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Challenging the working time reduction and wages trade-off: a simulation for the Spanish economy

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This paper analyzes the effect of working time reduction (WTR) on the Spanish economy. Using microdata from the Economically Active Population Survey (EAPS) and the Wage Structure Survey (WSS), we estimate the changes in employment, worked hours, wages and salaries, and the labour share driven by a 5-hour reduction of the ordinary work week in full-time contracts (from 40 hours to 35 hours), without a wage reduction. According to our results, this WTR would mean the liberation of private sector hours that are equivalent to 1.2 million full-time jobs. To calculate job creation, we consider the occupations and technical conditions of production (based on the European Working Conditions Survey). Consequently, had the WTR taken place in 2017, it would have created 560 thousand jobs, thus causing the unemployment rate to fall by 2.6 p.p. Moreover, women are found to be the group most affected by this measure. As for the effect on wages, these would have increased by 3.7%, implying a labour share increase of 2.1 p.p. Finally, we study the macroeconomic effects, through an extended version of the single-equations Bhaduri–Marglin model using quarterly data from 1995Q1 until 2017Q4. Our results show that a WTR of 5 hours leads to an increase of 1.4% in GDP.

Key words: Bhaduri–Marglin, Spanish economy, Working time reduction, Labour market
JEL classifications: C22, E22, E32

1. Introduction

Until quite recently, working time has been a central issue in collective bargaining agreements and labour policies (Messenger, 2011; Berg *et al.*, 2014). Indeed, its historical trend reflects a decline in working hours, which can be appreciated on various levels (Huberman and Minns, 2007). To be more precise, working time was reduced throughout the lifetimes of working people mainly because of the implementation of

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pension schemes and mandatory education. Annually, working time fell with the introduction of paid leave, and lastly, weekly working time underwent a substantial reduction not only due to the transition from the 6-day week to the 5-day week, but also the decrease in weekly working hours within the 5-day week. Regardless of employment level, working time dropped sharply during the first decades of the twentieth century and its decline decelerated from the 40s until the 80s (De Spiegelaere and Piasna, 2017). Nevertheless, this continuous reduction in working hours came to a halt as the claims brought by workers were rejected at the bargaining table. As a matter of fact, it is hard to find examples of working time reduction (WTR) in the past two decades in the oldest European Union Member States. Moreover, as some scholars point out, this declining trend could even reverse itself, as a result of an increase in the age of retirement (ibid.).

The arguments in favour of putting WTR back at the forefront of the workers' agenda are manifold. The recent literature on the effects driven by a WTR focuses mainly on microeconomic effects. Tucker and Folkard (2012) addressed the negative effects derived from longer daily hours as well as longer weekly hours. Whereas the former is associated with acute fatigue effects, the latter has been found to cause chronic fatigue and long-term health problems. Lepinteur (2018), in a study of WTR in Portugal and France, found positive effects in job and leisure satisfaction. De Spiegelaere and Piasna (2017) created a guide that tackles the reasons for introducing a WTR, and how it can be implemented. In their guide, they expanded on the positive effects that result from a WTR. We will briefly mention a few of them.

Given the unequal distribution of both paid and non-paid working time among women and men, the implementation of a WTR could be a step forward to gender equality. Firstly, a WTR might increase the participation in the labour market of women, who suffer a higher degree of underemployment, and as a result reorient trade union demands towards a more feminist perspective. And secondly, a WTR might also free up some paid working hours of men, who normally suffer from overemployment, so that they could devote more time to childcare and housework.

A reduction in the weekly working time might lead to an increase in labour productivity through various mechanisms: first, through the physiological factor, which relates to the workers' concentration and better suitability for work after a proper rest; second, through the motivational factor, which stems from the idea that shorter workdays increase the motivation of workers, rendering them more efficient; and third, via the organisational effect, given that WTR requires a complete redesign and redistribution of work. Golden (2012) synthesised the literature in this field and found a negative response of per-hour productivity to an increase in working time, both in the USA and in 18 EU countries.

There is no consensus in the literature as to the WTR effects on employment. Some scholars point to a positive effect on job creation, whereas several researchers have found the indirect upward effect on wage to be negative (Kapteyn *et al.*, 2004). The supply-side literature has traditionally considered wages exclusively as a production cost and consequently any increase in the marginal cost of production implies an output (and employment) decrease in a profit-maximising firm. It therefore follows that:

First, some critics of WTR point to a contraction in output and employment due to a lower capital operating time, which reduces the utilisation rate of installed capacity and investments in new equipment. However, Gilles (2015) finds that WTR in France has not translated into a decrease in capital operating time since firms increased shiftwork to compensate for the decreased hours of work.

A second critique states that firms in their optimal situation would prefer to extend overtime instead of hiring new employees, meaning that WTR fails to increase employment. However, Jacobson and Ohlsson (2000) find that legislated working time and hours per worker in Sweden have a long-term relationship. Accordingly, a WTR policy could decrease actual hours per worker.

Finally, WTR opponents hold that the practice leads to an increase in unit labour cost (ULC). In that case, companies reduce the demand for labour and domestic prices of goods and services rise. This loss of price-competitiveness could lead to a negative contribution of net exports to GDP and a lower employment rate.

On the other hand, Keynesian economists have widely considered that the supply-side framework adopts very unrealistic assumptions (Rowthorn, 1999), given that only when an economy is operating at full capacity is an increase in demand fully translated into prices. Considering the consensus about the positive relationship between reduction in working time and a proportional increase in hourly wages (Hunt, 1999) the final effect on GDP will depend on the response to the wage increase.

The Bhaduri and Marglin (1990) model offers the advantage of capturing the two-sided role of real wages, as a production cost and as a major source of demand, particularly on consumption, investment and net exports. On the one hand, a demand regime is wage-led when an increase in the labour share raises aggregate demand and the rate of accumulation through a strong acceleration effect on investment. On the other hand, a demand regime may be profit-led if an increase in the labour share reduces aggregate investment and hence GDP, through a lower profitability. As we discuss in Section 3.1, the macroeconomic impact of the WTR policy with no loss of pay could be positive or negative depending on the demand regime. The supply-side effect of an increase in ULCs can reduce exports through the export price-competitiveness effect or it could drive inflation up, increasing imports. However, if these effects are not significant or are weak, the final effect will be positive, given the positive impact of wages on consumption and investment.

The case of the WTR in France is undoubtedly the most similar and thus constitutes the reference for our research. Three laws were implemented to achieve WTR (Robien, 1996, Aubry I, 1998 and Aubry II, 2000). Hayden (2006) and Askenazy (2013) provided a review of the papers following microeconomic and macroeconomic perspectives, where some consensus among Keynesian researchers on the effect on the employment level was reached.

From a macroeconomic approach, Husson (2002) estimated several employment functions and attributed to WTR an employment creation of 448,000–508,000 jobs. Provided that 8 million full-time employees benefited from WTR[1] (Gubian *et al.*, 2004, p. 49, table 2), the estimated net employment rates were between 5.6 and 6.3%. Similarly, Logeay and Schreiber (2006) calculated 500,000 jobs (6.2%) using Vector autoregression models. Du *et al.* (2013) elaborated a methodology based on other countries as counterfactuals to test the effect of a 35-hour workweek regulation in France on unemployment and real GDP. Their estimations yielded positive effects on both real GDP (1.36%) and the level of employment (unemployment fell by 1.58%).

From a microeconomic perspective, Passeron (2002) estimated a net employment rate for firms affected by the Robien law of around 6–7.5%, by 3% for other companies

[1] We have used this value as a reference in order to estimate the net employment rates with the exception of Passeron (2002) because his study covers the period 1997–2000.

and by 4% for the whole economy during the 1997–2000 period (Tables 1 and 2). Similarly, the Directorate for the Coordination of Research, Studies and Statistics (DARES) and Gubian *et al.* (2004) estimated that approximately 350,000 jobs were created by WTR between 1998 and 2002, which implied a net employment rate of 4.4%. Bunel *et al.* (2002), Bunel and Jugnot (2003), Bunel (2004) and Crépon *et al.* (2004) found the job creation in firms benefiting from incentive scheme assistance to be higher than the job creation in those not receiving these incentives. Net employment rates of the former span from 6.9 to 8.8% (Robien), and from 5.4 to 9.9% (Aubry I); however, the rates of the latter range from 3 to 4% (Aubry II). Altogether, estimated employment creation varies between 300,000 and 356,000. Chemin and Wasmer (2009) find a significantly lower employment creation of 155,000 jobs. However, Chemin and Wasmer (2017) recognise that WTR was implemented with a lower intensity in their case study than in the rest of France, and therefore their results are not consistent with the existing literature.

In this paper, we aim to determine the effects on employment and real GDP after the implementation of a WTR from 40 to 35 hours per week in the case of the Spanish private sector in 2017. Basing our work on the French example, we simulate a WTR in two steps. In the first step, companies with more than 10 employees would be obliged to apply the 35-hour workweek. Two years after its implementation, WTR would be extended to all companies. All in all, the full implementation period of WTR amounts to four years. To that end, the Workers' Statute would have to be amended in a similar way to Law 4/1983,[2] while adding the implementation calendar, as specified in the Aubrey Law (1998–2000). The WTR we simulate does not imply a pay loss. Nevertheless, active labour market policies (ALMPs)[3] should be promoted, such as training and incentives, given their important role in job creation (as indicated by the French evidence).

To determine the hotly debated effects on the level of employment, we first tackle the issue of the substitutability of the 'gross liberated hours' by the newly employed. Second, we estimate the effect of a WTR where the cost of reduction is not borne by the workers, as previously mentioned. Our hypothesis is that an increase in the labour share (Ω), driven by an increase in the hourly wage and the newly employed, boosts real GlaborDP if the demand regime of the Spanish economy is wage-led.

The left-side of Figure 1 represents the microeconomic mechanisms of a WTR (continuous lines). As a WTR is implemented, companies are forced to redesign their work practices. This reconfiguration could lead to effects on labour productivity. However, there is some uncertainty in this regard. The reduction in weekly working time could reduce the hourly workday per worker, thus increasing labour productivity. This increase could be fostered by the introduction of shift-work. As previously discussed, labour productivity is likely going to increase, making ULCs fall. Consequently, the extent to which the combined factor costs vary is unclear, and will receive further attention below.

The right side of Figure 1 represents the macroeconomic mechanisms of a WTR (dashed lines). The introduction of a WTR, keeping wages constant, maintains the level of demand in the economy. As companies have to face the same level of

[2] The latest reduction in working hours in Spain was due to Law 4/1983, from 29 June, which reduced the legal maximum working week from 42 to 40 h and increased the minimum annual paid vacation from 23 to 30 days. This legal change was introduced with no loss of pay and therefore we have used it as an example.

[3] These public incentives could be partly financed through resources devoted to the unemployed thanks to the unemployment reduction and the increase in Government income caused by WTR.

Table 1. *Job creation*

Occupations	Substitution index for workers with complex tasks	Substitution index for workers without complex tasks	Workers in companies >10 employees	Workers in companies <10 employees	Gross liberated hours	First stage	Second stage	Total
	%	%	%	%	FTE	FTE	FTE	FTE
	1	2	3	4	5	6 = (1*3 + 2*3)*5	7 = (1*4 + 2*4)*5	8 = 6 + 7
Workers in personal services and salespersons	5.5	44.2	52.4	33.8	233,283	60,716	39,164	99,881
Craftspersons and skilled workers	27.9	14.4	55.6	40.9	203,374	47,790	35,155	82,945
Scientific and intellectual technicians and professionals	48.3	5.9	89.8	9.6	148,670	72,348	7,734	80,082
Technicians; support professionals	36.1	11.3	84.0	14.4	159,645	63,604	10,904	74,507
Basic occupations	4.5	50.5	58.6	19.7	172,236	55,521	18,665	74,186
Accounting, administrative and other office employees	25.7	17.6	79.6	19.6	148,922	51,337	12,641	63,978
Installation and machinery operators and assemblers	9.2	34.1	83.3	15.6	147,549	53,188	9,961	63,149
Directors and managers	18.6	19.2	63.6	36.4	42,661	10,270	5,878	16,147
Skilled agricultural sector workers	8.6	39.3	74.2	19.7	15,779	5,608	1,489	7,097
Total					1,272,119	420,383	141,591	561,973

Note: FTE is calculated by dividing the total amount of hours by 35 (the new weekly working time).
Source: Own elaboration using microdata from the EWCS and EAPS.

Table 2. *Unemployment rate reduction (p.p.)*

Provinces	Ex-ante		Ex-post		Variation of the U3 and U6 rates
	U3 rate	U6 rate	U3 rate	U6 rate	
Badajoz	28.2	43.3	26.5	41.6	−1.7
Madrid	13.3	24.1	10.4	21.2	−3.0
Barcelona	13.1	18.8	10.1	15.8	−3.0
Huesca	9.0	18.1	6.7	15.8	−2.4
Total	17.2	27.8	14.8	25.3	−2.5

Source: Own elaboration.

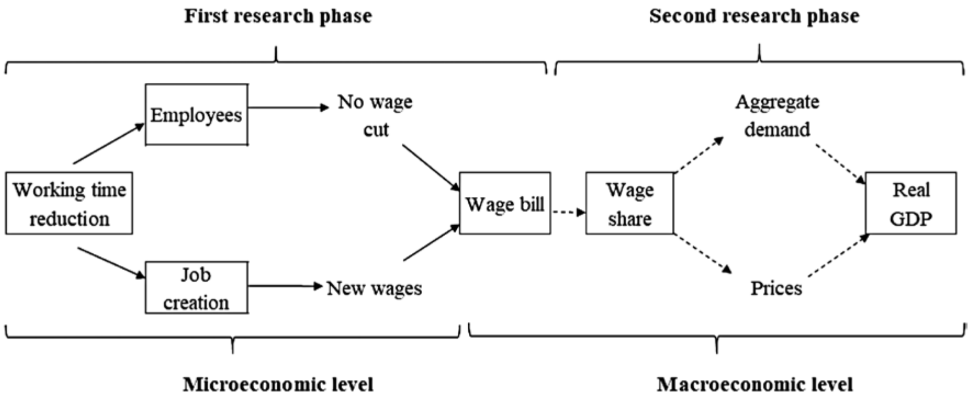

Fig. 1. *Disentangling the micro- and macro-impacts of a WTR.*

production with less labour (we assume that the increase in labour productivity does not balance out the demand for workers), they need to hire more employees. In the first round, the labour share increases because of the wages of the newly employed (there is an increase in the labour income but also inflation), which boosts real GDP.

As depicted in Figure 1, our methodology is based on two research phases. The first one (see Supplementary Appendix A) employs micro-databases to obtain the aggregate outcomes (job creation and the change in functional distribution) of the private sector. The second research phase is dedicated to the macroeconomic effects (taking the economy as a whole) of a WTR through an extended version of the single-equations Bhaduri–Marglin model with quarterly data from 1995Q1 until 2017Q4. This model emphasises the role of distributional change in economic growth, thus enabling us to obtain the impact on GDP driven by an increase in the labour share. In addition, the effects on ULCs and on domestic prices are studied to analyze the impact on foreign trade and external competitiveness.

This phase has led to several contributions. In the first place, this is to our knowledge the first paper that studies the macroeconomic implications of a WTR following the Bhaduri–Marglin approach. Hence, we also shed light on the relationship between labour policies, the labour share and demand growth. Secondly, we assume that the costs need not be borne by the workers since an increase in the labour share might foster GDP growth in a wage-led economy.

Finally, Spain is a good case study because this country is still suffering from one of the highest unemployment rates in the Eurozone (14.5% in 2018Q4). Moreover, in 2017 Spain had 1.48 million workers who suffered from underemployment, 68.5% of which were women. To the contrary, most of the workers suffering from overemployment (447,869 employees) were men (66.8% of the total). These variables point to a high volume of available hours in Spain.

The paper is organised as follows. Section 2 provides a description of the first research phase and presents the estimated outcomes on employment creation, unemployment reduction and wage increase. Section 3 introduces our theoretical approach and presents our use of the Bhaduri–Marglin model to evaluate the effect of a WTR. This section also presents the data and the estimation techniques employed, reports the results from the estimation of the model and explains the final outcomes. Finally, the last section is dedicated to the conclusions.

2. How does the WTR affect employment and wages?

This section focuses on the following main aspects: (i) the reduction of hours worked by full-time employees, (ii) the increase in employment derived from covering those hours by underemployed and unemployed people, and (iii) the rise in unit wages and the labour share (total labour compensation over GDP in terms of factor costs) as a consequence of employment creation.

2.1 The 'gross liberated hours'

In this section, we use microdata from the Economically Active Population Survey (EAPS) from 2017. We have limited our sample to private sector employees for two reasons. First, self-employed workers are not subject to labour legislation, according to the Workers' Statute. Second, public employees are excluded from the calculation since demand for public employees is determined by the State. Our sample therefore consists of 12.7 million people on average in 2017 with 9.4 million working more than 35 hours per week.

Once the sample is specified, we can calculate the following: (i) the number of weekly hours liberated per employee who works between 35 and 45 hours and (ii) the number of hours available from underemployed persons who work fewer than 30 hours.[4]

In our estimation, the sample has been segmented by three main criteria: (i) by gender: to account for possible effects on gender equality; (ii) by occupation: to include limitations on the supply side, derived from technical conditions; and (iii) by province: to analyze the geographical scope and restrictions on the mobility of workers.

The first variable to establish is the total volume of hours resulting from the WTR, defined as the difference between the 35 hours established by law and the hours currently agreed to by employees in the range between 35 and 45 hours per week. We set the hours per week limit at 45, to eliminate outliers. We believe these observations correspond to workers that accumulate a high number of hours in the reference week, since the aggregate of hours worked yearly is not consistent with the weekly aggregate.

[4] The information from (ii) will be used to estimate the effect on the level of unemployment

This difference constitutes the hours that each employee would stop working per week. We call this variable ‘liberated hours per employee’.

We now turn to a calculation of the total volume of weekly hours to be liberated through the WTR, multiplying those liberated hours per person by the corresponding number of employees affected by the reduction. Given that the unit of hours per week and person is not an intuitive variable, we divide it by 35 hours, thus transforming the results into full-time equivalent (FTE) jobs.

The results show that, on average in 2017, WTR would have liberated 1.27 million equivalent full-time jobs. The analysis of the data by professional occupation reveals a clear heterogeneity by gender (Figure 2). On the one hand, in the more male-oriented sectors, such as in the category of ‘craftsperson and skilled workers’, most of the ‘liberated’ hours correspond to men (approximately 190,136 full-time jobs). On the other hand, in those sectors with a greater presence of women, for instance ‘workers in catering, personal, and protection services and salespersons’ (where the reduction of working time translates to 132,418 full-time jobs), women would benefit more from WTR.

2.2 *Employment creation and unemployment reduction*

The focus in this section is on the extent to which the ‘liberated’ hours will be covered by new workers. As there is no optimal way to determine how companies will respond to the WTR and we are therefore unable to foresee their behavior, this exercise requires an assumption for dealing with the substitutability of the ‘gross liberated hours’. We elaborated a substitution index based on the technical conditions of production using the Sixth European Working Conditions Survey (EWCS), namely the complexity of tasks, the automatic speed of a machine or movement of a product and task rotation (see Supplementary Appendix A).

The advantages of this procedure are several. It allows us to identify those occupations where new jobs would be created. We control for the existence of fixed costs, provided that equipment dependence (automatic speed of a machine) is accounted for in the substitution index. A high degree of dependence calls for an increase in the number of employees to maintain of production and time of use of capital constant (Gilles,

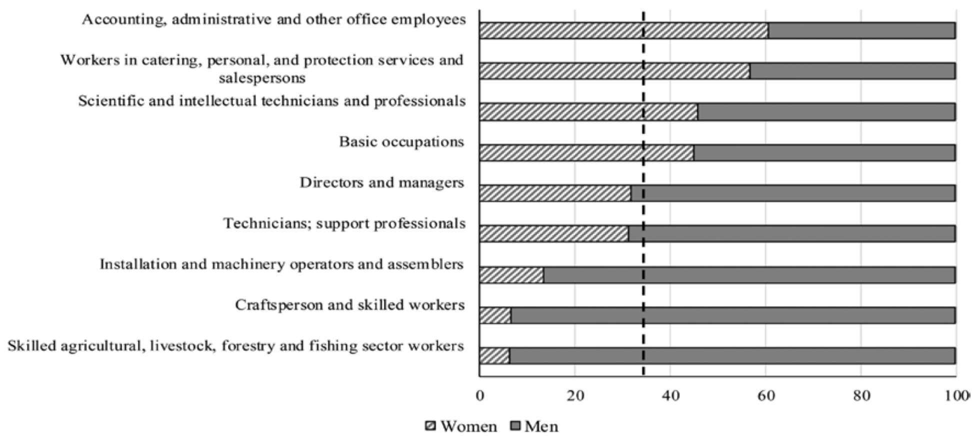

Fig. 2. *Distribution of ‘gross liberated hours’ by gender. Note: Dashed line represents the overall percentage of gross liberated hours worked by women over the total amount. Source: Own elaboration using microdata from the EWCS and EAPS.*

2015). Finally, task rotation enables us to include internal reorganisation strategies of firms through rotation and flexibility of workers.

In sum, Table 1 shows that about 562,000 jobs in FTE would be generated by WTR. Taking into account that the standard deviation is ±4.9% (see Supplementary Appendix A), the lower limit sets job creation at 534,000 jobs and the upper limit at 589,000 jobs. This implies a net employment growth rate (the proportion between the new jobs created and the employees affected by WTR) of 6%. This result is close to the upper limit (6.3 and 6.2%) found in the literature for the French case (Husson, 2002; Logeay and Schreiber, 2006), and similar to the estimated job creation rates for companies after Aubry I.

We consider this result to be plausible for several reasons. First, in the Spanish case the reduction might be greater since the current workweek consists of 40 hours, while France had a 39-hour workweek. This justifies the comparatively higher values of our calculations. Second, this result contemplates the internal reorganisation of companies based on shift-work and public support of job creation (tripartite collective agreements, incentive schemes and training).

Once the creation of employment has been estimated, we calculate its effect on unemployment. We use the definitions of labour underutilisation from the Bureau of Labor Statistics, namely the U3 rate which measures 'total unemployed, as a percent of the civilian labor force', and U6 which relates to 'total unemployed, plus all persons marginally attached to the labor force, plus total employed part time for economic reasons, as a percent of the civilian labor force plus all persons marginally attached to the labor force'.

Table 2 reports these variables for selected provinces (detailed results are available upon request). The analysis shows that there are important differences depending on the productive specialisation of each territory and their level of unemployment. As noted, the greater number of people employed in a province (such as Barcelona and Madrid), the greater the job creation these provinces experience (Barcelona and Madrid).

The unemployment rate in 2017 was 17.2% (U3) and 27.8% (U6). The implementation of the WTR in this year would have implied a U3 (U6) reduction rate of 2.5 p.p to 14.8% (25.3%)—considering that underemployment does not partially cover the 'gross liberated hours'. Regardless of the coverage of gross liberated hours by the underemployed, the U6 rate would have fallen by 2.55 p.p to 25.3%. We must also note that WTR might increase the active population and hence employment, through incoming migration flows and discouraged workers or persons marginally attached to the labour force.

As a conclusion, the reduction of unemployment would be moderate but significant, especially in some territories. Even by controlling for the existence of underemployment as a counterbalancing factor to employment creation, the unemployment rate declines.

2.3 Wage growth

The next step is to calculate the effect that a WTR would have on wages and on income distribution. It is worth remembering that our proposal is to introduce a workweek reduction that is not accompanied by a wage reduction. Consequently, total labour income (the total labour compensation of employees) would remain unchanged. Since the hours worked would decrease, however, the hourly wage would increase in the same proportion. Therefore, the expansionary effect on labour income is produced through the creation of new jobs, led by the WTR. To estimate this expansionary effect, we determine the hourly wage of workers by professional occupation using microdata collected in the Wage Structure Survey (WSS) (see Supplementary Appendix A).

The following step is to apply the previously measured rate of growth to the worked hours, thus obtaining the new volume of worked hours and the hourly wage. We calculate:

(i) the ex-ante labour income, which is defined by multiplying the hourly wage before WTR by the total number of hours worked before WTR for each professional category,
(ii) the ex-post labour income, which is defined by multiplying the hourly wage after WTR by the total number of hours worked after WTR for each professional category.

The rate of growth of total labour income is the difference between the ex-post value minus the ex-ante value over the ex-ante value. We assume that all new employees are paid the average hourly wage corresponding to full-time employees in their professional category. We are aware of the existing gender, workweek and contract pay gaps in Spain, but unfortunately attention will not be devoted to these divergences in this paper.

Hence, the number of employees increases by 4.4% (see Table 3). Conversely, the total amount of hours worked decreases by −5.2%. As a consequence, on the one side, the labour cost per employee is reduced by −0.2% while the labour cost per hour worked augments by 9.9%. On the other side, real labour productivity decreases when measured per employee (−4.2%), yet it decreases per hour worked (5.5%). As such, the ULC is the labour cost per employee over the real labour productivity per employee (4.2%).

Taking this into consideration, we use the results of equation 6 (Table 4) in order to get the change in the inflation rate. Hence, the increase in the price index (0.4%) is equal to the ULC increase (4.2%) times the elasticity (0.076), which represents to what extent changes in ULCs are transferred to domestic prices. In other words, companies will pass along the increase of ULC by raising their prices, thus accelerating the inflation rate by 0.4%.

Finally, Table 3 provides a simulation of the increase in the labour share. In 2017, according to National Accounts data, the labour share (measured as the ratio between labour income and GDP at factor costs, both at current prices) reached 60.6%. If the labour income had risen by 4.2% (more than 25 billion euros), the labour share would have reached 62.9%, implying an increase of 2.3 p.p. In the next section, we determine the impact of the wage increase on real GDP growth.

3. Estimating the macroeconomic impact

For the purpose of analyzing the macroeconomic implications of a WTR, we use the Bhaduri–Marglin model as our theoretical framework. This Kaleckian model is frequently used to determine the demand regime of an economy, which could be wage-led or profit-led. In the former, a labour share increase drives up GDP as the propensity

Table 3. *The effect of WTR on wages*

Variable	Unit	Ex-ante	Ex-post	Increase
Labour income	Mill€	632,521	659,293	4.2%
Employee	Persons	12,686	13,248	4.4%
Hour (FTE)	Persons	13,707	12,997	−5.2%
Price (base 2010 = 100)	%	102.4	102.7	0.4%
GDPfc nominal	Mill€	1,043,899	1,047,739	0.4%
GDPfc at constant prices	Mill€ 2010	1,019,763	1,019,763	0.0%
Labour share	p.p.	60.6	62.9	2.3
Labour cost per employee = labour income/employees	€/person(FTE)	49.9	49.8	−0.2%
Labour cost per hour = labour income/hours	€/hour	46.1	50.7	9.9%
Nominal labour productivity = GDP/employees	€/person(FTE)	82.3	79.1	−3.9%
Nominal hour productivity = GDP/hours	€/hour	76.2	80.6	5.9%
Real labour cost per employee	€2010/person	48.7	48.4	−0.6%
Real labour productivity = RGDP/employees	€2010/person	80.4	77.0	−4.2%
Real hour productivity = RGDP/hours	€2010/person	74.4	78.5	5.5%
ULC	p.p.	62.0	64.7	4.2%

Source: Author's own calculations, based on WSS 2014, EAPS 2017 and NA 2017.

to consume out of wages is higher than that out of profits and the acceleration effect (investment elasticity to GDP) is higher than profitability effect (investment elasticity to profit share). In the latter, an increase in the profit share boosts investment thanks to a strong profitability effect.

There are existing Bhaduri–Marglin estimations for the Spanish economy, with the most relevant being Naastepad and Storm (2006), Storm and Naastepad (2012), Onaran and Obst (2016), Álvarez *et al.* (2019) and Villanueva *et al.* (2020). All of these find that the demand regime in Spain is mainly wage-led, opposing the view of the Troika and its policy implications (fiscal austerity and wage devaluation). In any case, our main aim is not to determine its demand regime, but to use the results to measure the effect of the WTR.

3.1 An extended Bhaduri–Marglin model for the Spanish economy

The Bhaduri–Marglin model consists of a set of equations in which changes in the labour share affect different components of the private aggregate demand. Public expenditure is an exogenous variable in this model. Household consumption and private investment are directly affected by changes in the labour share. The former might increase or decrease depending on the propensities to consume out of wages and out of profits. The latter may be sensitive to changes in the profit rate (which depends on the profit share). On the other hand, net exports might be affected indirectly through changes in domestic or export prices via ULCs (price-competitiveness).

In this section, we estimate a single-equations model to obtain the elasticities that determine the total effect of 1 p.p. increase in the labour share on private consumption, private investment and net exports, and therefore on private aggregate demand.

We use quarterly data from Eurostat, the OECD and the Ministry of Economy and Business from 1995Q1 until 2017Q4. All variables are transformed into logarithms, except for the nominal long-term interest rates. In addition, all variables are expressed in real terms, except for prices, long-term interest rates and nominal ULCs. As the Augmented Dickey Fuller (ADF) test suggest that most variables are not stationary and we use quarterly data, we take the fourth difference of the variables in order to avoid spurious relations. Through this transformation, the estimated coefficients are elasticities.

Since long-term interest rates and the profit share are stationary, we use these variables in levels. We have included as explanatory variables both the contemporaneous value and the first lag of the variables, ultimately keeping those that were statistically significant. The presence of autocorrelation has been corrected through the Cochrane-Orcutt transformation (Villanueva *et al.*, 2020). Using these data, we have estimated the following six equations in keeping with Álvarez *et al.* (2019):

$$C = c_o + c_w W + c_r R + c_{dh} Dh \tag{1}$$

$$I = i_o + i_y Y + i_\pi \pi + i_r r + i_{dh} Dh \tag{2}$$

$$X = x_o + x_{y*} Y * + x_{reer37} REER37 \tag{3}$$

$$M = m_o + m_y Y + m_{ppm} PPM \tag{4}$$

$$P = p_o + p_{ulc} ULC + p_{pm} PM \tag{5}$$

$$PX = px_o + px_{ulc} ULC + px_{pm} PM \tag{6}$$

First, equations (1) and (2) measure the extent to which consumption and investment are affected by changes in functional distribution. Household consumption (*C*) growth is caused by adjusted employee compensation (*W*) and the adjusted operating surplus (*R*), as in the traditional Bhaduri–Marglin model. Household debt (*Dh*) is included to control for financialisation, following Onaran and Obst (2016), Stockhammer and Wildauer (2016) and Álvarez *et al.* (2019).

In the case of private gross fixed capital formation (*I*), growth is determined by real GDP (*Y*), profit share (π) and nominal long-term interest rates (*r*). National income proxies expected demand, and in OECD and Eurozone countries this is usually the main determinant of gross fixed capital formation (Onaran and Galanis, 2012). The profit share is introduced as a proxy for profitability as a variable for the existence of internal resources to fund investment. Nominal long-term interest rates should have a negative sign because they contain the financial cost of the investment. As in equation (1), household debt (*Dh*) is a proxy for financial markets.

Equation (3) estimates the effects of foreign demand (total GDP of OECD countries, $Y^\star$), and price variables (relative effective exchange rate vis-à-vis 37 industrialised economies calculated using export prices, REER37[5]) on gross exports (*X*). Exports depend positively on the income level of the rest of the world—which is an exogenous variable—and negatively on the relative export price vis-à-vis its competitors.

[5] This aggregate of industrialised economies includes: EU28, Australia, Canada, Japan, Mexico, New Zealand, Norway, Switzerland, Turkey and the USA.

Table 4. *Estimation results*

	Consumption	Investment	Exports	Imports	Domestic prices	Export prices
	Equation (1)	Equation (2)	Equation (3)	Equation (4)	Equation (5)	Equation (6)
dlog GDP		3.216***		2.538***		
		(0.739)		(0.570)		
dlog Debt households	0.228*	1.377**				
	(0.0909)	(0.433)				
dlog Wage bill	0.340**					
	(0.108)					
dlog Import prices						0.437***
						(0.0338)
dlog ULC					0.0731*	
					(0.0296)	
dlog OECD GDP			2.783***			
			(0.187)			
dlog $REER_{t-2}$			−0.324†			
			(0.176)			
dlog PPM_{t-1}				0.302†		
				(0.158)		
Times dummies				−0.108***	−0.0328***	
				(0.0220)	(0.00415)	
Constant / trend	0.00191	0.0134	−0.0137*	−0.0106	0.00166**	0.00645*
	(0.0110)	(0.126)	(0.00593)	(0.0233)	(0.000616)	(0.00280)
Observations	73	71	85	86	85	87
R^2	0.39	0.53	0.599	0.54	0.96	0.66
F-test (*p*-value)	0.01	0.00	0.00889	0.01	0.00	0.06
Durbin-Watson	1.47	2.12	1.856	1.77	2.02	2.01
Shapiro test (*p*-value)	0.02	0.01	0.445	0.93	0.44	0.29
AIC	−495	−308	−416.5	−379	−704	−601
AR	0.86	0.90	0.609	0.84	0.87	0.68

Notes: Standard errors in parentheses. Time dummies have been included to account for the outliers of the residuals, in 2009 (equation 4), 1997Q1 and 1999Q2 (equation 5).

Source: Author's own calculations, based on Eurostat quarterly data

Significance level: ***$p < 0.001$, **$p < 0.01$, * $p < 0.05$, $^{\dagger}p < 0.1$.

Table 5. *Effects of a one percentage point change in the labour share on GDP*

	Elasticities	Ratio to GDP	Marginal effect	Multiplier	Effect 1 pp	Labour share	Total effect
	(a)	(b)	(c) = (a)*(b)	μ	(d) = (c)*μ	$\Delta\ \Omega$	(e) = (d)* $\Delta\ \Omega$
(1) Consumption	0.61	0.55	0.33	1.28	0.42	2.33	0.99
(2) Investment	3.22	0.19	0.20	1.28	0.25	2.33	0.59
(3) Net exports			−0.01	1.28	−0.01	2.33	−0.03
(4) = (1) + (2) + (3)			0.52	1.28	0.66	2.33	1.55

Source: Author's own calculations, based on Eurostat quarterly data.

In addition, equation (4) shows the effects of domestic demand and price variables (the ratio of domestic prices over import prices [PPM]) on gross imports (M). We expect the first variable to be of greater relevance, because of the high income elasticity of imports observed in the Spanish case.

The last two equations show how changes in ULCs and import prices (pm) influence domestic prices (GDP deflator, p) and export prices (px). Equation (5) expresses the GDP deflator (P) as a function of ULCs and import prices (PM). The coefficient p_{ulc} represents the extent to which changes in ULCs are transferred to domestic prices.

Finally, equation (6) expresses export prices as a function of ULCs and import prices (PM). Similarly, px_{ucl} shows the link between changes in ULC and changes in export prices. The other explanatory variable implies that export prices could be influenced by domestic prices. We expect both elasticities to be positive.

Table 4 summarises the estimated results and the following section will deal with the calculation of the total effect.

3.2 The effects of the growth of the labour share on the economy

Firstly, we calculate the effect of a change in the labour share on consumption (Supplementary Equation A.7). Using equation (1), dividing by GDP (Y) and deriving, we have the elasticity of consumption relative to the labour share, whose value is retrieved from Table 4. According to our results, the propensity to consume out of profits is not statistically significant. This is in line with the results in Álvarez *et al.* (2019) but differs from those in Onaran and Obst (2016). In addition, household debt (Dh) has the expected sign because credit can be a source of disposable income, therefore driving consumption up.

Secondly, there are two effects of a change in the labour share on investment (Supplementary Equation A.8). On the one hand, the ex-ante (or direct) effect consists of the investment profit share elasticity (with a negative sign) multiplied by the reinvestment rate. Thus, even though the profit share could theoretically increase investment under a scenario of a low reinvestment rate, the stimulus effect would be small.

And on the other hand, the ex-post (or indirect) effect reflects the change in investment driven by the accelerator effect. To estimate this, the investment income elasticity is weighted by the investment share (investment over GDP ratio) and multiplied by the ex-ante effects of each component of aggregate demand. In this case, we include the positive impact of consumption and the negative impact of net exports. Table 5 presents the total effect on GDP and the indirect effect on investment driven by changes in functional income.

The total effect on investment will depend on the ex-ante and the ex-post effects. If the ex-ante effect is higher than the ex-post effect, the investment will be profit-led even if aggregate demand is wage-led. In our case, the direct profitability effect is not statistically significant, and the same thing happens when alternative lag structures and specifications are tested. Therefore, this effect has not been included in Table 5 and investment is also wage-led, as we find a strong positive relationship between income and private investment, showing a strong accelerator. Although some previous papers have found a positive impact of the profit share on investment (Naastepad and Storm, 2006; Storm and Naastepad, 2012), we believe this might be due to the period used (1964–2000). Additionally, there is another significant variable, household debt, which could play a determinant role in the high residential investment during the period

1995–2007. Long-term interest rates do not show a statistically significant relationship with investment.

The marginal effect (see Supplementary Appendix) of net exports on GDP (Supplementary Equation A.9) depends on the impact of the labour share on exports (Supplementary Equation A.9a) and imports (Supplementary Equation A.9b). In the first case, the main channel is the 'price-competitiveness of exports'. If an increase in the labour share boosts ULCs, then the price of exports (*PX*) increases as well.

This loss of price-competitiveness could imply a fall in gross exports. Thus, we estimate the relationship between Ω and ULC ($\varepsilon_{\Omega}^{ULC}$); the elasticity of export prices relative to labour costs (ε_{ULC}^{PX}); and the elasticity of exports with respect to export prices (ε_{PX}^{X}). We found that ULCs do not translate significantly into export prices: a reduction in ULCs, and hence in the labour share (Ω), does not imply a gain in price-competitiveness (see Supplementary Table A1).

Regarding imports, a fall in ULCs that is transferred into domestic prices (*P*) could foster a process of substitution of imports by domestic production, depending on the price elasticity of imports. Nevertheless, we have found that 1% of growth in ULC is only translated into a 0.07% growth in prices, so that this transmission effect is rather weak.

This relationship between ULC and domestic prices resembles the estimation results yielded by Onaran and Obst (2016) and Álvarez *et al.* (2019). In countries that are similar to Spain, the ULC coefficient is significant, yet it is much smaller than that of domestic prices.

Table 5 summarises the calculation of the total effect on GDP driven by the change in labour share. Thus, income elasticities of consumption and investment are weighted by each ratio to GDP, in order to obtain the marginal effects of domestic demand. In the case of consumption, income elasticity is multiplied by the ratio of total private consumption over labour income. Conversely, the accelerator coefficient is weighted by the ratio of private Gross Fixed Capital Formation over GDP.

As Table 5 shows, the marginal effects of both components of domestic demand are positive. Hence, our outcomes lead us to conclude that the Spanish economy has a wage-led domestic demand regime. These results are consistent with the existing literature on the demand regime in Spain, for instance, Naastepad and Storm (2006), Onaran and Obst (2016) and Álvarez *et al.* (2019).

The main reasons are the following. First, the estimates from the consumption function reveal that the marginal propensity to consume out of wages is greater than that out of profits, the latter not being statistically significant. Second, the profit share has no statistically significant impact on private investment, as aggregate demand is its main determinant (accelerator principle).

With regard to external demand, the marginal effect is calculated as presented in Supplementary Table A1. In this case, GDP will be negatively affected by an increase in the labour share, as a consequence of the increase in imports. Hence, net exports would fall if the labour share increases, because the demand effect on imports is statistically significative. All in all, the total marginal effect reaches 0.5%.

Through the multiplier effect, which has been calculated as shown in the Supplementary Table A2, a 1 p.p. increase in the labour share implies a 0.70% increase in GDP. Hence, if the WTR increases the labour share by 2.06 p.p. (as we have estimated above) then the GDP will grow by almost 1.5%.

Finally, the second effect on ULCs, which could be relevant to our macroeconomic analysis, is the elasticity of imports with respect to the labour share (ε_{Ω}^{M}). Supplementary Table A1 shows that this elasticity is 0.02, as a consequence of net exports responding modestly to changes in ULC. This is explained by the low domestic price elasticity of ULC and the pass-through effect of ULC into export prices, which is not statistically significant.

4. Conclusions

This paper has tackled the macroeconomic impacts of the policy of WTR in the context of the Spanish economy. Most of the literature on this topic has studied to which extent this policy can improve working and living conditions, yet to the best of our knowledge most studies have evaluated the effects of a WTR after its implementation.

Our main aim has been to calculate how the WTR affects aggregate demand by developing a methodology which combines the calculation of employment creation and wage increase using microdata, feeding these results into a Bhaduri–Marglin model, thus allowing us to observe how the labour share and GDP will increase with no wage cuts. As a result, our outcomes pointed out that for a WTR policy to be completely successful, the wages of full-time employees need not be reduced.

Firstly, had the WTR taken place in 2017, it would have created 560,000 jobs, in terms of FTE jobs, thus reducing the unemployment rate by 2.6 p.p. What is more, the WTR would have implied an amount of 'gross liberated hours' in the private sector, equal to 1.2 million full-time jobs.

Another interesting result is that women would be more affected by the reduction, as they suffer from a higher level of underemployment than men. Additionally, it is likely that companies would extend the hours of under-employees, prior to hiring new workers.

Secondly, these 560,000 FTE jobs could directly increase the labour share by 2.3 p.p. And as a result, the labour income would increase by 4.2%, because of the new hours paid. In addition, WTR would enhance hourly labour productivity, raising the productivity rate by 5.5%.

Thirdly, with the help of the Bhaduri–Marglin model, we have studied the macroeconomic effects of the measure. Our results show that a WTR of 5 hours in 2017 would have implied an increase in the labour share of 2.3 p.p, which would have led to an increase of 1.55% in GDP growth. This increase in real GDP would be a consequence of the impact of wages on domestic demand, consumption and investment.

Conversely, ULC (4.2%) and domestic prices (0.4%) would have been slightly affected and thus external competitiveness would not have been significantly reduced. It follows that the external contribution to GDP growth would be reduced by −0.01 p.p. and, even taking into account the multiplier effect, the net exports would fall by only -0.03 p.p. All in all, the macroeconomic impact of WTR is clearly positive.

To summarise, our principal contribution is to show that it is not necessary to reduce wages as a complementary measure of WTR as a labour share increase fosters GDP growth. Additionally, we develop a methodology that can be applied to other countries and regions. Furthermore, this policy can improve both the working conditions of employees and the employment rate, especially in the case of the Spain where the unemployment rate was soaring during the economic crisis (Uxó *et al.*, 2016) and remains among the highest in the European Union.

Finally, we might note that policy implications are also relevant. WTR not only improves working and living conditions. A wage-led strategy of economic growth should include some kind of WTR policy as way to increase the labour share and, thus, GDP. This would contribute to a transition towards a more egalitarian and sustainable growth model.

Supplementary data

Supplementary data are available at *Cambridge Journal of Economics* online.

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