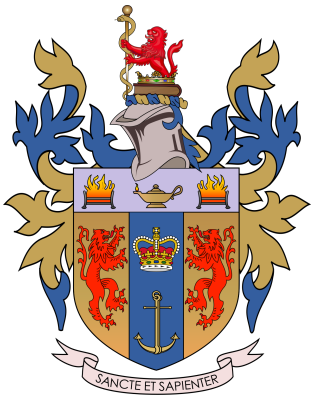

Department of Political Economy

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6SSPP352 Dissertation

Collective Wage Bargaining and Unemployment: A Synthetic Control Approach

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Abstract

This dissertation aims to contribute to the literature concerning how collective wage bargaining systems affect the macroeconomic performance of a country employing the novel empirical technique of the synthetic control method with a regional approach. It estimates that, over the period between 1995 and 2015, Northwest and Northeast Italy would have shown a 1.1 and 1.6 percentage point increase on average in unemployment rates, respectively, had Italy decentralised its wage setting regime in 1995 in an organised decentralised fashion like Germany did. The empirical results are of interest for policymakers because they seem to run contrary to the evidence from the academic literature in support of wage setting decentralisation but an important caveat, concerning time lags of labour market reforms, shall influence the interpretation of these results.

I would like to thank my supervisor, Dr David Hope, for his thoughtful suggestions and guidance. I am grateful to my friends and family for their support during these unusual times.

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List of Abbreviations

BA	Bundesagentur für Arbeit (German Federal Employment Agency)
CRENoS	Centro Ricerche Economiche Nord-Sud (Centre for North-South Economic Research)
Destatis	Statistisches Bundesamt (German Federal Statistical Office)
ISTAT	Istituto Nazionale di Statistica (Italian National Institute of Statistics)
OECD	Organisation for Economic Co-operation and Development

1. Introduction

Attempting to assess the role that labour market institutions play in determining the macroeconomic performance of a country has captured researchers' interest for decades. Collective bargaining systems, initially seen as secondary by policymakers and economists alike, started rising to prominence in the late 80s following the seminal work by Calmfors & Driffill (1988) and, subsequently, the influential OECD (1994a,b) Job Study. The latter, in particular, firmly supported decentralisation of wage setting in developed economies with the purpose of reducing wage rigidities and inducing labour costs to become more receptive of market forces. The OECD's stance in favour of decentralising labour market institutions was later embraced by other international bodies (see, for example, IMF, 2003) seeking to reduce countries' unemployment levels and enhance wage flexibility ultimately hoping to raise their competitiveness, what Krugman (as cited in Terzi, 2016, p. 2) characterised as a "dangerous obsession".

The existing empirical literature concerning the benefits and detriments of decentralising collective bargaining mainly employs panel data regression analysis either through a macro cross-country perspective or micro firm-level one but both approaches have substantial shortcomings (Ronchi & Di Mauro, 2017, p. 10). Micro analyses, albeit they seem to find a significant effect of wage bargaining on the economy, are generally limited to single-country studies because of a lack of comparable data concerning firms' characteristics in multiple countries which hampers their external validity (see, for example, Cardoso & Portela, 2009; Díez-Catalán & Villanueva, 2015; Faggio & Nickell, 2005). On

the other hand, macro analyses using country-level data tend not to produce significant results because of unobserved heterogeneity in country-specific characteristics which limits the scope for causal inference (see, for example, Baker et al., 2004; Flanagan, 1999; Freeman, 2007). Moreover, cross-country studies are also undermined by considerable measurement errors since, in order to have a proxy of centralisation and coordination, they must classify labour market reforms taking place in different countries into categories but no two reforms are analogous which produces ambiguous approximations (Adhikari et al., 2018, p. 880).

As a consequence, this dissertation aims to mitigate shortcomings of previous studies and contribute to the literature by employing a novel empirical approach – the synthetic control method (SCM) – to causally determine the impact on aggregate economic outcomes, specifically unemployment, of not decentralising wage setting institutions. In fact, the drive towards decentralisation of labour markets which began in the 1980s under the aegis of international organisations pressured policymakers in several countries to enact collective bargaining reforms. However, Boeri (2014) illustrates what he judged to be a misguided tendency in several countries to accommodate both this decentralisation push and unions' resistance by way of a two-tier system of bargaining where wage floors are established nationally and only upward adjustments in wages are allowed locally. Italy is a notable example of a country that, in an effort to promote wage moderation, implemented such a two-tier structure in the 1990s which did not fundamentally overhaul its predominately centralised collective bargaining system. This dissertation aims to determine whether Italy missed an opportunity to more thoroughly decentralise its labour market and at what cost, if any, in terms of unemployment. Germany will serve as the comparison unit of this study since it was among those countries that were more receptive to the plea for greater decentralisation and, in the 1990s, established what the OECD (2017) defines an organised decentralised wage bargaining system. Such novel institutional arrangement began to bear fruit, in terms of lower unemployment

and better macroeconomic performance, more than a decade later and, it has been argued, contributed to the country shifting from being "the sick man of Europe" in the 1990s to an "economic superstar" not long after (Dustmann et al., 2014).

The synthetic control method used in this investigation compares the unemployment trend in the unit of interest - in this study, Italian regions - to that of a synthetic counterfactual constructed as a convex combination of several potential control units - in this study, German states - selected by way of a data-driven procedure to best approximate the unit of interest prior to the treatment date (Abadie et al., 2010). The SCM remedies to some of the flaws of macro studies previously mentioned. First, it reduces endogeneity from omitted variable bias since, unlike difference-in-differences analyses, it allows for unobserved confounders to vary with time. If the unemployment levels in the region under consideration and its synthetic counterfactual follow a similar path in the pre-treatment period and only diverge after the treatment date, then unemployment in both geographical units is influenced by similar unobserved and observed variables and the post-treatment divergence can be ascribed to the treatment itself (Adhikari et al., 2018, pp. 883-84). Second, the estimated difference between the values of the outcome variable in the region in question and its synthetic control measures the reform impact on unemployment of that specific reform in that particular region rather than the average treatment effect of reforms carried out in multiple countries that a cross-country OLS regression would have produced (Adhikari et al., 2018, pp. 883-84). Third, the synthetic approach, by allowing each control unit from the donor pool to only take a weight between 0 and 1, curtails the risk of extrapolation typical of traditional regression analyses (Abadie et al., 2015, p. 496). Finally, an additional benefit of employing the SCM is that it permits to estimate the treatment effect over time which is crucial for this particular study since labour market reforms often require years before their impact is felt in the economy (Turrini et al., 2014).

This dissertation interacts with a growing literature where the synthetic control method is employed to estimate the outcome of policy interventions (see, for example, Billmeier & Nannicini, 2013; Campos & Kinoshita, 2010; Fernández & Perea, 2015; Hope, 2016). In particular, most closely related to my work is Adhikari et al. (2018)'s paper where the authors employ the synthetic control method to evaluate the impact on per capita GDP of labour market reforms implemented in various countries. The study also includes an assessment of the German Hartz reforms of the early 2000s and establishes that they were successful in increasing per capita GDP in the country but with somewhat inconclusive placebo tests. Albeit the Hartz reforms contributed to the decentralisation process of the German labour market, their role was fairly peripheral as shown by Dustmann et al. (2014) and this dissertation rather focuses on the gradual decentralisation of wage setting that Germany underwent following reunification in 1990 which constituted the foundations on which the Hartz reforms could subsequently be implemented (see Section 4).

This dissertation is structured as follow: in the next section, I outline the literature concerning the impact of wage bargaining regimes on aggregate economic outcomes with particular regard to unemployment. I then set out the comparative case study by examining the institutional arrangements of the Italian and German labour markets establishing why a regional approach is the most suited for this analysis. In Section 3, I illustrate my hypothesis and the synthetic control method whereas, in Section 4, the empirical analysis and its findings are delineated. Finally, in Section 5, I discuss the implications of this study and how it interacts with the overarching literature on the topic.

2. Literature Review[1]

2.1 Theoretical overview

Collective bargaining refers to the negotiation process between employees and employers - usually represented by trade unions and employers' organisations, respectively - which sets out the working conditions and aims to provide employees with adequate pay and working time (protective function), a platform to express grievances and resolve disputes (voice and conflict management function) whilst ensuring that they are entailed to a fair share of the benefits stemming from training, technological innovation and growth in productivity (distributive function) (Visser, 2016, pp. 1-2).

Collective bargaining systems vary substantially across countries, the OECD (2017, 2018a,b), as depicted in Figure 1, distinguishes them on the basis of (i) what level the bargaining between unions and employers' associations takes place, (ii) whether deviation from higher-level agreements at the firm-level is permitted and how common it is, (iii) the prevalence of wage coordination between actors at the sector- or firm-level, and (iv) the degree of enforcement of the agreement which largely depends on existing trust between social partners and the amount of control exerted by unions and employers' organisations on their members.

[1]This section uses material previously submitted in the dissertation proposal.

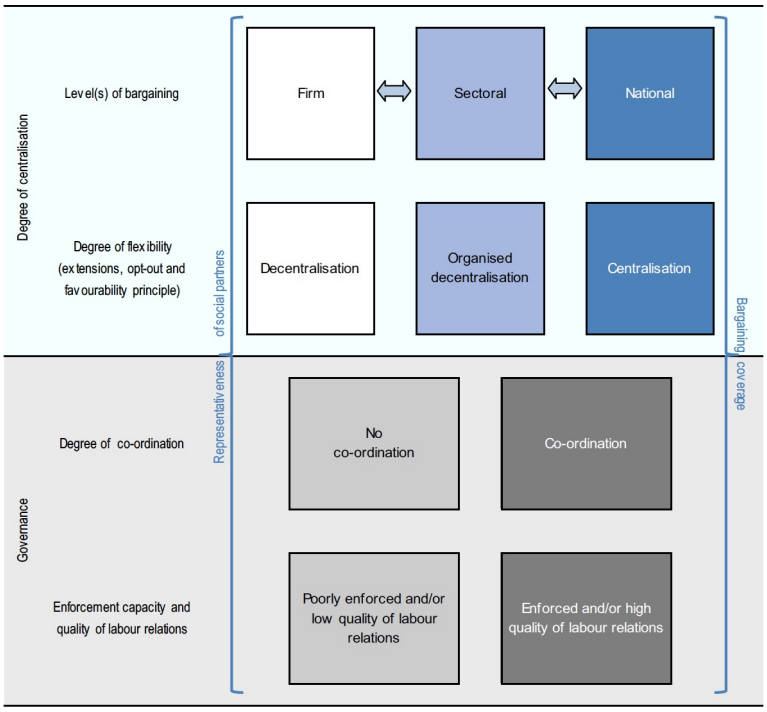


Figure 1: The main building blocks of collective bargaining. Reprinted from OECD (2017).

For the OECD (2017, 2018a,b), collective bargaining is thus of five kinds: (1) predominantly centralised and weakly coordinated, (2) predominantly centralised and coordinated, (3) organised decentralised and coordinated, (4) largely decentralised, and (5) fully decentralised.

The literature has extensively debated how wage bargaining systems affect labour markets' performance particularly with regard to employment. On the one hand, standard economic theory maintains that centralised wage bargaining at the sector level is deficient since the bargaining process operates following the "right-to-manage" model where profit-maximising social partners negotiate exclusively over nominal wages leaving firms to unilaterally decide employment levels with suboptimal results (Nickell & Andrews, 1983). On the other hand, the "efficient bargaining" model acknowledges that bargaining actors may consider both employment and macroeconomic resilience in addition to wages when negotiating (McDonald & Solow, 1981). Calmfors & Driffill (1988), by way

of their influential "hump-shape" thesis, concluded that fully centralised and fully decentralised systems are the most successful at reducing unemployment whereas intermediate systems obtain the worst labour market outcomes. Similarly, the corporatist view in the 1980s asserted the superiority of centralised wage bargaining systems in the form of national, cross-sector bargaining since this process would drive national bargainers to acknowledge and internalise the macroeconomic impact of wage setting (Flanagan, 1999).

Such approaches, however, by focusing almost exclusively on the level at which bargaining takes place, fail to address the role that coordination plays. Coordination refers to the voluntary synchronisation of wage setting between sectors or firms which prevents completely independent and atomised bargaining between actors in decentralised systems (OECD, 2017, pp. 152-53). Soskice (1990) found that full coordination and full centralisation are functionally equivalent as far as macro flexibility is concerned: coordination ensures that sector-level bargaining adjusts to aggregate macroeconomic conditions which, in turn, improves the labour market resilience to shocks.

Recent research has upheld the view that decentralisation, combined with coordination, generates superior labour market outcomes than centralised systems lacking coordination. The OECD (2018a) provides evidence that forms of organised decentralised bargaining – that is, decentralised regimes with a high degree of wage coordination between sectors and bargaining units as is the case in Germany, the Netherlands and Austria – deliver higher employment, higher productivity, and higher salaries for covered employees than other systems of wage determination. Organised decentralised bargaining establishes a common framework by means of sector-level agreements but integrates it with firm-level bargaining which can determine additional aspects of employees' working time and, most importantly, compensation allowing working conditions to more closely follow productivity patters at the firm level. These results are similar to those reported by Ronchi & Di Mauro (2017) who highlight the heightened resilience to economic shocks of decentralised systems by virtue of their higher

wage flexibility and Baker et al. (2004) who establish how high coordination brings about lower unemployment.

2.2 Wage bargaining institutions in Italy and Germany

Since the 1980s, Europe has experienced a trend towards decentralisation of collective bargaining aimed at raising labour markets resilience to shocks via increased wage flexibility (OECD, 2017, p. 128). In this context, Germany constitutes a prominent case since, following reunification in 1990, it embarked in a process of decentralisation of wage setting through changes within the system of sector-level bargaining existing at the time without any large-scale reform which resulted in the country moving towards a decentralised yet coordinated bargaining regime (Dustmann et al., 2014). Before the 1990s, the German and Italian systems of wage bargaining were remarkably similar characterised by a centralised system primarily at the sector-level with few deviations permitted at the firm-level (Boeri et al., 2019, pp. 6-10). Following the OECD (2018b) taxonomy, Italy is classified as being almost continuously a predominantly centralised system from 1985 to this day whereas Germany moved from being a predominantly centralised system before 1993 to an organised decentralised one in 1993 and has remained so until today with few exceptions.

In Italy, wage bargaining has historically been conducted through a highly centralised system where negotiations take place at the sector-level between unions and employers' organisations and agreements are usually extended to the whole workforce through court rulings in absence of formal *erga omnes* extension clauses in collective agreements (Afonso, 2019, p. 953; Boeri et al., 2019, pp. 6-8). Before 1992, firm-level bargaining was rare and wage compression was enforced through a national wage-indexation scheme, the so-called *Scala Mobile* (Erikson & Ichino, 1994, pp. 16-19). Starting in 1992, the *Scala Mobile* was abolished to contain inflation and firm-level bargaining was permitted to

determine productivity-related wage increments at the local level resulting in the establishment of a two-tier bargaining system (Pérez, 2000, pp. 442-443). However, this decentralisation process has been ineffective in making wages more responsive to local productivity patterns since (i) it does not allow for deviations from wage floors agreed nationally apart from upward adjustments and (ii) firms' reluctance to enter into time-consuming negotiations meant that firm-level bargaining has not been widely used (Boeri, 2014). In 2011, a decree law made firm-level agreements prevail over sector-level ones if certain conditions were met but legal uncertainty and strict restrictions resulted in very few firms making use of such provision (Kangur, 2018, p. 16) .

In Germany, wage setting has similarly been conducted by way of a centralised system of sector-level bargaining between trade unions and employers' organisations at the regional level. Pattern bargaining was an important feature of the system where all sectors and regions, for the most part, conformed to wages negotiated by the powerful metalworking union and employers' federation - IG Metall and Gesamtmetall, respectively (Ochel, 2005, p. 105). Sectoral agreements were legally binding only to members of the unions and employers' organisations that negotiated them but were usually extended to the whole workforce whereas firm-level bargaining through elected work councils was present but could only implement upward wage adjustments (Oberfichtner & Schnabel, 2017, pp. 9-11). In the early 1990s, several factors including (i) the cost of reunification, (ii) the significant productivity divergence between the East and the West, (iii) the enhanced risk of German firms relocating to newly independent eastern bloc nations, and (iv) a steady increase in labour costs in the country made it challenging for German companies to pay high union wages and led to an unprecedented decentralisation effort of wage setting. Albeit sector-level bargaining was preserved, the German system gradually allowed wages to be adjusted at the firm-level through local negotiations with unions outside of sectoral agreements so that local wages became more responsive to local productivity levels. The most important element of such transformation was the introduc-

tion of the so-called "opening clauses", initially intended as hardship clauses to be used by firms in difficulty to deviate in terms of working time from sectoral agreements but whose use was expanded since the mid-90s ultimately being employed as a way for companies to gain competitiveness by means of downward wage adjustments even in absence of exceptional circumstances (Dustmann et al., 2014). Falling union density and bargaining coverage have been a side effect of decentralisation in Germany with the number of workers being covered by either sector-level or firm-level agreements steadily falling since the 1990s which contributed to making wages more flexible yet more unequal throughout the country (Addison et al., 2017; Antonczyk et al., 2018; Oberfichtner & Schnabel, 2017).

Differences in collective bargaining are likely to have contributed to the divergence in economic outcomes between Italy and Germany over the past decades. The centralised system in place in Italy appears to be deficient in promoting (i) wage flexibility which brings about an inability to adequately respond to both micro- and macroeconomic shocks and (ii) wage moderation since sectoral wage floors fail to link productivity and pay resulting in high wages that constitute a large component of the cost structure of Italian firms (Boeri, 2014). Figure 2 shows how labour costs have been steadily rising in Italy and falling in Germany as a result of nominal wage growth in Italy outpacing

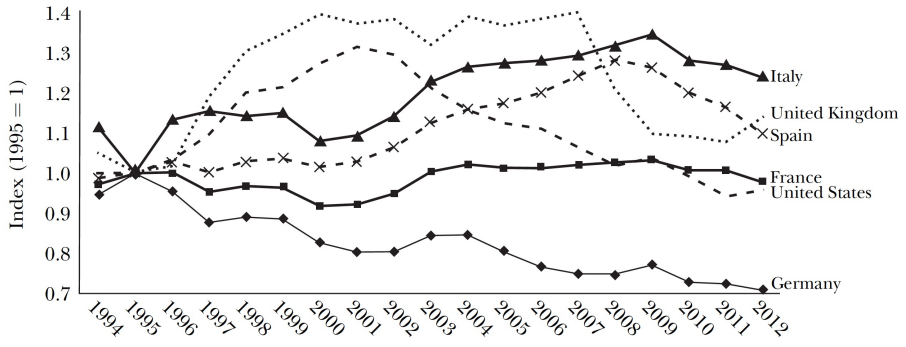
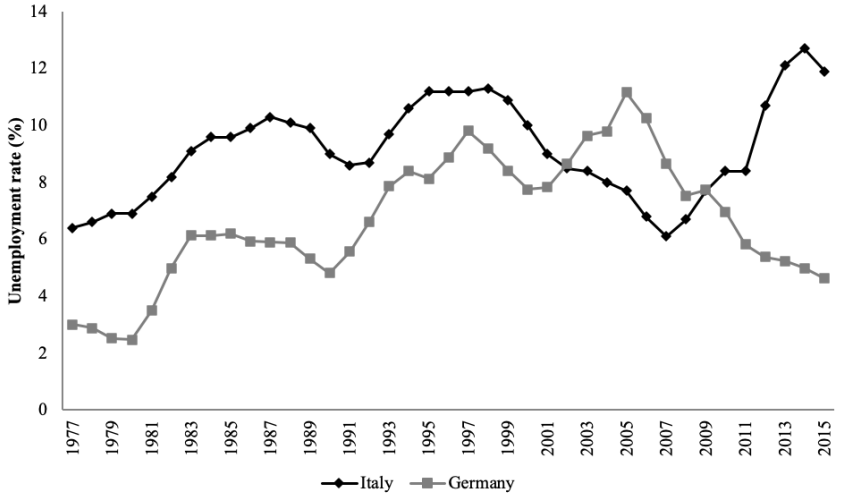


Figure 2: Competition-weighted relative Unit Labour Costs, selected countries, 1994–2012. Reprinted from Dustmann et al. (2014).

productivity growth, which has been stagnant, since the 1990s while wage growth in Germany has been largely in line with productivity growth contributing to the ongoing surge in German competitiveness (Dustmann et al., 2014, pp. 169-176; Kangur, 2018, pp. 7-8).

Accordingly, Italian firms have smaller margins of manoeuvre for adjustment in response to a shock because temporary cost reduction measures like cutting wages are not permitted which leads to companies having to adjust through quantities – that is, laying off workers (Kangur, 2018, pp. 9-11). Figure 3 outlines the development of unemployment rates in Italy and Germany over the period from 1977 to 2015 and shows a superior performance of the latter with some exceptions: Italy seems to perform better in the 2000s and be outperformed again after the Great Recession.

Figure 3: Unemployment rates in Italy and Germany, 1977-2015. Retrieved from ISTAT and OECD.



Notes: for ISTAT source, see Section 4. For OECD source, the dataset is publicly available at https://data.oecd.org/unemp/unemployment-rate.htm

Thus, the immutability of the Italian bargaining regime lends itself well to a comparative case study to determine whether Italy would have been better off, as far as unemployment is concerned, had it carried out a decentralisation effort of its wage setting akin to the German one. In doing so, this dissertation

also aims to establish if an organised decentralised system can successfully be implemented in a country with different institutional bases which, as shown by Dustmann et al. (2014), were instrumental in the post-reunification German labour market success. Pérez (2000), for instance, observes how it is generally acknowledged that highly encompassing and cohesive unions as well as employers' associations which can ensure compliance of all workers within a sector with national agreements are necessary for effective sector-level bargaining and Italy has long experienced factionalism and ideological divisions within unions.

2.3 The regional aspect of the problem

Studying the impact of wage bargaining regimes on the Italian and German economies with a national focus would be inaccurate. As Pench et al. (1999, p. 7) observed, unemployment in several European countries is a regional problem and nations with severe productivity differentials within their borders are particularly ill-suited for a country-level analysis. The literature has shown that wage rigidity enforced through centralised collective bargaining prevents wages from adjusting to equilibrate regional labour markets which, in turn, generates large divergences in regional unemployment rates if a country presents significant interregional productivity variation (for a review see Vamvakidis, 2008). In fact, when salaries are decided at the sector or cross-sector level with little divergence allowed locally, they tend to be set with reference to the market-clearing level in the median region. This process generates artificially high wages in the less productive regions which harms their competitiveness and increases their rate of unemployment (Pench et al., 1999)

Both Italy and Germany have similarly large geographical differences in firms' productivity between their regions due to historical reasons - a North-South divide in Italy and an East-West one in Germany. However, unemployment divergence between Germany's East and West is not as striking as it is between Italy's North and South. Boeri et al. (2019) finds this to be the result

of different wage setting regimes in the two countries with the German decentralised system permitting wages to better mirror local productivity patterns so that East Germany has lower nominal wages than its western counterpart but it does not fall considerably behind in terms of unemployment. Thus, analysing unemployment at the national level in Germany and Italy would be misleading as a result of their productivity-related geographical misalignment and the empirical analysis conducted in this dissertation, rather than considering the entirety of Italy and Germany, will focus on the richer regions of each country – that is, Northern Italy and West Germany – to enhance the comparability of the two geographical units (see Section 4 for a more technical evaluation).

3. Methodology[1]

3.1 Identification strategy

The previous section established how decentralised yet coordinated systems of collective bargaining seem to perform better in terms of labour market outcomes by reinforcing wage flexibility as well as wage moderation. Centralised wage setting, in fact, tends to produce wage increments above productivity growth which depresses a country's competitiveness and raises unemployment rates in all regions but more significantly in less productive ones. Furthermore, by limiting temporary salary cuts, it hampers the shock-absorption capacity of a polity. Thus, the main question this dissertation attempts to answer is: what impact does organised decentralised wage bargaining have on unemployment at the regional level? The hypothesis that will be tested is:

- H1: Organised decentralised wage bargaining results, on average, in lower unemployment in all regions.

This hypothesis will be tested by means of the synthetic control method outlined in the following subsection on a sample of Italian regions using data obtained from BA, CRENoS, Destatis and ISTAT.

[1] This section uses material previously submitted in the dissertation proposal.

3.2 The synthetic control method

To study the change in unemployment that an organised decentralised wage setting arrangement akin to the German one would generate in Italy if it were to be implemented, I carry out a comparative case study employing the novel approach of the synthetic control method. The SCM was conceived by Abadie & Gardeazabal (2003), it was subsequently refined in a series of papers by Abadie et al. (2010, 2011, 2015) and has been widely used in the fields of economics and political science to evaluate the impact of policy interventions or historical events – that is, occurrences that have a clear starting date – on aggregate entities like countries, regions or cities.

A comparative case study consists of observing how the outcome variable evolves in the treated and control unit before and after a certain point in time which coincides with a particular event taking place. What sets the SCM apart from closely related methods like difference-in-differences is that, rather than comparing the change in outcome between the treated unit and another state, region or city arbitrary designated by the researcher to be the control, it constructs a synthetic counterfactual instead. Such synthetic unit is a weighted average of multiple potential control units where the weight that each unit is assigned is chosen on the basis of how closely it resembles the treated unit in the pre-treatment period in terms of relevant covariates. That is, the SCM combines multiple potential controls and creates a synthetic counterfactual which can more accurately depict what the outcome path would have been in the treated region, had a certain event not taken place (Abadie et al., 2015).

The SCM reduces ambiguity around the counterfactual since the choice of the control is not at the discretion of the researcher but is obtained through a clear, data-driven procedure. The potential control units are selected depending on their similarity to the treated unit in terms of certain relevant quantifiable characteristics with their relative contribution to the resulting synthetic control being made explicit. The rationale of the SCM is that a combination of poten-

tial control units produces a more accurate counterfactual than any unit taken singularly (Abadie et al., 2010).

As mentioned in the Introduction, in this dissertation, Italian regions, which did not undergo a reform of wage bargaining, are the treated unit and German states, which experienced that policy change, constitute the synthetic control unit. Such an approach, albeit less common in the literature, does not entail any additional specification and has been previously put into practice like in Saia (2017)'s analysis of what trade flows between the UK and other European countries would have been, had the UK joined the Euro. Thus, this study compares Italian regions - taken singularly or together in the form of macroregions (see Section 4) - with a synthetic control constructed from a donor pool of ten western German states. I then estimate the impact of wage setting reforms by looking at the resulting difference in unemployment between Italian regions and their synthetic counterparts after the treatment date which constitutes a causal estimate of the impact of not decentralising wage bargaining.

What follows is an account of how the synthetic control method is applied to my analysis in accordance with Abadie et al. (2010, 2011, 2015). Given a sample of $J+1$ units, $j=1$ is the treated unit whereas all others belong to the donor pool of potential control units. Therefore, in this dissertation, $j=1$ represents an Italian region and units from $j=2$ to $j=J+1$ constitute the donor pool consisting of ten western German states. The treatment occurs at T_0+1, which in this study is the year 1995 (see Section 4), so that unit $j=1$ is exposed to the treatment (i.e. not implementing labour market reforms) from that point forward - periods $T_0+1,...,T$ - but not before it - periods $1,...,T_0$. The positive number of pre-intervention periods is denoted T_0 while the positive number of post-intervention periods is T_1 such that $T=T_0+T_1$.

Some assumptions are necessary: (i) there must be no interference between units such that the reforms implemented in German states should have no impact on Italian regions (for a detailed discussion, see Rosenbaum, 2005), (ii) the donor pool must be restricted to units that are similar to the treated one in

terms of observed determinants of the outcome variable in order to reduce interpolation bias, and (iii) potential control units that sustained structural shocks to the outcome variable over the sample period should be excluded.

The synthetic counterfactual is a convex combination of potential control units and can be written as a Jx1 vector of weights $W = (w_2, ..., w_{J+1})'$ with $w_j \geq 0$ for $j = 2, ..., J+1$ and $w_2 + ... + w_{J+1} = 1$. Any divergence, following labour market reforms, in the unemployment levels between the region of interest and its synthetic control unit can thus be interpreted as a causal estimate of the impact of not decentralising wage bargaining.

Abadie et al. (2010) select weights W^* depending on what combination of control units most closely approximates the characteristics of the treated region in the pre-reform period. That is, the synthetic control W^* will be the one that minimises the vector $||X_1 - X_0 W||$ where X_1 is a (kx1) matrix comprising the values of the pre-reform characteristics of the treated unit whereas X_0 is the corresponding (kxJ) matrix for the donor pool. The country characteristics mentioned so far consist of macroeconomic determinants of unemployment and may also include the values of the pre-reform outcome variable as outlined in greater detail in Section 4. Therefore, the optimal weights vector W^* minimises:

$$||X_1 - X_0 W||v = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$$

where V depicts a (kxk) matrix of the weights assigned to the variables in X_1 and X_0 in terms of their predictive power on unemployment. The optimal V, V^*, minimises the mean square prediction error (MSPE), which is a measure of the lack of fit between the outcome variable path in the treated unit and its synthetic counterfactual over the pre-treatment period. Thus, V^* is formally defined as:

$$\underset{v \in \nu}{\operatorname{argmin}} (Z_1 - Z_0 W^*(V))' (Z_1 - Z_0 W^*(V))$$

where Z_1 is the (T_0x1) vector consisting of the values of the outcome variable

for the treated unit over the pre-treatment period and Z_0 is the corresponding (T_0xJ) matrix for units in the donor pool while ν represents the set of all positive definite and diagonal matrices.

Finally, the causal estimate of the impact on unemployment of not decentralising wage setting (i.e. the treatment effect) will be obtained by comparing the values that the outcome variable takes over the post-intervention period T_1 in the treated units - that is, Italian regions that did not undergo labour market reforms - and the synthetic control - that is, their synthetic counterpart consisting of western German states which did undergo labour market reforms. Thus, such difference is defined by

$$Y_1 - Y_0 W^*$$

where Y_1 is a (T_1x1) vector consisting of the post-treatment values of the outcome variable in the treated unit and Y_0 is the corresponding (T_1xJ) matrix for the control units.

4. Empirical Analysis

4.1 Data

The dataset used in this dissertation is my own elaboration on regional data retrieved from CRENoS, ISTAT, BA and Destatis. Macroeconomic variables - namely, GDP, GVA and population - are obtained from the research institute CRENoS[1] with regard to Italian regions and from the statistical institute Destatis[2] with regard to German states. They are all constructed using the 1995 European System of Accounts (ESA 1995), GDP and GVA variables are at constant 1995 prices for Italy and 1991 prices for Germany but this dissertation only uses growth rates in order to prevent data mismatch. Unemployment data is retrieved from the databases of ISTAT[3] and BA[4] for Italy and Germany, respectively.

This region-level panel dataset encompasses the years between 1971 and 2015. However, unemployment data starts in 1977 for Italian regions and, consequently, the pre-intervention period of this study goes from 1977 to the treatment date, 1995. Such 18-year time span is of a similar length to the one used by Abadie et al. (2010) and is long enough to determine whether the synthetic

[1]The dataset is publicly available upon request to CRENoS, all related information are available in the appendix of Paci & Saba (1997). It has previously been used, among others, by Pinotti (2015) and Tabellini (2010).

[2]The dataset used is part of the "Revision 2005" made by the working group "Regional Accounts" (VGRdL), the dataset and all related information are publicly available at https://www.statistik-bw.de/VGRdL

[3]The dataset used are "Tavola 10.6.1" and "Tavola 10.8.1" publicly available at http://seriestoriche.istat.it/

[4]The dataset used is "Arbeitslose und Arbeitslosenquoten - Deutschland und Länder (Zeitreihe Jahreszahlen ab 1950)" publicly available at https://statistik.arbeitsagentur.de

control unit constitutes a suitable counterfactual for a given Italian region - that is, whether the outcome variable paths in the treated and synthetic control units follow a similar trend prior to decentralisation. The outcome variable in this study is the unemployment rate in percentage value which, following Abadie et al. (2010), I also include as a separate explanatory variable in order to enhance the overall goodness of fit. The other explanatory variables are GDP growth (%), GVA growth (%), per capita GDP growth (%), per capita GVA growth (%) and population growth (%) where growth is calculated as average annual rates. These variables are chosen among those which the literature has found to be macroeconomic determinants of unemployment (see, for example, Riza Bayrak, 2018; Busetta & Corso, 2012; Maqbool et al., 2013; Okun, 1962). In order to enhance the goodness of fit further and since all macroeconomic variables are available for both treated and control units starting in 1971, macro variables (i.e. growth in GDP, GVA, per capita GDP, per capita GVA and population) are considered from 1971 rather than 1977. As per the methodology of the synthetic approach (see Section 3), all explanatory variables are averaged over their respective pre-1995 interval - that is, 1977 to 1995 for the unemployment variable and 1971 to 1995 for all other variables.

The year 1995 is designated as the treatment date because it is the year when opening clauses were extended to wages in Germany (Brändle et al, 2011 cited in OECD, 2017) and OECD (2018b) starts categorising the German wage bargaining system as an organised decentralised one around the same time. As a consequence of the fact that the decentralisation process was naturally a gradual one because opening clauses were not immediately adopted by a majority of firms, the post-treatment period necessitates to be long enough to detect this progressive transformation of the labour market. It is for this reason that the analysis ends in 2015 - that is, 20 years of post-treatment period. An important caveat must, however, be made: between 1995 and 2015 both Italy and Germany witnessed significant macroeconomic developments in consequence of the establishment of the European Monetary Union in 1999, the Great Recession in

2008 as well as the Sovereign Debt Crisis that followed which have the potential to confound my results. However, it must be noted that, given the close economic integration between the two countries with Germany historically being the largest trading partner of Italy and both economies belonging to the common market and eurozone, it is reasonable to assume that major macroeconomic events that could justify unemployment divergence have not impacted on the two economies in completely different ways. Italy suffered the debt crisis and its aftermath more intensely than Germany as a result of austerity policies but it did not resort to financial assistance from European institutions (i.e. bailout) (Quaglia & Royo, 2015). Most importantly, albeit limited changes to the labour market were undertaken in 2011 including a pension reform, Italy did not overhaul its collective wage bargaining system. A broader labour market reform was only adopted in 2015 whose impact, if any, is only detectable after the period analysed in this dissertation. Moreover, as mentioned in the Literature Review, even though opening clauses were introduced in the Italian system in 2009 and 2011, they were barely used by employers (Afonso, 2019, pp. 953-54; Pavolini et al., 2015, pp. 65-68). Similarly, between 2003 and 2005 Germany passed into law a set of reforms that came to be known as the Hartz reforms designed primarily to (i) enhance job matching efficiency, (ii) curtail reservation wages and (iii) reduce unemployment benefits whilst increasing work incentives (Adhikari et al., 2018, pp. 903-05; Burda & Hunt, 2011, pp. 22-24). However, such reforms did not alter the German system of wage determination and, albeit they certainly stimulated employment, their contribution was modest and significantly dependent on the decentralisation process that started a decade earlier in 1995 of which they were a continuation (Dustmann et al., 2014). Other changes in the labour markets of the two countries that occurred between 1995 and 2015 did not cause the two systems to significantly diverge: for instance, the short-time work schemes of Germany and Italy - the *Kurzarbeit* and *Cassa Integrazione Guadagni*, respectively - were both strengthened during the financial crisis of 2008 and their conditions of use were actually made more similar than they were

before the recession (Sacchi et al., 2011). Finally, retaining the years following the two crises may also be of interest for this study since a common argument in the literature (see Section 2) in support of wage setting decentralisation is that the resulting wage flexibility enhances responsiveness to shocks of an economy which could be detected in the empirical analysis.

My identification strategy is not faultless and most issues stem from data limitations. As a matter of fact, long time series about European regions are rare. East Germany, for instance, lacks comparable data about unemployment and other macroeconomic variables before reunification in 1990 which explains why eastern states were omitted from this analysis. In measuring unemployment in Germany, a potential problem arises from the data source because, whilst Italian data is retrieved from the National Institute of Statistics (ISTAT), long time series for German states could not be supplied by its German counterpart (Destatis) and were obtained from the Federal Employment Agency (BA) instead whose measurement of unemployment only considers workers subject to social security contributions (i.e. registered unemployed). Melis & Lüdeke (2006) outline how BA's data slightly overestimates unemployment in Germany if compared to Destatis measurement mostly because BA categorises as unemployed those who have an involuntary short or low paid part-time job whereas Destatis counts them as employed. Such overestimation is, however, not substantial and the authors observe how the ratio between the unemployment data produced by these two institutes is around 1.04. This dissertation could, without doubt, be improved if more data was available but informative results can nevertheless be obtained which could serve as the basis for further research and might motivate the collection of better data about European regions. In the next subsections, I outline the empirical analysis I conducted in R employing the Synth package in accordance with the instructions given in Abadie et al. (2011). In choosing what set of results and robustness tests to include in my study, I follow the original articles by Abadie & Gardeazabal (2003) and Abadie et al. (2010, 2015) as well as more recent articles, most notably Hope (2016).

4.2 Region selection

Deciding what regions to retain in my analysis primarily depends on how closely the synthetic counterfactual mirrors the outcome path of a given Italian region before 1995. As a matter of fact, as explained in Section 3, unemployment levels in the control and treated units must closely match before the treatment date in order to accurately implement the synthetic control method and derive an estimate of the causal effect of not decentralising wage bargaining. As a way to measure closeness of fit, I examine which synthetic counterfactual minimises the mean square prediction error (MSPE) the most in the pre-treatment period so that a lower values indicates a better fit. In Table 1, I report the values of MSPE obtained by carrying out the synthetic control method for all Italian

Table 1: Pre-treatment MSPEs between Italian regions and their synthetic counterfactuals. Author's calculations.

Northern regions	**MSPE**	**All other regions**	**MSPE**
Piedmont	0.83	Tuscany	2.04
Aosta Valley	1.89	Umbria	2.32
Lombardy	0.55	Marche	1.46
Liguria	2.50	Lazio	5.38
Northwest Italy	0.53	Abruzzo	3.33
		Molise	10.24
Veneto	0.90	Campania	42.36
Friuli-Venezia Giulia	0.26	Apulia	7.35
Trentino-South Tyrol	1.93	Basilicata	34.22
Emilia-Romagna	1.07	Calabria	54.03
Northeast Italy	0.54	Sicily	44.56
		Sardinia	38.24

Notes: As per ISTAT guidelines, Northeast Italy includes the regions of Veneto, Friuli-Venezia Giulia, Trentino-South Tyrol and Emilia-Romagna while Northwest Italy includes the regions of Piedmont, Aosta Valley, Lombardy and Liguria.

regions and two macroregions: Northeast Italy and Northwest Italy. Following Billmeier & Nannicini (2013) and Hope (2016), all those regions whose MSPE is not sufficiently low should not be retained in the analysis. Table 1 clearly displays how the donor pool of western German states only accurately approximates the pre-1995 unemployment trend in northern Italian regions. As discussed in Section 2 and in light of the lack of data concerning lower-income eastern German states indicated earlier in this section, this result is expected. Western German states, even in the most apt arrangement determined by the synthetic control algorithm, differ too much from southern Italian regions in terms of macroeconomic determinants of unemployment which results in a poor fit. Table 1 also illustrates how all northern regions have a relatively good fit and, in particular, the two macroregions appear to have some of the lowest MSPE in the sample. Italian regions, in fact, tend to be smaller than their German counterparts in terms of population as well as income levels so that a combination of multiple Italian regions may be better suited for a comparison with a synthetic counterfactual consisting of mostly large western German states. Thus, I retain in my analysis only the two macroregions of Northeast Italy and Northwest Italy.

4.3 The synthetic control units

Table 2 depicts the weights, in percentage value, assigned to German states by the SCM algorithm while constructing the synthetic Northwest and Northeast Italy. Whilst the former is a convex combination of all German states except for Hesse, the latter has a much less diverse mixture of control units but both synthetic units share Bavaria as the most significant state in the donor pool. This result is not surprising since Northwest and Northeast Italy as well as Bavaria are amongst the richest and most industrialised regions of their respective countries and this economic affinity justifies the large weight given to Bavaria.

Control unit	Weight	
	Synthetic NW Italy	**Synthetic NE Italy**
Baden-Württemberg	3%	0
Bavaria	72%	92%
Bremen	2%	0
Hamburg	4%	0
Hesse	0	0
Lower Saxony	3%	0
North Rhine-Westphalia	2%	0
Rhineland-Palatinate	3%	0
Saarland	7%	8%
Schleswig-Holstein	3%	0

Table 2: Weights of German states in synthetic Northwest Italy and Northeast Italy. Author's calculations.

Tables 3 and 4 show the values of the determinants of unemployment in the pre-treatment period in Northeast Italy and Northwest Italy and their synthetic control units as well as the average of the entire donor pool. The synthetic counterfactuals seems to more closely resemble the regions of interest, as opposed to the entirety of the donor pool, particularly with regard to unemployment rate,

Variable	Mean		
	NE Italy	**Synthetic NE Italy**	**Donor pool**
GDP growth	3.1%	3%	2.4%
GVA growth	3.2%	3%	2.4%
GDPPC growth	2.9%	2.5%	2.1%
GVAPC growth	3%	2.5%	2.1%
Population growth	0.2%	0.5%	0.2%
Unemployment rate	6.3%	6.2%	8%

Table 3: Mean values of unemployment determinants before 1995 in Northeast Italy. Author's calculations.

Variable	Mean		
	NW Italy	**Synthetic NW Italy**	**Donor pool**
GDP growth	2.5%	2.8%	2.4%
GVA growth	2.3%	2.8%	2.4%
GDPPC growth	2.4%	2.4%	2.1%
GVAPC growth	2.3%	2.4%	2.1%
Population growth	0.06%	0.4%	0.2%
Unemployment rate	6.6%	6.6%	8%

Table 4: Mean values of unemployment determinants before 1995 in Northwest Italy. Author's calculations.

GDP per capita growth and GVA per capita growth since those are the variables that are found to be the best predictors of unemployment and thus obtain a higher weight.

4.4 Empirical results

Figures 4 and 5 reproduce the trends in unemployment rates in Northwest Italy and Northeast Italy compared with those of their synthetic control units throughout the whole period analysed in this dissertation from 1977 to 2015 where the dotted vertical line marks the treatment date, 1995, when Germany began decentralising its collective wage bargaining system. It is evident from these graphs that unemployment levels follow very similar trends in the regions of interest and their synthetic counterfactuals before diverging around 1995. This noticeably good fit until the treatment date confirms the main assumption of this model - that is, this convex combination of control units closely resembles the regions of interest in terms of the outcome variable in the pre-treatment period - but also fails to uphold the hypothesis made in Section 3. The synthetic control method, in fact, establishes that, were labour market reforms undertaken in Italy to decentralise wage bargaining, unemployment would have been higher than it actually was for approximately a decade before beginning its de-

scent around 2005. Therefore, albeit these results indicate that decentralisation presumably caused the divergence in unemployment rates, the direction of such impact is, however, unanticipated given the literature outlined in Section 2.

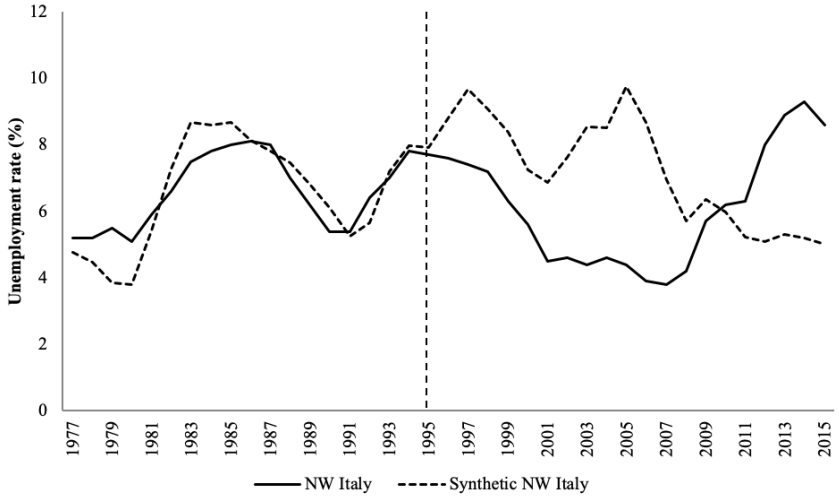


Figure 4: Unemployment rates in Northwest Italy and its synthetic counterfactual, 1977-2015. Author's calculations.

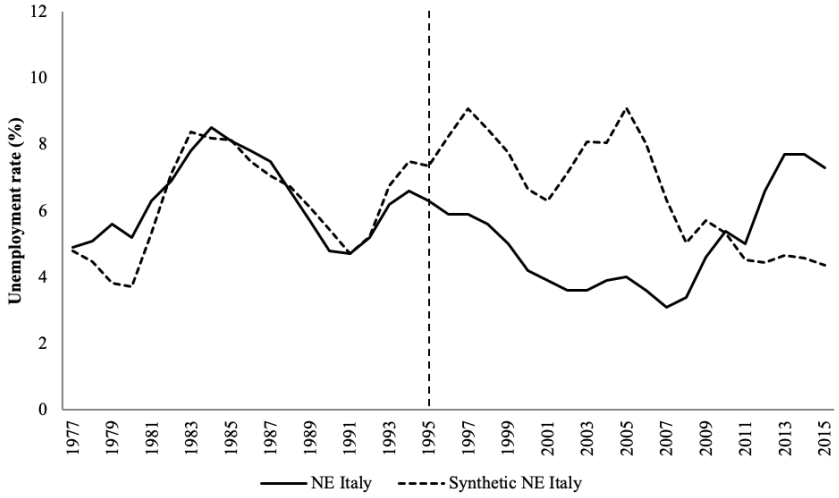


Figure 5: Unemployment rates in Northeast Italy and its synthetic counterfactual, 1977-2015. Author's calculations.

The unemployment rate gaps between the two Italian macroregions and their synthetic control units in the period following 1995 determines the causal effect

of the decentralising wage bargaining whose average value is reported in Table 5. On average, the treatment has a negative impact meaning that unemployment rates in Northwest (Northeast) Italy would have been approximately 1.1 (1.6) percentage points higher over the period between 1977 and 2015, had Italy reformed its collective bargaining system in an organised decentralised fashion in 1995. Figure 6 plots the unemployment rate gaps over the whole period of interest for both Northwest and Northeast Italy and illustrates how the gap is close to 0 in the years preceding 1995 before becoming negative and then, after 2011, positive reasonably as a result of the different response of the German and Italian economies to the Great Recession and the European Debt Crisis.

Mean		
	NW Italy	**NE Italy**
Pre-1995	0 pp	0.1 pp
Post-1995	-1.1 pp	-1.6 pp

Table 5: Average unemployment rate gaps between Northwest Italy and Northeast Italy and their synthetic counterfactuals in the pre- and post-treatment periods. Author's calculations.

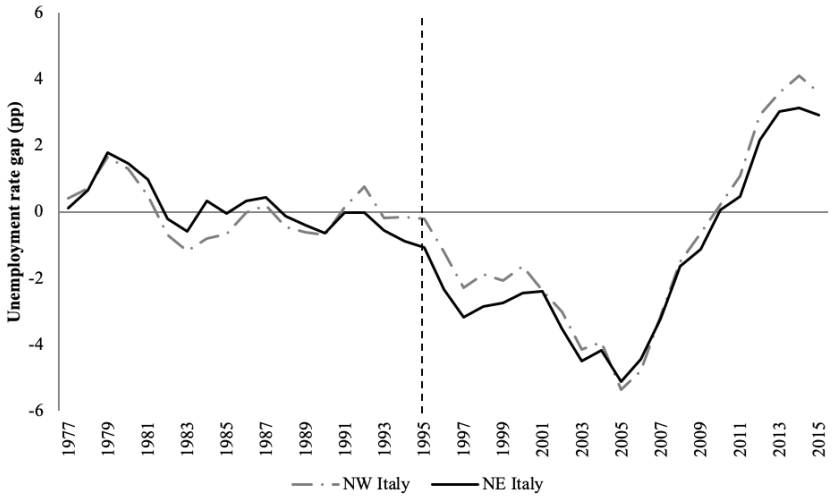


Figure 6: Unemployment rate gaps between Northwest Italy and Northeast Italy and their synthetic counterfactuals, 1977-2015. Author's calculations.

4.5 Robustness and placebo tests

In order to enhance the credibility of my findings and more accurately determine whether decentralisation of wage bargaining had a causal effect on unemployment, I now perform two additional tests. First, Figure 7 depicts an in-time placebo test where I rerun the synthetic analysis reassigning the treatment date to a year within the pre-treatment period when no treatment actually occurred. Specifically, I choose the middle year in the 18 year-long pre-treatment period from 1977 to 1995 - that is, 1986. For the placebo test to be successful, the unemployment rate gaps should be close to 0 both before and after the placebo treatment date of 1986 since no labour market reform was implemented in that year (i.e. there was no treatment).

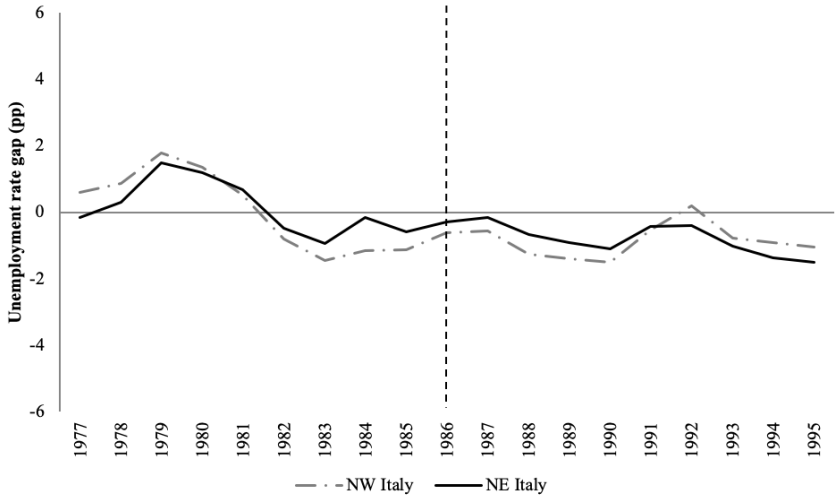


Figure 7: In-time placebo test: unemployment rate gaps between Northwest Italy and Northeast Italy and their synthetic counterfactuals, 1977-1995. Author's calculations.

As a matter of fact, that is the case which confirms that the divergence in unemployment rates observable after 1995 between Northwest Italy and Northeast Italy and their synthetic control units can be ascribed to the labour market reforms that Germany enacted that year. Most importantly, this result also upholds a significant assumption of the model that must be satisfied for it to

generate causal estimates: the treatment must have no effect before it occurs.

In Figure 8 I carry out a leave-one-out robustness test where I rerun the synthetic analysis leaving the state of Bavaria out of the donor pool of potential control units. In fact, Table 2 showed how Bavaria - one of the largest German states in terms of population and GDP - dominates the table of weights assigned to potential control units accounting for 72% and 92% of the synthetic counterfactuals of both Northwest and Northeast Italy, respectively. Thus, Figure 8 illustrates the unemployment rate gaps between Northwest Italy and Northeast Italy and their synthetic counterparts both when the donor pool includes Bavaria (solid lines) and when it does not (dotted lined). It is clear that, in both cases, the unemployment rate gaps follow similar trends which proves that the results are not driven by one state only and are robust to the exclusion of the most relevant donor unit.

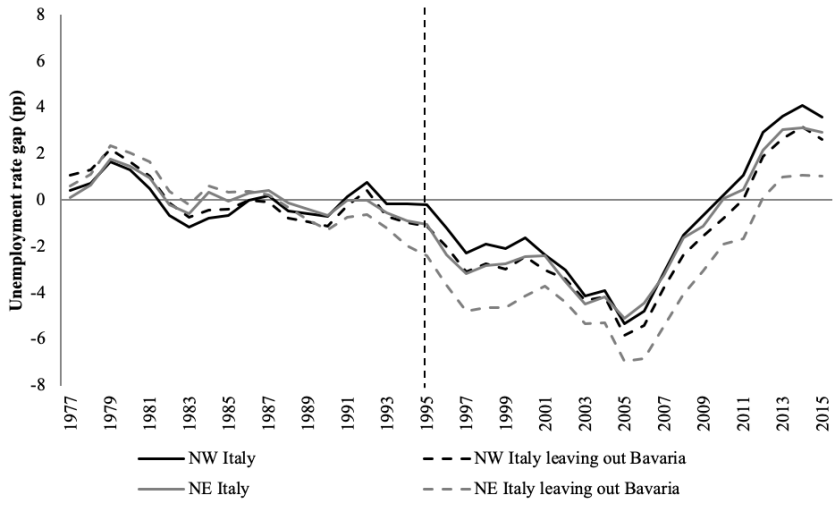


Figure 8: Leave-one-out robustness test: unemployment rate gaps between Northwest Italy and Northeast Italy and their synthetic counterfactuals, 1977-2015. Author's calculations.

5. Discussion

The previous section showed how decentralising the system of wage determination in Italy would have had a significant impact on unemployment. The direction of such effect was, however, not consistent with the evidence from the academic literature outlined in Section 2 and the hypothesis laid out in Section 3 since the empirical results revealed that, had Italy undertaken a decentralisation effort in 1995, both Northwest and Northeast Italy would have experienced a higher unemployment level by around one percentage point on average between 1995 and 2015. The synthetic control method cannot specifically determine the channels through which institutional changes impact on unemployment so that the following discussion aims to go beyond the causal estimate that was found to exist in the previous section in an attempt to determine what can justify these results as well as motivate further research on the matter.

The Literature Review indicated how the arguments in support of decentralised yet coordinated systems of collective bargaining mostly revolve around its ability to promote (i) wage flexibility and (ii) wage moderation which, in turn, enhance the shock-absorption capacity and support competitiveness of an economy, respectively (Boeri, 2014; Dustmann et al., 2014; Kangur, 2018; Ronchi & Di Mauro, 2017). The former channel is probably what is observable in Figure 4 and 5 where, following the Great Recession in 2008, the synthetic counterfactual indicates that both Northwest and Northeast Italy would have seen their unemployment rates falling instead of surging if reforms were enacted in 1995. Germany was, in fact, one of the few countries in Europe whose unemployment levels did not rise as a consequence of the financial crisis and

this has been attributed to the decentralisation of collective bargaining started in 1995 which contributed to raising German productivity and competitiveness ultimately allowing the economy to react flexibly when faced to a recession (Dustmann et al., 2014). Therefore, since it may be long before the effect of labour market reforms is felt in the economy (see Turrini et al., 2014), it is plausible to speculate that the decentralisation process impacted on unemployment in Germany with a lag. As a matter of fact, opening clauses were not immediately used extensively throughout the country and it was not until 2011, 16 years after their introduction, that approximately a majority of all workers in West Germany were employed in companies which applied opening clauses for wage adjustments (Boeri et al., 2019, p. 37). Correspondingly, excessively generous collectively agreed wages and high non-wage labour costs in the late 1980s and 90s were primarily responsible for high unemployment in Germany in the 2000s which may help interpreting the trends observed in the synthetic counterfactuals of Figures 4 and 5 (Schnabel, 1999, pp. 7-8). As a consequence, the initial surge in unemployment after 1995 discernible in those figures may be the lagged result of high wages and labour costs in Germany in the preceding decades whereas the subsequent fall may be the lagged outcome of the decentralisation process started in 1995 which, nonetheless, was naturally compounded with posterior policies like the Hartz reforms that are likely to have contributed, to a lesser extent, to the steep decline in unemployment following the Great Recession (Krebs & Scheffel, 2013; Schnabel, 1999).

However, it must be acknowledged that the benefits of decentralisation in terms of unemployment are not universal and the applicability of any reform depends on countries' labour markets. Despite the possible explanation outlined above, it is plausible that decentralisation would have not been as advantageous for the Italian labour market as it was for the German one. Given the expected lags associated with institutional changes, the years following 2015 may hold the key to understanding whether the declining trend in unemployment is set to continue for long enough to compensate for the initial surge.

6. Conclusions

This dissertation sought to estimate the magnitude and direction of the impact on unemployment that decentralisation of collective bargaining would have had in Italy if it was carried out in 1995 by means of the data-driven and transparent approach of the synthetic control method. In contrast to evidence from the academic literature, this study established that, had Italy reformed its system of wage determination in an organised decentralised fashion in 1995, Northwest and Northeast Italy would have shown a 1.1 and 1.6 percentage point increase on average in unemployment rates, respectively. Nonetheless, some caution is needed when evaluating these results since the expected lag associated with labour market reforms is likely to have delayed the effect of wage setting decentralisation.

The contribution made by this dissertation is innovative because it employs the novel synthetic control method to conduct a regional analysis using an original dataset about Italian regions and German states in the 38 years between 1977 and 2015. Such approach permits to focus my study on a single decentralisation process, the one undertaken by Germany in 1995, which allows for more consistent results than cross-country investigations, where multiple labour market reforms are classified within broad categories, while retaining a macroeconomic approach. However, this also hampers the external validity of my study since the results are not necessarily relevant for other labour market reforms given that the degree of decentralisation as well as coordination is what defines the impact of any reform. A potential issue of this analysis concerns spillovers

which could bias the estimated causal effect found in Section 4 if the economic performance of German states following the decentralisation process impacts on the Italian economy. Being the two economies closely intertwined, such effect is likely to have occurred but it is beyond the scope of this dissertation to determine its magnitude or direction. Furthermore, albeit this study quantifies possible gains or losses from decentralisation of collective bargaining in terms of unemployment, it is important to note that the effect of labour market reforms extends beyond unemployment and covers other aspects of the economy such as wage inequality which, for instance, has been found to be steadily rising in Germany since the 1990s (Antonczyk et al., 2018).

Overall, this dissertation should be seen as small yet innovative contribution to our understanding of how systems of wage determination influence aggregate macroeconomic outcomes like unemployment and it should motivate policymakers to be more sceptical of decentralisation as a sort of panacea for unsatisfactory labour market performance, as it was the case following the Great Recession (see Turrini et al., 2014), since collective bargaining reforms are significantly dependent on the labour market on which they are implemented. As already mentioned, this dissertation would have certainly been improved if better and longer time series about European regions were available. Future research on the matter should also aim to more accurately determine the effect that wage bargaining regimes have on less developed regions within a country particularly with regard to highly centralised systems. Less developed southern Italian regions were excluded from this study because of a lack of fit as a consequence of the donor pool consisting solely of richer western German states but it is reasonable to assume that, were data about less developed eastern German states available, these regions could have been retained in the synthetic analysis.

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