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# **An Impact Evaluation of the Effects of Income Support Benefits on Aggregate Labour Supply**

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## **Abstract**

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This paper assesses the impact of the Agrarian Unemployment Benefit (AUB), a regionally targeted income support scheme introduced in Andalucía, Spain, in 1984. At its peak, the program covered more than 10% of the regional labour force, making it one of the most extensive welfare measures of its kind in Europe. Unlike most previous studies, which focus on micro-level effects of unemployment benefits, this research adopts a macroeconomic perspective to evaluate whether the AUB encouraged or discouraged labour force participation at the extensive margin. The analysis combines a theoretical model of labour supply decisions with the Synthetic Control Method (SCM), which provides a robust counterfactual based on regional data from 1980 to 1996. The results show that the AUB increased Andalucía's participation rate by about two percentage points in the years following its introduction. Nonetheless, the number of newly activated workers remained below the total number of beneficiaries, pointing to only partial compensation of disincentive effects. The study contributes by offering a macro-level evaluation of an income support program, developing a framework that clarifies incentive mechanisms, and applying SCM in this context for the first time. The findings yield relevant lessons for the design of modern welfare schemes and for current debates on place-based policies.

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**Keywords:** Labour supply, Labour force participation, Income support benefits, Synthetic Control Method.

**JEL codes:** J21, J65, H24, K31, C32, C54.

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## 1. Introduction

Rising inequality in developed countries over recent decades has prompted governments to adopt legislation aimed at supporting low-income earners (Meyers et al., 2001; Bucci & Jansa, 2021). Among the policies designed to improve their living conditions, two stand out: the so-called Minimum Income Scheme (MIS) and a set of special unemployment benefits (SUB). These types of policies are often linked to specific behaviours concerning labour supply. For example, actively searching for a job is sometimes a requirement to be eligible for the allowance. Therefore, conditionality (on job-seeking) becomes a crucial feature of these public programs. It is commonly assumed that opportunistic behaviour could become an issue if monitoring by public agencies is not very effective.

At the same time, there is growing concern about regional imbalances, with prosperous regions coexisting alongside lagging territories within the same country. This situation often prompts central governments to transfer substantial financial resources to less-developed areas in an effort to reduce such disparities. These transfers are typically channelled through pensions, education, national health care, and unemployment protection systems, funded primarily by taxes collected at the national level. The Italian *Mezzogiorno*, East Germany, and the southern Spanish region of Andalucía are well-documented examples of heavily subsidized territories (Boltho et al., 1997; Sinn & Westermann, 2001; Jofre-Monseny, 2014). Some of these social programs, such as more generous SUB in specific areas, may in turn influence the labour supply behaviour of residents in the targeted regions.

The aim of this paper is to examine the effects of one such SUB, the Agrarian Unemployment Benefit (AUB), on aggregate labour supply at the extensive margin. The AUB was designed to support unemployed workers in the agricultural sector, but it applied exclusively to two Spanish regions: Andalucía and Extremadura. We exploit the fact that the AUB was not implemented nationwide to develop a quasi-experimental design, constructing a counterfactual version of Andalucía and comparing it with the actual region<sup>1</sup>.

The significance of this programme is substantial given the large number of people involved. At its peak, the number of beneficiaries exceeded 10% of the total labour force (not just the agrarian workforce). Notably, in 1990, almost 16% of the female labour force received this allowance. For comparison, Spain's current flagship social programme, the Minimum Income Scheme (MIS), covered only 2.4% of the labour

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<sup>1</sup> For a sense of scale, Andalucía's population ( $\approx 8.66$  million in 2025) exceeds that of several European countries, including Bulgaria, Denmark, Finland, Slovakia, Ireland, Croatia, and all Baltic states. This makes it a region whose economic dynamics are comparable in magnitude to those of sovereign states.

force in 2024. These figures, often overlooked, underscore the importance of analysing this policy. Moreover, given the size of the population affected, a macroeconomic perspective is warranted to account for potential spillover effects on the broader economy. In particular, the sizeable transfers within Andalusian society associated with the AUB can be viewed as a form of expansionary fiscal policy, with possible impacts extending beyond the direct recipients.

We address two closely related research questions. First, we examine whether substantial income support programmes such as the AUB have an encouraging or discouraging effect on labour supply at the macroeconomic level. Specifically, we analyse whether the labour force participation rate increases or decreases following the introduction of this programme. Second, conditional on finding a positive effect, we investigate whether the number of “new active workers” exceeds the number of benefit recipients. If this is the case, we can infer the existence of spillover effects, whereby the policy stimulates additional participation beyond its direct beneficiaries. Conversely, if the number of recipients surpasses the increase in active workers, this would point to potential discouraging effects on labour supply.

Our methodological approach is twofold. First, we develop a theoretical model of labour supply decisions, following the framework of [Martín-Román et al. \(2020\)](#) and [Martín-Román \(2022\)](#), but adapted to address the specific questions of this study. This model enables us to identify the incentives and disincentives generated by the AUB in shaping individuals’ labour supply choices, as well as to distinguish the main channels through which these effects operate. Importantly, it also allows us to differentiate between microeconomic mechanisms and broader macroeconomic forces affecting the working-age population. Second, we test two hypotheses derived directly from our research questions using the Synthetic Control Method (SCM). This approach is particularly well suited to our objective, as it focuses on aggregate labour force participation rates and captures both micro- and macro-level effects. By adopting this macroeconomic perspective, we move beyond a purely microeconomic analysis to account for the wider spillover impacts of the policy.

Regarding the results, our analysis shows that the implementation of the AUB led to an increase of approximately two percentage points in Andalucía’s labour force participation rate during the years immediately following the law’s enactment. This is a noteworthy outcome, as income support programs are often assumed to discourage active job search and reduce participation rates.

However, when we assess whether this increase in the labour force exceeds the total number of AUB beneficiaries, the evidence points to a negative result. While the program did generate a positive number of “activated” individuals, this figure was smaller than the total number

of recipients. In other words, the labour-enhancing effects of the AUB only partially offset the discouraging effects created by such income support schemes.

This paper makes three main contributions to the literature. First, it introduces a macroeconomic perspective to the study of income support programs and their effects on labour supply, whereas most previous research has relied mainly on microeconomic approaches. This broader lens is particularly relevant in the case of the AUB, as even non-beneficiaries may be indirectly affected by the program. Second, it identifies and examines the theoretical channels through which the AUB could either encourage or discourage labour supply. This framework provides a clear basis for formulating the two hypotheses tested in the empirical analysis. Third, it applies the SCM technique to this topic for the first time, to the best of our knowledge. This approach not only offers a robust counterfactual for assessing policy impact but also allows us to determine whether spillover effects are sufficient to offset the discouraging mechanisms, something that a purely microeconomic framework cannot capture.

The remainder of the paper is structured as follows. Section 2 describes the AUB and its main institutional features. Section 3 provides the economic background necessary to contextualize the policy. Section 4 develops the theoretical framework used to analyse the AUB's potential effects on labour supply, while Section 5 states the hypotheses derived from this framework. Section 6 explains the empirical strategy, based on the SCM, and Section 7 details the database employed. Section 8 presents the main results of the analysis. Finally, Section 9 offers the conclusions and discusses the broader implications of the findings.

## **2. The AUB**

### **2.1. Overall Framework**

The public intervention analysed in this paper is the AUB. Also known as the “*subsidio agrario*”, the AUB has been available exclusively to residents of the Spanish regions of Andalucía and Extremadura since 1984.<sup>2</sup> This benefit is one of the three pillars of a broader national policy, the Integrated Protection System for Seasonal Agricultural Workers (SIPTEA, in Spanish), which aims to protect temporary agricultural workers in these regions. The other two pillars of the system are the “*Planes de Formación Ocupacional*” (PFO) and the “*Plan de Empleo Rural*” (PER).

The main purpose of the PFO was to enhance the skills and professional integration of unemployed youth aged 16 to 25. Training was provided

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<sup>2</sup> In this article, we focus solely on the region of Andalucía. The main reason is its demographic significance. Andalucía is the most populous region in Spain and has more than eight times the population of Extremadura.

within the framework of the so-called “*Plan Específico de Formación Ocupacional Rural*”. As for the PER, it is important to note that it was primarily structured through agreements between the former “*Instituto Nacional de Empleo*” (INEM) and the town halls of the two aforementioned regions. Its goal was to enable temporary agricultural workers registered in the (former) Special Agricultural Scheme (REASS) to participate, through formal employment contracts, in the execution of municipal infrastructure projects. Workers could count the days worked on these projects toward meeting the minimum workday requirements needed to qualify for the AUB. Beyond merely providing employment, the PER’s main objective was to help workers meet the eligibility criteria for the AUB.

Finally, the third pillar of SIPTEA, the AUB, is the measure evaluated in this paper. It is a benefit available to temporary agricultural workers registered in the REASS census. This subsidy is a welfare benefit under the Social Security system, specifically regulated by the REASS. This special Social Security allowance was established by Royal Decree 3237/1983 on December 28 and came into effect on January 1, 1984.

## **2.2. Institutional Features**

To be eligible as a beneficiary of the AUB under the general modality,<sup>3</sup> the following conditions must be met: (1) Be unemployed; (2) Be a temporary worker employed by someone else, be registered in the REASS census and be affiliated with a Social Security scheme or an equivalent system; (3) Reside in a locality in Andalucía or Extremadura; (4) Be at least 16 years old and not have reached the minimum age for obtaining a retirement pension; (5) Have no individual or family income of any kind that exceeds the legally established maximums, both at the time of application and during the receipt of the subsidy; (6) Have contributed a minimum of 60 days to the REASS.<sup>4</sup>

In the general case, each contributed workday within the REASS allowed the worker to increase 1.5 days of subsidy entitlement (e.g., 90 contributed workdays granted the worker 135 days of subsidy). Also, the subsidy had a maximum duration of 180 days within a twelve-month period. Finally, its monetary amount was set at 75% of the statutory minimum wage in force at any given time. **TABLE 1** summarizes the key statistics regarding the AUB following its implementation in 1984.

[INSERT [\*\*TABLE 1\*\*](#)]

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<sup>3</sup> There is a special type of subsidy for temporary agricultural workers over the age of 52, whose main difference from the general case is the extended duration of the benefit.

<sup>4</sup> This is the original requirement. Subsequent regulatory reforms have modified this threshold.

To assess the generosity of the AUB, **TABLE 2** compares it with the general unemployment insurance regulations in Spain from 1984 to 1996, which serves as the reference period for our empirical analysis. During these years, two laws governed general unemployment benefits: Law 31/1984 and Law 22/1992. Our focus is on two key dimensions: (1) the minimum number of workdays required to qualify for benefits and (2) the entitlement ratio, defined as the number of subsidy days granted per contributed workday.

[INSERT [TABLE 2](#)]

**TABLE 2** highlights significant differences in workday requirements and entitlement ratios between the AUB and the general unemployment insurance regulations in Spain. The AUB (Royal Decree 3237/1983) stands out as the most generous scheme, requiring only 60 workdays (2 months) to qualify, while offering an entitlement ratio of 1.5. In contrast, the general unemployment insurance regulations under Law 31/1984 and Law 22/1992 imposed stricter eligibility conditions and provided lower benefits. Law 31/1984 required 180 workdays (6 months) to qualify, with an entitlement ratio of 0.5, while Law 22/1992 further increased the requirement to 360 workdays (12 months) and reduced the entitlement ratio to 0.33. These figures suggest that the AUB was designed to provide more accessible and generous support compared to the general system. The lower workday requirement and higher entitlement ratio likely aimed to protect temporary and seasonal workers.

Finally, it is worth noting that the AUB covered the workers' contributions to the REASS during the period the subsidy was received. Furthermore, Article 6 of the aforementioned Royal Decree established the following incompatibilities with unemployment benefits: (1) Engaging in paid work, whether self-employed or employed by others; (2) Receiving periodic Social Security benefits, except for family protection; (3) Receiving any other form of unemployment benefit; (4) Earning any income exceeding the MIS, excluding the proportional part of extraordinary payments.

### **2.3. Evolution in the Number of Beneficiaries**

A key aspect in understanding the significant social impact of this public allowance is to analyse the evolution of the number of beneficiaries. **TABLE 3** presents this evolution from 1984 to 1996 (our reference period) for Andalucía, with a breakdown by sex. **FIGURE 1** graphically represents the information in **TABLE 3**.

[INSERT [TABLE 3](#)]

The total number of beneficiaries increased significantly between 1984 and 1990, peaking at 257,658 in 1990. However, from 1991 onward, there was a steady decline, reaching 167,397 by 1996. A striking trend



is the increasing participation of women in the program. In 1984, women accounted for only 16,624 beneficiaries (10.6%), whereas by 1990, their number had surged to 124,887, surpassing men for the first time. This trend continued, with women consistently outnumbering men from 1991 onwards, reaching 91,032 beneficiaries (54.4%) in 1996. In contrast, the number of male beneficiaries declined sharply after 1988. While they represented the vast majority in the early years (nearly 90% in 1984), their numbers dropped steadily, falling from 159,731 in 1988 to 76,365 in 1996.

**FIGURE 1** also shows that while the number of male AUB beneficiaries in Andalucía decreased by approximately 45% between 1984 and 1996, the number of female beneficiaries increased more than fivefold. This remarkable shift can be attributed to the institutional design of the AUB. Notably, the AUB approval created an individual right rather than a family-based benefit, allowing multiple members of the same household to qualify for assistance. These changes led to both a rise in program participation and an expansion in the number of recipients. Additionally, the reform promoted greater social diversification among beneficiaries, with women playing an increasingly prominent role.

[INSERT [FIGURE 1](#)]

**FIGURE 2** shows the evolution of beneficiaries as a percentage of the labour force, also disaggregated by gender. The total ratio increased from 7.4% in 1984 to a peak of 10.3% in 1989–1990, indicating a growing significance of the AUB during the late 1980s. After 1990, the ratio declined steadily. In the early years, men had a higher ratio of beneficiaries to the labour force than women (e.g., 8.8% vs. 3.2% in 1984). However, by 1988, women surpassed men in this ratio (10.6% vs. 9.4%), and the gap widened in the following years. The female ratio peaked at 15.4% in 1990, more than double the male ratio of 7.7%, highlighting a major shift in the program’s demographic composition. The female ratio remained relatively high throughout the period, even as the overall rate declined. In 1996, it was still at 8.9%, more than twice the male ratio.

[INSERT [FIGURE 2](#)]

The figure of more than 15% of female jobseekers involved in the AUB insurance scheme in 1990 should be considered truly impressive. Almost one in six women in the labour force were beneficiaries of the AUB. This positions this public allowance as one of the most, if not the most, intensive income support programs in Spain in terms of beneficiaries. For this reason alone, it already warrants further study.<sup>5</sup>

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<sup>5</sup> For comparison, the number of active subsidies in the MIS, perhaps the flagship social policy today, stood at 590,000 in April 2024, representing 2.4% of the labour force in Spain in the second quarter of 2024.



It is also worth noting that the significant shift in the gender composition of recipients did not correspond to changes in the actual agricultural workforce in Andalucía. According to the *Encuesta de Población Activa* (Spanish Labour Force Survey), the male-to-female ratio among agricultural workers in these regions remained around one-seventh in both 1984 and 1991 (Jofre-Monseny, 2014).

Another point of interest is the evidence suggesting that, during the period under study, a significant portion of AUB recipients were not genuinely agricultural workers. An ethically questionable practice involved allocating workdays ("peonadas") to relatives to maximize household-level unemployment benefits (Cansino, 2000).

Finally, **FIGURE A1-1**<sup>6</sup>, included for clarification purposes, depicts the distribution of beneficiaries across Andalucía's eight provinces. To do this, we use four choropleth maps: for 1984, 1988, 1992, and 1996. In absolute terms, Seville consistently records the highest counts, whereas Almería and Huelva exhibit the lowest.

[INSERT [FIGURE A1-1](#)]

## 2.4. Why Study the AUB Today?

An important question that arises is why we should analyse a policy from 40 years ago today. The answer lies in its potential long-lasting implications for current macroeconomic figures. Perhaps the most evident of these is population evolution. There is no doubt that a dynamic labour market helps retain inhabitants within a region, preventing population loss and fostering growth. To test this assumption, an informal but suggestive analysis was conducted.

**FIGURE 3** shows the evolution of the population over 16 years old in Castilla y León from 1976 to 2024, based on data from the Spanish Labour Force Survey. Castilla y León is a landlocked region in Spain and one of the most representative examples of the so-called *Depopulated Spain*, referring to regions that have experienced poor population growth in recent decades. At the same time, the figure also presents the evolution of what we have termed *Inland Andalucía*, which consists of the combined population of the three landlocked provinces in Andalucía: Sevilla, Córdoba, and Jaén.

[INSERT [FIGURE 3](#)]

Surprisingly, the number of inhabitants in these two geographical areas was almost identical in 1976, just over 1.8 million people, and remained similar throughout the early 1980s.<sup>7</sup> However, around 1984, the cut-

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<sup>6</sup> See **APPENDIX 1**.

<sup>7</sup> For example, in 1977.Q4, the population over 16 years old was 1,866,100 in Castilla y León and 1,866,500 in *Inland Andalucía*.

off point in our empirical analysis, a gap between the two time series began to emerge. By the end of the period (i.e., in 2024), *Inland Andalucía* had approximately 2.8 million people over 16 years old, whereas Castilla y León had just over 2.0 million. The difference amounts to roughly three-quarters of a million, an astonishing gap. Although this article does not focus on demographic patterns, this evidence strongly suggests that the AUB may have had (and potentially still has) significant effects on the labour market, which in turn could have influenced demographic trends in Spain.

To summarize, we argue that analysing the effects of the AUB from today's perspective is relevant for three key reasons: (1) the large number of people involved in the program (almost 1 in 6 female jobseekers in 1990), (2) its potential long-term impact on macroeconomic indicators, and (3) the scarcity of impact evaluation studies on this policy; to the best of our knowledge, only the paper by [Jofre-Monseny \(2014\)](#) has addressed it.

### **3. Background**

#### **3.1. AUB as a Unique Form of Income Support**

In recent decades, modern income-support policies have evolved substantially, pursuing objectives that extend beyond the mere reduction of poverty or compensation for income losses. These policies now also aim to stabilize aggregate demand during economic downturns and to strengthen social cohesion, functions that have gained particular prominence in the wake of two major global shocks: the 2008 financial crisis and the COVID-19 pandemic ([Barr, 2020](#); [Espinoza et al., 2021](#); [OECD, 2021](#)). In this new context, cash transfer programs are understood not only as instruments of individual protection, but also as key tools for sustaining macroeconomic stability and collective solidarity.

Nevertheless, despite this broadened scope, economic theory has consistently articulated a central concern: the possibility that such assistance distorts labour-supply decisions. Specifically, there is apprehension that, by providing income without an associated work requirement, these programs may weaken incentives to accept available jobs, particularly when such jobs are precarious or poorly paid ([Katz & Meyer, 1990](#); [Moffitt, 1985](#); [Mortensen, 1977](#)). This tension between social protection and the encouragement of labour-force participation remains a core axis of debate regarding the effectiveness and optimal design of welfare policies.

#### **3.2. Do Income Support Benefits Incentivize or Disincentivize Labour Supply?**

The effect of income support programs, particularly unemployment allowances, on labour supply decisions has been investigated in depth.

Thus, recent empirical research has emphasised the causal relationship between the generosity of unemployment benefits and unemployment duration using quasi-experimental methods. For instance, [Card & Levine \(2000\)](#) pioneered this approach in the U.S., while European studies have significantly expanded this literature. In the Nordic countries, [Carling et al. \(2001\)](#), [Røed & Zhang \(2003\)](#), and [Uusitalo & Verho \(2010\)](#) provide robust evidence of increased unemployment duration due to longer benefit periods. Central and Western Europe have served as effective testing grounds. Studies by [Van Ours & Vodopivec \(2006\)](#), [Lalive \(2007, 2008\)](#), and [Schmieder et al. \(2012\)](#) find that extending benefit duration lengthens unemployment spells by roughly 20% of the extension. [Caliendo et al. \(2013\)](#), using a discontinuity in benefit duration at age 45 in Germany, observe a sharp increase in re-employment probability near benefit exhaustion. Similarly, [Le Barbanchon \(2016\)](#) shows that extending benefits from 7 to 15 months in France significantly delayed re-employment.

In Spain, [Bover et al. \(2002\)](#) exploited a 1984 reform, finding that workers without benefits exited unemployment at twice the rate of those with benefits. More recently, [Rebollo-Sanz & García-Pérez \(2015\)](#) used timing-of-events models to show that benefit recipients were 10–20 percentage points less likely to find a job. [Rebollo-Sanz & Rodríguez-Planas \(2020\)](#) found that reducing the replacement rate by 10 percentage points increased re-employment probability by at least 41%, underscoring the strong disincentive effect of generous benefits.

Overall, recent studies confirm that both the level and duration of benefits significantly affect unemployment dynamics. Later work, however, nuances this concern by distinguishing between moral hazard and liquidity effects in unemployment insurance, showing that liquidity constraints may dominate in shaping behaviour ([Chetty, 2008](#)). Thus, growing empirical evidence challenges this disincentive narrative. When complemented by activation strategies, conditional transfers, and job search incentives, income support schemes can foster labour force engagement ([Caliendo & Künn, 2011](#); [Card et al., 2007](#); [Fredriksson & Holmlund, 2006](#); [Hoynes & Rothstein, 2019](#); [Marinescu & Skandalis, 2021](#); [Schmieder & Von Wachter, 2016](#)). A foundational review of the econometric methods used to evaluate Active Labour Market Programs (ALMP), and their heterogeneous effects is provided by [Heckman et al. \(1999\)](#).

### **3.3. A Macroeconomic Evaluation of Income Support Programs**

Recent literature has been overwhelmingly dominated by a microeconomic perspective. This approach allows researchers to design detailed quasi-experimental setups and obtain precise causal estimates for the targeted population. However, the micro perspective limits the ability to account for spillover effects on the broader population, an important consideration when a policy affects a large number of individuals within an economy, as in the case of the AUB.

In the Spanish context, macro-level evaluations of labour policy remain limited but are increasingly necessary (Arranz et al., 2013). To assess the macro-level labour effects of the AUB, we apply the Synthetic Control Method (SCM), a counterfactual-based approach well-suited for single-unit policy evaluations (Abadie et al., 2010; Abadie, 2021). SCM has gained traction in the evaluation of region-specific welfare policies where experimental designs are infeasible (Billmeier & Nannicini, 2013; Bohn et al., 2014; Kaul et al., 2021). Applications of this method are becoming increasingly common in the assessment of geographically targeted labour and welfare interventions, particularly when appropriate control groups must be constructed from observational data.

Evaluating the AUB's impact from a macroeconomic perspective is essential for several reasons. First, understanding its aggregate effects is key to informing current debates on targeted income support in lagging regions, especially in light of renewed interest in place-based policies across Europe (European Commission, 2022; Rodríguez-Pose, 2018). This perspective aligns with broader arguments favouring place-based regional development over place-neutral approaches (Barca et al., 2012).

Second, the AUB anticipated design elements that are now central to modern welfare reforms, such as regionally differentiated benefits, flexible eligibility criteria, and broader development objectives (Cansino, 2001). In this sense, the AUB can be seen as a precursor to ongoing discussions on Universal Basic Income (Banerjee et al., 2019), conditional transfers, and regional resilience strategies.

Finally, rigorous macro-level evaluations of entrenched income support programs remain scarce. Most existing studies rely on nationally representative samples or short-term experimental data, often neglecting the cumulative and context-specific effects of long-standing policies. This is particularly true for regionally targeted unemployment schemes, which have played a long-standing role in Spanish labour market policy but remain underexplored from a macroeconomic perspective (European Commission, 2001). Our study addresses this gap by applying the SCM to assess the AUB's impact on regional labour markets over a critical twelve-year period (1985–1996), offering new insights into the long-term effects of structural policy interventions in economically vulnerable areas.

### **3.4. Value Added and Contribution**

Although several studies have addressed research questions that are partially related to the topic of this paper, most of them are only tangentially connected to our specific research interest. To the best of our knowledge, there is only one study that evaluates the effect of the AUB on labour force participation using impact evaluation techniques.

This is the paper by [Jofre-Monseny \(2014\)](#). While the main focus of that study is migration, the author also investigates, as a secondary outcome, the effect of the AUB on labour supply. The analysis is based on census data from 1981 and 1991 and employs a border discontinuity design.

The identification strategy compares municipalities located near the border in Andalucía and Extremadura (treated group) with municipalities on the other side of the border in Castilla y León, Castilla-La Mancha, and Murcia (control group). The main findings can be summarised as follows: (1) when the full sample is considered, the estimated impact ranges from 2.5 to 2.9 percentage points, depending on the specification. However, the effect is not symmetric across genders. For men, the estimated effect is negative, albeit statistically insignificant. For women, the results indicate a substantial and statistically significant increase in labour force participation, exceeding 7 percentage points across all specifications. This is a notably large effect for a participation rate outcome.

At this point, an important question arises: what does our study contribute to the existing literature? We identify at least four main contributions. First, we expand the geographical scope of the analysis. While [Jofre-Monseny \(2014\)](#) focuses on a limited set of municipalities located near the regional border, our study examines the entire region of Andalucía, allowing us to estimate the effect at the broader regional level. Second, we employ a fundamentally different methodological approach, which complements the strategy used in that study. Third, we incorporate a temporal dimension that is absent in previous work: whereas that paper provides a single point estimate, we estimate quarterly effects over the period 1985–1996. This enables us to track the evolution of the estimated impact over time. Finally, our analysis is grounded in theory. We develop a simple model that outlines three key conceptual channels through which the AUB may influence labour force participation. This theoretical framework helps to interpret some of the empirical results and provides guidance for the design of more effective economic policies.

## **4. Theory**

### **4.1. Basic Theoretical Setting**

We develop a labour market participation model to identify how the AUB affects the LFPR. Focusing on the extensive margin of labour supply, we assume a fixed workweek, making labour supply choices equivalent to participation decisions ([Martín-Román et al., 2020](#); [Martín-Román, 2022](#)). The model also considers the impact of unemployment and the



AUB on the LFPR<sup>8</sup>. The structure of the model comprises three critical assumptions (Rodrik, 2015):

**Assumption 1:** *Individuals qualify for the AUB if they live in Andalucía and work in agriculture. They must also be unemployed to receive it. There are three groups: eligible and entitled, eligible but not entitled, and non-eligible. All may be affected by the AUB. Its implementation is represented by a dummy variable  $r$  equal to 1 when applied and 0 otherwise.*

**Assumption 2:** *A positive unemployment rate  $u$  exists, which determines the job-finding probability  $p$  for all individuals. This probability decreases with  $u$  and increases with the implementation of the AUB (denoted by  $r$ ). In other words, for a given  $u_0$ ,  $p(u_0, r = 1) > p(u_0, r = 0)$ .<sup>9</sup>*

**Assumption 3:** *The AUB provides an unemployment benefit  $b$  that is, in principle, conditioned on job search. However, due to imperfect monitoring, an individual not actively searching is caught with probability  $q$  (losing the benefit) and evades detection with probability  $1 - q$ . Moreover, the benefit increases with  $r$ , meaning that  $b(r = 1) > b(r = 0)$ .<sup>10</sup>*

In **FIGURE A2-1**, the decision-making alternatives for three worker types are illustrated, incorporating budget constraints by substituting consumption and leisure levels with corresponding utility values. Here,  $y$  represents real non-labour income, and total time is normalized to 1. To elucidate the theoretical channels through which the AUB affects the aggregate LFPR, we sequentially analyze the three groups and then aggregate the results.

[INSERT **FIGURE A2-1**]

#### 4.2. Effects of the AUB on Non-Eligible Persons

We examine individuals ineligible for the AUB, who face two choices: (1) not participating in the labour force, yielding utility  $U(y, 1)$ ; and (2) participating, with expected utility  $p(r)U(w\bar{l} + y, 1 - \bar{l} - s) + (1 - p(r))U(y, 1 - s)$ . The reservation wage  $w_0^R$  equates these utilities<sup>11</sup>:

<sup>8</sup> The set of other non-critical assumptions are discussed in **APPENDIX 2**. There, some variables are defined too.

<sup>9</sup> Unemployment is mainly involuntary, so higher unemployment rates lower  $p$ . Conversely, effective implementation of the AUB stimulates local economic activity, thereby improving job search outcomes.

<sup>10</sup> For simplicity, we omit other unemployment benefits or social allowances, as including them would add complexity without significant insight.

<sup>11</sup> In the absence of unemployment benefits ( $b = 0$ ), the reservation wage is positive ( $w_0^R > 0$ ). Focusing on leisure time, since  $1 > (1 - s) > (1 - \bar{l} - s)$ , equality in equation (1) requires  $w_0^R\bar{l} + y > y$ , implying  $w_0^R > 0$ .



$$p(r)U(w_0^R \bar{l} + y, 1 - \bar{l} - s) + (1 - p(r))U(y, 1 - s) = U(y, 1) \quad (1)$$

Even individuals not eligible for the AUB are influenced by its implementation, as it alters the probability of finding a job. The AUB acts as a fiscal stimulus, indirectly affecting all workers by enhancing economic activity and employment prospects.

In **APPENDIX 2**, it is demonstrated that  $w_0^R$  depends negatively on  $p$ . Moreover, following the aggregation process described also in **APPENDIX 2**, it is easy to conclude that the AUB has an encouraging effect on the participation rate for non-eligible workers ( $PR^{NE}$ ). This can be formalized through expression (2):

$$\frac{\partial PR^{NE}(r)}{\partial r} = \underbrace{\frac{\partial PR}{\partial w_0^R}}_{(-)} \times \underbrace{\frac{\partial w_0^R}{\partial p}}_{(-)} \times \underbrace{\frac{\partial p}{\partial r}}_{(+)} > 0 \quad (2)$$

Put differently,  $\partial p / \partial r > 0$  by definition,  $\partial w_0^R / \partial p < 0$  from the discussion in this section, and that  $\partial PR / \partial w_0^R < 0$  from the concept of reservation wage.

#### 4.3. Effects of the AUB on Eligible and Entitled Persons

Examining individuals eligible and entitled for the AUB involves assessing three monitoring scenarios: perfect ( $q = 1$ ), none ( $q = 0$ ), and partial ( $0 < q < 1$ ). Each scenario corresponds to a specific reservation wage. Equations (3), (4), and (5) define them ( $w_1^R, w_2^R, w_3^R$ ), respectively:<sup>12</sup>

$$p(r)U(w_1^R \bar{l} + y, 1 - \bar{l} - s) + (1 - p(r))U(y + b, 1 - s) = U(y, 1) \quad (3)$$

$$p(r)U(w_2^R \bar{l} + y, 1 - \bar{l} - s) + (1 - p(r))U(y + b, 1 - s) = U(y + b, 1) \quad (4)$$

$$p(r)U(w_3^R \bar{l} + y, 1 - \bar{l} - s) + (1 - p(r))U(y + b, 1 - s) = qU(y, 1) + (1 - q)U(y + b, 1) \quad (5)$$

Now, we analyse the effect of the AUB on the PR, at the aggregate level, through the first theoretical channel (i.e., changes in  $b$  holding constant  $p$ ). We denote the PR for benefit-eligible individuals as  $PR^E$ . According to the aggregation process in **APPENDIX 2**, the AUB's impact on the LFPR is expressed as:

$$\left. \frac{\partial PR^{EE}(r)}{\partial r} \right|_{\bar{p}} = \underbrace{\frac{\partial PR}{\partial w_3^R}}_{(-)} \times \underbrace{\frac{\partial w_3^R}{\partial b}}_{(?)} \times \underbrace{\frac{\partial b}{\partial r}}_{(+)} \leq 0 \quad (6)$$

In expression (6),  $\partial p / \partial b > 0$  by hypothesis, and  $\partial PR / \partial w_3^R < 0$ , based on the reservation wage concept. However, as discussed in **APPENDIX 2**,

<sup>12</sup> In **APPENDIX 2**, the relationship between the three of them and with  $w_0^R$  is discussed.

the sign of  $\partial w_3^R / \partial b$  is indeterminate. Notably, increased monitoring heightens the likelihood of PR rising due to the AUB.

The second theoretical channel through which the AUB affects the  $PR^{EE}$  is via changes in the probability of finding a job. An analysis at the individual level can be found in **APPENDIX 2**. At the aggregate level we have:

$$\left. \frac{\partial PR^{EE}(r)}{\partial r} \right|_{\bar{b}} = \underbrace{\frac{\partial PR}{\partial w_3^R}}_{(-)} \times \underbrace{\frac{\partial w_3^R}{\partial p}}_{(?) } \times \underbrace{\frac{\partial p}{\partial r}}_{(+)} \leq 0 \quad (7)$$

Expression (7) confirms that this second theoretical channel (i.e., changes in  $p$  while keeping  $b$  constant) also generates a mixed set of incentives for eligible individuals.

#### 4.4. Effects of the AUB on Eligible but not Entitled Persons

In this case, the reservation wage is defined formally by (8):<sup>13</sup>

$$p(r)U(w_4^R \bar{l} + y + b(r), 1 - \bar{l} - s) + (1 - p(r))U(y, 1 - s) = U(y, 1) \quad (8)$$

From (8) and (3), it is easy to demonstrate that  $w_4^R < w_1^R$ . In **APPENDIX 2**, it is proved that  $\partial w_4^R / \partial b < 0$  and  $\partial w_4^R / \partial p < 0$ . The unambiguous negative sign in both expressions highlights the strong incentive for this group to participate in the labour market. As both effects reinforce each other, at the aggregate level, the participation rate for those eligible but not entitled ( $PR^{ENE}$ ) ought to increase when the law establishing the AUB is passed, as (9) states:

$$\frac{\partial PR^{ENE}(r)}{\partial r} = \underbrace{\frac{\partial PR}{\partial w_4^R}}_{(-)} \left( \underbrace{\frac{\partial w_4^R}{\partial b}}_{(-)} \cdot \underbrace{\frac{\partial b}{\partial r}}_{(+)} + \underbrace{\frac{\partial w_4^R}{\partial p}}_{(-)} \cdot \underbrace{\frac{\partial p}{\partial r}}_{(+)} \right) > 0 \quad (9)$$

#### 4.5. From Theory to Empirics

The total PR is the weighted sum of that of eligible and non-eligible groups. Denoting the non-eligible share as  $\theta$ , the eligible and entitled as  $\pi$ , and the eligible but not entitled as  $(1 - \theta - \pi)$ , we have the overall PR as a linear combination of the three groups:

$$PR(r) = \theta \cdot PR^{NE}(r) + \pi \cdot PR^{EE}(r) + (1 - \theta - \pi) \cdot PR^{ENE}(r) \quad (10)$$

Using (10) and results from (2), (6), (7), and (9):

<sup>13</sup> In (8), we assume that when an individual finds a job, they earn labour income ( $w\bar{l}$ ) and receive the AUB in the same period. In other words, the time span covers both the contribution and benefit periods.

$$\frac{\partial PR(r)}{\partial r} = \underbrace{\theta \frac{\partial PR^{NE}(r)}{\partial r}}_{(+)} + \underbrace{\pi \frac{\partial PR^{EE}(r)}{\partial r}}_{(?)} + \underbrace{(1 - \theta - \pi) \frac{\partial PR^{ENE}(r)}{\partial r}}_{(+)} \geq 0 \quad (11)$$

In short, the overall effect of the AUB on labour supply is theoretically ambiguous. Non-eligible individuals are incentivized by improved job prospects, and eligible-but-not-entitled individuals benefit from both this mechanism and higher financial rewards related to job search. However, eligible and entitled individuals may be either encouraged or discouraged from participating. Therefore, the net impact of the AUB on the LFPR is ultimately an empirical question.

## 5. Hypotheses

To assess the effects of AUB on LFPR, we first define the Activated Population to Beneficiaries Index (APBI) as the estimated number of individuals entering the labour force due to AUB, divided by the number of AUB recipients (AUBR) at a given point in time. To compute the number of Activated Persons (AP), we calculate the counterfactual labour force participation rate (LFPR<sup>C</sup>), i.e., the rate that would have prevailed had the AUB legislation not been enacted. To estimate this, we employ the SCM, which is described in detail later. We then compute the difference between the real labour force participation rate (LFPR<sup>R</sup>) and the counterfactual (LFPR<sup>C</sup>) and multiply this difference by the working-age population (WAP) at each point in time,  $t$ . Formally:

$$AP_t = (LFPR_t^R - LFPR_t^C) \times WAP_t \quad (12)$$

Accordingly, APBI is formally defined as:

$$APBI_t = \frac{AP_t}{AUBR_t} \quad (13)$$

By analysing the evolution of this index following the enactment of the AUB, we can evaluate its impact on LFPR. Specifically, we aim to determine whether the LFPR increased or decreased after the approval of AUB. Furthermore, conditional on an increase in APBI, we assess whether this rise was more or less proportional to the growth in AUBR.

To better understand the implications of the enactment of the AUB legislation, we propose the following two formal hypotheses:

**Hypothesis 1:** *The enactment of the AUB law led to an increase in the labour force participation rate (LFPR). In formal terms:*  
 $APBI_t > 0 \forall t \in [1984, 1996]$

This hypothesis implies that the number of Activated Persons (AP) is positive, given that the number of AUB recipients (AUBR) is strictly positive by definition after the law's enactment. In other words, it

suggests that the encouraging effects of the policy (i.e., incentives to enter the labour force) outweigh the discouraging effects (i.e., incentives to exit the labour force) across the working-age population at the aggregate level.

**Hypothesis 2:** *Conditional on a positive APBI, the enactment of the AUB law caused an increase in AP that was more than proportional to the increase in AUBR. That is:  $APBI_t > 1 \forall t \in [1984, 1996]$*

This second hypothesis aims to determine whether a multiplier effect exists within the labour force. From a policy perspective, it is important to assess whether the growth in the labour force exceeds the increase in the number of AUB beneficiaries. If so, this would indicate that such policies stimulate economic activity beyond the direct recipient group. Conversely, if labour force growth is positive but less than proportional relative to AUBR, we can conclude that, although the policy's encouraging effects outweigh the discouraging ones, these discouraging effects still exert influence and should be monitored by employment agencies.

## **6. Methodology: Synthetic Control Method**

This study relies on the SCM, a quasi-experimental strategy introduced by [Abadie & Gardeazabal \(2003\)](#), later formalized by [Abadie et al. \(2010, 2015\)](#), and finally systematized in [Abadie \(2021\)](#). SCM was originally designed for comparative case studies with a single treated unit and a set of untreated units, making it well suited to evaluating region-specific policy interventions implemented at specific points in time. In this setting, it provides a coherent framework for estimating the causal effect of the AUB introduced in Andalucía in 1984.

### **6.1. Intuition and Justification**

SCM constructs a counterfactual for the treated unit (Andalucía) by creating a weighted combination of untreated units, the *synthetic control*, that closely matches the treated unit's trajectory of the outcome variable prior to the intervention. Weights are chosen to minimize pre-treatment discrepancies between the treated unit and its synthetic counterpart, using both the outcome variable and a set of relevant predictors.

SCM offers several advantages over more traditional approaches such as Difference-in-Differences (DiD). First, SCM relaxes DiD's parallel-trends requirement by matching the full pre-intervention trajectory with a convex combination of controls, an assumption that is transparent and diagnosable in sample. Second, the method is transparent and data-driven, as the choice of comparison units and their weights is explicitly determined by an optimization procedure. Third, it is

particularly well suited to the present setting, where a region-specific policy affects a single unit (Andalucía) and comparable untreated regions are available. Additionally, it should be highlighted that SCM has been applied in studies on diverse policy fields: [Cavallo et al. \(2013\)](#) on the economic effects of natural disasters, [Billmeier & Nannicini \(2013\)](#) on the growth impact of liberalization, [Peri & Yassenov \(2019\)](#) on labour-market effects of refugee inflows, and [Herrero-Alcalde et al. \(2024\)](#) on subnational fiscal rules. Alongside applications to unemployment shocks and regional dynamics ([Ayala et al., 2023](#)), these studies illustrate SCM's flexibility and rigor for causal policy evaluation. As [Athey & Imbens \(2017\)](#) note, SCM "is arguably the most important innovation in the policy evaluation literature in the last 15 years."

Nonetheless, SCM has limitations. It requires a strong pre-treatment fit, which depends on predictive covariates and the availability of untreated units with sufficiently similar characteristics. Moreover, conventional large-sample inference is not directly applicable. Instead, alternative strategies based on placebo tests and permutation procedures are used (see section 6.3).

## 6.2. Formalization

We consider  $J + 1$  Spanish regions indexed by  $j \in \{1, \dots, J + 1\}$ . Let  $j = 1$  denote Andalucía, the treated unit, and  $j = 2, \dots, J + 1$  the potential control units, comprising all other Spanish regions except Extremadura<sup>14</sup> and the autonomous cities of Ceuta and Melilla. This set of potential controls constitutes the *donor pool* from which the synthetic control for Andalucía is constructed.

Time is indexed by  $t = 1, \dots, T$ . Let the pre-treatment period be  $t = 1, \dots, T_0$ , and the post-treatment period be  $t = T_0 + 1, \dots, T$ . For each region  $i$  and period  $t$ , define the potential outcomes  $Y_{it}^N$  (outcome for region  $i$  at time  $t$  in the absence of the intervention) and  $Y_{it}^I$  (outcome for region  $i$  at time  $t$  under exposure to the intervention). Also, let  $\alpha_{it} = Y_{it}^I - Y_{it}^N$  be the treatment effect of the AUB for unit  $i$  at time  $t$ , and let  $D_{it}$  be an indicator that takes value one if unit  $i$  is exposed to the intervention at time  $t$  (Andalucía), and value zero otherwise (rest of regions).

Then, the observed outcome for unit  $i$  at time  $t$  is:

$$Y_{it} = Y_{it}^N + \alpha_{it}D_{it} \quad (14)$$

Bearing in mind that only the first region (region 1) is exposed to the intervention, and only after period  $T_0$ , we have that:

<sup>14</sup> Extremadura is excluded from the *donor pool* because it was also affected by the AUB implementation; if anything, its inclusion would attenuate the estimated treatment effect for Andalucía.

$$D_{it} = \begin{cases} 1 & \text{if } i = 1 \text{ and } t > T_0, \\ 0 & \text{otherwise.} \end{cases} \quad (15)$$

And the *Average Treatment Effect on the Treated* (ATT)<sup>15</sup> for Andalucía is then calculated as follows:

$$\alpha_{1t}^{ATT} = Y_{1t}^I - Y_{1t}^N = Y_{1t} - Y_{1t}^N, \quad t = T_{0+1}, \dots, T \quad (16)$$

Where  $Y_{1t}$  is the observed outcome for Andalucía. By construction,  $Y_{1t}^N$  is observed for  $t \leq T_0$  (when no unit is yet treated) but is unobserved for  $t > T_0$ . Following [Abadie et al. \(2010\)](#), the counterfactual path  $Y_{1t}^N$  is approximated by a convex combination of outcomes from the *donor pool*, which is justified under a linear factor model for untreated outcomes.

To build this synthetic counterfactual, let  $X_1$  be a  $K \times 1$  vector collecting pre-treatment values of  $K$  predictors of the outcome (including, if desired, lags of the outcome) for Andalucía, and let  $X_0$  be the corresponding  $K \times J$  matrix for the donor pool. Denote by  $W = (w_2, \dots, w_{J+1})'$  a  $(J \times 1)$  vector of non-negative weights that sum to one. For a given symmetric diagonal matrix  $V$  with non-negative entries that encode the relative importance of the predictors, the synthetic control weights are chosen to minimize the  $V$ -weighted discrepancy between Andalucía and the synthetic combination in the pre-treatment period ( $t \leq T_0$ ):

$$\|X_1 - X_0 W\|_v = (X_1 - X_0 W)' V (X_1 - X_0 W) \quad (17)$$

subject to  $w_j \geq 0$  and  $\sum_{j=2}^{J+1} w_j = 1$ . The optimal weights are denoted in the following way:  $W^* = (w_2^*, \dots, w_{J+1}^*)'$ .

Given  $W^*$ , the synthetic control for Andalucía at any time  $t$  is  $\sum_{j=2}^{J+1} w_j^* Y_{jt}$ . Hence, the estimated ATT in the post-treatment period is:

$$\hat{\alpha}_{1t}^{ATT} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt}, \quad t = T_{0+1}, \dots, T \quad (18)$$

By design, a good pre-treatment fit, small  $\|X_1 - X_0 W^*\|_v$ , supports the credibility of  $\sum_j w_j^* Y_{jt}$  as an approximation to the unobserved counterfactual  $Y_{1t}^N$  for  $t > T_0$ .

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<sup>15</sup> The *Average Treatment Effect* (ATE) refers to the average effect that a given treatment or intervention would have if applied to the entire population. It captures the expected change in outcomes if all units, both treated and untreated, were exposed to the intervention. In contrast, the ATT focuses exclusively on those units that actually received the treatment. It estimates the average effect for the treated group by comparing their observed outcomes to the counterfactual outcomes they would have experienced in the absence of treatment. Here is the one we estimate.



### 6.3. Statistical Inference: “In-Space” Placebo Tests

Because SCM typically involves a single treated unit, and lacks a conventional sampling framework, standard errors and asymptotic tests are not directly available. Inference therefore relies on permutation procedures. Most commonly: *In-Space Placebo Tests* (reassigning treatment to each donor unit and re-estimating the SCM). The distribution of placebo effects provides the benchmark for assessing whether the treated unit’s estimate is unusually large.

When applying *In-Space Placebo Tests*, significance is evaluated via randomization inference. We re-estimate the SCM for each control unit as if treated at the same date, constructing a placebo distribution while excluding the actual treated unit from all *donor pools*. The treated estimate is considered atypical only if it lies in the extreme tail of this distribution. Because the procedure is permutation-based, it is exact and avoids parametric assumptions about the error process.

We use the Root Mean Squared Prediction Error (RMSPE)<sup>16</sup> to scale post-treatment fit by pre-treatment fit. For each unit  $j = 2, \dots, J + 1$  (with the treated unit indexed by  $j = 1$ ), we define the pre- and post-treatment RMSPE as follows:

$$\text{RMSPE}_{\text{pre}}^{(j)} = \sqrt{\frac{1}{T_0} \sum_{t=1}^{T_0} (Y_{jt} - \hat{Y}_{jt}^N)^2} \quad (19)$$

$$\text{RMSPE}_{\text{post}}^{(j)} = \sqrt{\frac{1}{T - T_0} \sum_{t=T_0+1}^T (Y_{jt} - \hat{Y}_{jt}^N)^2} \quad (20)$$

Our test statistic is the post-/pre-RMSPE ratio:

$$R^{(j)} = \frac{\text{RMSPE}_{\text{post}}^{(j)}}{\text{RMSPE}_{\text{pre}}^{(j)}} \quad (21)$$

If the treated unit’s ratio  $R^{(1)}$  is much larger than the ratios from the placebo units, the effect is unlikely to be due to chance.

A pseudo  $p$ -value<sup>17</sup> is computed then as:

<sup>16</sup> The RMSPE measures how closely the synthetic control replicates the pre-intervention trajectory of the treated unit. A lower RMSPE indicates a better pre-treatment fit and, consequently, a more reliable counterfactual.

<sup>17</sup> These pseudo  $p$ -values were used to assess the statistical significance of the estimated treatment effects, as reported in **TABLE 8** and **TABLE 9**, respectively.

$$\hat{p} = \frac{1}{J} \sum_{j=2}^{J+1} \mathbb{I}(R^{(j)} \geq R^{(1)}) \quad (22)$$

Where  $J$  is the number of placebo units and  $\mathbb{I}(\cdot)$  is the indicator function. This is the fraction of placebo ratios at least as large as the treated unit's ratio, providing a clear and robust basis for inference in synthetic control applications.

## 7. Data

### 7.1. The Labour Force Survey

Our primary data source is the Spanish Labour Force Survey (*Encuesta de Población Activa*) provided by the Spanish Statistical Office (INE). We use quarterly, region-level data spanning from the first quarter of 1980 to the fourth quarter of 1996, covering all 17 Spanish regions (*Comunidades Autónomas*). The starting point of this period is determined by the enactment of the Statute of Workers' Rights in 1980, which provides a natural and substantive basis for beginning the analysis at that time. The end point, the fourth quarter of 1996, is chosen because in 1997 the Agreement for Employment and Agricultural Social Protection (AEPSA)<sup>18</sup> was implemented, replacing the Rural Employment Plan (PER). While maintaining the core structure of subsidies based on days worked and investment programs to support employment during periods of agricultural inactivity, the AEPSA crucially extended unemployment protection to agricultural workers in all remaining Spanish regions. For this reason, our analysis concludes in the fourth quarter of 1996.

The AUB was introduced in Spain in 1984 to address persistent unemployment and income volatility in rural areas, particularly in Andalucía and Extremadura. However, this study focuses exclusively on Andalucía. This methodological choice is supported by two main considerations. First, throughout the period under analysis (1984–1996), Andalucía consistently accounted for the vast majority of AUB recipients, both in absolute numbers and relative terms. Second, Andalucía is a significantly larger economy than Extremadura in terms of territory, GDP, and labour force size. These characteristics make Andalucía a more appropriate and representative case for analysing the impact of the AUB. Focusing solely on this region therefore enhances the study's internal consistency and empirical clarity.

The remaining *Comunidades Autónomas* serve as potential candidates for inclusion in the control group (*donor pool*). The effective application of the SCM requires a key assumption to be met: all units exposed to similar interventions during the pre-intervention period must be omitted. Including such units could distort the estimated effect of the

<sup>18</sup> *Acuerdo para el Empleo y la Protección Social Agrarios.*

intervention by introducing confounding influences (Abadie et al., 2010).

Regarding the variables used in the analysis<sup>19</sup>, the selected outcome variable is the activity rate or labour force participation rate (percentage of the working-age population that is economically active). As for the predictors, the model includes the following: percentage of males in the active population; share of active individuals aged 25–54; agricultural employment as a share of total employment; construction employment as a share of total employment; long-term unemployment (1–2 years) (%); very long-term unemployment (more than 2 years) (%); and, in some specifications, lagged values of the outcome variable for several periods prior to the enactment of the law under study: the activity rate in 1981.Q2, 1982.Q2, and 1983.Q2.

Regarding the number of predictors, it is important to note that increasing the number of covariates does not necessarily improve model fit, nor does reducing them necessarily worsen it (McClelland & Mucciolo, 2022). A common practice in this methodology is to include lagged values of the outcome variable as predictors (Abadie et al., 2010). Incorporating multiple lags helps capture the effects of omitted variables and partially mitigates the impact of excluding relevant predictors. However, there is no consensus on the optimal number of lags to include.

Some authors advocate using lagged outcomes as predictors, arguing that additional covariates have limited impact on the final estimates (Athey & Imbens, 2006, as cited in McClelland & Gault, 2017). In contrast, other scholars contend that relying exclusively on lagged outcomes is problematic, as it lacks economic justification and weakens the theoretical foundation of the model (Kaul et al., 2021). Ferman et al. (2020) recommend estimating multiple model specifications with different combinations of predictors and selecting the one that minimizes the RMSPE during the pre-treatment period. This is the strategy adopted in the present study (see **TABLE 4**).

[INSERT **TABLE 4**]

To ensure robustness across specifications, we included up to three lags of the outcome variable among the set of predictors<sup>20</sup>. Specifically, we selected the second quarter of 1981, 1982, and 1983. This choice aims to avoid potential seasonal distortions commonly affecting the first and fourth quarters, thereby providing more stable and representative

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<sup>19</sup> To smooth short-term fluctuations and abrupt changes in the data series, all variables have been redefined using centred moving averages. Specifically, each value is recalculated as the average of its own value, the immediately preceding value, and the immediately following one.

<sup>20</sup> We rule out using further lags for the reasons stated above.

measures of economic activity and enhancing the consistency of the analysis. The best-performing model, identified as specification [3], is the one with the lowest RMSPE. Accordingly, the main results presented below are based on this specification<sup>21</sup>.

**TABLE 5** presents descriptive statistics for Andalucía, the *donor pool*, and the full sample during the pre-treatment period (1980.Q1 – 1984.Q1). The mean value of the outcome variable, the labour force participation rate (in percentage), in Andalucía (45.20) is notably lower than that of the *donor pool* (50.26), accompanied by a much smaller standard deviation (0.23 vs. 2.55), suggesting greater internal homogeneity within Andalucía. A similar pattern of lower variability is observed for most predictors. Specifically, Andalucía displays higher average values for Predictor 1 (76.90 vs. 70.60) and Predictor 4 (11.02 vs. 8.38) compared to the control group, while Predictor 2 shows comparable means across groups (63.40 in Andalucía vs. 64.47 in the *donor pool*). Conversely, Andalucía reports slightly lower average values for Predictors 3, 5, and 6, along with consistently lower dispersion.

[INSERT [TABLE 5](#)]

The comparison of minimum and maximum values further underscores that the range of variation in Andalucía is narrower than in the control group, particularly for Predictor 3 and Predictor 6, where potential comparison units display substantial variability. Overall, these descriptive statistics highlight notable differences in both central tendency and dispersion between Andalucía and the control units, offering preliminary insights into the region's distinct characteristics relative to the comparison group.

Before introducing the descriptive statistics, we also provide a graphical overview of the evolution of the labour force participation rate across all Spanish regions over the entire period of analysis. **FIGURE 4** plots the trajectories of each region individually, with Andalucía highlighted in red and all other regions shown in blue.

[INSERT [FIGURE 4](#)]

## 7.2. The Bulletin of Labour Statistics

A second data source is used to construct the APBI indicator required to test Hypotheses 1 and 2: the *Boletín de Estadísticas Laborales* (Bulletin of Labour Statistics, BLS). This database, compiled by the Spanish Ministry of Labour, provides a range of officially registered statistics, including figures on AUB beneficiaries.

It is important to note that, although the number of AUB beneficiaries was recorded monthly, the BLS only began publishing these figures at

<sup>21</sup> All remaining results are available upon request.

a monthly frequency in 1995. Prior to that, it reported annual totals. From 1995 onward, we were able to compute quarterly values by averaging three consecutive months. However, in order to align the beneficiaries' data with the quarterly structure of the Labour Force Survey, necessary for testing Hypotheses 1 and 2, we implemented a two-step backward estimation procedure to reconstruct a quarterly time series of AUB recipients from 1984. This reconstruction allowed us to calculate the quarterly APBI indicator<sup>22</sup>. The results of this estimation are presented in **FIGURE 5**.

[INSERT [FIGURE 5](#)]

## 8. Main results

### 8.1. Graphical Evidence

**FIGURE 6a** and **FIGURE 6b** present the results of applying the SCM originally proposed by [Abadie et al. \(2010, 2015\)](#) to estimate the ATT over the period 1980–1996. Results are shown for both quarterly data (top panel) and yearly data (bottom panel), with the intervention (treatment) occurring in the first quarter of 1984, as indicated by the vertical dashed line.

[INSERT [FIGURE 6a](#)]

[INSERT [FIGURE 6b](#)]

In the left-hand graphs, the outcome trajectory for the treated unit (blue line) is compared to its synthetic counterpart (red dashed line). The close alignment of both series during the pre-treatment period reveals a good pre-treatment fit, which lends credibility to the synthetic counterfactual. Following the intervention, a persistent divergence emerges between the treated and synthetic series, suggesting a positive effect of the treatment. This divergence appears more pronounced in the quarterly data, indicating that higher-frequency data may better capture the dynamic evolution of the treatment effect.

The right-hand graphs display the estimated ATT over time. In both the quarterly and yearly specifications, the ATT floats around zero prior to the intervention and becomes consistently positive afterward, with a gradually increasing pattern that suggests a cumulative treatment effect. The quarterly ATT series appears smoother and more detailed, highlighting again the advantage of using more disaggregated data for dynamic impact evaluation.

Taken together, these figures provide strong visual evidence of a positive and sustained treatment effect beginning in 1984. The consistency

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<sup>22</sup> See **APPENDIX 3** for the details.

between quarterly and yearly results supports the robustness of the findings and reinforces the validity of the synthetic control estimates.

## **8.2. Optimization Weights: Units ( $W^*$ ) and Predictors ( $V^*$ )**

**TABLE 6** and **TABLE 7** present the synthetic control composition and the relative importance of the predictors across eight alternative specifications, respectively.

Considering the donor composition (**TABLE 6**), Castilla-La Mancha consistently emerges as the dominant contributor to the synthetic Andalucía, receiving the largest weight across all specifications. In most cases, its assigned weight exceeds 90%, indicating a strong similarity to Andalucía in terms of the predictor set.

[INSERT [TABLE 6](#)]

Minor contributions are observed from Cantabria, Comunidad de Madrid, and Región de Murcia in some specifications, although their relative weights remain marginal. The RMSPE is comparatively lower for specifications [S1], [S3], [S5], [S6], and [S8], suggesting a better pre-treatment fit relative to alternative models. It should be noted, however, that RMSPE values cannot be interpreted in absolute terms because they depend on the scale and variability of the outcome variable ([Abadie et al., 2010](#)). Therefore, the quality of the pre-treatment fit is assessed by comparing RMSPE values across specifications rather than relying on their magnitude alone.

**TABLE 7** reports the predictor weights ( $V^*$ ) that guide the optimization process. A common pattern emerges across specifications: lagged values of the outcome variable (activity rates in 1981.Q2, 1982.Q2, and 1983.Q2) receive substantial weight in most cases.

[INSERT [TABLE 7](#)]

This finding is consistent with standard practices in the synthetic control literature, where lagged outcomes are often emphasized to capture unobserved factors affecting the treated unit ([Abadie et al., 2010](#); [Ferman & Pinto, 2019](#)). The heavy reliance on lagged outcomes contributes to improving the pre-treatment fit by proxying for omitted variables. Nevertheless, some caution is warranted, as relying exclusively on lagged outcomes without incorporating substantive covariates could limit the economic interpretability of the model ([Kaul et al., 2021](#)). In our case, although lagged activity rates dominate in most specifications, demographic and labour market characteristics, such as the proportion of males in the active population, agricultural employment, and construction employment, also contribute meaningfully to the synthetic control construction, enhancing the robustness and interpretability of the empirical strategy.



In summary, the results show that the composition of the synthetic Andalucía is stable across specifications, that the pre-treatment fit is comparatively better for certain specifications, and that the predictor weights are aligned with best practices in the synthetic control literature. These elements jointly support the credibility and robustness of the subsequent analysis.

### **8.3. Treatment Effects**

**TABLE 8** and **TABLE 9** present the actual outcomes, synthetic outcomes, and corresponding treatment effects (ATT) for Andalucía over time, based on quarterly and yearly data, respectively. The SCM is used to estimate what would have happened in the absence of the intervention, allowing for a causal assessment of its impact.

#### *8.3.1. Quarterly results*

The quarterly results show a clear and persistent positive treatment effect after the intervention. Initially, in 1984 and 1985, the estimated effects are relatively small and fluctuate between positive and negative values (e.g., 0.21 in 1984.Q2, -0.27 in 1984.Q3, -0.09 in 1984.Q4, and 0.28 in 1985.Q2). This suggests a lagged effect, where the intervention's impact was not immediate but developed progressively over time.

**TABLE 8** reveal that, from 1986 onwards, treatment effects become consistently positive and increasingly large. Starting in 1987, the ATT values regularly exceed 2 points (e.g., 2.27 in 1987.Q2, 2.21 in 1987.Q3, 2.19 in 1987.Q4), indicating a significant improvement in outcomes relative to the synthetic control. This upward trend continues through the late 1980s and early 1990s, with some fluctuations but maintaining overall high positive values.

[INSERT [\*\*TABLE 8\*\*](#)]

Notably, the treatment effect peaks between 1994 and 1996, reaching values above 2.8 and up to approximately 3.1 points (e.g., 3.08 in 1995.Q1 and 1995.Q2). The persistence of high ATT values during this period highlights the consolidation of the intervention's positive effects over the medium to long term. The average ATT across the full period is 1.82, reinforcing the interpretation of a sustained and meaningful impact.

#### *8.3.2. Yearly results*

The yearly data summarize the dynamics observed in the quarterly data, smoothing out short-term variations while preserving the main trends. In the first post-treatment years (1985–1986), treatment effects are modest (0.27 and 0.86, respectively), consistent with the gradual onset of the intervention's impact.

**TABLE 9** shows that, from 1987 onwards, treatment effects grow substantially, exceeding 2 points and maintaining high levels in subsequent years. The peak effects occur in 1995 and 1996, with ATT values of 2.98 and 2.99, respectively, confirming the findings from the quarterly data.

The average ATT for the yearly data is 1.97, slightly higher than the quarterly average (1.82). This difference likely reflects the smoothing effect of yearly aggregation, which mitigates short-term fluctuations present in the quarterly data.

[INSERT [TABLE 9](#)]

The results from both tables consistently indicate that the intervention produced a positive and persistent impact on the activity rate in Andalucía. The positive ATT values grow over time, suggesting a dynamic effect where the benefits of the intervention accumulate and strengthen throughout the years following its implementation.

#### 8.4. Robustness Check

The main way to assess the robustness of the results is to examine the distribution of the ratios between the post- and pre-AUB RMSPE. This approach evaluates the gap observed for Andalucía relative to the control regions when they are hypothetically treated (*placebo runs*).

**FIGURE 7a** and **FIGURE 7b** display this distribution for Andalucía and the 15 control regions, using quarterly and yearly data, respectively. In both cases, the ratio for the treated region clearly stands out. With quarterly data, the post-AUB RMSPE is about 8 times larger than the pre-AUB RMSPE; when using yearly data, the ratio even exceeds 12. No control region exhibits a ratio of this magnitude.

[INSERT [FIGURE 7a](#)]

[INSERT [FIGURE 7b](#)]

From a probabilistic perspective, if one were to randomly select a region from the sample, the likelihood of obtaining such a high ratio would be only  $1/16$  ( $\approx 0.062$ ). This provides strong evidence that the estimated effect is unlikely to be driven by chance.

#### 8.5. Hypotheses Testing

In this subsection, we assess the validity of the two hypotheses formulated in Section 5 by analysing the behaviour of the Activated Population to Beneficiaries Index (APBI) following the enactment of the AUB legislation. The analysis is conducted using both annual and quarterly data, allowing us to capture long-term trends as well as short-term fluctuations in the policy's activation effects. **FIGURE 8a** and

**FIGURE 8b** illustrate the evolution of the APBI over time under these two different frequencies.

[INSERT [FIGURE 8a](#)]

[INSERT [FIGURE 8b](#)]

The results obtained with yearly data (see **FIGURE 8a**) show that **Hypothesis 1** holds throughout the entire period under analysis. This implies that the encouraging effects of the AUB on labour force participation consistently outweighed the discouraging effects, resulting in a positive net activation of the working-age population. Furthermore, the APBI displays a clear positive trend, suggesting that the magnitude of the activation effect increased over time. In contrast, **Hypothesis 2** is not generally supported by the data, as the APBI remains below unity for most years, with the sole and marginal exception of 1996, when the index slightly exceeds one.

When the analysis is replicated using quarterly data (see **FIGURE 8b**), the overall picture remains broadly consistent with the annual results. The APBI supports **Hypothesis 1** in most quarters, with only minor exceptions in 1984.Q3, 1984.Q4, and 1985.Q1, where the index falls just below zero. These deviations likely reflect short-term adjustment effects during the early stages of policy implementation. Conversely, in the first two quarters of 1996 (1996.Q1 and 1996.Q2), **Hypothesis 2** clearly holds, as the APBI exceeds unity, indicating that activation effects extended beyond the direct beneficiary group in the final phase of the analysed period.

## 9. Conclusions

This paper has provided a comprehensive evaluation of the AUB and its macroeconomic effects on labour supply in Andalucía. By applying the SCM, we constructed a robust counterfactual to assess the causal impact of this income support scheme on labour force participation. The results are unambiguous in one respect: the introduction of the AUB in 1984 generated a sustained and positive effect on the regional participation rate, with increases averaging close to two percentage points in the years following its implementation. This finding is particularly noteworthy, as income support programs are often assumed to reduce incentives for labour market engagement.

However, our analysis also reveals that this positive effect did not exceed the number of beneficiaries, indicating that the encouraging mechanisms induced by the program were only able to partially offset its discouraging effects. In other words, while the AUB succeeded in activating new participants, the number of activated individuals fell short of the total number of recipients, suggesting the presence of

partial labour supply disincentives. This nuanced result underscores the dual nature of such policies: they can simultaneously stimulate participation through entitlement-based incentives and macroeconomic spillovers while reducing it among recipients through weaker job-search incentives.

Beyond the empirical findings, this study makes several substantive contributions. First, it introduces a macroeconomic perspective into a debate largely dominated by microeconomic analyses, highlighting the importance of evaluating spillover effects that extend beyond direct beneficiaries. Second, it develops a theoretical framework that clarifies the channels through which the AUB may encourage or discourage participation, thus offering a coherent structure to interpret the empirical evidence. Third, it applies the SCM to this context for the first time, demonstrating the method's capacity to provide transparent and credible estimates in the evaluation of regional labour market policies.

These results have broader implications for current debates on income support policies: they highlight the importance of effective monitoring mechanisms and conditionality, as well as the need to balance social protection with incentives for labour force engagement. At the same time, the findings illustrate that regionally targeted schemes can play a significant role in shaping aggregate labour market outcomes, a consideration of particular relevance for ongoing discussions on place-based policies in Europe.

## References

- Abadie, A. (2021). Using synthetic controls: Feasibility, data requirements, and methodological aspects. *Journal of Economic Literature*, 59(2), 391–425.
- Abadie, A., & Gardeazabal, J. (2003). The economic costs of conflict: A case study of the Basque Country. *American Economic Review*, 93(1), 113–132.
- Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of California’s tobacco control program. *Journal of the American Statistical Association*, 105(490), 493–505.
- Abadie, A., Diamond, A., & Hainmueller, J. (2015). Comparative politics and the synthetic control method. *American Journal of Political Science*, 59(2), 495–510.
- Arranz, J. M., García-Serrano, C., & Hernanz, V. (2013). Active labour market policies in Spain: A macroeconomic evaluation. *International Labour Review*, 152(2), 327–348.
- Athey, S., & Imbens, G. W. (2006). Identification and inference in nonlinear difference-in-differences models. *Econometrica*, 74(2), 431–497.
- Athey, S., & Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. *Journal of Economic Perspectives*, 31(2), 3–32.
- Ayala, L., Martín-Román, J., & Navarro, C. (2023). Unemployment shocks and material deprivation in the European Union: A synthetic control approach. *Economic Systems*, 47(1), 101053.
- Banerjee, A., Niehaus, P., & Suri, T. (2019). Universal Basic Income in the Developing World. *Annual Review of Economics*, 15, 131–156.
- Barca, F., McCann, P., & Rodríguez-Pose, A. (2012). The case for regional development intervention: Place-based versus place-neutral approaches. *Journal of Regional Science*, 52(1), 134–152.
- Barr, N. (2020). *The Economics of the Welfare State* (6th ed.). Oxford University Press.
- Billmeier, A., & Nannicini, T. (2013). Assessing economic liberalization episodes: A synthetic control approach. *Review of Economics and Statistics*, 95(3), 983–1001.

- Bohn, S., Lofstrom, M., & Raphael, S. (2014). Did the 2007 Legal Arizona Workers Act reduce the state's unauthorized immigrant population? *Review of Economics and Statistics*, 96(2), 258–269.
- Boltho, A., Carlin, W., & Scaramozzino, P. (1997). Will East Germany become a new Mezzogiorno? *Journal of Comparative Economics*, 24(3), 241–264.
- Bover, O., Arellano, M., & Bentolila, S. (2002). Unemployment duration, benefit duration and the business cycle, *The Economic Journal*, 112(479): 223–265.
- Bucci, L. C., & Jansa, J. M. (2021). Who passes restrictive labour policy? A view from the States. *Journal of Public Policy*, 41(3), 409–439.
- Caliendo, M., & Künn, S. (2011). Start-up subsidies for the unemployed: Long-term evidence and effect heterogeneity. *Journal of Public Economics*, 95(3–4), 311–331.
- Caliendo, M., Tatsiramos, K., & Uhlendorff, A. (2013). Benefit duration, unemployment duration and job match quality: a regression-discontinuity approach, *Journal of Applied Econometrics*, 28(4), 604–627.
- Cansino, J. M. (2000). El subsidio agrario. Principales magnitudes (1984-1999). *Revista Española de Estudios Agrosociales y Pesqueros (España)*, (189).
- Cansino, J. M. (2001). El subsidio agrario por desempleo a través de sus cifras en Andalucía (1984-2000). *Revista del Ministerio de Trabajo y Asuntos Sociales*, (31), 71–89.
- Card, D., & Levine, P. B. (2000). Extended benefits and the duration of UI spells: evidence from the New Jersey extended benefit program. *Journal of Public Economics*, 78(1-2), 107–138.
- Card, D., Chetty, R., & Weber, A. (2007). Cash-on-Hand and Competing Models of Intertemporal Behavior: New Evidence from the Labor Market. *The Quarterly Journal of Economics*, 122(4), 1511–1560.
- Carling, K., Holmlund, B., & Vejsiu, A. (2001). Do benefit cuts boost job finding? Swedish evidence from the 1990s. *The Economic Journal*, 111(474), 766–790.
- Cavallo, E., Galiani, S., Noy, I., & Pantano, J. (2013). Catastrophic natural disasters and economic growth. *Review of Economics and Statistics*, 95(5), 1549–1561.



- Chetty, R. (2008). Moral hazard versus liquidity and optimal unemployment insurance. *Journal of Political Economy*, 116(2), 173–234.
- Espinoza, R., Adan, H., Alonso, C., Battersby, B., Goncalves, C., Hong, G. H., Lagerborg, A., Perrelli, R., & Sayegh, A. (2021). Strengthening the credibility of public finances. En *Fiscal Monitor*, October 2021 (pp. 17–32). International Monetary Fund.
- European Commission (2001). *Policy responses to regional unemployment: The case of Spain*. Directorate-General for Economic and Financial Affairs.
- European Commission (2022). *Employment and social developments in Europe 2022*. Publications Office of the European Union.
- Ferman, B., & Pinto, C. (2019). Inference in differences-in-differences with few treated groups and heteroskedasticity. *Review of Economics and Statistics*, 101(3), 452–467.
- Ferman, B., Pinto, C., & Possebom, V. (2020). Cherry picking with synthetic controls. *Journal of Policy Analysis and Management*, 39(2), 510–532.
- Fredriksson, P., & Holmlund, B. (2006). Improving incentives in unemployment insurance: A review of recent research. *Journal of Economic Surveys*, 20(3), 357–386.
- Heckman, J. J., LaLonde, R. J., & Smith, J. A. (1999). The economics and econometrics of active labor market programs. In O. Ashenfelter & D. Card (Eds.), *Handbook of Labor Economics* (Vol. 3A, pp. 1865–2097). Elsevier.
- Herrero-Alcalde, A., Martín-Román, J., Tránchez-Martín, J. M., & Moral-Arce, I. (2024). Fiscal rules to the test: The impact of the Spanish expenditure rule. *European Journal of Political Economy*, 81, 102501.
- Hoynes, H., & Rothstein, J. (2019). Universal basic income in the United States and advanced countries. *Annual Review of Economics*, 11(1), 929–958.
- Jofre-Monseny, J. (2014). The effects of unemployment protection on migration in lagging regions. *Journal of Urban Economics*, 83, 73–86.
- Katz, L. F., & Meyer, B. D. (1990). Unemployment insurance, recall expectations, and unemployment outcomes. *The Quarterly Journal of Economics*, 105(4), 973–1002.

- Kaul, A., Klößner, S., Pfeifer, G., & Schieler, M. (2021). Standard synthetic control methods: The case of using all preintervention outcomes together with covariates. *Journal of Business & Economic Statistics*, 40(3), 1362-1376.
- Lalive, R. (2007). Unemployment benefits, unemployment duration, and post-unemployment jobs: A regression discontinuity approach, *American Economic Review*, 97(2), 108-112.
- Lalive, R. (2008). How do extended benefits affect unemployment duration? A regression discontinuity approach. *Journal of Econometrics*, 142(2), 785-806.
- Le Barbanchon, T. (2016). The effect of the potential duration of unemployment benefits on unemployment exits to work and match quality in France, *Labour Economics*, 42, 16-29.
- Marinescu, I., & Skandalis, D. (2021). Unemployment insurance and job search behavior. *The Quarterly Journal of Economics*, 136(2), 887-931.
- Martín-Román, Á. L. (2022). Beyond the added-worker and the discouraged-worker effects: the entitled-worker effect. *Economic Modelling*, 110, 105812.
- Martín-Román, Á. L., Cuéllar-Martín, J., & Moral, A. (2020). Labor Supply and the Business Cycle: The “Bandwagon Worker Effect”. *Papers in Regional Science*, 99(6), 1607-1642.
- McClelland, R., & Gault, S. (2017). *The synthetic control method as a tool to understand state policy*. Tax Policy Center, Urban Institute & Brookings Institution.
- McClelland, R., & Mucciolo, L. (2022). *An update on the synthetic control method as a tool to understand state policy*. Tax Policy Center, Urban Institute & Brookings Institution.
- Meyers, M. K., Gornick, J. C., & Peck, L. R. (2001). Packaging support for low-income families: Policy variation across the United States. *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management*, 20(3), 457-483.
- Moffitt, R. (1985). Unemployment Insurance and the Distribution of Unemployment Spells. *Journal of Econometrics*, 28(1), 85-101.
- Mortensen, D. T. (1977). Unemployment Insurance and Job Search Decisions. *Industrial and Labor Relations Review*, 30(4), 505-517.

- OECD (2021). *OECD Employment Outlook 2021: Navigating the COVID-19 Crisis and Recovery*. OECD Publishing.
- Peri, G., & Yasenov, V. (2019). The labor market effects of a refugee wave: Synthetic control method meets the Mariel Boatlift. *Journal of Human Resources*, 54(2), 267–309.
- Rebollo-Sanz, Y. F. & García-Pérez, J. I. (2015). Are unemployment benefits harmful to the stability of working careers? The case of Spain, *SERIEs: Journal of the Spanish Economic Association*, 6(1), 1–41.
- Rebollo-Sanz, Y. F., & Rodríguez-Planas, N. (2020). When the Going Gets Tough...: Financial Incentives, Duration of Unemployment, and Job-Match Quality. *Journal of Human Resources*, 55(1), 119–163.
- Rodríguez-Pose, A. (2018). The revenge of the places that don't matter (and what to do about it). *Cambridge Journal of Regions, Economy and Society*, 11(1), 189–209.
- Rodrik, D. (2015). *Economics rules: The rights and wrongs of the dismal science*. New York: WW Norton & Company.
- Røed, K., & Zhang, T. (2003). Does unemployment compensation affect unemployment duration? *The Economic Journal*, 113(484), 190–206.
- Schmieder, J. F., & Von Wachter, T. (2016). The effects of unemployment insurance benefits: New evidence and interpretation. *Annual Review of Economics*, 8, 547–581.
- Schmieder, J. F., Von Wachter, T., & Bender, S. (2012). The effects of extended unemployment insurance over the business cycle: Evidence from regression discontinuity estimates over 20 years. *The Quarterly Journal of Economics*, 127(2), 701–752.
- Sinn, H. W., & Westermann, F. (2001). Two Mezzogiornos. NBER Working Paper Series, 8125.
- Tatsiramos, K., & van Ours, J. C. (2014). Labor market effects of unemployment insurance design. *Journal of Economic Surveys*, 28(2), 284–311.
- Uusitalo, R., & Verho, J. (2010). The effect of unemployment benefits on re-employment rates: Evidence from the Finnish unemployment insurance reform. *Labour Economics*, 17(4), 643–654.
- Van Ours, J. C., & Vodopivec, M. (2006). How shortening the potential duration of unemployment benefits affects the duration of

unemployment: Evidence from a natural experiment. *Journal of Labor Economics*, 24(2), 351-378.

## **TABLES AND FIGURES**

**TABLE 1. Key Statistics on the AUB**

<b>Requirement/Condition</b>	<b>Details</b>
Minimum number of contributed workdays (“peonadas”)	60 days
Duration of the subsidy (general rule)	1.5 days of subsidy per contributed workday
Maximum duration	180 days of subsidy
Monetary amount	75% of minimum wage

**Note:** The duration of the subsidy is generally calculated as 1.5 days per contributed workday, but exceptions may apply.

**Source:** Own elaboration. Royal Decree 3237/1983.

**TABLE 2. Comparison of Workday Requirements and Benefit Ratios under Different Laws**

<b>Regulation</b>	<b>Workdays Required <sup>(1)</sup></b>	<b>Entitlement Ratio <sup>(2)</sup></b>
<b>Royal Decree 3237/1983 (AUB)</b>	<b>60 (2 months)</b>	<b>1.50</b>
Law 31/1984	180 (6 months)	0.50
Law 22/1992	360 (12 months)	0.33

**Notes:** (1) It is a minimum. (2) The entitlement ratio refers to the number of days of subsidy received per contributed workday.

**Source:** Own elaboration.



**TABLE 3. Evolution of AUB Beneficiaries by Gender: 1984–1996**

Year	All	Men		Women	
	Number	Number	%	Number	%
1984	156,141	139,517	89.4%	16,624	10.6%
1985	152,315	128,929	84.6%	23,386	15.4%
1986	193,694	154,915	80.0%	38,779	20.0%
1987	213,876	156,427	73.1%	57,449	26.9%
1988	241,032	159,731	66.3%	81,301	33.7%
1989	256,408	149,938	58.5%	106,470	41.5%
1990	257,658	132,771	51.5%	124,887	48.5%
1991	206,248	96,604	46.8%	109,644	53.2%
1992	173,854	79,550	45.8%	94,304	54.2%
1993	196,271	90,213	46.0%	106,058	54.0%
1994	198,945	90,046	45.3%	108,899	54.7%
1995	188,194	85,295	45.3%	102,899	54.7%
1996	167,397	76,365	45.6%	91,032	54.4%

**Source:** Labour Statistics Bulletin. Ministry of Labour.

**TABLE 4. Choosing the Model to be Assessed**

Predictors	Specification							
	[S1]	[S2]	[S3]	[S4]	[S5]	[S6]	[S7]	[S8]
Males in active population (%)	✓	✓	✓	✓	✓	✓	✓	✓
Actives aged 25-54 years over total actives (%)	✓	✓	✓	✓	✓	✓	✓	✓
Agricultural employment over total employment (%)	✓	✓	✓	✓	✓	✓	✓	✓
Construction employment over total employment (%)	✓	✓	✓	✓	✓	✓	✓	✓
Long-term unemployment (1-2 years) (%)	✓	✓	✓	✓	✓	✓	✓	✓
Very long-term unemployment (> 2 years) (%)	✓	✓	✓	✓	✓	✓	✓	✓
Activity rate (1981.Q2) (%)	—	✓	—	—	✓	✓	—	✓
Activity rate (1982.Q2) (%)	—	—	✓	—	✓	—	✓	✓
Activity rate (1983.Q2) (%)	—	—	—	✓	—	✓	✓	✓
<b>RMSPE</b>	<b>0.268</b>	<b>0.811</b>	<b>0.258</b>	<b>0.816</b>	<b>0.307</b>	<b>0.334</b>	<b>0.509</b>	<b>0.292</b>

**Source:** Own elaboration.

**TABLE 5. Descriptive Statistics: Andalucía vs Donor Pool (pre-treatment)**

Group	Variable	Mean	SD	Min	Max
Andalucía	Outcome	45.20	0.23	44.94	45.80
	Predictor 1	76.90	0.65	75.48	77.75
	Predictor 2	63.40	0.24	63.11	64.01
	Predictor 3	22.45	1.47	20.19	25.08
	Predictor 4	11.02	0.84	9.22	12.18
	Predictor 5	20.36	1.93	16.51	23.66
	Predictor 6	17.03	5.79	9.21	25.53
Donor Pool	Outcome	50.26	2.55	44.71	57.77
	Predictor 1	70.60	2.99	60.72	77.07
	Predictor 2	64.47	2.09	58.67	68.11
	Predictor 3	19.20	10.21	1.26	44.38
	Predictor 4	8.38	1.64	5.43	13.22
	Predictor 5	23.12	4.25	10.32	33.24
	Predictor 6	18.35	9.47	1.59	46.57
Total	Outcome	49.94	2.76	44.71	57.77
	Predictor 1	70.99	3.28	60.72	77.75
	Predictor 2	64.40	2.04	58.67	68.11
	Predictor 3	19.40	9.93	1.26	44.38
	Predictor 4	8.55	1.73	4.43	13.22
	Predictor 5	22.95	4.19	10.32	33.24
	Predictor 6	18.27	9.28	1.59	46.57

**Notes:** SD = Standard Deviation; Outcome: Activity rate (%); Predictor 1 = Males in active population (%); Predictor 2 = Actives aged 25-54 years over total actives (%); Predictor 3 = Agricultural employment over total employment (%); Predictor 4 = Construction employment over total employment (%); Predictor 5 = Long-term unemployment (1-2 years) (%); Predictor 6 = Very long-term unemployment (> 2 years) (%).

**Source:** Own elaboration.

**TABLE 6. Donor Pool Weights in the Synthetic Andalucía (W\*)**

Spanish regions	Composition of the <i>donor pool</i> (Synthetic Andalucía)							
	[S1]	[S2]	[S3]	[S4]	[S5]	[S6]	[S7]	[S8]
Aragón	0	0	0	0	0	0	0	0
Asturias	0	0	0	0	0	0	0	0
Cantabria	0	0	<b>0.019</b>	<b>0.010</b>	<b>0.050</b>	<b>0.060</b>	<b>0.107</b>	<b>0.044</b>
Castilla y León	0	0	0	0	0	0	0	0
Castilla-La Mancha	<b>1</b>	<b>0.706</b>	<b>0.981</b>	<b>0.692</b>	<b>0.950</b>	<b>0.940</b>	<b>0.893</b>	<b>0.956</b>
Cataluña	0	0	0	0	0	0	0	0
Com. de Madrid	0	<b>0.019</b>	0	0	0	0	0	0
Com. Valenciana	0	0	0	0	0	0	0	0
Extremadura*	—	—	—	—	—	—	—	—
Galicia	0	0	0	0	0	0	0	0
Islas Baleares	0	0	0	0	0	0	0	0
Islas Canarias	0	0	0	0	0	0	0	0
La Rioja	0	0	0	0	0	0	0	0
Navarra	0	0	0	0	0	0	0	0
País Vasco	0	0	0	0	0	0	0	0
Región de Murcia	0	<b>0.275</b>	0	<b>0.298</b>	0	0	0	0
<b>RMSPE</b>	<b>0.268</b>	<b>0.811</b>	<b>0.258</b>	<b>0.816</b>	<b>0.307</b>	<b>0.334</b>	<b>0.509</b>	<b>0.292</b>

**Notes:** (1) (\*) Conflicting region excluded. (2) The autonomous cities of Ceuta and Melilla have not been included in the analysis.

**Source:** Own elaboration.

**TABLE 7. Predictor Weights in the Synthetic Andalucía (V\*)**

Predictors	Relative importance of the predictors used (%)							
	[S1]	[S2]	[S3]	[S4]	[S5]	[S6]	[S7]	[S8]
Males in active population	88.93	0.59	1.40	3.10	0.44	0.47	1.12	0.44
Actives aged 25-54 years over total actives	1.43	2.97	1.40	2.64	0.63	0.38	2.24	0.16
Agricultural employment over total employment	5.23	3.14	1.00	1.54	0.55	0.29	1.60	0.05
Construction employment over total employment	1.52	0.97	2.73	1.66	1.74	1.45	0.53	0.46
Long-term unemployment (1-2 years)	0.45	0.34	0.53	0.47	0.29	0.28	0.61	0.26
Very long-term unemployment (> 2 years)	2.44	4.67	2.22	2.64	1.10	0.68	2.70	0.31
Activity rate (1981.Q2)	—	87.32	—	—	50.16	48.49	—	37.28
Activity rate (1982.Q2)	—	—	90.81	—	45.09	—	39.56	21.50
Activity rate (1983.Q2)	—	—	—	87.96	—	47.95	51.65	39.54
<b>RMSPE</b>	<b>0.268</b>	<b>0.811</b>	<b>0.258</b>	<b>0.816</b>	<b>0.307</b>	<b>0.334</b>	<b>0.509</b>	<b>0.292</b>

**Note:** All predictors are measured in percentages.

**Source:** Own elaboration.

**TABLE 8. Treatment Effects Over Time (quarterly data)**

Time	Actual Andalucía	Synthetic Andalucía	Treatment Effects (ATT)
Q2 1984	44.87	44.65	0.21
Q3 1984	44.70	44.97	- 0.27
Q4 1984	45.09	45.18	- 0.09
Q1 1985	45.10	45.18	- 0.07
Q2 1985	45.22	44.93	0.28
Q3 1985	45.07	44.98	0.09
Q4 1985	45.42	44.88	0.54
Q1 1986	45.52	44.72	0.80
Q2 1986	45.47	44.71	0.76
Q3 1986	45.47	44.83	0.64
Q4 1986	45.83	44.80	<b>1.03***</b>
Q1 1987	46.64	44.83	<b>1.81***</b>
Q2 1987	47.50	45.23	<b>2.27***</b>
Q3 1987	48.17	45.95	<b>2.21***</b>
Q4 1987	48.62	46.43	<b>2.19***</b>
Q1 1988	48.71	46.60	<b>2.10***</b>
Q2 1988	48.95	46.89	<b>2.06***</b>
Q3 1988	48.88	47.03	<b>1.84***</b>
Q4 1988	49.01	47.08	<b>1.92***</b>
Q1 1989	48.79	46.77	<b>2.01***</b>
Q2 1989	48.68	46.92	<b>1.75***</b>
Q3 1989	48.48	46.90	<b>1.58*</b>
Q4 1989	48.70	46.89	<b>1.81***</b>
Q1 1990	48.80	46.45	<b>2.34***</b>
Q2 1990	48.82	46.43	<b>2.39***</b>
Q3 1990	48.80	46.48	<b>2.31***</b>
Q4 1990	48.97	46.59	<b>2.37***</b>
Q1 1991	49.04	46.30	<b>2.74***</b>
Q2 1991	48.91	46.32	<b>2.59***</b>
Q3 1991	48.65	46.62	<b>2.03***</b>
Q4 1991	48.63	46.92	<b>1.71***</b>
Q1 1992	48.66	46.87	<b>1.78***</b>
Q2 1992	48.71	46.84	<b>1.87***</b>
Q3 1992	48.62	46.98	1.63
Q4 1992	48.45	47.03	1.41
Q1 1993	48.41	46.95	1.45
Q2 1993	48.42	47.05	1.36
Q3 1993	48.57	47.15	1.42
Q4 1993	48.80	47.07	1.72
Q1 1994	49.07	46.78	<b>2.28***</b>
Q2 1994	49.08	46.57	<b>2.51***</b>
Q3 1994	49.02	46.42	<b>2.60***</b>
Q4 1994	49.04	46.20	<b>2.83***</b>
Q1 1995	49.23	46.15	<b>3.08***</b>
Q2 1995	49.37	46.29	<b>3.08***</b>
Q3 1995	49.23	46.38	<b>2.84***</b>
Q4 1995	49.20	46.39	<b>2.81***</b>

Q1 1996	49.34	46.34	<b>2.99***</b>
Q2 1996	49.71	46.72	<b>2.98***</b>
Q3 1996	49.93	46.95	<b>2.97***</b>
Q4 1996	50.07	47.13	<b>2.94***</b>
<b>Average</b>	<b>48.05</b>	<b>46.23</b>	<b>1.82***</b>

**Source:** Own elaboration.

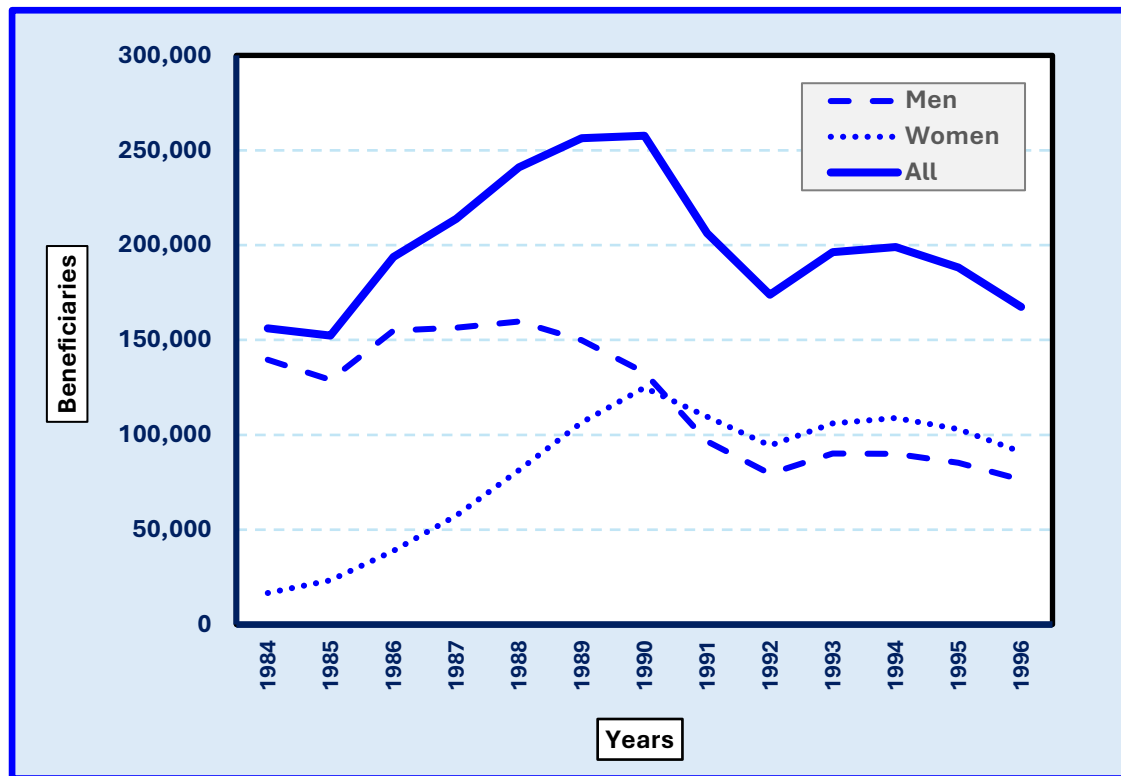


**TABLE 9. Treatment Effects Over Time (yearly data)**

<b>Time</b>	<b>Actual Andalucía</b>	<b>Synthetic Andalucía</b>	<b>Treatment Effects (ATT)</b>
1985	45.21	44.94	0.27
1986	45.58	44.72	<b>0.86***</b>
1987	47.74	45.58	<b>2.16***</b>
1988	48.89	46.88	<b>2.01***</b>
1989	48.66	46.84	<b>1.83***</b>
1990	48.85	46.45	<b>2.40***</b>
1991	48.81	46.52	<b>2.29***</b>
1992	48.61	46.91	<b>1.70***</b>
1993	48.55	47.04	<b>1.52***</b>
1994	49.06	46.47	<b>2.59***</b>
1995	49.26	46.28	<b>2.98***</b>
1996	49.76	46.77	<b>2.99***</b>
<b>Average</b>	<b>48.25</b>	<b>46.28</b>	<b>1.97***</b>

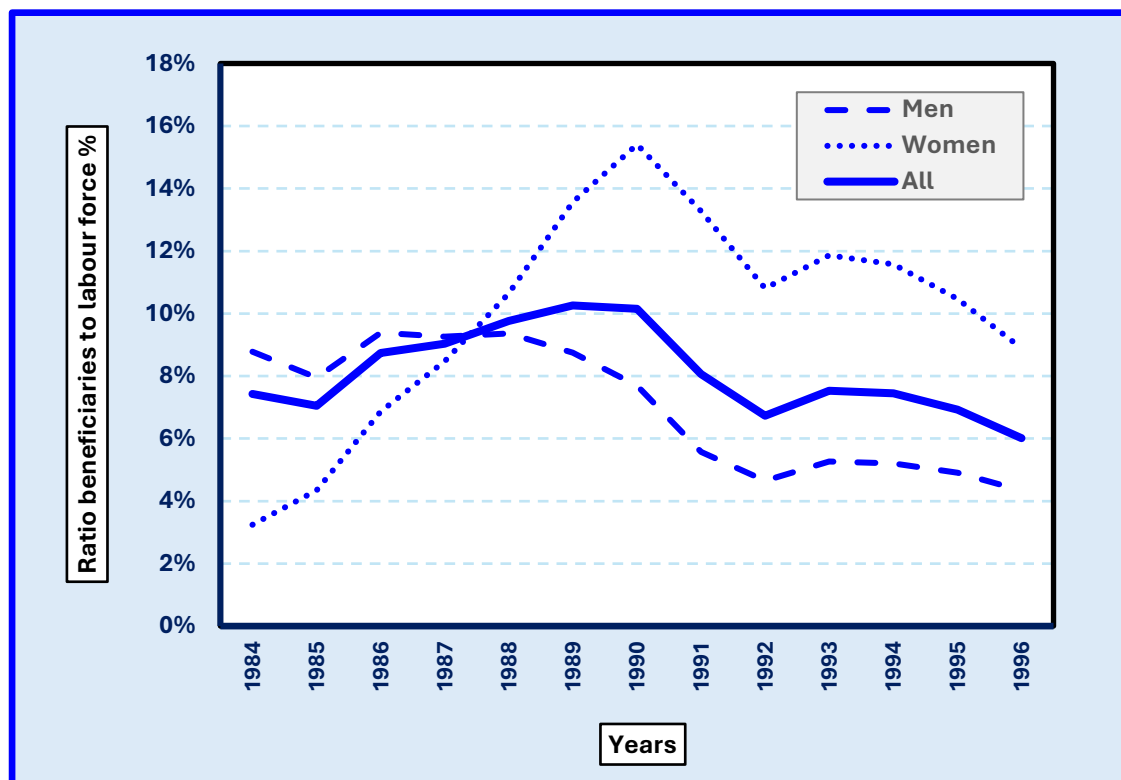
**Source:** Own elaboration.

**FIGURE 1. Trends in AUB Beneficiaries: A Gender Perspective: 1984–1996**



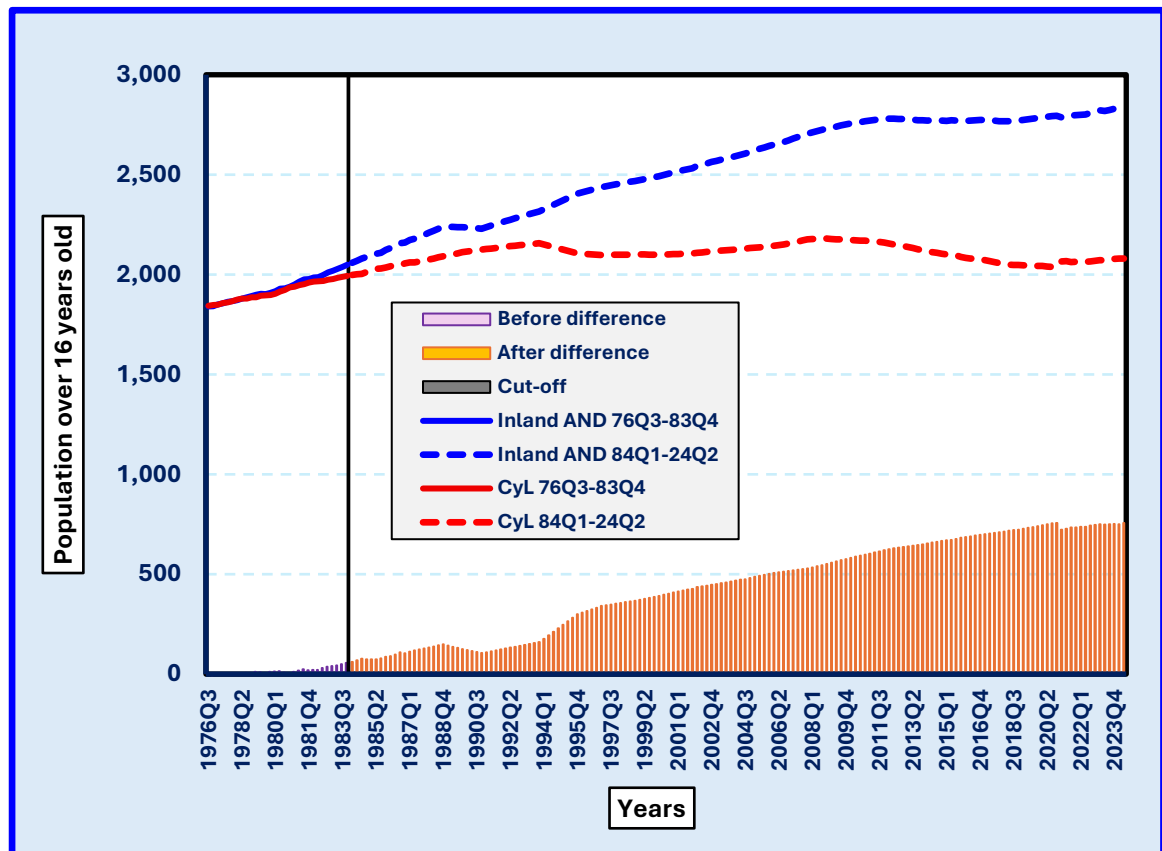
**Source:** Labour Statistics Bulletin. Ministry of Labour.

**FIGURE 2. Ratio AUB Beneficiaries to Labour Force: 1984–1996**



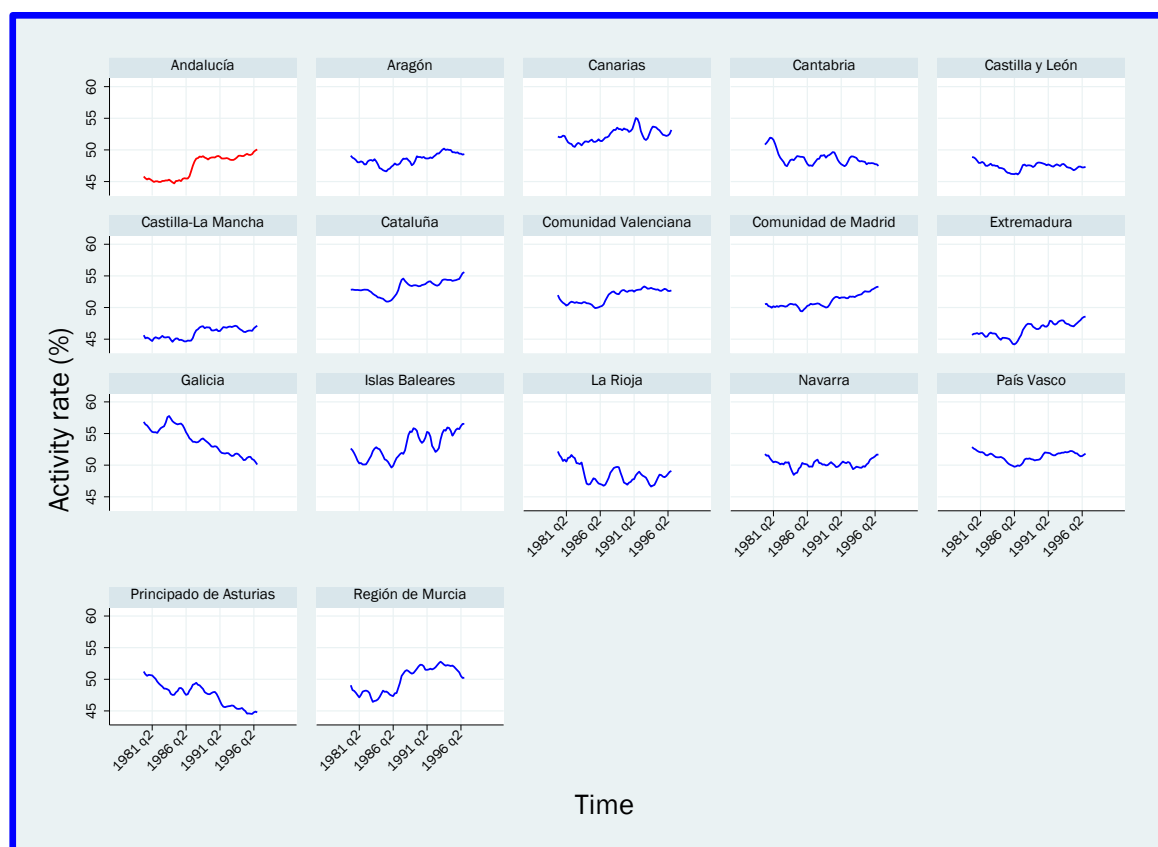
**Source:** Labour Statistics Bulletin. Ministry of Labour.

**FIGURE 3. Population Over 16 Years Old in Castilla y León and Inland Andalucía: 1976–2024**



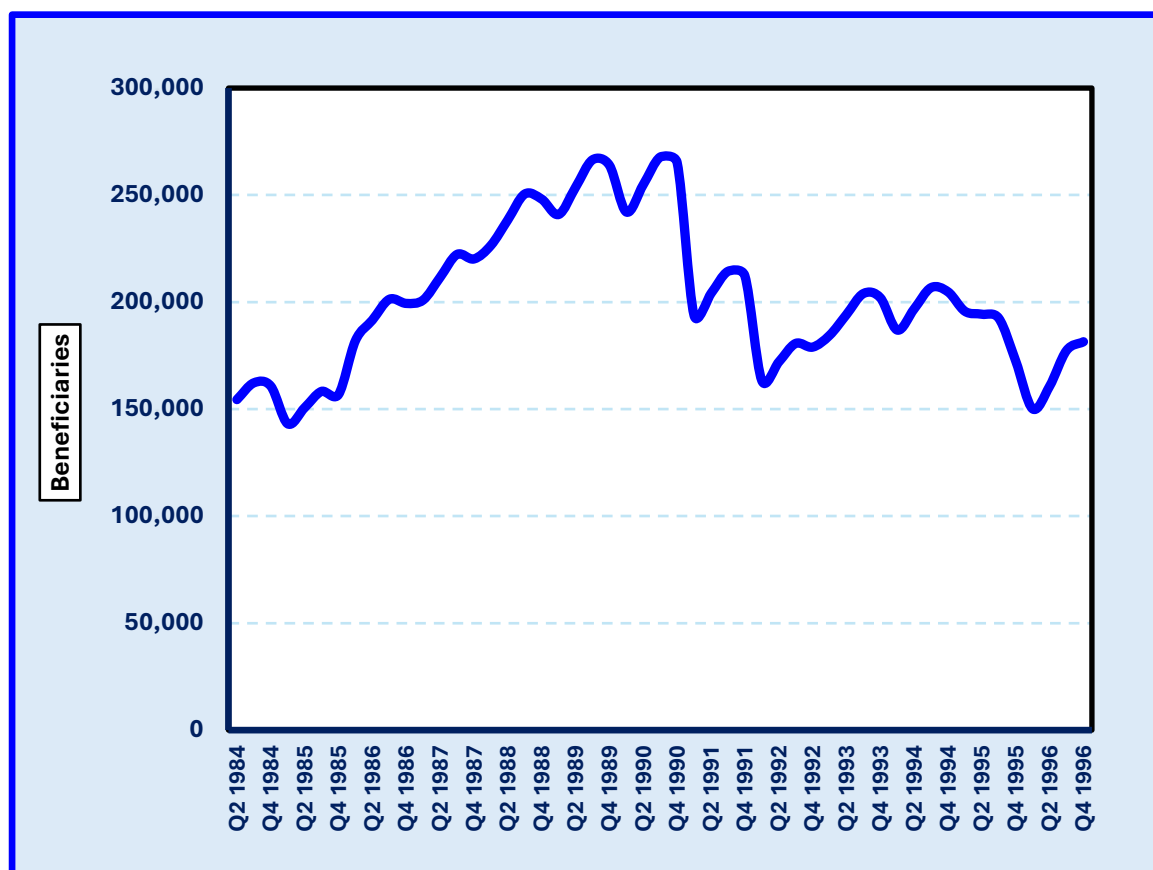
**Source:** Spanish Labour Force Survey.

**FIGURE 4. Labour Force Participation Rate by Region: 1984-1996**



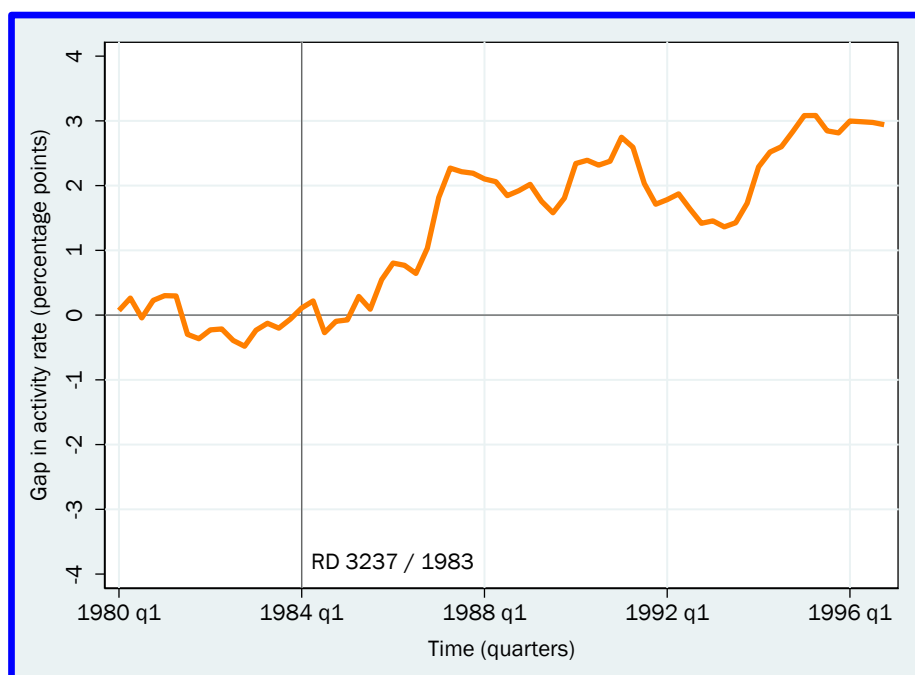
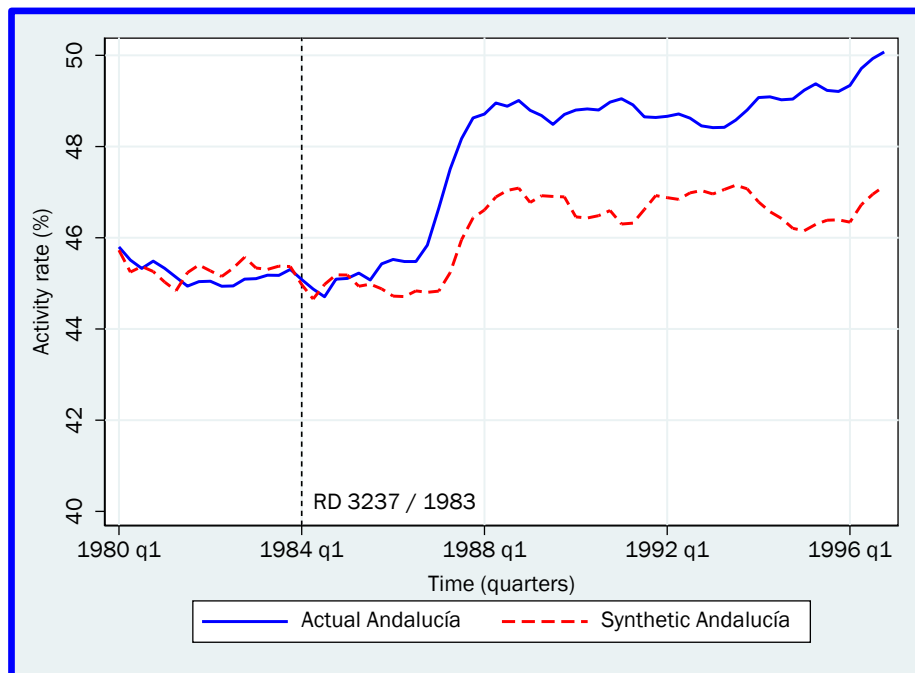
**Source:** Own elaboration.

**FIGURE 5. Number of Beneficiaries (quarterly data)**



**Source:** Own elaboration.

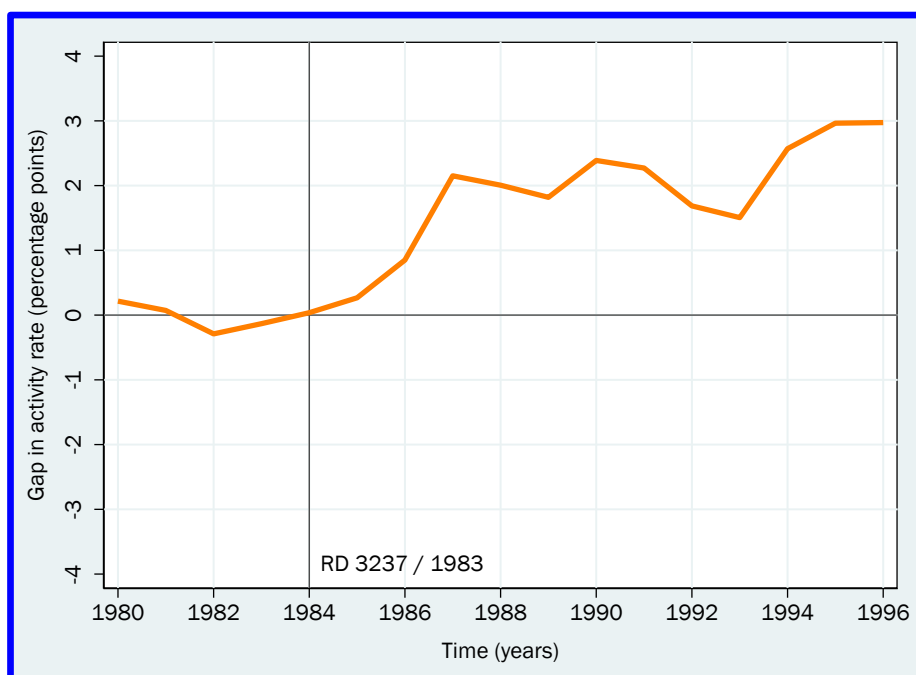
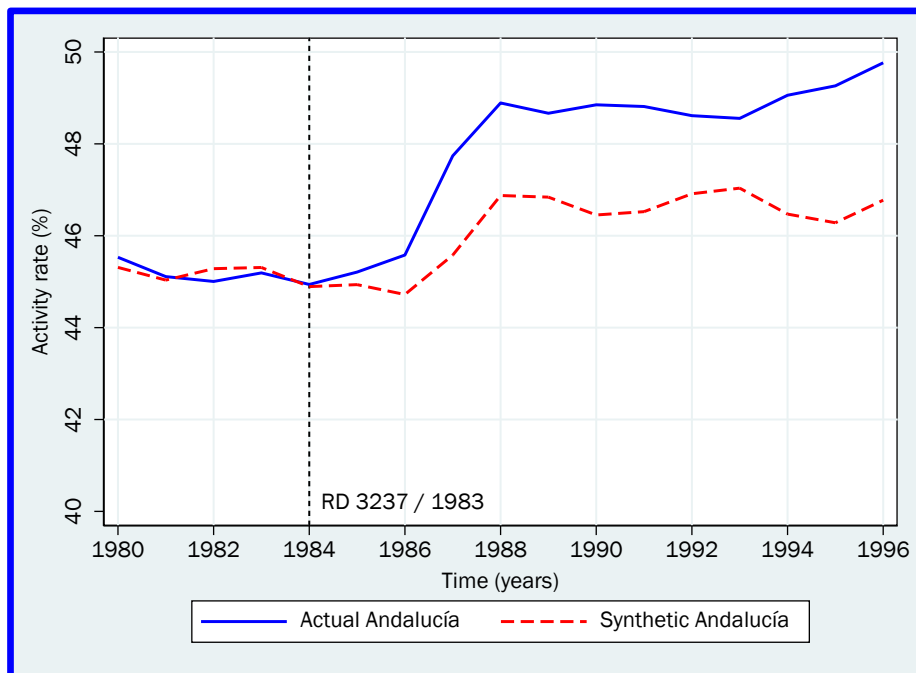
**FIGURE 6a. “Eyeball” Test and Treatment Effects (ATT): 1980.Q1–1996.Q4**



**Source:** Own elaboration.

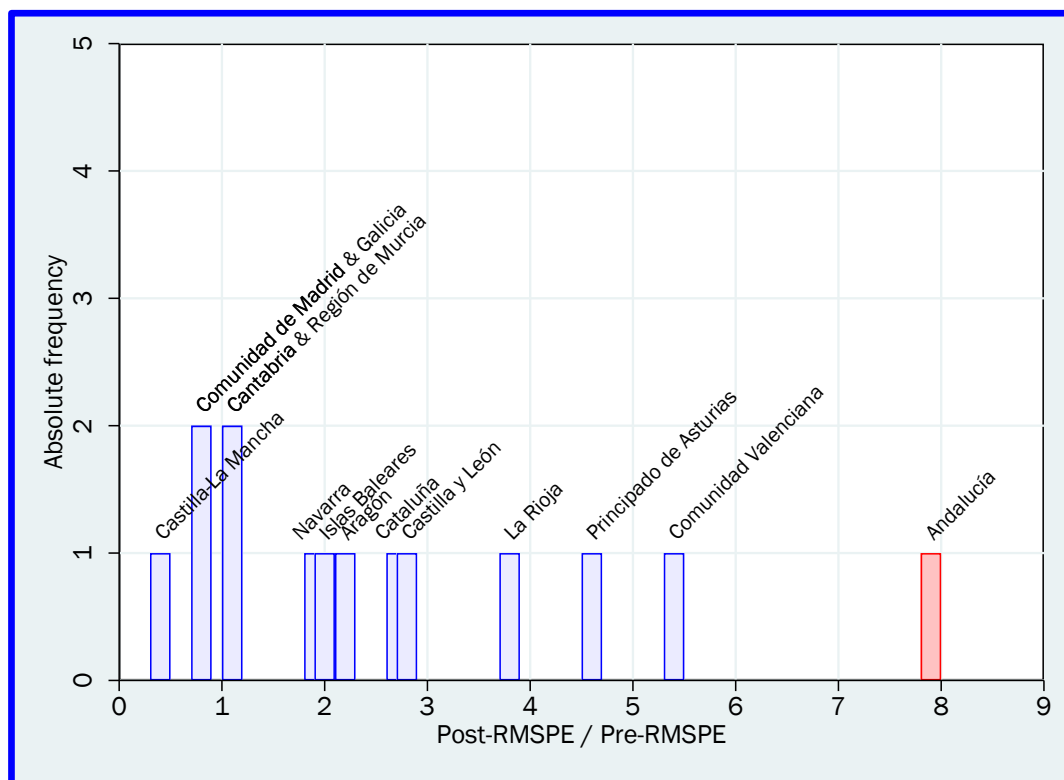
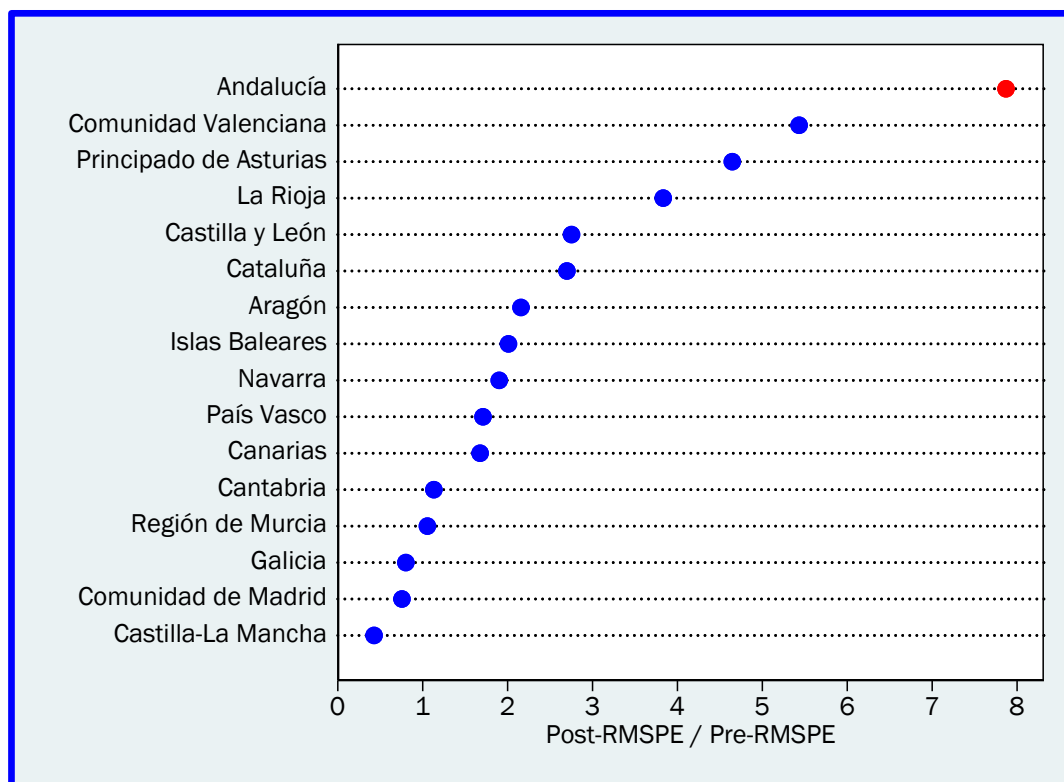


**FIGURE 6b. “Eyeball” Test and Treatment Effects (ATT): 1980–1996**



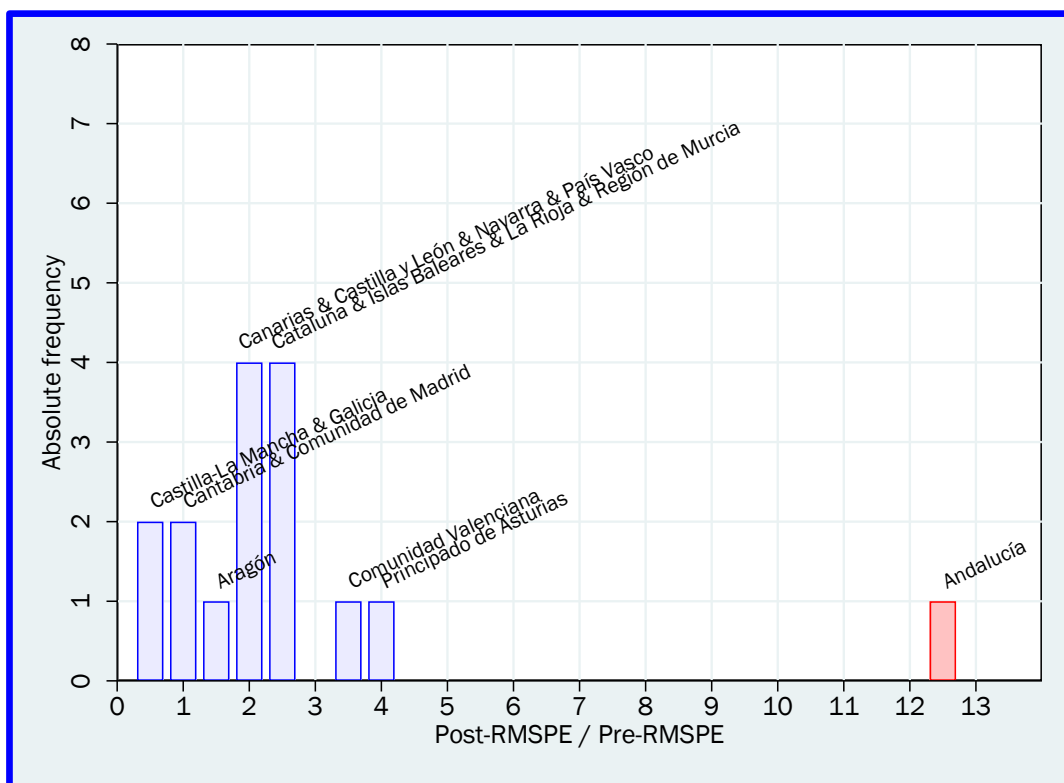
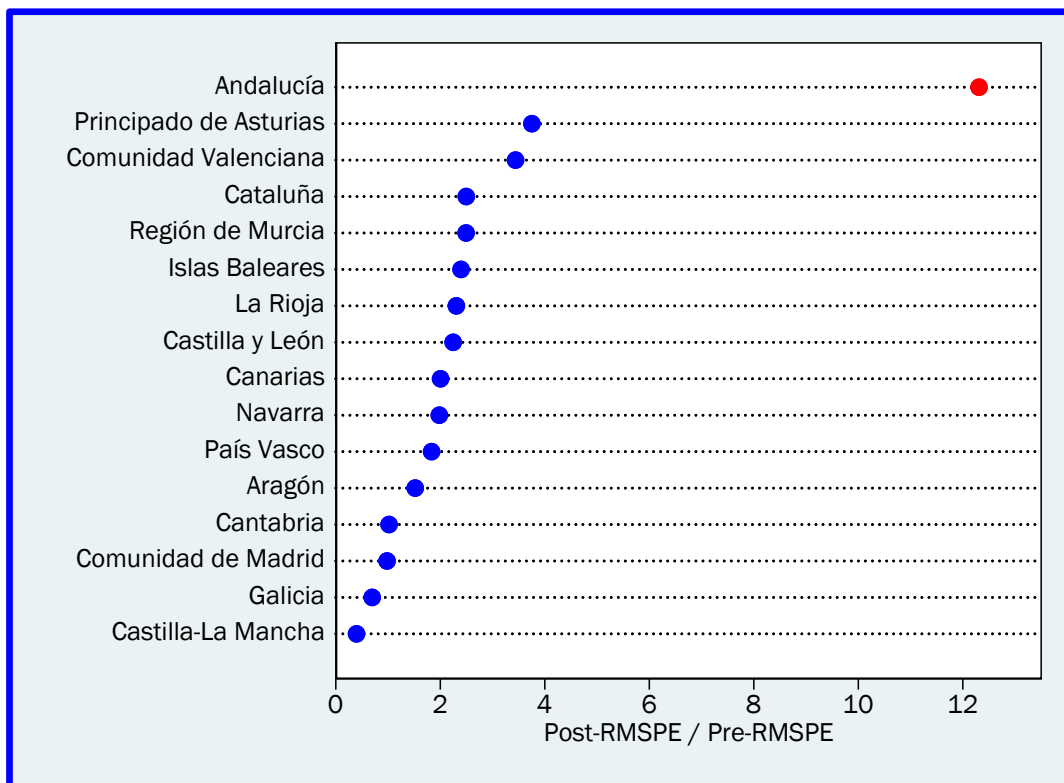
**Source:** Own elaboration.

**FIGURE 7a. Inference Through RMSPE (quarterly data)**



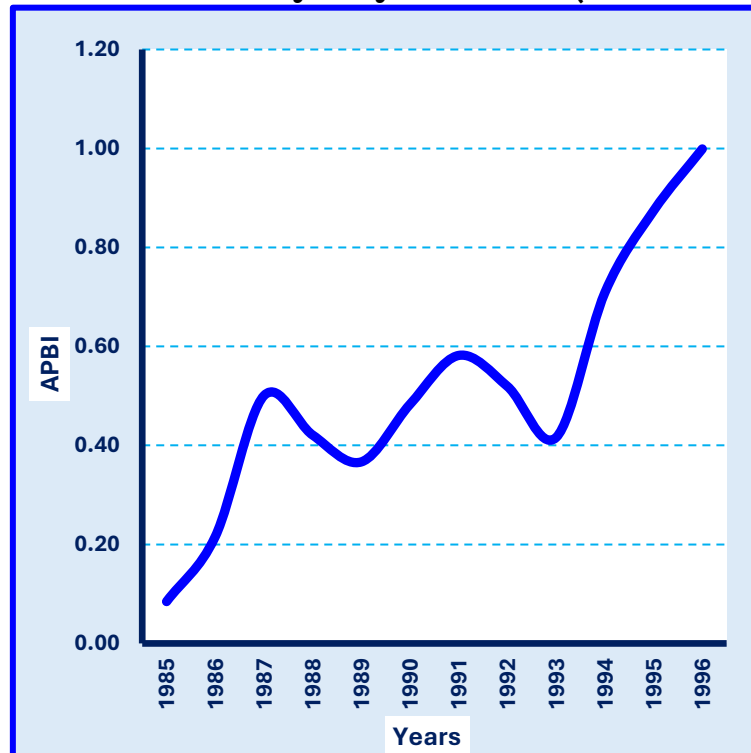
**Source:** Own elaboration.

**FIGURE 7b. Inference Through RMSPE (yearly data)**



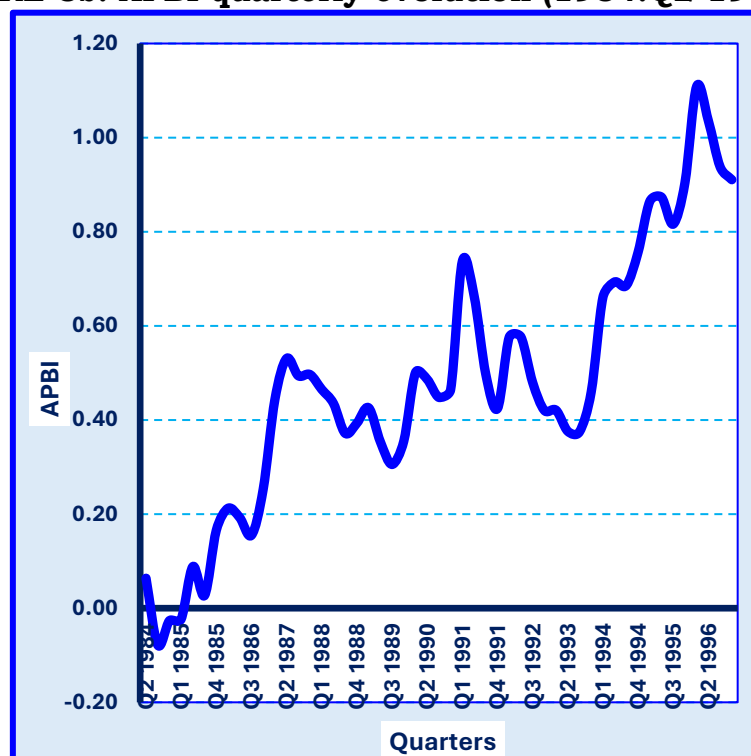
**Source:** Own elaboration.

**FIGURE 8a. APBI yearly evolution (1985-1996)**



**Source:** Own elaboration

**FIGURE 8b. APBI quarterly evolution (1984.Q2-1996.Q4)**

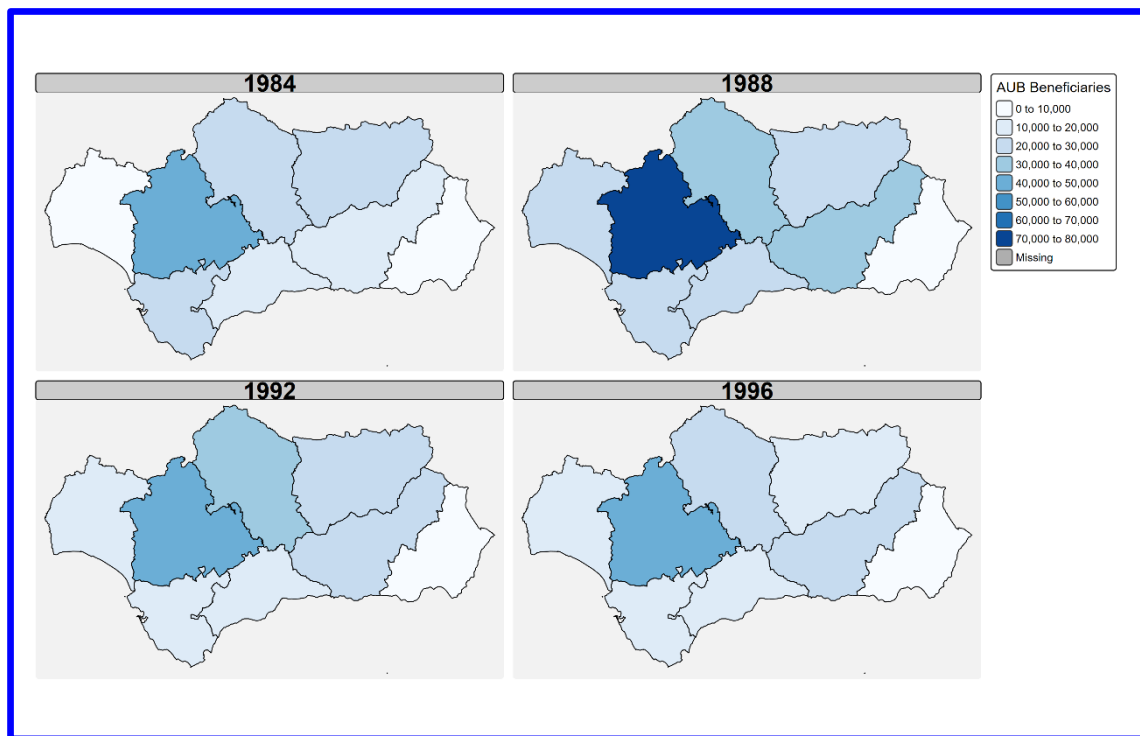


**Source:** Own elaboration

## **APPENDICES**

## ► APPENDIX 1: Visual Breakdown of AUB Beneficiaries in Andalucía

**FIGURE A1-1. Beneficiaries by Province**



**Source:** Own elaboration.

## ► APPENDIX 2: Theory

### **Non-critical Assumptions.**

**A1.** Labour is homogeneous, meaning all workers receive the same wage ( $w$ ).

**A2.** Labour contracts last one period. Signing a new contract requires a fixed amount of time for job searching.

**A3.** Before signing a contract, a worker must spend  $s$  units of time on job search, where  $s$  is fixed and exogenous.<sup>23</sup>

**A4.** The workweek length  $\bar{l}$  is fixed and exogenously determined.<sup>24</sup>

**A5.** The utility function is additive:  $U(C, H) = \Lambda(C) + \Omega(H)$ , where  $C$  represents consumption (equivalent to total income, as there is no saving), and  $H$  denotes leisure time (total time minus work hours). Marginal utilities are positive and decreasing.<sup>25</sup>

### **Proof of the negative relation between $w_0^R$ and $p$ .**

Taking equation (1) and making use of the implicit function theorem:

$$\frac{\partial w_0^R}{\partial p} = - \frac{U(w_0^R \bar{l} + y, 1 - \bar{l} - s) - U(y + b, 1 - s)}{p \bar{l} U_C(w_0^R \bar{l} + y)} < 0 \quad (A1)$$

The negative sign of (A1) is the result of the definition given in (1). First, it is evident that  $U(y, 1) > U(y, 1 - s)$ . Second, to achieve equality in (1),  $U(w_0^R \bar{l} + y, 1 - \bar{l} - s) > U(y + b, 1) > U(y, 1 - s)$  must be fulfilled. In other words: when  $p$  rises (drops),  $w_0^R$  decreases (increases).

### **Aggregation process.**

Workers' differing preferences for consumption, leisure, and non-labour income result in varying reservation wages  $w^R \in [0, +\infty)$ , represented by the cumulative distribution function  $\Phi(w|Z)$ , where  $Z$  includes other PR determinants. If  $Z$  remains constant, aggregate labour supply follows:

$$L = N \times \Phi(w) \quad (A2)$$

<sup>23</sup> Treating  $s$  as endogenous is beyond this paper's scope; this pertains to job-search theory (see [Tatsiramos & van Ours, 2014](#)).

<sup>24</sup> As the interest is on the labour supply's extensive margin, this assumption focuses on participation decisions.

<sup>25</sup> This assumption is less restrictive than it appears. Firstly, such utility functions yield convex, downward-sloping indifference curves. Secondly, in ordinal utility theory, a logarithmic transformation of the Cobb–Douglas utility function is additive, representing the same preferences.



where  $L$  is the labour force and  $N$  is the working-age population. Thus, the PR is:

$$PR = \frac{L}{N} = \Phi(w) = \int_0^w \phi(v)dv \quad (A3)$$

Since  $\Phi(w)$  is a cumulative distribution function, by definition,  $\Phi_w = \phi > 0$  (i.e. the density function is positive). To analyse the AUB's role, we introduce  $w_M^R$ , the median worker reservation wage, yielding:

$$PR = \Phi(w, w_M^R) \quad (A4)$$

By definition,  $(\partial PR / \partial w) > 0$ , while  $(\partial PR / \partial w_M^R) < 0$ , consistently with the concept of reservation wage. Moreover,  $w_M^R$  depends on  $b$  and  $p$ , both functions of the AUB. Thus:

$$PR(r) = \Phi(w, w_M^R[b(r), p(r)]) \quad (A5)$$

Equation (A5) shows PR depends on the AUB through two channels: (1) job-finding probability, affecting both eligible and non-eligible individuals, and (2) direct AUB impact via  $b$ , influencing eligible workers' behaviour.

### **Reservation wages of eligible and entitled persons.**

When  $b = 0$ , expressions (3) and (4) coincide with expression (1) and, therefore,  $w_0^R = w_1^R = w_2^R$ . Then, we can examine how  $w_1^R$  and  $w_2^R$  change when  $b$  varies. By using the implicit function theorem with (3) and (4), we find:

$$\frac{\partial w_1^R}{\partial b} = -\frac{(1-p)U_c(y+b)}{p\bar{l}U_c(w_1^R\bar{l}+y)} < 0 \quad (A6)$$

$$\frac{\partial w_2^R}{\partial b} = \frac{U_c(y+b)}{\bar{l}U_c(w_2^R\bar{l}+y)} > 0 \quad (A7)$$

The negative sign in (A6) is evident. The positive sign in (A7) arises from the additivity of the utility function (Assumption A5), implying  $U_c(y+b, 1-s) = U_c(y+b, 1)$ . Consequently, for  $b > 0$ ,  $w_2^R > w_0^R > w_1^R$ , as depicted in **FIGURE A2-2**.<sup>26</sup>

[INSERT **FIGURE A2-2**]

<sup>26</sup> Besides,  $w_1^R$  is a convex function of  $b$  and  $w_2^R$  a concave function of  $b$ :

$$\frac{\partial^2 w_1^R}{\partial b^2} = -\frac{(1-p)U_{cc}(y+b)}{p\bar{l}U_c(w_1^R\bar{l}+y)} > 0; \quad \frac{\partial^2 w_2^R}{\partial b^2} = \frac{U_{cc}(y+b)}{\bar{l}U_c(w_2^R\bar{l}+y)} < 0$$

From equation (5), when  $q = 0$ ,  $w_3^R = w_2^R$ ; when  $q = 1$ ,  $w_3^R = w_1^R$ . As  $q$  increases,  $w_3^R$  decreases and vice versa:

$$\frac{\partial w_3^R}{\partial q} = -\frac{U(y+b, 1) - U(y, 1)}{p\bar{l}U_c(w_3^R\bar{l} + y)} < 0 \quad (A8)$$

The negative sign of (A8) is due to the decreasing marginal utility of income. There is a linear relationship between  $w_3^R$  and  $q$ , as depicted in **FIGURE A2-3**, since  $(\partial^2 w_3^R / \partial q^2) = 0$ . A critical value  $q^*$  exists where  $w_3^R$  equals  $w_0^R$ .<sup>27</sup>

[INSERT **FIGURE A2-3**]

**FIGURE A2-3** illustrates how the AUB's effect on labour participation depends on monitoring levels. For a given  $b$ , if monitoring exceeds  $q^*$ ,  $w_3^R$  is lower than  $w_0^R$ , encouraging labour participation. Conversely, if  $q < q^*$ ,  $w_3^R$  exceeds  $w_0^R$ , discouraging participation. This dynamic arises from comparing the certain leisure loss from working with the expected gain of receiving the AUB. The probability  $q$  of losing AUB eligibility due to not job searching influences this assessment: if  $q > q^*$ , the expected gain outweighs the loss; otherwise, it does not.

Expression (A9) shows this ambiguity formally:<sup>28</sup>

$$\frac{\partial w_3^R}{\partial b} = \frac{(p-q)U_c(y+b)}{p\bar{l}U_c(w_3^R\bar{l} + y)} \leq 0 \quad (A9)$$

The sign of (A9) depends on the difference between the likelihood of finding a job and the likelihood of being caught without searching for a job when claiming for the AUB. From (A9), for relatively high values of  $q$ , the sign is negative. Hence, the level of monitoring becomes key to determining the encouraging or discouraging effect of the AUB on the labour supply. The higher the  $q$ , the stronger the incentives for an individual to participate in the labour market.

At the individual level,  $w_3^R$  varies with  $p$  as shown in expression (A10):

$$\frac{\partial w_3^R}{\partial p} = -\frac{U(w_3^R\bar{l} + y, 1 - \bar{l} - s) - U(y+b, 1-s)}{p\bar{l}U_c(w_3^R\bar{l} + y)} \leq 0 \quad (A10)$$

<sup>27</sup> From equations (1) and (5), and assumption A5, when  $w_0^R = w_3^R$ , then:

$$U(y, 1) - (1-p)U(y, 1-s) = qU(y, 1) + (1-q)U(y+b, 1) - (1-p)U(y+b, 1-s) \Leftrightarrow p = q^*$$

<sup>28</sup> This ambiguity affects the concave or convex profile of  $w_3^R$  as a function of  $b$  too:

$$\frac{\partial^2 w_3^R}{\partial b^2} = \frac{(p-q)U_{cc}(y+b)}{p\bar{l}U_c(w_3^R\bar{l} + y)} \leq 0$$

Unlike the case for non-eligible individuals, see equation (A1), the sign of expression (A10) is ambiguous. The utility  $U(w_3^R \bar{l} + y, 1 - \bar{l} - s)$  may be greater or less than  $U(y + b, 1 - s)$ , making the numerator positive or negative. This ambiguity arises because  $U(y + b, 1 - s)$  can be greater or less than the utility of not participating,  $qU(y, 1) + (1 - q)U(y + b, 1)$  depending on individual preferences between income and leisure.

### **Reservation wage of eligible but not entitled persons**

Expressions (A11) and (A12) shows how the reservation wage varies when the AUB and the likelihood of finding a job change, respectively:<sup>29</sup>

$$\frac{\partial w_4^R}{\partial b} = - \frac{U_c(y + b)}{\bar{l} U_c(w_4^R \bar{l} + y)} < 0 \quad (A11)$$

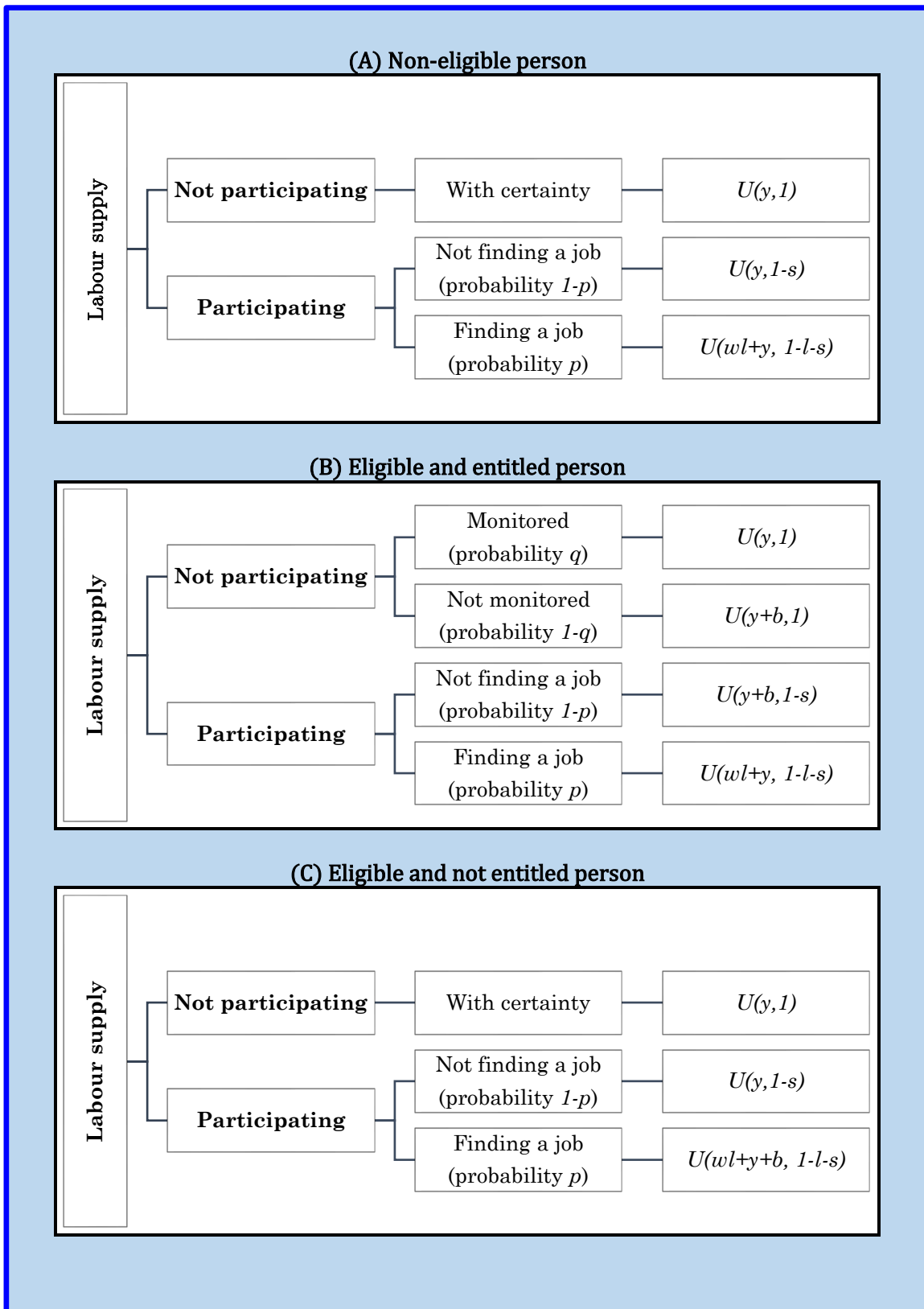
$$\frac{\partial w_4^R}{\partial p} = - \frac{U(w_4^R \bar{l} + y + b, 1 - \bar{l} - s) - U(y, 1 - s)}{p \bar{l} U_c(w_4^R \bar{l} + y)} < 0 \quad (A12)$$

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<sup>29</sup> It can also be proved that  $w_4^R$  is a concave function of  $b$ :

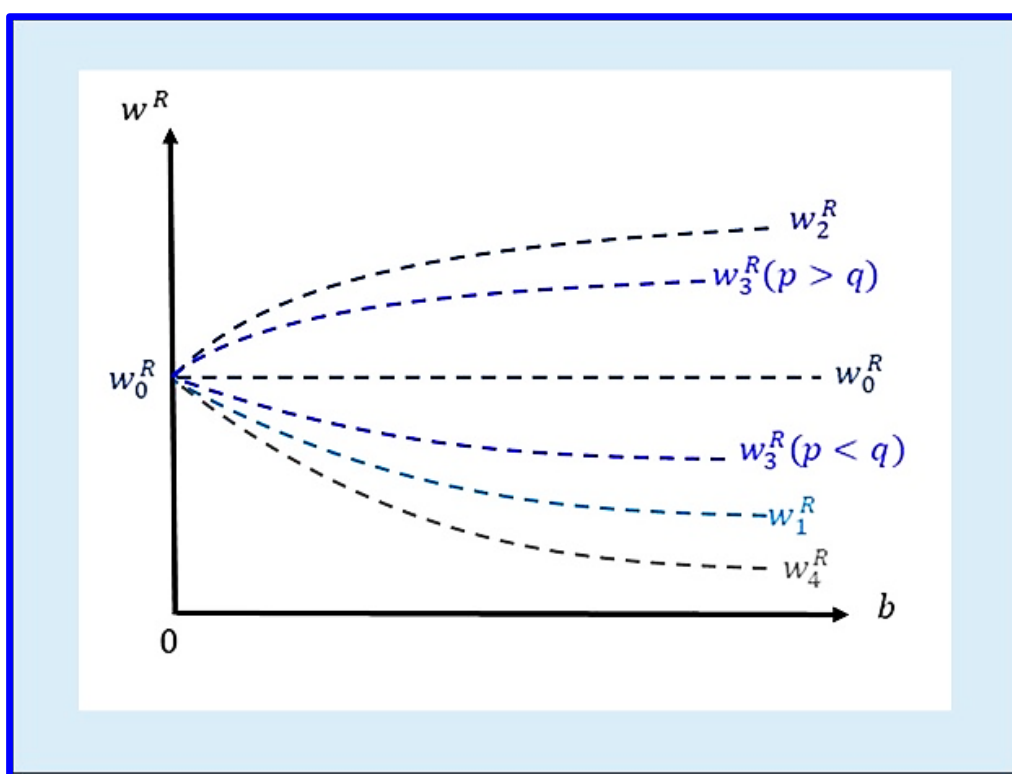
$$\frac{\partial^2 w_4^R}{\partial b^2} = - \frac{U_{cc}(y + b)}{\bar{l} U_c(w_4^R \bar{l} + y)} > 0$$

**FIGURE A2-1. Set of Alternatives Regarding Labour Participation**



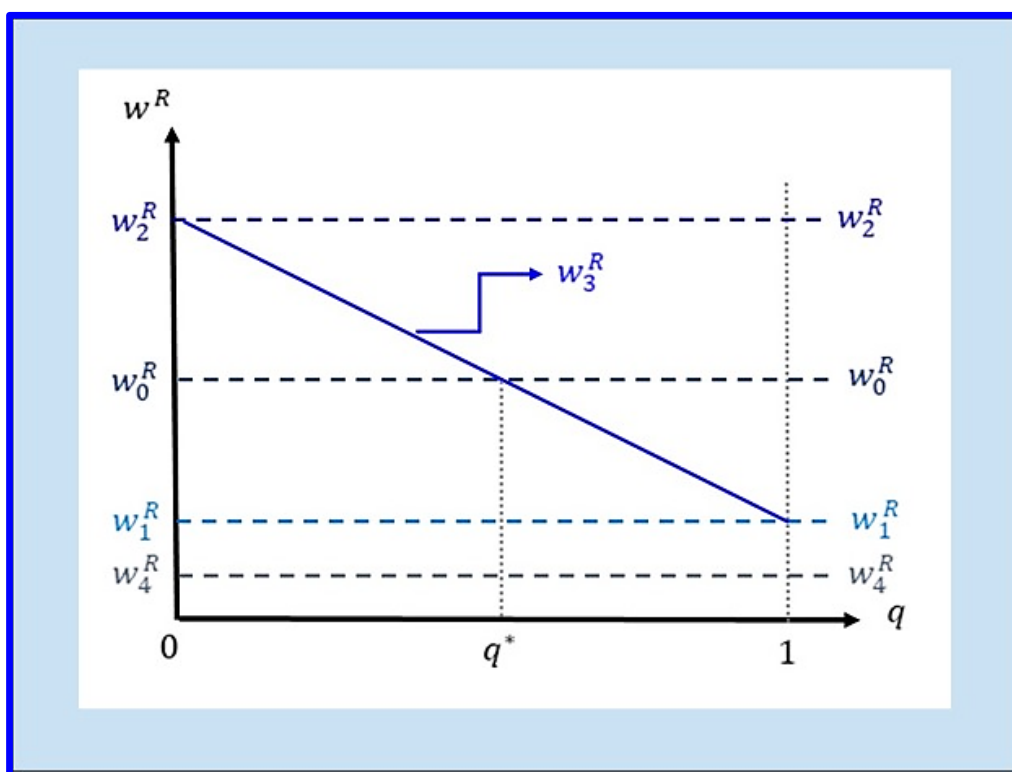
**Source:** Own elaboration.

**FIGURE A2-2. Reservation Wages as a Function of “b”**



**Source:** Own elaboration.

**FIGURE A2-3. Reservation Wages as a Function of “q”**



**Source:** Own elaboration.

### ► APPENDIX 3: Backward Estimation of Quarterly Beneficiary Numbers

The *Bulletin of Labour Statistics* began publishing quarterly data on the number of beneficiaries only in 1995. To construct a consistent quarterly series for earlier years, we employed a two-step estimation procedure.

**Step 1:** Using data from 1995 to 2002, when quarterly figures are available, we estimated the following equation:

$$\ln\left(\frac{AUBR_t^q}{AUBR_t^y}\right) = \sum_{i=1}^4 \beta_i Q_{it} + \varepsilon_t \quad (t = 1995q1 \text{ to } 2002q4) \quad (A13)$$

Here,  $AUBR_t^q$  denotes the observed quarterly number of beneficiaries, and  $AUBR_t^y$  is the annual average, repeated four times each year. The  $Q_{it}$  are quarterly dummy variables capturing seasonal effects,  $\beta_i$  are the corresponding coefficients to be estimated, and  $\varepsilon_t$  is the error term. This specification isolates seasonal variation in the data.

**Step 2:** We then applied the estimated seasonal coefficients  $\widehat{\beta}_1, \widehat{\beta}_2, \widehat{\beta}_3, \widehat{\beta}_4$  to the annual figures for 1984–1994 to impute quarterly values:

$$\widehat{AUBR}_t^q = \sum_{i=1}^4 (1 + \widehat{\beta}_i) Q_{it} AUBR_t^y \quad (t = 1984q1 \text{ to } 1994q4) \quad (A14)$$

This yields a reconstructed quarterly series of beneficiaries for the pre-1995 period, which we use to test Hypotheses 1 and 2.