 – Impact of CB reforms that decentralize bargaining on employment - by education level - 1 lag

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



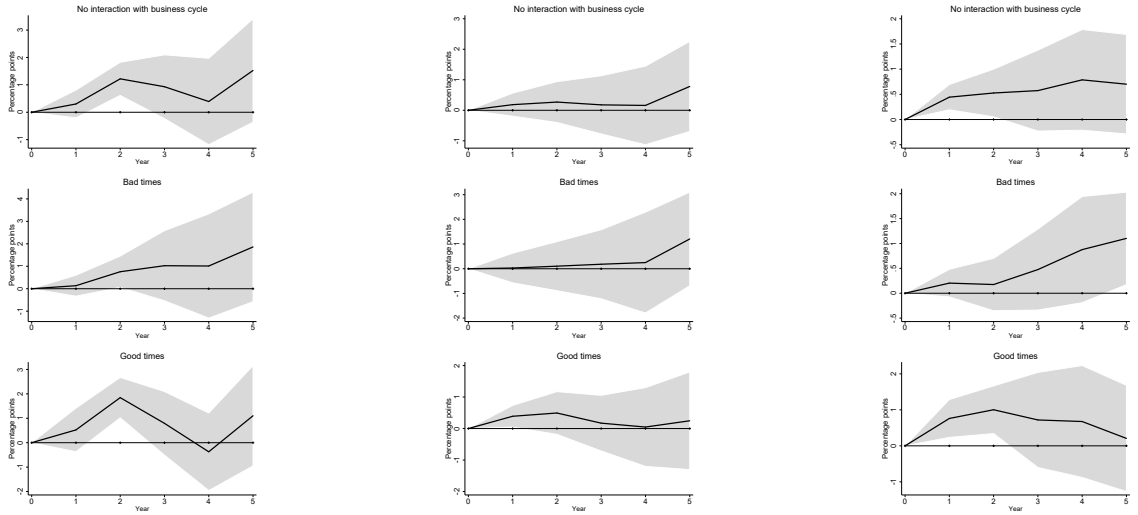
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.34 – Impact of CB reforms that weaken unions on employment - by education level - 1 lag

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



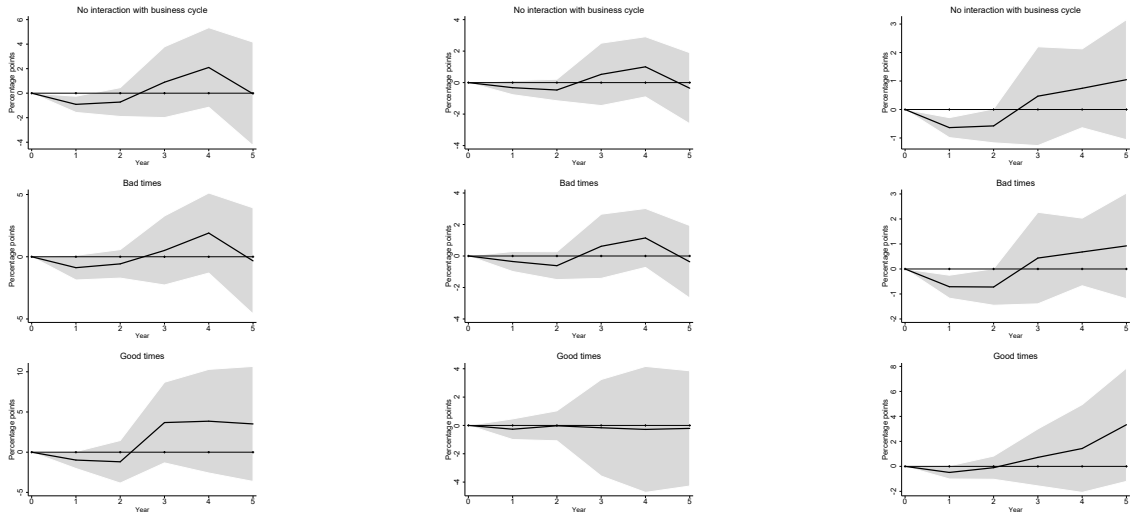
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the main specification but with only 1 lag. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.35 – Impact of CB reforms that reduce bargaining coverage on employment - by education level - 3 lags

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



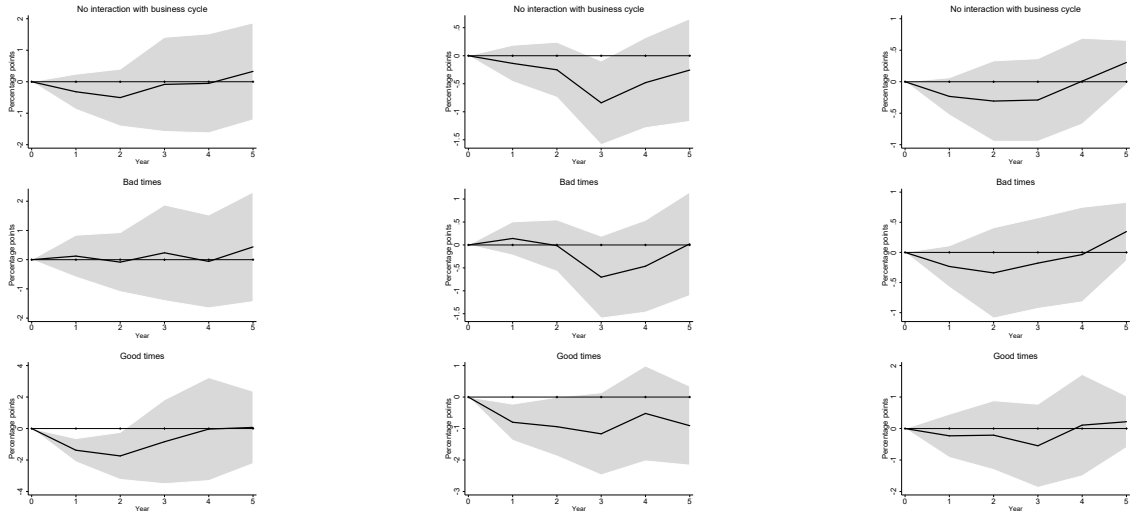
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that reduces bargaining coverage. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.36 – Impact of CB reforms that decentralize bargaining on employment - by education level - 3 lags

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

(c) Employment Rate of Tertiary-educated Adults



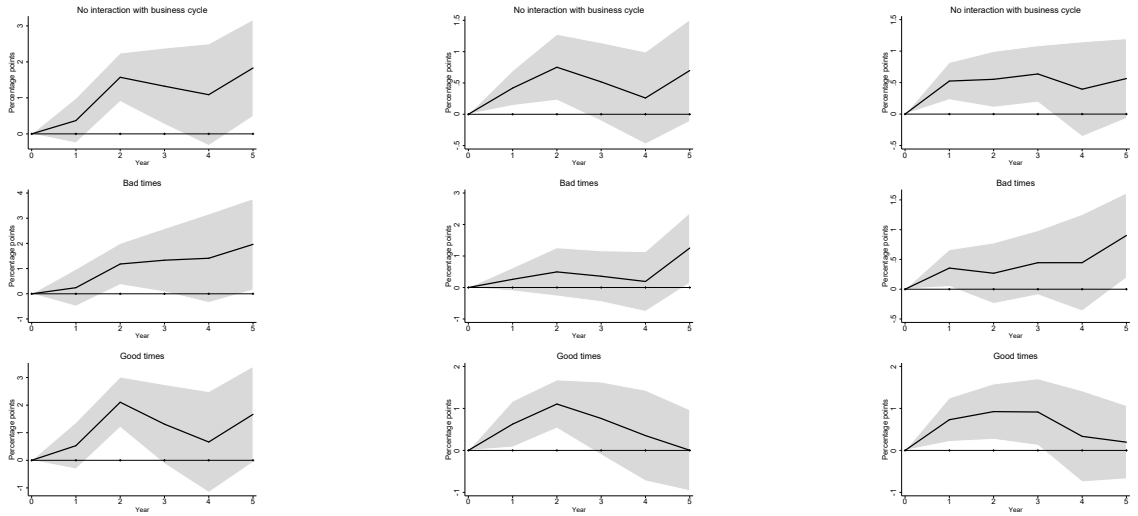
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that decentralizes bargaining. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

Figure 4.37 – Impact of CB reforms that weaken unions on employment - by education level - 3 lags

(a) Employment Rate of Low-educated Adults

(b) Employment Rate of Secondary-educated Adults

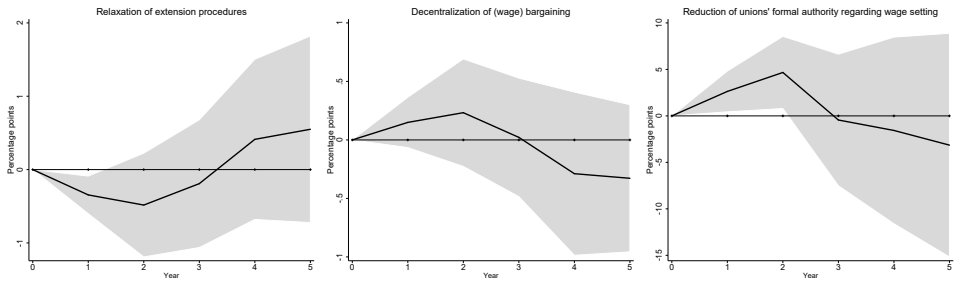
(c) Employment Rate of Tertiary-educated Adults



Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to a reform of the collective bargaining system that weakens unions. The estimates are based on the main specification but with 3 lags. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the employment rates (a) of low-educated adults, (b) of secondary-educated adults, and (c) of tertiary-educated adults. Each part of the figure contains three subpanels, showing the effects on employment (i) regardless of the timing of the reform in the business cycle, (ii) in "bad times" (output gap < -1) and (iii) in "good times" (output gap ≥ -1).

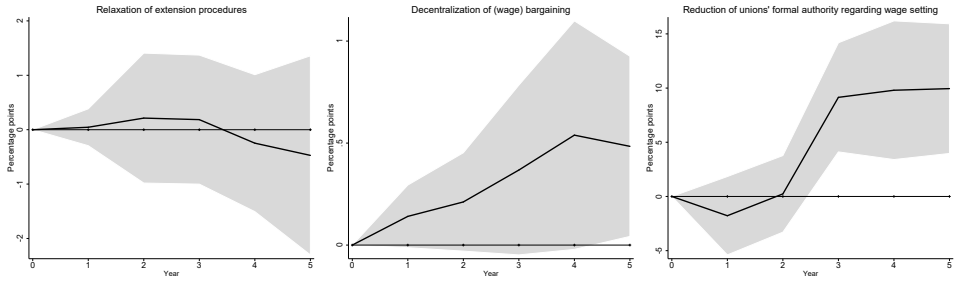
4.8.5.C Using ICTWSS variables

Figure 4.38 – Impact of CB reforms on aggregate employment - ICTWSS variables



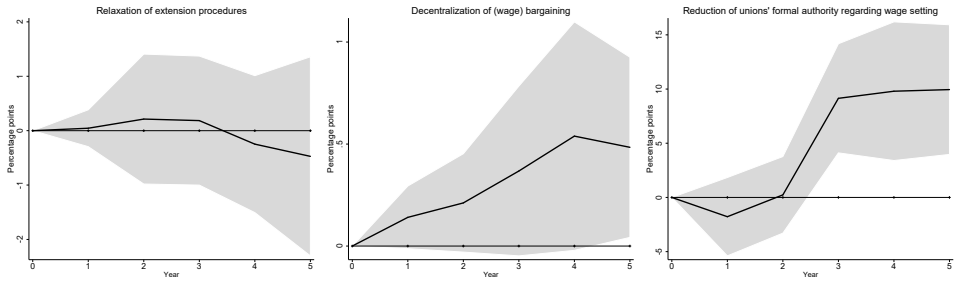
Notes: The figures show the cumulative impulse responses of the employment rate of 15–64-year-olds (in percentage points) to variations in collective bargaining system indicators in the ICTWSS database. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of a relaxation of extension procedures (as a proxy for reforms that reduce bargaining coverage), (b) of decentralization of (wage) bargaining (as a proxy for reforms that decentralize bargaining), and (c) of a reduction in the formal authority of unions in setting wages (as a proxy for reforms that weaken unions).

Figure 4.39 – Impact of CB reforms on aggregate unemployment - ICTWSS variables



Notes: The figures show the cumulative impulse responses of the unemployment rate of 15–74-year-olds (in percentage points) to variations in collective bargaining system indicators in the ICTWSS database. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on unemployment (a) of a relaxation of extension procedures (as a proxy for reforms that reduce bargaining coverage), (b) of decentralization of (wage) bargaining (as a proxy for reforms that decentralize bargaining), and (c) of a reduction in the formal authority of unions in setting wages (as a proxy for reforms that weaken unions).

Figure 4.40 – Impact of CB reforms on temporary employment - ICTWSS variables



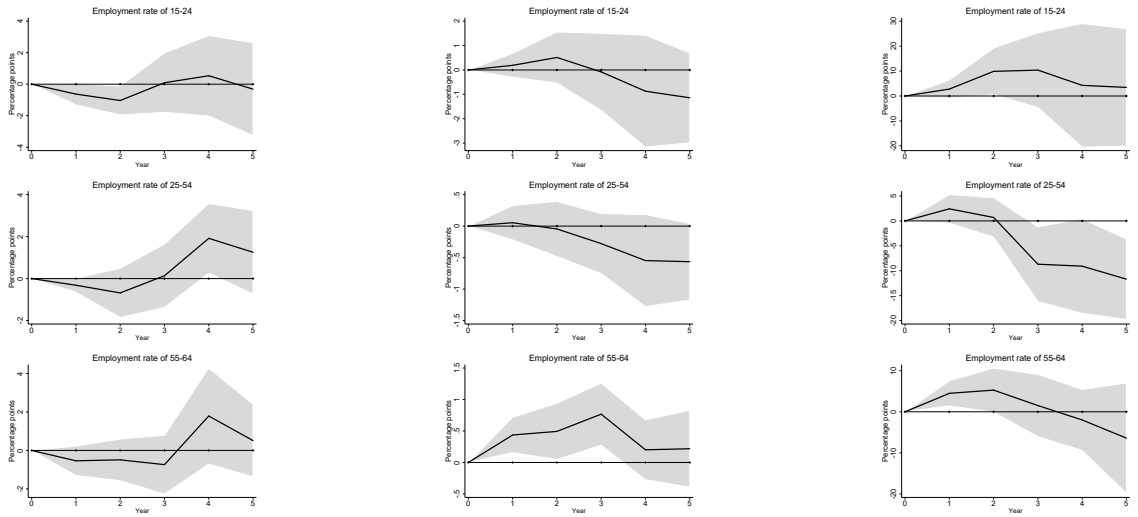
Notes: The figures show the cumulative impulse responses of the temporary employment rate (in percentage points) to variations in collective bargaining system indicators in the ICTWSS database. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on temporary employment (a) of a relaxation of extension procedures (as a proxy for reforms that reduce bargaining coverage), (b) of decentralization of (wage) bargaining (as a proxy for reforms that decentralize bargaining), and (c) of a reduction in the formal authority of unions in setting wages (as a proxy for reforms that weaken unions).

Figure 4.41 – Impact of CB reforms on employment - by age group - ICTWSS variables

(a) Relaxation of extension procedures

(b) Decentralization of (wage) bargaining

(c) Reduction of unions' formal authority regarding wage setting



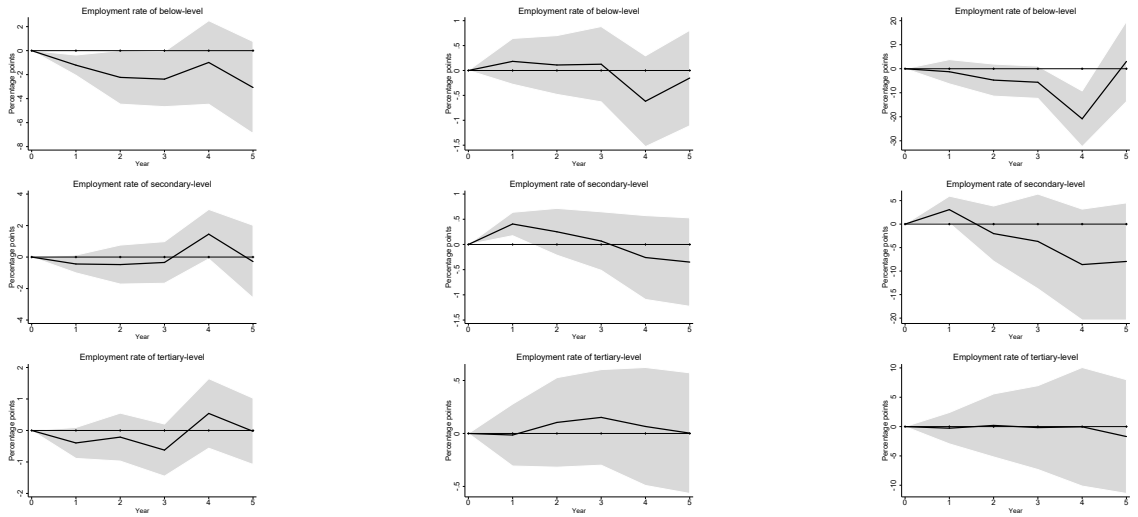
Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different age groups to variations in collective bargaining system indicators in the ICTWSS database. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of a relaxation of extension procedures (as a proxy for reforms that reduce bargaining coverage), (b) of decentralization of (wage) bargaining (as a proxy for reforms that decentralize bargaining), and (c) of a reduction in the formal authority of unions in setting wages (as a proxy for reforms that weaken unions).

Figure 4.42 – Impact of CB reforms on employment - by education level - ICTWSS variables

(a) Relaxation of extension procedures

(b) Decentralization of (wage) bargaining

(c) Reduction of unions' formal authority regarding wage setting



Notes: The figures show the cumulative impulse responses of the employment rate (in percentage points) in different education-level groups to variations in collective bargaining system indicators in the ICTWSS database. The contemporaneous effect of the reform is set to 0. The grey bands represent 90% confidence intervals. Parts (a–c) show the effects on employment (a) of a relaxation of extension procedures (as a proxy for reforms that reduce bargaining coverage), (b) of decentralization of (wage) bargaining (as a proxy for reforms that decentralize bargaining), and (c) of a reduction in the formal authority of unions in setting wages (as a proxy for reforms that weaken unions).

4.8.5.D Forward Terms

Table 4.12 – OLS estimates including forward terms of collective bargaining reforms

Dependent: change in employment rate of 15–64-year-olds	(1)	(2)	(3)	(4)
Reduction in bargaining coverage t	-0.52**	-0.57**	-0.58**	-0.61**
	(0.23)	(0.24)	(0.24)	(0.24)
Reduction in bargaining coverage $t-1$		-0.43**	-0.43**	-0.52**
		(0.19)	(0.19)	(0.23)
Reduction in bargaining coverage $t-2$			-0.07	-0.09
			(0.21)	(0.22)
Decentralization of bargaining t	0.01	-0.01	-0.01	0.02
	(0.21)	(0.23)	(0.24)	(0.23)
Decentralization of bargaining $t-1$		-0.09	-0.07	-0.05
		(0.16)	(0.17)	(0.17)
Decentralization of bargaining $t-2$			0.16	0.10
			(0.14)	(0.15)
Weakening of unions t	0.04	0.01	0.00	-0.03
	(0.18)	(0.19)	(0.19)	(0.19)
Weakening of unions $t-1$		0.23*	0.24**	0.25*
		(0.11)	(0.11)	(0.14)
Weakening of unions $t-2$			0.23	0.24
			(0.15)	(0.19)
Reduction in bargaining coverage $t+1$				-0.09
				(0.20)
Decentralization of bargaining $t+1$				0.05
				(0.19)
Weakening of unions $t+1$				-0.30*
				(0.15)
R^2	0.691	0.699	0.702	0.708
Observations	420	420	420	396

Notes: Country-based cluster-robust standard errors are shown in parentheses below the coefficient estimates. Coefficient estimates of control variables and fixed effects are not reported. The dependent variable is the change in the employment rate (15–64-year-olds). The control variables include the twice-lagged values of *(i)* the change in the employment rate; *(ii)* national change; and the contemporaneous and twice-lagged values of *(iii)* the output gap; *(iv)* the yield curve; *(v)* the short-term interest rate; *(vi)* real total government expenditure excluding interest; and the contemporaneous value of *(vii)* euro zone membership. The forward terms are denoted $t+1$ and are shown in column (4).

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

4.8.6 Standard IV - First stage estimates

Table 4.13 – Effects of CB reforms on employment - First stage (OLS)

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**					
	IV	0.29**	0.31**	0.32**	0.31**	0.37**
		(0.14)	(0.15)	(0.15)	(0.15)	(0.17)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	5.03 (0.02)	5.48 (0.02)	5.51 (0.02)	5.58 (0.02)	6.32 (0.01)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	13.10	14.88	14.94	13.10	18.72
	Kleibergen-Paap Wald rk F statistic	4.38	4.41	4.39	4.23	4.44
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	2.48 (0.12)	1.20 (0.28)	0.15 (0.70)	0.03 (0.87)	0.07 (0.79)
	Difference-in Sargan C statistic	0.88 (0.35)	0.83 (0.36)	0.03 (0.87)	0.00 (0.99)	0.02 (0.89)
Category 2	**Decentralization of bargaining**					
	IV	-0.01	0.00	0.02	0.02	0.02
		(0.09)	(0.09)	(0.10)	(0.10)	(0.10)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	0.03 (0.86)	0.00 (1.00)	0.07 (0.80)	0.07 (0.80)	0.06 (0.80)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	0.04	0.00	0.09	0.08	0.07
	Kleibergen-Paap Wald rk F statistic	0.03	0.00	0.06	0.06	0.05
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	0.89 (0.35)	0.75 (0.39)	0.06 (0.81)	0.18 (0.68)	0.64 (0.42)
	Difference-in Sargan C statistic	1.13 (0.29)	0.33 (0.56)	0.56 (0.46)	0.01 (0.93)	0.01 (0.93)
Category 3	**Weakening of unions**					
	IV	0.00	0.00	0.00	0.00	0.00
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	0.04 (0.84)	0.02 (0.89)	0.06 (0.81)	0.05 (0.82)	0.02 (0.89)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	0.03	0.01	0.03	0.03	0.01
	Kleibergen-Paap Wald rk F statistic	0.04	0.02	0.05	0.04	0.02
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	1.51 (0.22)	2.68 (0.10)	1.55 (0.21)	0.31 (0.58)	0.03 (0.86)
	Difference-in Sargan C statistic	1.01 (0.31)	1.28 (0.26)	1.30 (0.25)	1.32 (0.25)	3.05 (0.08)

Notes: Country-based cluster-robust standard errors are shown in parentheses below the first stage coefficient estimates. P-values for LM, DWH F and Sargan C tests are shown in parentheses. The Stock–Yogo critical values for weak identification tests (used in the Cragg–Donald Wald test) are 16.38 for 10% and 8.96 for 15% maximal relative bias. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4.14 – Effects of CB reforms on unemployment - First stage (OLS)

		Year 1	Year 2	Year 3	Year 4	Year 5
Category 1	**Reduction in bargaining coverage**					
	IV	0.29**	0.31**	0.31**	0.30**	0.36**
		(0.14)	(0.15)	(0.15)	(0.15)	(0.17)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	5.06 (0.02)	5.50 (0.02)	5.43 (0.02)	5.57 (0.02)	6.46 (0.01)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	13.19	14.92	14.72	12.57	18.30
	Kleibergen-Paap Wald rk F statistic	4.38	4.41	4.32	4.17	4.44
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	0.87 (0.35)	0.69 (0.41)	0.01 (0.92)	0.42 (0.52)	1.18 (0.28)
	Difference-in Sargan C statistic	0.88 (0.35)	0.71 (0.39)	0.01 (0.92)	0.54 (0.46)	1.53 (0.22)
Category 2	**Decentralization of bargaining**					
	IV	-0.02	-0.01	0.01	0.01	0.01
		(0.09)	(0.09)	(0.10)	(0.10)	(0.10)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	0.08 (0.78)	0.01 (0.94)	0.02 (0.89)	0.02 (0.90)	0.01 (0.92)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	0.10	0.01	0.03	0.02	0.01
	Kleibergen-Paap Wald rk F statistic	0.07	0.00	0.02	0.01	0.01
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	0.00 (0.99)	0.19 (0.66)	0.03 (0.87)	0.03 (0.87)	0.19 (0.66)
	Difference-in Sargan C statistic	0.00 (0.99)	0.22 (0.64)	0.03 (0.86)	0.03 (0.86)	0.23 (0.63)
Category 3	**Weakening of unions**					
	IV	0.00	0.00	0.00	0.01	0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
	Observations	396	369	342	315	287
	Instrument relevance test					
	H0: Excluded instruments are irrelevant (under-identification)					
	Kleibergen–Paap rk LM statistic	0.16 (0.69)	0.02 (0.88)	0.05 (0.82)	0.43 (0.51)	0.32 (0.57)
	Instrument weakness tests					
	H0: Excluded instruments are weak (weak identification)					
	Cragg-Donald Wald Statistic	0.11	0.01	0.03	0.27	0.17
	Kleibergen-Paap Wald rk F statistic	0.14	0.02	0.04	0.37	0.27
	Endogeneity tests					
	H0: Endogenous regressor is exogenous					
	Durbin-Wu-Hausman F statistic	1.46 (0.23)	1.25 (0.27)	0.25 (0.62)	0.02 (0.89)	0.37 (0.55)
	Difference-in Sargan C statistic	1.61 (0.20)	1.38 (0.24)	0.28 (0.59)	0.02 (0.88)	0.42 (0.52)

Notes: Country-based cluster-robust standard errors are shown in parentheses below the first stage coefficient estimates. P-values for LM, DWH F and Sargan C tests are shown in parentheses. The Stock–Yogo critical values for weak identification tests (used in the Cragg–Donald Wald test) are 16.38 for 10% and 8.96 for 15% maximal relative bias. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

General conclusion

This dissertation proposes an investigation, both empirical and theoretical, of the impact of collective bargaining systems on the macroeconomic performance, looking at indicators of employment, unemployment, economic growth, wage growth and welfare. It relates to the issues of how should the collective bargaining system be organized to achieve better macroeconomic outcomes, when it should be reformed, and how it does interact with other institutions and economic policy. In short, I intend to modestly inform public policy decisions related to shaping collective bargaining.

Chapter 1 shows the existence of non-linearities in the wage Phillips curve due to collective bargaining. Using European NUTS-2 regional data and national indicators of wage bargaining centralization, we show that the slope of the wage Phillips curve becomes flat in periods of high unemployment where bargaining takes place mainly at or above the sectoral level. Chapter 2 relies on an equilibrium unemployment model with frictions and endogenous job destruction to evaluate the effectiveness of setting up an experience-rating system to finance unemployment insurance via layoff taxes in economies characterized by sectoral negotiations with extension of agreements. Simulations show that the reform is effective in reducing unemployment and increasing aggregate welfare, especially when accompanied by a relaxation of existing employment protection. Chapter 3 shows empirical evidence on the relationship between decentralized collective bargaining and economic growth for OECD countries. The findings suggest that organized decentralized bargaining systems with the relaxation of the 'favorability' principle are associated with higher economic growth relative to other systems. Chapter 4 questions the timing of flexibility-enhancing reforms of collective bargaining. Using data on reforms of collective bargaining institution in European Union countries, there is no evidence that making collective bargaining institutions more flexible during a recession has a positive effect on employment or unemployment in the short term. More specifically, reforms that reduce bargaining coverage have negative short-term effects, particularly on the employment of young people and low-educated workers, and are associated with a decline in the share of temporary jobs.

The different chapters of this thesis allow me to draw some policy implications. First, the adoption of an organized, decentralized system of collective bargaining, where company negotiations complement sectoral or cross-sectoral agreements without being constrained by the principle of favorability, is conducive to stronger economic growth. However, it seems counterproductive in terms of employment

outcomes to reform the collective bargaining system in times of economic recession. Policy-makers should wait until the economy is expanding to initiate reforms of collective bargaining, if any, especially when these reforms introduce more flexibility. Finally, policy-makers should take the collective bargaining system into account when designing other policies, such as reforms affecting employment protection or the conduct of monetary policy. Indeed, there are interactions that can affect the outcomes initially targeted.

Limitations and future extensions — The implications and policy recommendations outlined just above should, however, be read in the light of the limitations of each chapters. I describe some of them, and provide ideas to address them.

A limitation of Chapter 1 relies on the different degree of aggregation between economic variables and collective bargaining variables. The economic variables (nominal wage growth, unemployment gap, and other control variables) are at the regional NUTS-2 level, while the collective bargaining variables are nation-wide. Furthermore, we argue that collective bargaining shapes the wage Phillips curve, which can then influence the shape of the price Phillips curve. However, price data being not available at the regional level, we cannot investigate this intuition. Finally, the chapter will be completed by a theoretical model that we are working on. It will augment the paper with a theoretical framework on the link between wage dynamics over the business cycle and the level of centralization of collective bargaining.

In Chapter 2, we have modeled two exclusive levels of bargaining: a sectoral bargaining and a decentralized bargaining within the firm. The sectoral agreements cannot be renegotiated with lower standards for the employee at the firm level. This choice allowed us to emphasize the role of sectoral negotiation and binding agreements in the success of the reform implementing experience-rating as a system of employment protection and unemployment insurance financing. We could work on an extension project considering two-tier bargaining existing in Western Europe. Following Cardullo et al. (2018), we might model a total wage composed of a fraction negotiated by workers' unions and firms' representatives at sectoral level and the remaining part negotiated at firm level, with the latter being unable only to fix an agreement that would make workers worse off than under the sectoral agreement.

Chapter 3 relies on estimates of data converted to a 5-year average in order to avoid the problem of instrument proliferation in the system GMM related to our large time span. However, this can lead to loss of information and alter the results. We are working on a version with annual data. But this requires finding instruments to take into account the endogeneity problems induced by our dynamic

growth equation. The large time period also requires to take into account the non-stationarity issue. We are also considering how to introduce the coordination of bargaining in our current classification, since, as has been noted by OECD (2019) and Garnero (2020), it can be distinguished from the centralization of bargaining and play a role in macroeconomic performance. Our study is also limited by the data at our disposal (ICTWSS data). Although they are detailed, they remain aggregate indicators, which may obscure some of the practical realities of decentralization, such as whether organized decentralization is actually effective in practice.

In Chapter 4, I propose a classification of collective bargaining reforms from which I build a database containing the reforms for EU countries over the period 2000–2018. This classification contains a degree of arbitrariness because certain features of the reforms, which I point out in the chapter, required me to make choices when creating the dataset. These choices can, and should, be discussed as they may affect the results. The classification itself can be discussed. Indeed, there may be, for example, a link between the decentralization of negotiations and the decline in coverage of workers, which are currently considered as two different categories of reform.

Then, while working with macroeconomic data is appealing for the generalization of the results, it comes with some gray areas, as the estimated effects on employment rate do not provide information on how employment adjustment is, if any, carried out within firms, according to firms' characteristics. For instance, Kauhanen et al. (2020) use linked Finnish employer-employee panel data to highlight that decentralization has divergent implications for blue-collar employees versus white-collar. Therefore, I plan to work on a complementary project studying the impact of collective bargaining reforms in France using microeconomic data. I will apply for access to INSEE data from *déclaration annuelle de données sociales (DADS)*. more precisely data on pay and salaried employment (FLORES).

Another limitation is about the instrumentation strategy. I argue that my specification does not lead to a major endogeneity problem. But as a precaution, I propose an identification strategy based on geographically related instruments, i.e. the adoption of a collective bargaining reform by peripheral countries would increase the probability of the domestic country to implement a reform, without having a direct effect on its employment rate. Although the instrument seems to meet the conditions of relevance and exogeneity, it would be relevant to find other instruments to obtain a more efficient estimator in case the current instrument is considered weak. Moreover, it would allow to test whether a subset of the instrument exogeneity conditions is valid.

Conclusion générale

Cette thèse propose une étude, à la fois empirique et théorique, de l'impact des systèmes de négociations collectives sur la performance macroéconomique, en examinant les indicateurs d'emploi, de chômage, de croissance économique, de croissance des salaires et de bien-être agrégé. Plus précisément, elle apporte des éléments de réponse aux questions suivantes. Comment le système de négociation collective devrait-il être organisé pour obtenir les meilleurs résultats macroéconomiques ? Quand devrait-il être réformé ? Comment interagit-il avec les autres institutions du marché du travail et la politique monétaire ? En enquêtant sur ces questions, la thèse vise à modestement éclairer les décisions de politique publique liées à l'organisation des négociations collectives.

Le chapitre 1 montre l'existence de non-linéarités dans la courbe de Phillips des salaires dues à la négociation collective. En utilisant des données régionales européennes (NUTS-2) et des indicateurs nationaux de la centralisation des négociations salariales, nous montrons que la pente de la courbe de Phillips des salaires devient plate en période de chômage élevé, lorsque les négociations se déroulent principalement au niveau sectoriel ou supérieur. Le chapitre 2 s'appuie sur un modèle de chômage d'équilibre avec frictions et destruction endogène d'emplois pour évaluer l'efficacité de la mise en place d'un système de financement de l'assurance chômage par le biais de taxes sur les licenciements proportionnelles au coût anticipé du nouveau chômeur pour la caisse d'assurance chômage (en partie inspiré d'un système d'*experience-rating*, comme existant aux États-Unis) dans les économies caractérisées par des négociations sectorielles avec extension des accords. Nos simulations montrent que la réforme est efficace pour réduire le chômage et augmenter le bien-être agrégé, en particulier lorsqu'elle s'accompagne d'un assouplissement de la protection de l'emploi existante. Le chapitre 3 présente des résultats empiriques sur la relation entre la décentralisation de la négociation collective et la croissance économique pour les pays de l'OCDE sur la période 1960-2017. Les résultats suggèrent que les systèmes de décentralisation organisée avec l'assouplissement du principe de "faveur" sont associés à une croissance économique plus élevée relativement aux autres systèmes. Enfin, le chapitre 4 s'interroge sur le timing des réformes des négociations collectives visant à accroître leur flexibilité. En utilisant des données sur les réformes qui ont modifié les institutions de négociations collectives dans les pays de l'Union Européenne, nos résultats ne permettent pas de conclure à un quelconque effet positif à court-terme sur l'emploi de réformes mises en place en période de récession et visant à rendre les négociations collectives plus

flexibles. Au contraire, les réformes qui réduisent la couverture des négociations ont des effets négatifs à court terme, notamment sur l'emploi des jeunes, des travailleurs peu qualifiés, et des travailleurs en contrat temporaire.

Les résultats des différents chapitres de cette thèse permettent de tirer quelques implications en termes de politique économique. Premièrement, l'adoption d'un système de décentralisation organisée, où les négociations d'entreprise complètent les accords sectoriels ou interprofessionnels sans être contraintes par le principe de faveur, est propice à une croissance économique plus forte. Toutefois, il semble contre-productif en termes de résultats pour l'emploi de réformer le système de négociations collectives en période de récession économique. Les décideurs politiques devraient attendre que l'économie soit en expansion pour engager ces réformes, s'ils les pensent nécessaires, en particulier lorsque ces réformes introduisent plus de flexibilité. Enfin, les décideurs politiques devraient prendre en compte le système de négociations collectives lors de la conception d'autres politiques, telles que les réformes touchant à la protection de l'emploi ou la conduite de la politique monétaire. En effet, il existe des interactions qui peuvent modifier les résultats initialement espérés.

Limites et extensions futures — Les implications et les recommandations politiques énoncées ci-dessus doivent toutefois être lues à la lumière des limites de chaque chapitre. Nous décrivons certaines d'entre elles, et proposons quelques idées pour y répondre.

Une limite du chapitre 1 repose sur les différents degrés d'agrégation entre les variables économiques et les variables décrivant les négociations collectives. Alors que les variables économiques (croissance des salaires nominaux, écart de chômage et autres variables de contrôle) décrivent le niveau régional NUTS-2, les variables relatives aux négociations collectives décrivent ces dernières au niveau national. Ensuite, nous soutenons que les négociations collectives façonnent la courbe de Phillips des salaires, qui peut ensuite influencer la forme de la courbe de Phillips des prix. Cependant, les données sur les prix n'étant pas disponibles au niveau régional, nous ne pouvons pas confirmer cette intuition. Enfin, le chapitre sera complété par un modèle théorique sur lequel nous travaillons. Il complétera notre travail avec un cadre théorique sur le lien entre la dynamique des salaires au cours du cycle économique et le niveau de centralisation des négociations collectives.

Dans le chapitre 2, nous avons modélisé deux niveaux exclusifs de négociation : une négociation sectorielle et une négociation décentralisée au sein de l'entreprise. Les accords sectoriels ne peuvent pas être renégociés avec des normes inférieures pour le salarié au niveau de l'entreprise. Ce choix nous a permis de souligner le

rôle de la négociation sectorielle et des accords contraignants dans le succès de la réforme mettant en œuvre un financement de l'assurance chômage via des taxes sur les licenciements proportionnelles au coût anticipé du nouveau chômeur pour la caisse d'assurance chômage. Nous pourrions travailler sur un projet d'extension en tenant compte de la négociation à deux niveaux existant dans beaucoup de pays européens. En suivant Cardullo et al. (2018), nous pourrions modéliser un salaire total composé d'une fraction négociée par les syndicats de travailleurs et les représentants des entreprises au niveau sectoriel et de la partie restante négociée au niveau de l'entreprise, cette dernière ne pouvant pas fixer un accord qui rendrait les conditions de travail des salariés moins favorables que celles fixées dans le cadre de l'accord sectoriel.

Le chapitre 3 s'appuie sur des estimations menées sur des données converties en moyennes de 5 ans afin d'éviter le problème de la prolifération des instruments dans le système MMG, lié à notre large période de temps (1960-2017). Cependant, cela peut entraîner une perte d'information, rendant les résultats moins fiables. Nous travaillons sur une version avec des données annuelles. Mais cela nécessite de trouver des instruments pour prendre en compte les problèmes d'endogénéité induits par notre équation de croissance dynamique. La longue période de temps nécessite également de prendre en compte la question de la non-stationnarité. Nous étudions également comment introduire la coordination des négociations dans notre classification actuelle, car, comme l'ont fait remarquer OECD (2019) et Garnero (2020), elle peut être distinguée de la centralisation des négociations et joue un rôle dans les performances macroéconomiques. Notre étude est également limitée par les données dont nous disposons (données de l'ICTWSS). Bien qu'elles soient détaillées, elles restent des indicateurs agrégés, qui peuvent masquer certaines réalités pratiques de la décentralisation, comme la question de savoir si la décentralisation organisée est réellement mise en oeuvre dans les faits.

Dans le chapitre 4, je propose une classification des réformes des négociations collectives à partir de laquelle je construis une base de données contenant les réformes menées dans les pays de l'Union Européenne sur la période 2000-2018. Cette classification contient un certain degré d'arbitraire car certaines caractéristiques des réformes, que je mentionne dans le chapitre, m'ont forcé à faire des choix lors de la création de la base de données. Ces choix peuvent, et doivent, être discutés car ils influencent potentiellement les résultats. De plus, la classification elle-même peut être discutée. En effet, il peut y avoir, par exemple, un lien entre la décentralisation des négociations et la diminution de la couverture des travailleurs, qui sont actuellement considérés comme deux catégories différentes dans la classification.

Ensuite, bien que le travail avec des données macroéconomiques soit attrayant au regard de la possibilité de généraliser les résultats, il s'accompagne d'une certaine opacité, notamment car les effets estimés sur le taux d'emploi ne fournissent pas d'informations sur la nature des ajustements au sein des entreprises, en fonction des caractéristiques de ces dernières. Par exemple, Kauhanen et al. (2020) utilise des données finlandaises de panel employeur-employé pour souligner que la décentralisation a des implications divergentes pour les cols blancs et les cols bleus. Je prévois donc de travailler sur un projet complémentaire étudiant l'impact des réformes des négociations collectives en France en utilisant des données microéconomiques. Je solliciterai l'accès aux données de l'INSEE à partir de la *déclaration annuelle de données sociales (DADS)*, plus précisément les données sur les rémunérations et l'emploi salarié (FLORES).

Une autre limite concerne la stratégie d'instrumentation. Je soutiens que ma spécification ne conduit pas à un problème majeur d'endogénéité. Mais par précaution, je propose une stratégie d'identification basée sur des instruments liés à la géographie. Plus précisément, l'instrument utilisé suppose que l'adoption d'une réforme des négociations collectives par les pays périphériques augmenterait la probabilité que le pays domestique mette en œuvre une réforme, sans avoir d'effet direct sur son taux d'emploi. Bien que l'instrument semble remplir les conditions de pertinence et d'exogénéité, il serait intéressant de trouver d'autres instruments pour obtenir un estimateur plus efficient au cas où l'instrument actuel serait considéré comme faible.

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Négociations collectives et performance macroéconomique

Résumé

Cette thèse étudie le lien entre la structure des négociations collectives et la performance macroéconomique. Les chapitres 1 et 2 étudient les systèmes de négociation collective en considérant leurs interactions avec leur environnement institutionnel. Le chapitre 1 analyse le rôle des systèmes de négociation collective sur le lien entre la croissance des salaires et le taux de chômage, c'est-à-dire la courbe de Phillips des salaires, qui peut avoir des implications sur la faisabilité des objectifs de politique monétaire. Le chapitre 2 étudie théoriquement comment le système de négociation collective influence les résultats des réformes de la législation sur la protection de l'emploi. Les chapitres 3 et 4 étudient l'effet macroéconomique des réformes des systèmes de négociation collective. Le chapitre 3 renseigne sur le lien entre la décentralisation des négociations collectives et la croissance économique. Enfin, le chapitre 4 questionne le timing des réformes qui visent à modifier l'institution des négociations collectives, en analysant leurs effets sur l'emploi selon la position sur le cycle économique lors de leur mise en œuvre.

Mots clés : Négociations collectives, Institutions du marché du travail, Emploi, Chômage, Salaires, Réformes, Modèle d'appariement, Analyse économétrique en données de panel

Résumé en anglais

This thesis investigates the link between the structure of collective bargaining and the macroeconomic performance. Chapters 1 and 2 study collective bargaining systems by considering their interactions with their institutional environment. Chapter 1 analyzes the role of collective bargaining systems on the link between wage growth and the unemployment rate, i.e. the wage Phillips curve, which may have implications for the feasibility of monetary policy objectives. Chapter 2 examines theoretically how the collective bargaining system influences the outcomes of reforms modifying the employment protection legislation. Chapters 3 and 4 study the macroeconomic effect of reforms to collective bargaining systems. Chapter 3 provides evidence on the link between the decentralization of collective bargaining and economic growth. Finally, chapter 4 questions the timing of reforms aimed at changing the institution of collective bargaining, analyzing their effects on employment according to the position on the economic cycle when they are implemented.

Keywords: Collective Bargaining, Labor Market Institutions, Employment, Unemployment, Wages, Reforms, Search-and-Matching Model, Panel Data Econometric Analysis