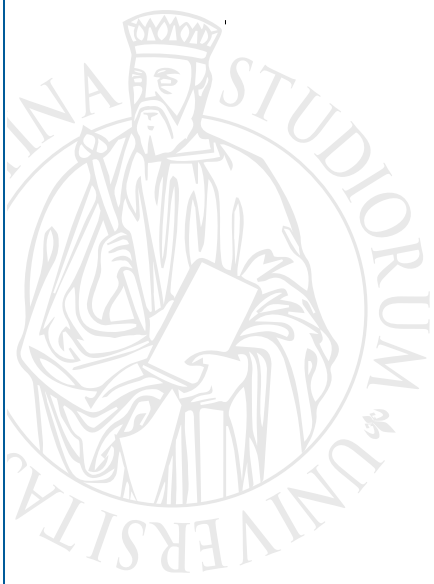
UNIVERSITÀ DEGLI STUDI FIRENZE
DISIA
DIPARTIMENTO DI STATISTICA, INFORMATICA, APPLICAZIONI "GIUSEPPE PARENTI"

The impact of labour market deregulation reforms on fertility in Europe

Elena Bastianelli, Raffaele Guetto, Daniele Vignoli



DISIA WORKING PAPER
2022/04

The impact of labour market deregulation reforms on fertility in Europe

Elena Bastianelli – Raffaele Guetto – Daniele Vignoli

University of Florence

elena.bastianelli@unifi.it / raffaele.guetto@unifi.it / daniele.vignoli@unifi.it

Abstract

It is theoretically ambiguous whether a more loosely regulated labour market should inhibit or foster fertility in a society. Micro-level studies on the effects of employment instability on family formation have primarily focused on single episodes of unemployment or temporary employment, by means of event history analyses modelling the instantaneous effects of labour market transitions. This approach has highlighted the existence of a negative association between employment instability and fertility but makes it difficult to evaluate the overall fertility consequences of the several waves of labour market deregulation reforms implemented in Europe. Furthermore, the few existing studies analysing the relationship between employment protection legislation (EPL) and fertility have found mixed evidence. This paper reconciles the ambivalent conclusions of previous studies by analysing the impact of labour market (de)regulation reforms on total fertility across 19 European countries between 1990 and 2019. We operationalize the country-specific regulatory strictness of regular and temporary contracts over time through the OECD EPL indexes. Our results indicate that an increase in employment protection for regular workers positively affects total fertility. However, an increasing gap between the regulation of regular and temporary employment – that is, labour market segmentation – negatively impacts total fertility. These effects are relatively homogeneous across age groups and geographical areas and are especially pronounced among the lower-educated. We conclude that labour market segmentation, rather than a rigid EPL per se, depresses fertility.

Keywords: Labour market deregulation; Employment protection legislation (EPL); Total fertility rate (TFR); Europe; Regression analysis; Fixed-effect estimator

Acknowledgements

The authors acknowledge the financial support provided by the European Union's Horizon 2020 research and innovation programme / ERC Consolidator Grant Agreement No 725961 (EU-FER project) "Economic Uncertainty and Fertility in Europe" (PI: Daniele Vignoli). The authors are also thankful to the colleagues from the Unit of Population and Society (UPS) of the University of Florence for their comments on a preliminary version of this research.

1. Introduction

Since the beginning of the 1990s, the relatively strict employment protection legislation (EPL) – the norms and procedures regulating labour markets' hiring and firing processes (OECD, 1999) – of European labour markets came to be considered one of the main determinants of persistently high unemployment in Europe (Grubb & Wells, 1993). Following the recommendations set by the OECD Jobs Study (OECD, 1994) and the European Employment Strategy (EES, 1997) to preserve Europe's competitive edge in a globalized world (Boeri et al., 2012), most European countries undertook a set of 'deregulatory' reforms to increase labour market flexibility (Cutuli & Guetto, 2013). Reforms mainly included the progressive liberalization and promotion of new forms of flexible and temporary work contracts, characterized by lower bargaining power, lower levels of social protection, and generally lower wages. While the diffusion of flexible working contracts has contributed to reducing unemployment in the short run, it has also caused increasing precariousness of career paths, with negative consequences on individuals' life courses (Garibaldi & Taddei, 2013; Kim et al., 2008; Scherer, 2009). By affecting labour market entry and exit conditions and individuals' job security, deregulation reforms may thus affect family formation (de Paola et al., 2021; Karabchuk, 2020).

The literature on the effect of an individual's labour market situation on family formation has often focused on single episodes of unemployment or temporary employment over one's life course, by means of event history analyses modelling the instantaneous effects of labour market transitions, for example, job losses or shifts from fixed-term to permanent contracts. A consistent stream of studies has shown that flexible and temporary work contracts delay the transition to adulthood and lead to fertility postponement and decline (Barbieri et al., 2015; Dantis & Rizzi, 2020; Kreyenfeld et al., 2012; Pailhé & Solaz, 2012; Vignoli et al., 2012, 2016, 2019; Vignoli, Mencarini, et al., 2020). However, the time-to-event empirical strategy adopted in these studies makes it difficult to evaluate the overall fertility consequences of the several waves of labour market deregulation reforms implemented in Europe. In addition, most existing studies focus on the transition to the first child, whereas higher-order childbirths are rarely analysed. This study addresses these oversights in previous research by focusing on the impact of labour market (de)regulation reforms on total fertility across Europe.

Whether a more flexible EPL inhibits or fosters fertility at the aggregate level is a matter of debate. On the one hand, labour market deregulation generates uncertainty, making it more

difficult for individuals to make long-term plans and leading potential parents to postpone fertility (de Paola et al., 2021; Fahlén & Oláh, 2018; Prifti & Vuri, 2013; Vignoli, Guetto, et al., 2020). On the other hand, more liberal labour legislation may facilitate the recruitment of young workers and consequently lead to higher fertility (Adsera, 2011; Karabchuk, 2020). Only a handful of studies have considered the effects of EPL on fertility in Europe and have found evidence for both mechanisms (e.g. Adsera, 2005; Bellani, 2020; de Paola et al., 2021; Rovny, 2011). Thus, the evidence is mixed, and policy implications are unclear. We advance that these ambiguous theoretical expectations and contrasting evidence regarding the impact of EPL on fertility can be reconciled by considering that labour market reforms have been mostly "partial and targeted" (Esping-Andersen & Regini, 2000). In many European countries, deregulatory reforms only applied to new jobs and mainly affected a disadvantaged fraction of the population (primarily youths and low-skilled workers), while legislation for regular contracts remained substantially unchanged for a long time (Barbieri & Scherer, 2009; Boeri et al., 2012; Boeri & Garibaldi, 2007). In a segmented labour market, it is more difficult and time-demanding for young people to fully integrate into the market (Barbieri & Cutuli, 2016), with plausible negative consequences for their reproductive behaviours. Our main argument is that the gap between the regulation of regular and temporary employment – that is, labour market segmentation – rather than a rigid EPL depresses fertility. By contrast, increasing employment protection and reducing employment uncertainty should foster higher fertility rates, in line with the micro-level evidence suggesting that stable employment is a prerequisite for fertility.

Building on this argument, we aim to evaluate the impact of protecting regular contracts and of the changing differentials in EPL between regular[1] and temporary workers, the so-called EPL-gap (Barbieri & Cutuli, 2016), on total fertility. We ask whether deregulation reforms and, specifically, marginal EPL reforms that increased the gap in protection levels between distinct segments of the labour force led to negative fertility consequences. Moreover, we ask whether EPL has a different impact on the fertility of specific population subgroups, defined in terms of age and education, or across countries.

[1] We use the term "regular contracts" for permanent/open-ended contractual forms as defined by the OECD: https://www.oecd.org/els/emp/oecdindicatorsofemploymentprotection.htm

2. Labour market (de-)regulation and fertility

EPL includes all norms regulating labour markets' hiring and dismissing processes; for example, EPL includes conditions for using temporary contracts, redundancy procedures, mandated prenotification periods and severance payments, special requirements for collective dismissals, and so forth. It refers to all types of employment protection measures, whether grounded primarily in legislation, court rulings, collectively bargained conditions of employment, or customary practice (OECD, 1999). The degree of labour market regulation is generally measured separately for regular and temporary work and measures the strictness of labour laws on dismissing permanent employees and opportunities for employers to hire workers on a temporary basis (OECD, 2013). However, when measuring labour market flexibility/rigidity, the literature generally refers to the degree of employment protection for regular workers. A *rigid* (*strict*) EPL guarantees strong employment protection for regular workers, while a *flexible* (or *liberal, loose*) EPL allows more unstable jobs.

By influencing individuals' job stability, EPL has the potential to influence fertility (de Paola et al., 2021; Karabchuk, 2020). However, it is theoretically ambiguous whether a flexible EPL inhibits or fosters fertility in a society. By increasing labour market mobility, a **flexible EPL** may generate employment uncertainty, making it more difficult for individuals to predict their future and make long-term plans, thus leading them to postpone fertility (de Paola et al., 2021; Fahlén & Oláh, 2018; Prifti & Vuri, 2013). The primary purpose of EPL is indeed to provide workers with more stability in their current jobs. A strict EPL has been found to increase job tenure (Cazes & Tonin, 2010) and reduce the inflow rate into unemployment (OECD, 2004). Furthermore, a rigid EPL increases the perceived stability and continuity of one's employment, whereas its weakening is associated with higher employment uncertainty (Anderson & Pontusson, 2007). In the field of fertility research, various micro-level studies have shown that employment instability (i.e. unemployment and/or temporary working contracts) contributes to childbearing postponement and reduction (Alderotti, 2022; Alesina et al., 2015; Barbieri et al., 2015; Busetta et al., 2019; Kreyenfeld & Andersson, 2014; Özcan et al., 2010; Pailhé & Solaz, 2012; Vignoli et al., 2012, 2019; for a meta-analysis of European research findings see: Alderotti et al., 2021). Uncertainty over employment may lead young people to defer family formation until full integration into the labour market is achieved (Bolano & Vignoli, 2021) and, ultimately, have fewer children than desired (van Wijk et al., 2021). Thus, *a de-regulated labour market may hinder fertility rates.*

However, the literature also reports that a **rigid EPL** hampers young people's integration into the labour market (Hipp et al., 2015). Extensive protection for permanent workers increases the costs of hiring young labour market entrants with no experience and incentivizes firms to offer temporary jobs (Cazes & Tonin, 2010; Kahn, 2007). A rigid EPL reduces labour market dynamics; that is, it decreases both the inflow rate into unemployment and the rate of exit from unemployment, with detrimental consequences for the (re-)employment chances of the young and especially of young women (OECD, 2004). By contrast, more liberal labour legislation corresponds to higher flexibility in recruitment and dismissals. It follows that a flexible EPL is usually associated with lower barriers to entering the labour market and lower youth unemployment rates (Bertola et al., 2007; Hipp et al., 2015). As youth unemployment hampers family planning (Comolli, 2017), *a de-regulated labour market may foster fertility rates*.

The empirical evidence on the relationship between EPL and fertility is limited and supports both perspectives. Fahlén and Oláh (2018) found that short-term fertility intentions have increased in countries where EPL has been strengthened from 2004 to 2011. Furthermore, studies analysing the causal impact of two different EPL reforms in Italy found that the reduced employment instability following a strengthening of EPL had a positive and sizable effect on the fertility behaviours of Italian working women (Prifti & Vuri, 2013), while a subsequent reduction in job stability significantly lowered women's propensity to have a child (de Paola et al., 2021). In addition, higher employment protection has been shown to make it easier for women to combine work and family responsibilities (Bratti et al., 2005) and to increase life satisfaction (Ochsen & Welsch, 2012), with plausible positive effects on fertility (Mencarini et al., 2018; Vignoli, Mencarini, et al., 2020). Nevertheless, many studies analysing the relationship between EPL and fertility found a rigid EPL to be associated with lower fertility rates (Adsera, 2004, 2005, 2011; Bellani, 2020; Rovny, 2011) or not to have any significant effect (Karabchuk, 2020; Luci-Greulich & Thévenon, 2013; Vignoli, Mencarini, et al., 2020). Importantly, most of these studies only consider EPL as a confounding factor within models designed to test other research hypotheses.

We argue that the ambiguous theoretical expectations and empirical results concerning the association between EPL and fertility can be addressed by disentangling EPL into its two components related to regular and temporary employment. In fact, the (few) existing studies on the link between EPL and fertility ignore that the EPL reforms of the last three decades mostly affected employment patterns by creating segmentation in the labour market through marginal and/or targeted provisions that only apply to a disadvantaged fraction of workers

(Barbieri & Cutuli, 2016; Cazes & Tonin, 2010). A bulk of research has shown that the degree of rigidity/flexibility of EPL does not substantially alter the employment and unemployment rates in a country; rather, deregulating temporary contracts while leaving the protection of regular contracts unchanged – that is, increasing the EPL-gap – is responsible for rising youth unemployment rates and the diffusion of more precarious forms of employment (Barbieri & Cutuli, 2016; Boeri & Garibaldi, 2007; Gebel & Giesecke, 2016; Noelke, 2016). In addition, in dual labour markets, the perceived job insecurity of the "outsider" contingent is significantly higher (Balz, 2017). In a segmented labour market, it is harder and takes longer for young people to fully integrate into the world of work, with negative consequences for their well-being (Voßemer et al., 2018) and, presumably, their reproductive choices.

We thus posit that the EPL-gap, that is, the differential in employment protection between regular and temporary workers, rather than a rigid EPL per se, discourages fertility. Specifically, we hypothesize that:

H1: Increasing labour market protections for regular contracts (EPL-r) fosters higher fertility rates.

By contrast,

H2: Increasing labour market segmentation (EPL-gap) leads to lower fertility rates.

3. Employment protection legislation and fertility: heterogeneity across age, educational groups, and country contexts

Group-specific differences – for example, age and education – in the impact of EPL on fertility have seldom been considered in previous research. However, EPL may differentially impact the fertility of different age and educational groups and across different country contexts.

For instance, regarding age, the literature argues that strict protection for regular contracts hampers labour market entrance for young workers with no experience (Cazes & Tonin, 2010; Hipp et al., 2015). It follows that labour market entrants could benefit relatively less from a strict EPL, in terms of fertility as well. Young adults were also the most affected by increasing labour market segmentation, as deregulation mainly applied to new jobs (Gebel & Giesecke, 2016; Noelke, 2016). Thus, labour market entrants may postpone their fertility until they reach more stable employment conditions. The negative effects of the EPL-gap on fertility may be

felt only at relatively young ages, and a fertility catch-up could occur at older ages once employment stability is achieved. Nevertheless, fully integrating into a segmented labour market may be time-consuming, and there may not be time for catching up on fertility. In addition, it is not straightforward which age group defines the "labour market entrants", as it may vastly vary according to individuals' level of education and country context (e.g. educational system, culture, etc.). Thus, in this research, *we test whether a strict EPL for regular workers and increasing labour market segmentation have a different effect on the fertility of different age groups*, without advancing specific hypotheses.

Regarding education, the literature reports that in segmented labour markets, low-skilled workers face a much higher risk of remaining in temporary and low-quality jobs, while the highly educated have relatively higher chances to be employed with regular contracts (Garibaldi & Taddei, 2013). The highly educated have been found to benefit more from stricter EPL for regular contracts in terms of subjective well-being and occupational status attainment (Ochsen & Welsch, 2012; Wolbers, 2007). Therefore, the highly educated could benefit more from a rigid EPL in terms of fertility realization. By contrast, as labour market segmentation mainly affects low-skilled workers, the lower-educated may face worse negative consequences of increasing segmentation on fertility. To account for these possible differences, *we test whether a rigid EPL for regular workers and the EPL-gap have a different impact on the fertility of different educational groups.*

Finally, the effects of labour market reforms may vary across institutional contexts (Balz, 2017). For instance, labour market policies (such as unemployment benefits or assistance in job search) may influence the relationship between employment instability and fertility by affecting unemployment duration or opportunities for entering stable employment, or by providing financial support in the case of unemployment (Adsera, 2004, 2005; OECD 2006). Nordic countries are known for providing strong welfare support and implementing active labour market policies that facilitate (re-)entry into employment (Esping-Andersen, 1999). Continental countries also provide strong financial support for the unemployed. In the Anglo-Saxon area, labour markets are highly flexible with relatively short unemployment spells (Adsera, 2004). Social assistance for the unemployed is the least generous in Southern Europe and post-socialist countries of Central and Eastern Europe (Esping-Andersen, 1999; Javornik, 2014). In addition, Southern countries are characterized by high levels of youth unemployment, temporary employment, and involuntary part-time employment (Barbieri & Scherer, 2009; Barbieri et al., 2019). Considering this substantial variation in welfare regimes and labour

market contexts in Europe, in this study *we account for possible heterogeneity in the impact of EPL on fertility across different country-areas.*

4. Employment protection legislation in Europe

In Europe, most employment protection norms in the modern form were developed through legislation, collective agreements, and court rulings between the 1960s and 1980s. The process of increasing employment protection through the regulation of hiring and firing dynamics reached relatively regulatory stability during the 1980s (OECD, 2013). Since the beginning of the 1990s, most European countries undertook a set of 'deregulatory' reforms to increase labour market flexibility. This first wave of labour market deregulation mainly concerned drastic deregulation of hiring on temporary contracts while maintaining restrictions on regular contracts (Garibaldi & Taddei, 2013). Other than Anglo-Saxon countries that have always allowed the use of temporary contracts without any specific reason, in many countries, there was a substantial relaxation of the regulations regarding the use of temporary contracts (OECD, 1999). The most prevalent path of reform involved facilitating the use of fixed-term contracts and recourse to workers hired from temporary work agencies (OECD, 2004). For instance, reforms at the beginning of the 1990s in Belgium, Germany, and Sweden made fixed-term contracts possible without specifying objective reasons. Moreover, in Germany and Belgium, the number of possible renewals and overall duration of temporary contracts were progressively widened. Between the end of the 1990s and the early 2000s, temporary work agencies were liberalized in Italy and Spain, as well as different types of temporary work contracts (OECD, 1999; OECD, 2004).

A tendency toward the deregulation of regular contracts began at the end of the first decade of the 2000s, following the onset of the financial crisis (OECD, 2013). The action was mostly taken in countries where legislation for regular contracts was stricter, as in southern Europe, but also in other areas. For instance, between 2009 and 2014, various reforms shortened notice periods in Portugal, Slovakia, Greece, and Spain. Furthermore, the required severance pay for dismissals was reduced in Portugal and Greece. In Portugal, the range of valid grounds for termination was increased, making dismissals of regular contracts easier. In Italy, the eligible cases in which reinstatement could be ordered by the court were restricted to only discrimination. Moreover, in the United Kingdom, where regulation was already relatively

loose, the minimum period between notification to the administration and a collective dismissal was halved (OECD, 2013).

Another wave of deregulation reforms occurred in the most recent period (2014–2019) in an attempt to reduce labour market segmentation (OECD, 2019). Recent reforms can be classified into two main categories. The first class of reforms continued in the direction of reducing the restrictions on dismissing regular workers (sometimes at the same time as they eased restrictions on the use of temporary employment). Among those, major reforms involving several aspects of regulation took place in France, Italy, and Slovenia. The second group of reforms instead increased restrictions on the use of temporary employment. Among those, several countries (e.g. Poland, Germany, and Slovakia) introduced a legal limit for the cumulative duration of fixed-term contracts or temporary work agency assignments. Others (e.g. Italy and Denmark) introduced the obligation to provide a rationale when using a fixed-term contract in certain circumstances (OECD, 2019).

5. Data and trends

To analyse the impact of EPL on fertility, we built a country-level panel with 19 European countries (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, and UK)[2] covering the period between 1990 and 2019[3].

Our dependent variable is the countries' total fertility rate (TFR) provided by OECD. To test for heterogeneity across age and educational groups, we additionally used age- and education-specific fertility rates as dependent variables. Age-specific fertility rates are provided by Eurostat and are available for all countries and years except for France and Germany, where they are available beginning in 1998 and 2000, respectively. Education-specific fertility rates have been calculated from Eurostat data. The rates are based on the number of live births by the mother's level of education (15–39 years old) divided by the total number of women by the level of education (15–39 years old) for each country and year. Information is only available

[2] For other EU countries, data on EPL were not available (Bulgaria, Cyprus, Romania, and Malta) or were available only for a few recent years (since 2018 for Estonia, Luxemburg, and Slovenia; since 2012 for Latvia; since 2014 for Lithuania; only in 2015 for Croatia).
[3] Data for Slovakia and the Czech Republic are available beginning in 1993.

from 2007 to 2019[4], and only for 13 countries. The information is missing for France, Germany, Ireland, Italy, the Netherlands, and the UK.

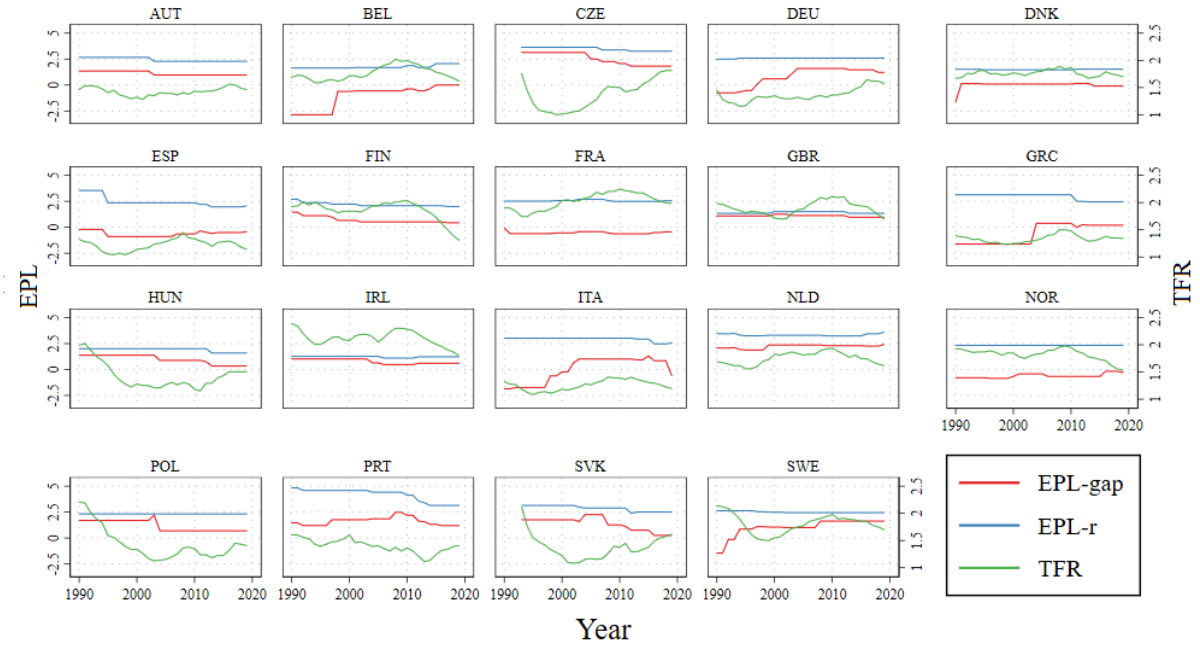
The main explanatory variables are derived from the OECD employment protection indexes for regular and temporary workers. The OECD indexes are compiled from 21 items covering different aspects of employment protection regulations in a country, as they were in force on 1 January of each year. Information is collected from detailed questionnaires completed by local experts, government authorities, and the OECD Secretariat, integrated with national and international secondary sources (e.g. statutory laws, collective bargaining agreements, and case law). Then, it is converted into a score measured on a 0–6 scale, with higher values representing stricter regulation (OECD, 1999, 2013). The EPL index for regular workers measures the strictness of the labour laws on firing permanent employees in a country. It incorporates three main aspects of dismissal protection: (i) procedural inconveniences that employers face when initiating the dismissal process (e.g. notification and consultation requirements), (ii) notice periods and severance pay, and (iii) circumstances in which it is possible to dismiss workers and the repercussion on employers for unfair dismissals (OECD, 2013). The EPL index for temporary contracts concerns, instead, the possibility and conditions for employers to hire workers on a temporary basis, including the types of work for which these contracts are allowed and the possibilities for their renewal and cumulative duration (OECD, 1999, 2013). In our models, the main independent variables are the EPL index for regular workers (EPL-r) and the EPL-gap, that is, the difference between the two indexes. In our sample, the variable measuring the EPL-gap ranges from -3 to 4. Changes in EPL-r scores correspond to reforms in EPL regarding regular contracts, while changes in EPL-gap scores correspond to changes in the gap between the regulation of regular and temporary contracts.

Figure 1 displays the countries' EPL-r, EPL-gap, and fertility trends. In 2019, the EU TFR stood at 1.53. Among the countries included in this study, the one with the highest TFR in 2019 was France (1.86), followed by the Czech Republic, Ireland, and Sweden (1.71), then Denmark (1.70). The lowest fertility rates were observed in Spain (1.23), Italy (1.27), and Greece (1.34). Over the entire period, the EPL-gap appears to increase in most countries between the 1990s and the 2000s, while EPL for regular workers remained substantially unchanged, with some declines since the 2010s. This confirms that most countries undertook partial EPL deregulation, whereby the use of temporary contracts was liberalized while the protection of regular contracts

[4] For Austria, the data are only available through 2012, and for Belgium, through 2014.

was minimally changed. For some countries, a reduction in the gap is evident in the last decade due to the previously mentioned reforms aimed at reducing labour market segmentation.

Figure 1: EPL-r, EPL-gap, and TFR for each country



6. Methodology

We empirically estimated the impact of EPL and labour market deregulation reforms on fertility with a fixed-effect (FE) estimator, that is, by analysing within-country variations. Formally, our model can be described as follows:

$$\widetilde{TFR_{ct}} = \beta_1 \widetilde{EPLr_{ct}} + \beta_2 \widetilde{EPLgap_{ct}} + T_t + C_c * T_t + T_t^2 + C_c * T_t^2 + \widetilde{\varepsilon_{ct}} \qquad (1)$$

All variables are country de-meaned (as indicated by the tildes) to capture within-country variation. The elements $T_t + C_c * T_t + T_t^2 + C_c * T_t^2$ represent country-specific linear and quadratic time trends, and ε_{ct} represents country-specific error terms (c and t in the subscripts stand for country and time). $\widetilde{EPLr_{ct}}$ and $\widetilde{EPLgap_{ct}}$ refer to the legislation in force on 1 January (see data section) and, therefore, are lagged relative to the TFR.

One of the problems with the current literature on EPL effects is that most of the evidence is based on cross-country time-series data, which is generally affected by endogeneity and measurement problems (Barbieri & Cutuli, 2016; Bertola, 2014; Hijzen et al., 2013). The FE

estimator, performing regressions on the deviations from the country means, disentangles the impact of changes in the EPL-r and EPL-gap from that of time-constant country characteristics that affect fertility. By using an FE model, we eliminated cross-country heterogeneity and addressed potential bias due to unobserved time-constant country characteristics, such as national culture and the institutional and economic environment. We compared the results of the FE model with those of the between-effect and random-effect models and found the FE model to be superior based on the results of the Hausman test (not shown). Furthermore, the model includes country-specific linear and quadratic time trends to capture the underlying fertility trend in each country. This analytic strategy reduces the risk of omitted variable bias and takes into account that fertility may have evolved in different ways across countries for reasons other than EPL reforms. Including country-specific time trends is thus necessary to uncover the causal impact of EPL-r and EPL-gap on fertility. We added the quadratic term as fertility trends did not evolve linearly in the period observed.

Then, we augmented equation (1) with a set of control variables that have been found to influence fertility and may confound the effects of EPL-r and EPL-gap, such as women's employment rate, public spending on the family as a percentage of GDP[5], unemployment rates, and the share of part-time work in total dependent employment (Adsera, 2004; Comolli, 2017; Matysiak et al., 2021). Controlling for these time-varying variables, we can distinguish the causal effects of EPL-r and EPL-gap on fertility from those of other competing macro-level factors. We thus obtained the following equation:

$$\widetilde{TFR_{ct}} = \beta_1 \widetilde{EPLr_{ct}} + \beta_2 \widetilde{EPLgap_{ct}} + \beta_3 \widetilde{WEmpl_{ct}} + \beta_4 \widetilde{PubSpe_{ct}} + \beta_5 \widetilde{Unempl_{ct}} + \beta_6 \widetilde{Parttime_{ct}} + T_t + C_c * T_t + T_t^2 + C_c * T_t^2 + \widetilde{\varepsilon_{ct}} \quad (2)$$

Some of the introduced variables, however, may also be influenced by EPL, especially the unemployment rate, women's employment rate, and the share of part-time employment. Thus, as a robustness check (section 7.2), we ran additional models introducing different temporal lags to account for the ordering of effects.

[5] Public spending on the family includes child-related cash transfers to families with children, public income support payments during periods of parental leave, income support for single-parent families, public spending on services for families with children (e.g. childcare and public spending on assistance for young people) and financial support for families provided through the tax system.

To test for heterogeneity across age and educational groups (section 7.1), we estimated models with age-specific and education-specific fertility rates as dependent variables, respectively, while the right-hand side of equations (1) and (2) remained unchanged.

Our FE models analyse within-country variation assuming a similar effect of EPL-r and EPL-gap across countries. However, the effects of labour market reforms may vary across institutional contexts (Balz, 2017). To investigate possible cross-country heterogeneity, we tested for interaction effects between EPL-r and EPL-gap and European areas (i.e. Anglo-Saxon, Continental, Southern, Eastern, and Nordic)[6]. To avoid over-specification, variables were not country de-meaned for this supplementary analysis. We included, instead, country-area dummies and substituted country-specific time trends with year fixed effects[7].

$$TFR_{ct} = \beta_1 EPLr_{ct} + \beta_2 EPLgap_{ct} + EPLr_{ct} * A_a + EPLgap_{ct} * A_a + A_a + \beta_3 \widetilde{WEmpl}_{ct} + \beta_4 \widetilde{PubSpe}_{ct} + \beta_5 \widetilde{Unempl}_{ct} + \beta_6 \widetilde{Parttime}_{ct} + T_t + \varepsilon_{ct} \quad (3)$$

In equation (3), $\beta_1 EPLr_{ct}$ and $\beta_2 EPLgap_{ct}$ are the main effects of EPL-r and EPL-gap, $EPLr_{ct} * A_a$ is the interaction term between EPL for regular contracts and country-areas, $EPLgap_{ct} * A_a$ is the interaction term between EPL-gap and country-areas, A_a denotes country-area fixed effects, and T_t represents year fixed effects (the subscripts *a* and *t* stand for country-area and time).

Several robustness checks are provided in section 7.2. Descriptive statistics and data sources for all variables included in the analysis can be found in Table A1 in the appendix.

7. Results

Model 1 provides the linear effect of a unit increase in EPL-r and EPL-gap on the within-country TFR, accounting for time-invariant country characteristics and country-specific time trends. The coefficients of the two EPL variables support hypotheses 1 and 2: following an increase in employment protection for regular workers (EPL-r), we see an increase in the TFR,

[6] In our data, Anglo-Saxon countries include the UK and Ireland; Continental countries include Austria, Belgium, Germany, France, and the Netherlands; Nordic countries include Denmark, Finland, Norway, and Sweden; Southern countries include Italy, Greece, Portugal, and Spain; and Eastern countries include the Czech Republic, Hungary, Slovakia, and Poland.

[7] This model specification implies that both differences *between* and *within* countries in each European area contribute to the estimated effects of EPL-r and EPL-gap. While this specification exposes our findings to possible country-specific unobserved heterogeneity, if the results align with those of the FE models, they allow for more generalizability of our main findings.

while an increase in labour market segmentation (EPL-gap) leads to lower fertility rates. The estimated coefficients suggest a considerable positive impact of a unitary increase in EPL-r on fertility, which increases fertility rates by 0.15. A one-point increase in the EPL-gap, instead, leads to a reduction in fertility of about 0.03.

Controlling for further labour market and policy variables (Model 2), the effect of EPL-r more than halves in magnitude but remains positive and statistically significant, while the effect of EPL-gap slightly increases, now contributing to a reduction in fertility of about 0.04. Overall, EPL seems to exert, on average, a moderate impact on fertility rates in Europe. In line with existing research, our estimated coefficients for the control variables confirm that increases in female employment, part-time employment, and public spending on family benefits positively affect fertility rates, while rising unemployment leads to lower fertility rates (Adsera, 2011; Comolli, 2017; Luci-Greulich & Thévenon, 2013; Matysiak et al., 2021; Rovny, 2011).

Table 1: Fixed-effect regression on TFR

VARIABLES	(1)	(2)
EPL-r	0.145***	0.062**
	(0.036)	(0.031)
EPL-gap	-0.028**	-0.035***
	(0.013)	(0.011)
% Women employment		0.010***
		(0.004)
Public spending on the family		0.198***
		(0.016)
% Unemployment		-0.016***
		(0.001)
% Part-time work		0.015***
		(0.004)
Country-specific time trends	Yes	Yes
Observations	564	491
R-squared	0.62	0.68
Number of countries	19	19

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, UK.

7.1 Heterogeneity across age, educational group, and country contexts

To observe possible differences across age groups, we estimated the same models shown in Table 1 on age-specific fertility rates for the following age groups: 15–24, 25–29, 30–34, 35–39, and 40+. Results are displayed in Table 2. Model 1 is specified as in equation (1), while in Model 2, all control variables are added, as in equation (2). We found that increased protection for regular workers positively affects the fertility of all age groups. The effect is stronger in the youngest age groups, despite their lower fertility rates compared to older age groups. Thus, we do not find evidence for the idea that very young age groups are penalized by a strict EPL-r; on the contrary, it appears that they benefit from it, at least in terms of fertility. Similarly, increasing the gap in employment protection between regular and temporary workers leads to a reduction in fertility for all age groups. Although we do not observe cohort progression, our results suggest that increasing EPL-gap reduces total fertility rather than just inducing fertility postponement. The reduction in fertility due to EPL-gap is not statistically significant for the youngest age group (15–24); its largest effect is found in the 30–34 age group. This may be because different effect sizes are related to differences in age-specific fertility rates, and the 30–34 age group has the highest fertility (see Table A1 in the appendix).

Table 2: EPL and age-specific fertility

	15-24		**25-29**		**30-34**		**35-39**		**40+**	
VARIABLES	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
EPL-r	0.006***	0.004***	0.008***	0.004**	0.005**	-0.000	0.005***	0.002*	0.001***	0.000***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.000)	(0.000)
EPL-gap	-0.000	-0.000	-0.001	-0.002**	-0.003***	-0.003***	-0.001***	-0.001***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Women's employment		0.000**		0.000*		0.000		0.000***		0.000***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
Public spending on the family		0.005***		0.011***		0.012***		0.007***		0.001***
		(0.001)		(0.001)		(0.001)		(0.001)		(0.000)
Unemployment		-0.000***		-0.001***		-0.001***		-0.000***		-0.000***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
Part-time work		0.001***		0.001***		0.001***		0.000**		0.000***
		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)
Country-specific time trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	545	475	545	475	545	475	545	475	545	475
R-squared	0.951	0.946	0.849	0.869	0.895	0.932	0.957	0.975	0.968	0.977
Number of countries	19	19	19	19	19	19	19	19	19	19

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Countries: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, UK.

Next, we assessed the fertility effects of changes in EPL-r and EPL-gap for lower-, middle- and highly educated women. Results are shown in Table 3. It is important to note that education-specific fertility data are only available for the period 2007–2019 and only for 13 countries, which implies a substantial loss of country-year observations (134 instead of 491). Increased protection for regular contracts has a positive and significant effect on all educational groups, with a similar magnitude. However, the effects are no longer statistically significant when the control variables are included (Model 2). Thus, in terms of fertility, our results suggest that highly educated individuals do not benefit more than others from stricter employment regulations. Conversely, increasing labour market segmentation has a negative and significant impact only on the fertility of lower-educated women, which persists when adding our control variables. This result is in line with the argument that the lower-educated are more strongly affected by labour market segmentation.

Table 3: EPL and education-specific fertility

	LOW		**MID**		**HIGH**	
VARIABLES	(1)	(2)	(1)	(2)	(1)	(2)
EPL-r	0.009**	0.005	0.009**	0.004	0.010**	0.008
	(0.004)	(0.005)	(0.003)	(0.004)	(0.004)	(0.005)
EPL-gap	-0.009***	-0.009***	0.002	0.001	0.001	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Women employment		0.002**		0.002***		0.002***
		(0.001)		(0.001)		(0.001)
Public spending on the family		0.005*		0.005**		0.007***
		(0.003)		(0.002)		(0.003)
Unemployment		-0.000		-0.000		-0.000
		(0.000)		(0.000)		(0.000)
Part-time work		-0.000		-0.001		-0.000
		(0.001)		(0.001)		(0.001)
Country-specific time trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	154	134	154	134	154	134
R-squared	0.573	0.604	0.746	0.735	0.754	0.772
Number of countries	13	13	13	13	13	13

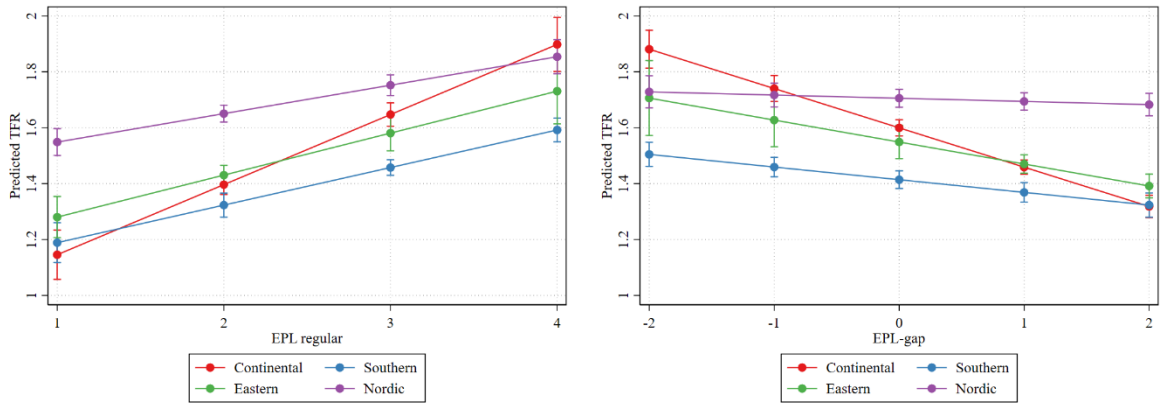
Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Countries: Austria, Belgium, Czech Republic, Denmark, Finland, Greece, Hungary, Norway, Poland, Portugal, Slovakia, Spain, Sweden. Period: 2007–2018.

Finally, the predicted TFRs for each group of countries at different levels of EPL-r and EPL-gap are displayed graphically in Figure 2 (the full table with the interactions can be found in Table A2 in the appendix). Besides Anglo-Saxon countries (not shown)[8], for all other country

[8] The Ango-Saxon group is only constituted by the UK and Ireland, which undertook limited changes in EPL during our observational window (see Figure 1).

groups, we found an increase in TFR as EPL-r increases. Likewise, as labour market segmentation increases, the predicted TFR decreases for all country groups. However, the reduction in TFR is not statistically significant for Nordic countries. This result could be explained by the fact that, as Nordic welfare systems simultaneously guarantee high labour flexibility and social protection (Muffels & Luijkx, 2008), EPL reforms are less decisive for fertility in those countries. Overall, results suggest that the pattern described by our hypotheses 1 and 2 holds across different contexts, notwithstanding differences in institutional and cultural settings across European areas.

Figure 2: Interaction between EPL-r (1) and EPL-gap (2) with country-area



7.2 Robustness checks

Our main results hold after a long set of robustness checks. First, we tested our models using, instead of EPL-gap built as the simple difference EPLr – EPLt, the relative gap in EPL = (EPLr – EPLt)/EPLr. Results proved stable in this different computation as we found negative effects on fertility for an increase in the relative EPL-gap. Results are shown in Table A3 in the appendix.

Second, some of our control variables may be influenced by the EPL (i.e. unemployment, women's employment, and the share of part-time). Thus, measuring them simultaneously may conceal some of the effects of EPL. Moreover, responses of fertility rates to changing institutional and economic factors might be delayed. Therefore, we ran three additional models to account for the ordering of effects and possible delayed fertility responses, which can be found in the appendix (Table A4). While most of the estimated coefficients are very similar with these different specifications, the effect of EPL-r is reduced in magnitude and no longer

statistically significant. However, the effect of EPL-gap is stable across all models. Thus, accounting for different temporal ordering of our variables, it appears that the control variables in the main model (Table 1) do not mediate the effect of EPL.

FE models often suffer from problems related to serial correlation, which may produce biased standard errors. In our model, serial correlation arises because some of our time-varying independent variables (in particular, EPL-r) only undertake limited changes over time (Andreß et al., 2013). To account for a possible bias in the standard errors, we tested more flexible models which relax the assumption of non-serially correlated errors. We thus estimated our models through the generalized estimating equation (GEE), including panel correlation[9]. Results are shown in the appendix (Table A5). We note that even when allowing panel-specific correlation, our results are fairly stable.

Finally, a Levin test (Levin et al., 2002) for unit root suggests the non-stationarity of our data. Nonstationary variables can be converted into stationary variables by differencing (Cameron & Miller, 2015; Moody & Marvell, 2020); thus, we re-estimated our models with a first-difference (FD) estimator. The differencing process implicitly controls for fixed effects and removes the unit root from the residual autocorrelation that can come from the non-stationarity of data series (Luci-Greulich & Thévenon, 2014). FD and FE models measure slightly different aspects of a within-country change in EPL, with FD models measuring the (instantaneous) change in TFR as a consequence of a change in EPL-r and EPL-gap in two subsequent years. Using the FD estimator, we found that following an increase in EPL-r, there is an instantaneous rise in TFR, while following an increase in segmentation (EPL-gap), there is a reduction in TFR (see Table A5, Model 2). Thus, the results are consistent with our FE model.

8. Conclusions

Fertility decline is a matter of major concern on the European agenda, as most EU countries have long been marked by low fertility rates, with negative implications for population ageing and welfare systems. After a rebound in fertility rates in the early 2000s (mostly due to the postponement of childbearing across cohorts), in the last decade, fertility has again dropped in

[9] The usual solution is to calculate cluster-robust standard errors that permit heteroskedasticity and within-cluster error correlation; however, this strategy presumes that the number of clusters is large (at least 50; see Cameron et al., 2008; Cameron & Miller, 2015; Moody & Marvell, 2020). Moreover, using clustered standard errors when changes in the main independent variable are limited is likely to produce biased standard errors (Conley & Tabor, 2011; Moody & Marvell, 2020).

most European countries. Understanding whether and how labour market flexibilization reforms influence fertility trends is, therefore, of remarkable importance.

This paper evaluates the fertility consequences of the several waves of labour market deregulation reforms implemented in Europe. We found that, overall, a more regulated and protected labour market is beneficial for fertility. Our results show that the gap between the regulation of regular and temporary contracts, that is, labour market segmentation, hinders fertility plans. Increasing job protection leads to higher fertility for all age groups, while labour market segmentation is detrimental to the fertility of all age groups, except for the youngest (below 24), for which the effect is not significant. Nevertheless, at very young ages, fertility rates are very low in European countries, and their determinants are likely to be different (Caldas & Pounder, 1990; Kahn & Anderson, 1992). Breaking down fertility by education, we found that stricter labour market protection for regular contracts positively affect the fertility of all educational groups, while the negative effect of labour market segmentation on fertility is especially pronounced among the lower-educated. The lower-educated are indeed those more likely to be entrapped in the secondary labour market (Garibaldi & Taddei, 2013), and higher segmentation may increase their feelings of job insecurity (Balz, 2017). Finally, we found the positive effect of increased protection for regular contracts and the negative effect of increased labour market segmentation on fertility to be relatively homogeneous across European contexts. The negative effect of labour market segmentation on fertility is only not statistically significant in the Nordic countries. Nordic welfare systems, however, simultaneously guarantee high labour flexibility and social protection (Muffels & Luijkx, 2008), reducing the negative consequences of labour market segmentation.

Our paper has several limitations. First, our main explanatory variables, the OECD EPL indexes, heavily rely on subjective assessments. For this reason, despite their extensive use in scientific research and policy evaluation, they have been widely criticized (Bertola et al., 2000; Boeri & Jimeno, 2005; Myant, 2016). Notwithstanding the extensive efforts undertaken by the OECD to make the indicators objective (OECD, 2004, 2013, 2019), a considerable degree of arbitrary estimation goes into deciding individual scores, which can make cross-country comparability problematic. Another potential issue is that EPL indexes rely on formal legislation, which may not be enforced or may be enforced unevenly. Finally, EPL is limited to formal employment, making it problematic as a measure of *de facto* labour market regulation in countries with a large informal sector (Myant, 2016). Nevertheless, these issues are a matter of concern mainly when considering cross-country differences in the *levels* of regulation, while

in our within-country approach, we partially account for them. Indeed, with our analytic strategy, we removed all between-country heterogeneity and focused on changes, thus unambiguously identifying the effects of changes in legislation, regardless of cross-country differences.

Second, the analysis does not cover all European Union countries but is limited to those for which data on EPL and fertility are available. In particular, we acknowledge that our results on education-specific fertility are based on a limited number of cases (only 13 countries observed for 11 years). Thus, more research is needed to evaluate differences in the effects of labour market deregulation reforms on the fertility of different educational groups. Finally, although we accounted for interactions between EPL and country-areas, our analysis mainly revealed within-country effects. Further research is needed to delve into the analysis of country-specific differences concerning the relationship between EPL and fertility.

Despite these limitations, by analysing the effects of changes in labour market (de-)regulation on fertility over the last 30 years, our study reconciles the ambiguous conclusions of existing studies on the impact of labour market flexibilization on fertility in Europe. Indeed, it provides robust evidence for the negative impact of labour market deregulation reforms on fertility. In particular, it highlights the negative effects of increasing labour market segmentation on the reproductive behaviours of Europeans. Labour market reforms should therefore consider that increasing labour market deregulation and segmentation negatively impacts fertility.

References

Adsera, A. (2004). Changing fertility rates in developed countries. The impact of labor market institutions. *Journal of Population Economics*, *17*(1), 17–43. https://doi.org/10.1007/s00148-003-0166-x

Adsera, A. (2005). Vanishing Children: From High Unemployment to Low Fertility in Developed Countries. *American Economic Review*, *95*(2), 189–193. https://doi.org/10.1257/000282805774669763

Adsera, A. (2011). Where Are the Babies? Labor Market Conditions and Fertility in Europe. *European Journal of Population / Revue Européenne de Démographie*, *27*(1), 1–32. https://doi.org/10.1007/s10680-010-9222-x

Alderotti, G. (2022). Female employment and first childbirth in Italy: What news? *Genus*, 78(1), 14. https://doi.org/10.1186/s41118-022-00162-w

Alderotti, G., Vignoli, D., Baccini, M., & Matysiak, A. (2021). Employment Instability and Fertility in Europe: A Meta-Analysis. *Demography*, *58*(3), 871–900. https://doi.org/10.1215/00703370-9164737

Alesina, A., Algan, Y., Cahuc, P., & Giuliano, P. (2015). Family Values and the Regulation of Labor. *Journal of the European Economic Association*, *13*(4), 599–630. https://doi.org/10.1111/jeea.12121

Anderson, C. J., & Pontusson, J. (2007). Workers, worries and welfare states: Social protection and job insecurity in 15 OECD countries. *European Journal of Political Research*, *46*(2), 211–235. https://doi.org/10.1111/j.1475-6765.2007.00692.x

Andreß, H. J., K. Golsch, und A. W. Schmidt. 2013. Analyzing Panel Data. Berlin: Springer.

Balz, A. (2017). Cross-National Variations in the Security Gap: Perceived Job Insecurity among Temporary and Permanent Employees and Employment Protection Legislation. *European Sociological Review*, 33(5), 675–692. https://doi.org/10.1093/esr/jcx067

Barbieri, P., & Bozzon, R. (2016). Welfare, labour market deregulation and households' poverty risks: An analysis of the risk of entering poverty at childbirth in different European welfare clusters. *Journal of European Social Policy*, 26, 99–123.

Barbieri, P., Bozzon, R., Scherer, S., Grotti, R., & Lugo, M. (2015). The Rise of a Latin Model? Family and fertility consequences of employment instability in Italy and Spain. *European Societies*, *17*(4), 423–446. https://doi.org/10.1080/14616696.2015.1064147

Barbieri, P., & Cutuli, G. (2016). Employment Protection Legislation, Labour Market Dualism, and Inequality in Europe. *European Sociological Review*, *32*(4), 501–516. https://doi.org/10.1093/esr/jcv058

Barbieri P, Cutuli G, Guetto R, Scherer S. Part-time employment as a way to increase women's employment: (Where) does it work? International Journal of Comparative Sociology. 2019;60(4):249-268. doi:10.1177/0020715219849463

Barbieri, P., & Scherer, S. (2009). Labour Market Flexibilization and its Consequences in Italy. *European Sociological Review*, *25*(6), 677–692. https://doi.org/10.1093/esr/jcp009

Bellani, D. (2020). The institutional and cultural framing of the educational stratification in fertility. A review of the role of labor market institutions and attitudinal orientations. *Research in Social Stratification and Mobility*, *66*, 100482. https://doi.org/10.1016/j.rssm.2020.100482

Bertola, G. (2014). *Labor market policies and European crises*. 11.

Bertola, G., Blau, F. D., & Kahn, L. M. (2007). Labor market institutions and demographic employment patterns. *Journal of Population Economics*, *20*(4), 833–867. https://doi.org/10.1007/s00148-007-0137-8

Bertola, G., Boeri, T., & Cazes, S. (2000). Employment protection in industrialized countries: The case for new indicators. *International Labour Review*, 139(1), 57–72. https://doi.org/10.1111/j.1564-913X.2000.tb00402.x

Boeri, T., Conde-Ruiz, J. I., & Galasso, V. (2012). The Political Economy of Flexicurity. *Journal of the European Economic Association*, *10*(4), 684–715. https://doi.org/10.1111/j.1542-4774.2012.01065.x

Boeri, T., & Garibaldi, P. (2007). Two Tier Reforms of Employment Protection: A Honeymoon Effect? *The Economic Journal*, *117*(521), F357–F385. https://doi.org/10.1111/j.1468-0297.2007.02060.x

Boeri, T., & Jimeno, J. F. (2005). The effects of employment protection: Learning from variable enforcement. *European Economic Review*, 49(8), 2057–2077. https://doi.org/10.1016/j.euroecorev.2004.09.013

Bolano, D., & Vignoli, D. (2021). Union formation under conditions of uncertainty: The objective and subjective sides of employment uncertainty. *Demographic Research*, *45*, 141–186. https://doi.org/10.4054/DemRes.2021.45.5

Bratti, M., Bono, E. D., & Vuri, D. (2005). New Mothers' Labour Force Participation in Italy: The Role of Job Characteristics. *Labour*, *19*(s1), 79–121. https://doi.org/10.1111/j.1467-9914.2005.00324.x

Busetta, A., Mendola, D., & Vignoli, D. (2019). Persistent joblessness and fertility intentions. *Demographic Research*, *40*, 185–218. https://doi.org/10.4054/DemRes.2019.40.8

Caldas, S. J., & Pounder, D. G. (1990). Teenage fertility and its social integration correlates: A control theory explanation. Sociological Spectrum, 10(4), 541–560. https://doi.org/10.1080/02732173.1990.9981945

Cameron, A. C., Gelbach, J. B., & Miller, D. L. (2008). Bootstrap-Based Improvements For Inference With Clustered Errors. *The Review of Economics and Statistics*, 14.

Cameron, A. C., & Miller, D. L. (2015). A Practitioner's Guide to Cluster-Robust Inference. Journal of Human Resources, 50(2), 317–372. https://doi.org/10.3368/jhr.50.2.317

Cazes, S., & Tonin, M. (2010). Employment protection legislation and job stability: A European cross-country analysis. *International Labour Review*, *149*(3), 261–285. https://doi.org/10.1111/j.1564-913X.2010.00087.x

Comolli, C. L. (2017). The fertility response to the Great Recession in Europe and the United States: Structural economic conditions and perceived economic uncertainty. *Demographic Research*, *36*, 1549–1600. https://doi.org/10.4054/DemRes.2017.36.51

Conley TG, Tabor CR (2011) Inference with "difference in differences" with a small number of policy changes. *Rev Econ Stat* 93:113–125

Cutuli, G., & Guetto, R. (2013). Fixed-Term Contracts, Economic Conjuncture, and Training Opportunities: A Comparative Analysis Across European Labour Markets. *European Sociological Review*, *29*(3), 616–629. https://doi.org/10.1093/esr/jcs011

Dantis, C., & Rizzi, E. L. (2020). Transition to first birth during the Great Recession: The case of Greece. *Genus*, 76(1), 1. https://doi.org/10.1186/s41118-019-0070-1

de Paola, M., Nisticò, R., & Scoppa, V. (2021). Employment protection and fertility decisions: The unintended consequences of the Italian Jobs Act. *Economic Policy*, 735–773.

Esping-Andersen, G. (1999). Social foundations of postindustrial economies. Oxford, UK:Oxford University Press.

Esping Andersen, G., & Regini, M. (2000). *Why deregulate labour markets?* Oxford University Press.

Fahlén, S., & Oláh, L. Sz. (2018). Economic uncertainty and first-birth intentions in Europe. *Demographic Research*, *39*, 795–834. https://doi.org/10.4054/DemRes.2018.39.28

Garibaldi, P., & Taddei, F. (2013). *Italy: A Dual Labour Market in Transition*. 69.

Gebel, M., & Giesecke, J. (2016). Does Deregulation Help? The Impact of Employment Protection Reforms on Youths' Unemployment and Temporary Employment Risks in Europe. *European Sociological Review*, *32*(4), 486–500. https://doi.org/10.1093/esr/jcw022

Grubb, D., & Wells, W. (1993). *Employment regulation and patterns of work in EC countries*. OECD Economic Studies No. 21. Winter 1993.

Hijzen, A., Mondauto, L., & Scarpetta, S. (2013). The Perverse Effects of Job-Security Provisions on Job Security in Italy: Results from a Regression Discontinuity Design. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2325852

Hipp, L., Bernhardt, J., & Allmendinger, J. (2015). Institutions and the prevalence of nonstandard employment. *Socio-Economic Review*, *13*(2), 351–377. https://doi.org/10.1093/ser/mwv002

Javornik, J. (2014).Measuring state de-familialism: Contesting post-socialist exceptionalism. *Journal of European Social Policy*, 24, 240–57.

Kahn, L. M. (2007). The Impact of Employment Protection Mandates on Demographic Temporary Employment Patterns: International Microeconomic Evidence. *The Economic Journal*, *117*(521), F333–F356. https://doi.org/10.1111/j.1468-0297.2007.02059.x

Kahn, J. R., & Anderson, K. E. (1992). Intergenerational patterns of teenage fertility. Demography, 29(1), 39–57. https://doi.org/10.2307/2061362

Karabchuk, T. (2020). Job Instability and Fertility Intentions of Young Adults in Europe: Does Labor Market Legislation Matter? *The ANNALS of the American Academy of Political and Social Science*, *688*(1), 225–245. https://doi.org/10.1177/0002716220910419

Kim, M.-H., Kim, C., Park, J.-K., & Kawachi, I. (2008). Is precarious employment damaging to self-rated health? Results of propensity score matching methods, using longitudinal data in South Korea. *Social Science & Medicine*, *67*(12), 1982–1994. https://doi.org/10.1016/j.socscimed.2008.09.051

Kreyenfeld, M., & Andersson, G. (2014). Socioeconomic differences in the unemployment and fertility nexus: Evidence from Denmark and Germany. *Advances in Life Course Research*, *21*, 59–73. https://doi.org/10.1016/j.alcr.2014.01.007

Kreyenfeld, M., Andersson, G., & Pailhé, A. (2012). Economic Uncertainty and Family Dynamics in Europe: Introduction. *Demographic Research*, *27*, 835–852. https://doi.org/10.4054/DemRes.2012.27.28

Levin, A., Lin, S. F., & Chu, C. S. (2002). Unit root tests in panel data: asymptotic and finite sample properties. *Journal of Econometrics*, 108, 1–24.

Lesthaeghe, R. (2020). The second demographic transition, 1986–2020: Sub-replacement fertility and rising cohabitation—a global update. Genus, 76(1), 10. https://doi.org/10.1186/s41118-020-00077-4

Luci-Greulich, A., & Thévenon, O. (2013). The Impact of Family Policies on Fertility Trends in Developed Countries: L'influence des politiques familiales sur les tendances de la fécondité des pays développés. *European Journal of Population / Revue Européenne de Démographie*, *29*(4), 387–416. https://doi.org/10.1007/s10680-013-9295-4

Luci-Greulich, A., & Thévenon, O. (2014). Does Economic Advancement 'Cause' a Re-increase in Fertility? An Empirical Analysis for OECD Countries (1960–2007). *European Journal of Population*, 30(2), 187–221. https://doi.org/10.1007/s10680-013-9309-2

Matysiak, A., Sobotka, T., & Vignoli, D. (2021). The Great Recession and Fertility in Europe: A Sub-national Analysis. *European Journal of Population*, *37*(1), 29–64. https://doi.org/10.1007/s10680-020-09556-y

Mencarini, L., Vignoli, D., Zeydanli, T., & Kim, J. (2018). Life satisfaction favors reproduction. The universal positive effect of life satisfaction on childbearing in contemporary low fertility countries. *PLOS ONE*, *13*(12), e0206202. https://doi.org/10.1371/journal.pone.0206202

Moody, C. E., & Marvell, T. B. (2020). Clustering and Standard Error Bias in Fixed Effects Panel Data Regressions. *Journal of Quantitative Criminology*, 36(2), 347–369. https://doi.org/10.1007/s10940-018-9383-z

Muffels, R.; Luijkx, R. Labour market mobility and employment security of male employees in Europe: trade-off 'or flexicurity'?. *Work, employment and society*, 2008, 22.2: 221-242.

Myant, M. (2016). Uses and Abuses of the OECD's Employment Protection Legislation Index in Research and EU Policy Making. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2881873

Noelke, C. (2016). Employment Protection Legislation and the Youth Labour Market. *European Sociological Review*, *32*(4), 471–485. https://doi.org/10.1093/esr/jcv088

Ochsen, C., & Welsch, H. (2012). Who benefits from labor market institutions? Evidence from surveys of life satisfaction. *Journal of Economic Psychology*, *33*(1), 112–124. https://doi.org/10.1016/j.joep.2011.08.007

OECD. (1994). The OECD Jobs Study. *OECD Publishing*, 55.

OECD. (1999). OECD Employment Outlook 1999: Employment Protection and Labour Market Performances (p. Chapter 2, 50). *OECD Publishing.* https://stats.oecd.org/

OECD. (2004). OECD employment Outlook 2004: Employment protection regulation and labour market performance (pp. 61–125). *OECD Publishing.*

OECD. (2006). OECD Employment Outlook 2006: Boosting jobs and incomes, *OECD Publishing.*

OECD. (2013). OECD Employment Outlook 2013: *OECD Publishing*. https://doi.org/10.1787/empl_outlook-2013-en.

OECD. (2019). OECD Employment Outlook 2019: The Future of Work. *OECD Publishing*. https://doi.org/10.1787/9ee00155-en.

Özcan, B., Mayer, K. U., & Luedicke, J. (2010). The impact of unemployment on the transition to parenthood. *Demographic Research*, *23*, 807–846. https://doi.org/10.4054/DemRes.2010.23.29

Pailhé, A., & Solaz, A. (2012). The influence of employment uncertainty on childbearing in France: A tempo or quantum effect? *Demographic Research*, *26*, 1–40. https://doi.org/10.4054/DemRes.2012.26.1

Prifti, E., & Vuri, D. (2013). Employment protection and fertility: Evidence from the 1990 Italian reform. *Labour Economics*, *23*, 77–88. https://doi.org/10.1016/j.labeco.2013.04.003

Rovny, A. E. (2011). Welfare state policy determinants of fertility level: A comparative analysis. *Journal of European Social Policy*, *21*(4), 335–347. https://doi.org/10.1177/0958928711412221

Scherer, S. (2009). The Social Consequences of Insecure Jobs. *Social Indicators Research*, *93*(3), 527–547. https://doi.org/10.1007/s11205-008-9431-4

van Wijk, D. C., de Valk, H. A. G., & Liefbroer, A. C. (2021). Temporary Employment and Family Formation: An Income or Insecurity Effect? *European Sociological Review*, *37*(4), 641–658. https://doi.org/10.1093/esr/jcab007

Vignoli, D., Drefahl, S., & De Santis, G. (2012). Whose job instability affects the likelihood of becoming a parent in Italy? A tale of two partners. *Demographic Research*, *26*, 41–62. https://doi.org/10.4054/DemRes.2012.26.2

Vignoli, D., Guetto, R., Bazzani, G., Pirani, E., & Minello, A. (2020). A reflection on economic uncertainty and fertility in Europe: The Narrative Framework. *Genus*, *76*(1), 28. https://doi.org/10.1186/s41118-020-00094-3

Vignoli, D., Mencarini, L., & Alderotti, G. (2020). Is the effect of job uncertainty on fertility intentions channeled by subjective well-being? *Advances in Life Course Research*, 100343. https://doi.org/10.1016/j.alcr.2020.100343

Vignoli, D., Tocchioni, V., & Mattei, A. (2020). The impact of job uncertainty on first-birth postponement. *Advances in Life Course Research*, 100308. https://doi.org/10.1016/j.alcr.2019.100308

Vignoli, D., Tocchioni, V., & Salvini, S. (2016). Uncertain lives: Insights into the role of job precariousness in union formation in Italy. *Demographic Research*, *35*, 253–282. https://doi.org/10.4054/DemRes.2016.35.10

Voßemer, J., Gebel, M., Täht, K., Unt, M., Högberg, B., & Strandh, M. (2018). The Effects of Unemployment and Insecure Jobs on Well-Being and Health: The Moderating Role of Labor Market Policies. *Social Indicators Research*, 138(3), 1229–1257. https://doi.org/10.1007/s11205-017-1697-y

Wolbers, M. H. J. (2007). Patterns of Labour Market Entry: A Comparative Perspective on School-to-Work Transitions in 11 European Countries. *Acta Sociologica* 50 (3): 189–210. https://doi.org/10.1177/0001699307080924.

Appendix

Table A1. Descriptive statistics

Variable		*Mean*	*Std. Dev.*	*Min*	*Max*	*Observations*
TFR	overall	1.57	0.24	1.13	2.14	N = 564
	between		0.22	1.29	1.93	n = 19
	within		0.12	1.18	2.13	T = 29.68
Age specific fertility						
15-24	overall	0.03	0.01	0.01	0.10	N = 545
	between		0.01	0.02	0.05	n = 19
	within		0.01	0.01	0.09	T = 28.68
25-29	overall	0.10	0.02	0.05	0.16	N = 545
	between		0.02	0.07	0.13	n = 19
	within		0.01	0.06	0.14	T = 28.68
30-34	overall	0.10	0.02	0.04	0.14	N = 545
	between		0.02	0.06	0.13	n = 19
	within		0.01	0.06	0.13	T = 28.68
35-39	overall	0.04	0.02	0.01	0.10	N = 545
	between		0.01	0.03	0.08	n = 19
	within		0.01	0.02	0.07	T = 28.68
40+	overall	0.00	0.00	0.00	0.01	N = 545
	between		0.00	0.00	0.01	n = 19
	within		0.00	0.00	0.01	T = 28.68
Education-specific fertility						
Low	overall	0.04	0.01	0.01	0.07	N = 154
	between		0.01	0.02	0.06	n = 13
	within		0.01	0.01	0.05	T = 11.85
Mid	overall	0.06	0.01	0.03	0.09	N = 154
	between		0.01	0.05	0.07	n = 13
	within		0.01	0.04	0.09	T = 11.85
High	overall	0.08	0.02	0.03	0.12	N = 154
	between		0.02	0.04	0.11	n = 13
	within		0.01	0.06	0.10	T = 11.85
EPL						
EPL-r	overall	2.46	0.76	1.10	4.83	N = 564
	between		0.74	1.23	4.17	n = 19
	within		0.23	1.43	3.55	T = 29.68
EPL-gap	overall	0.62	1.15	-2.86	3.14	N = 564
	between		1.01	-1.07	2.53	n = 19
	within		0.60	-1.84	1.92	T = 29.68
Control variables						
% Women employment	overall	50.72	7.08	32.46	63.24	N = 564
	between		6.35	37.30	60.31	n = 19
	within		3.37	38.33	59.31	T = 29.68

Public spending on the family	overall	2.23	0.93	0.30	4.39	N = 517
	between		0.89	0.94	3.60	n = 19
	within		0.33	1.19	3.43	T = 27.21
% Unemployment	overall	8.70	4.49	2.01	27.47	N = 547
	between		3.38	4.09	17.14	n = 19
	within		3.06	-0.21	22.53	T = 28.79
% Part-time	overall	14.37	7.70	1.59	38.55	N = 546
	between		7.54	3.21	33.78	n = 19
	within		2.39	5.54	21.22	T = 28.73

Variables and sources:

TFR: OECD fertility database https://data.oecd.org/pop/fertility-rates.htm;

Age-specific fertility: Eurostat https://ec.europa.eu/eurostat/databrowser/view/DEMO_FRATE

Education-specific fertility: Eurostat https://ec.europa.eu/eurostat/databrowser/

EPL index: OECD https://www.oecd.org/employment/emp/oecdindicatorsofemploymentprotection.htm;

Women employment (% of employed women over the total number of women in working age 15-65), Unemployment rate, Part-time work (% of part-time work over the total employment): OECD https://data.oecd.org/

Public spending on the family (as % of GDP): OECD Social expenditure database https://stats.oecd.org/Index.aspx?DataSetCode=SOCX_DET#

Additional analyses and robustness checks

Table A2. Interaction EPL and area

VARIABLES	Interaction EPL-r and EPL-gap and Country area
Area * EPL-r	
Anglo-Saxon	-1.681***
	(0.211)
Continental	0.251***
	(0.043)
Southern	0.134***
	(0.023)
Eastern	0.150***
	(0.043)
Nordic	0.102***
	(0.022)
Area * EPL-gap	
Anglo-Saxon	0.525***
	(0.117)
Continental	-0.141***
	(0.017)
Southern	-0.045***
	(0.011)
Eastern	-0.079***
	(0.029)
Nordic	-0.011
	(0.014)
Women employment	0.001
	(0.001)
Public spending on the family	0.096***
	(0.015)
Unemployment	0.001
	(0.002)
Part-time	0.010***
	(0.002)
Country-area fixed effect	Yes
Year fixed-effect	Yes
Observations	491
R-squared	0.81

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A3. Model with relative EPL gap

VARIABLES	**Relative EPL gap**
Relative EPL-gap	-0.084***
	(0.026)
Women employment	0.011***
	(0.004)
Public spending on the family	0.202***
	(0.016)
% Unemployment	-0.016***
	(0.001)
Part-time	0.015***
	(0.004)
Country-specific time trends	Yes
Observations	491
R-squared	0.680
Number of countries	19

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A4: Models with different lags on the independent and control variables

VARIABLES	(1) TFR year **T** EPL year **T** Jan 1st Controls **T-1**	(2) TFR year **T** EPL year **T** Jan 1st Controls **T-2**	(3) TFR year **T** EPL year **T-1** Jan 1st Controls **T-2**
EPL-r	0.025	0.040	0.018
	(0.031)	(0.032)	(0.032)
EPL-gap	-0.035***	-0.030**	-0.036***
	(0.012)	(0.012)	(0.012)
Women employment	0.014***	0.012***	0.012***
	(0.004)	(0.004)	(0.004)
Public spending on the family	0.163***	0.101***	0.102***
	(0.016)	(0.016)	(0.016)
% Unemployment	-0.016***	-0.012***	-0.013***
	(0.001)	(0.002)	(0.001)
Part-time	0.012***	0.007	0.008*
	(0.004)	(0.004)	(0.004)
Country-specific time trends	Yes	Yes	Yes
Observations	491	489	489
R-squared	0.702	0.711	0.713
Number of countries	19	19	19

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10

Note: in model 1, TFR is measured at year T, EPL-r and EPL-gap are measured at January 1st of that year, and the control variables are measured at year T-1. In model 2, TFR is measured at time T, EPL-r and EPL-gap are measured at January 1st of that year, and the control variables are lagged by two years. In model 3, TFR is measured at time T, EPL-r and EPL-gap are measured at January 1st of the previous year, and the control variables are lagged by two years.

Table A5: GEE (1) and First Difference Estimator (2)

VARIABLES	(1) GEE model	(2) First difference estimator
EPL-r	0.034*	0.040**
	(0.019)	(0.017)
EPL-gap	-0.013*	-0.014*
	(0.007)	(0.008)
Women employment	0.003	0.002
	(0.002)	(0.002)
Public spending on the family	0.082***	0.078***
	(0.021)	(0.021)
% Unemployment	-0.010***	-0.009***
	(0.002)	(0.002)
Part-time	0.005*	0.004
	(0.003)	(0.003)
Country-specific time trends	Yes	
Observations	491	472
R-squared		0.14
Number of countries	19	19

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1