

IMPACT OF MINIMUM WAGE SETTING ON COMPANIES IN PORTUGAL

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Abstract

This paper aims to verify the relationship between minimum wage growth and company financial indicators in Portugal, in the light of the Economic Adjustment Programme. The period analysed is from 2009 to 2019, the work focuses on companies from the Accommodation, Administrative, and Food sectors. Panel regression models are estimated to test for dependencies. Significant impacts are detected especially for the indicators of companies in the Food sector. The significant role of the Economic Adjustment Programme is verified here, after the implementation of which the effects of minimum wage growth have been in line with economic expectations.

Keywords: company indicators, Economic Adjustment Programme, nominal minimum wage, performance by economic sector, Portugal

JEL codes: E24, G30, J31

1. Introduction

The minimum wage, especially its appropriate setting and economic impacts, remains a matter of debate among policymakers and researchers. The aim of setting a minimum wage is to ensure that workers do not receive too low a wage. It also contributes to the fair participation of the broader public in the development of the economy. The minimum wage is also an instrument for policymakers in the struggle against poverty and in tackling wage inequalities, including the pay gap between men and women (Majchrowska and Strawiński, 2018). A positive effect of the minimum wage growth on poverty reduction is discussed in Herrero-Olarte and Loaiza (2021). Moreover, the concept of minimum wage should be designed to have the potential to support other social systems and employment policies. Here, collective bargaining plays an important role in affecting employment as well as working conditions (ILO, 2016). The impact of setting or introducing a minimum wage on unemployment and employee earnings is relatively often examined.

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A review provided by Neumark and Washer (2006) can be mentioned, where are summarised studies that consider broad groups of industries for which a competitive model statistically demonstrates the effects of minimum wages on unemployment; only a few papers provide convincing evidence of positive minimum wage effects on employment. A large scientific literature also extensively documents the impact of the minimum wage on the incomes of a broad group of lower-wage workers, for example, see Burauel et al. (2020), which examines the introduction of the minimum wage in Germany and assesses its short-term effect on workers' hourly wages and their monthly incomes; further, e.g., Holtemöller and Pohle (2020) also discussed the situation in Germany after the introduction of a nominal minimum wage. For their analysis, they used panel regressions at the state industry level. As a result, their study found both a robust negative impact of the minimum wage on marginal employment and a robust positive impact on regular employment. In general, the available studies are not uniform in the direction or intensity of the impact of minimum wage increases or introductions, mainly because of the different conditions prevailing in the countries studied at the given time.

In contrast to the above directions of research on the impact of the minimum wage, there are a very limited number of authors analysing the impacts of the minimum wage at the company level. For instance, the situation in the United Kingdom after the introduction of the minimum wage in 1999 is examined by Draca et al. (2011). In their study, they confirm a significant increase in wages and a reduction in firm profits due to the implementation of the minimum wage. As regards the effect of the minimum wage on employment and firm productivity, this was found to be statistically insignificant. However, there was evidence of a greater decline in margins in sectors where market power is strong. Eriksson and Pytlíková (2004) focus on firms' average wages and cite the positive effect of minimum wage increases on this indicator, and hence on wage costs, as a crucial outcome of their study. On the contrary, they concluded that job losses were occurring in response to the minimum wage increase, but to an insubstantial extent. The issue was investigated on data from 1999–2002 for cases of the Czech Republic and Slovakia.

Bodnár et al. (2018) analysed a dataset on the pathways of adjustment that companies choose to adopt after the minimum wage has been raised. Relevant data were collected for the eight countries of Central and Eastern Europe and the sectors of manufacturing, trade, construction, business services and public sector services. Using a multivariate probit model, they showed that there are substantial differences in the average share of minimum wage workers. These differences can be traced with respect to country, industry, occupation, ownership, and export status; however, they are observed to a limited extent across groups by firm size. Companies' strategies in response to the minimum wage increase were also examined. The main ones include increasing product prices, reducing non-labour costs and enhancing productivity. Over 90% of the sample of firms with minimum wage employees favoured these approaches, which was consistent with the theoretical result predicted by the institutional model.

The study by Chorna (2021) points to the fact that little space is devoted in the literature to examining the impact of the minimum wage on firm profitability. For this purpose, research focuses on the short-run responses of firm indicators such as labour

cost, profits, capital, and sales. The paper examines the situation in Poland and finds that firms affected by the minimum wage increase in 2008 experienced a significant increase in total labour costs, which reduced firms' profits. The results, which show an increase in labour costs of about 23.5 percentage points for the average manufacturing firm, were obtained using separate difference-in-differences regressions. Using ordinary OLS models, both the increase in total labour costs and the decrease in profitability were found to be of high statistical significance.

For the sake of completeness, it is necessary to mention that to maintain the level of financial ratios in response to changes in the minimum wage, enterprises may change their production functions. Clemens (2021) notes that firms can increase their reliance on capital, technology, and high-skilled labour while decreasing their reliance on low-skilled labour. In this case, however, there is a difference between new entrants and continuing enterprises, where the full effect of the minimum wage change on the production function occurs gradually.

When examining the impact of changes to the minimum wage, attention is often focused on accommodation, food, and administrative sectors, where many employees work for wages relatively close to the minimum wage. For instance, Kim and Jang (2020) examined the effect of minimum wage increases in the restaurant industry from an economic perspective. Specifically, they looked at its effect on employment as well as the issue of employee remuneration. As a result of this analysis, they revealed the negative effect of the raised minimum wage on employment in restaurants. The authors report that a minimum wage increment of 1% reduces employment by 0.6%. The findings show that wage costs in the restaurant industry are substantial in practical terms, making the sector very sensitive to any increase in the minimum wage and thus forced to adapt to the new situation. In their previous research, Kim and Jang (2019) focus their interest in the restaurant industry on exploring the effects of an increase in the federal minimum wage on firm productivity, distinguishing between high-wage and low-wage restaurants. In their results, they concluded that productivity increased almost immediately, but only for low-wage restaurants. The situation in the United States between 2005 and 2010 in the restaurant and bar industry was also examined by Addison et al. (2013). Their result showed only a minor negative effect of the minimum wage on employment, despite the period of economic recession. In their study, they also focused on the issue of teenage employment.

The overall impression of the impact of the minimum wage on the U.S. hotel industry is positive (Hollander, 2022; Mun and Woo, 2021). Agarwal et al. (2023) conducted a detailed analysis of changes in the minimum wage in the US between 2000 and 2008 and found, based on data on over 29,000 hotel establishments, that a higher minimum wage has a significant negative effect on sales and occupancy. Responses vary by employer quality and organizational form, suggesting that different hotels adopt different strategies in response to minimum wage increases. Agarwal et al. observed that higher-end hotels suffer greater revenue losses than economy hotels. On the other hand, Mun and Woo (2021) arrived at a different conclusion that the effects of minimum wage on operating profitability (gross operating profit per available room) do not differ significantly between limited-service and full-service hotels. O'Neill and Sean (2016)

present different results from their research on the U.S. hotel industry, concluding that raising the minimum wage will have a negative economic impact.

Song et al. (2022) also examined the situation in the hotel industry and showed that the minimum wage does not have a significant impact on the wage costs of US hotels. In contrast, this study found that an increase in the federal minimum wage negatively affected the hotel performance as measured by EBITDA and total revenue. The study of Skedinger (2006) considers the effects of union-bargained minimum wages on transitions into and out of employment in the hotels and catering industry over the period 1979–1999. Their analysis was based on the probability of job accessions and separations. The results led to the conclusion that an increase in the real minimum wage is associated with an increase in the probability of job separation. Conversely, to a certain extent, it can be stated that a reduction in the real minimum wage will lead to an increase in the probability of job accessions.

The impact of the minimum wage offers itself for study in countries undergoing significant social and labour changes. These are, for example, countries where a minimum wage has been introduced in the period under review or where some reform with an impact on the minimum wage has been introduced. Examples of such regions are Greece and Portugal, which have implemented an Economic Adjustment Programme (EAP) in the wake of the Eurozone crisis, which influenced the labour market. In the case of Greece, the Troika (the European Commission, the European Central Bank, and the International Monetary Fund) assessed Greece as having a low implementation rate. For Portugal, the EAP assessment was more favourable, and Portugal was able to close its programmes without a so-called precautionary credit line or a follow-up programme.

Despite overall positive implementation results and net outcomes, several key measures were revised or postponed, and the closure of the programme was eventually left incomplete. Lütz et al. (2019) refer to Portugal as a case of a medium degree of implementation. Overall, it can be argued that the reforms in Portugal have been largely successful, and since the minimum wage has also been subject to adjustments in the remuneration settings of employees, there is a good opportunity to investigate the dependency effects of minimum wage changes on companies.

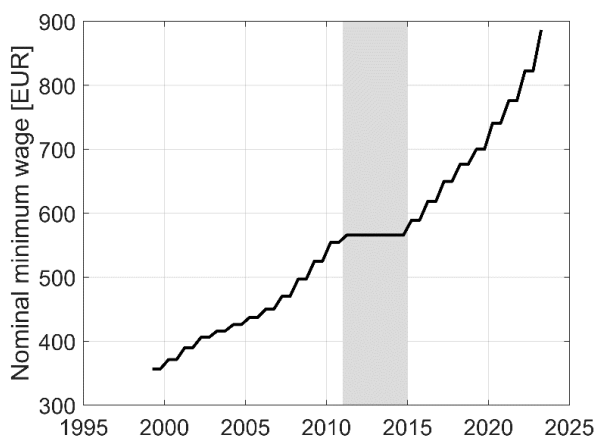
The minimum wage was introduced in Portugal in 1974 and since then it has undergone many adjustments, see Figure 1. By law, the nominal minimum wage is revised on an annual basis. During the period 2009–2019, the nominal minimum wage grew approximately 33%, from 525 EUR to 700 EUR. Because of the EAP, the government was forced to freeze the minimum wage between 2011 and 2014. After this period, the minimum wage has increased regularly. The minimum wage remains a live issue in the socio-political space in Portugal, see e.g., Donn (2021).

The minimum wage is positively related to the average wage. According to the Eurostat data for the year 2022, it reached 52.6% in Portugal and percentages between 42% and 60% in other European Union countries. Datos Macro (2024) includes data on Minimum and Average Wages. According to the World Bank (2024), for the period 2000–2023, the real Gross Domestic Product (GDP) per capita of Portugal increased by 19.1%. The percentages of increase in real GDP per capita, for that period, were 17.2%

in Spain and 16.0% in France. The real GDP per capita of Portugal in the year 2023, at 2021 prices, reached 41710 Dollars in Portugal, 46357 in Spain, and 55214 in France.

At the start of the EAP, Portugal faced many problems of an economic nature, including new high debt and a high current account deficit (European Commission, 2011). The government was tasked, regarding the EAP, to introduce austerity measures and implement structural reforms. Thus, a return to competitiveness and a brisk restoration of the position in the capital markets were expected.

Figure 1: Nominal minimum wage in Portugal during 1999–2023, bi-annual observations. The grey rectangle represents the period of the Economic Adjustment Programme



Source: own elaboration based on data from Eurostat.

If this process in Portugal and Greece is compared, it can undoubtedly be rated as more successful in Portugal. The explanation can be found in lesser demands for austerity measures, better planning on the part of the government and more intense export growth (Domnick and Schoenwald, 2016). The healing programme lasted for four years in the period 2011–2014, but it is worth noting that these measures led to waves of protests, including general strikes in November 2010 and January 2012 (Moury and Standing, 2017). The minimum wage rise in Portugal was conditional on developments in the economy and the labour market (Addison et al., 2017).

Among the main structural reforms sought by the Troika were greater decentralisation of collective bargaining, exemptions from sectoral agreements at the workplace level, rigorous consideration of what governments can afford when setting national minimum wages, and limits on extension agreements. In Portugal, the crisis has raised concerns about the role of collective bargaining as a barrier to labour market adjustment. An interesting comparison between southern and northern Europe in relation to bargaining at the sectoral level has been explored by Hijzen et al. (2017), who report that a more favourable perception of these measures was observed in the Netherlands than in Portugal during the 2009 financial crisis, highlighting that some experts even considered them as a tool to overcome the effects of the crisis more easily.

The Troika also demanded that the Portuguese government renegotiate public-private partnerships to reduce annual payments by 30%. The reduction of public spending in Portugal under the EAP is discussed by Reis and Sarmento (2019) using the example of reducing government investment in transport infrastructure where the construction of highways had put a large strain on public finances over the previous two decades. The authors detail the process of government renegotiation of public-private partnerships that led to gains for both parties in other fields as well.

The impact of the Troika austerity measures on the firm performance in Portugal was examined by Murillo and Rocha (2018). In their study, they focused on manufacturing firms in terms of efficiency scores using a multidirectional efficiency analysis on data from the Amadeus database employing the following variables: number of employees, cash and cash equivalent, issued share capital, total assets, long-term debt, profit margin, current liabilities, liquidity ratio, solvency ratio, sales, EBIT margin, EBITDA margin and cashflow. One of the results of their research was the rejection of the hypothesis that the Troika intervention improved the performance of firms in manufacturing. What can also be considered an important aspect of the performance of companies in Portugal is the fact that, despite the economic crisis, the level of training and education of workers has not stagnated. Moreover, there was an increase in the proportion of skilled labour (Lopez et al., 2020).

The aim of this paper is to empirically verify the relationship between the increase in the minimum wage and companies' financial indicators in Portugal, considering the impact of the 'Economic Adjustment Programme' on the Portuguese labour market.

2. Material and methods

It can be seen from EU data that 13.9 million people were employed in the administrative and support services sector in 2019, of which 518,400 were in Portugal. In the same year, if the average personnel costs in the administrative sector are compared with the average in the non-financial business economy (36,500 EUR per employee), the figure is lower, at 25,800 EUR per employee. This amount is the second lowest in the NACE sectors of the non-financial business economy, exceeded only by the costs in the accommodation and food sector (18,700 EUR per employee), employing almost 11 million people. In Portugal, this sector has 399,000 workers. Many employees traditionally work part-time, which has the effect of reducing average personnel costs. A significant characteristic of the sector is also the large number of working proprietors and unpaid family members (Eurostat, 2022). Based on these characteristics is evident, that the wages of employees in the discussed sectors may be affected by minimum wage setting most probably among all sectors. Moreover, the number of employees is significant not only across the EU, but also in Portugal, and so movements in the minimum wage can directly or indirectly affect a significant number of households. In our paper, these ideas are followed.

The industries concerned are NACE 55 (Accommodation), NACE 56 (Food and beverage service activities) and NACE 82 (Office administrative, office support and other business support activities). The data on the companies come from the Orbis database of Bureau van Dijk, where the following indicators have been used: Cash flow,

Operating revenue (Turnover), Profit/Loss before tax (P/L before tax), Operating Profit/Loss (EBIT), Profit margin, EBIT margin, Tangible fixed assets, Return on Assets using Profit/Loss before tax (ROA before tax), Return on Assets using Net income (ROA net income), Liquidity ratio, Number of employees, Costs of employees. Note that most of these indicators have been used by e.g., Murilo and Rocha (2018) and Tong and Serrasqueiro (2021) in their studies on companies' performance in Portugal.

The relationship between company-level indicators and the minimum wage is analysed for Portugal over the period 2009–2019. Data on the national minimum wage (NMW) were taken from the Eurostat database. They are captured bi-annually and have been converted to annual data using an average. Data on company financials are characterised by frequent missing values. This is the reason for using the following strategies: The first approach (A) includes companies with data available for all observation years and the second approach (B) includes companies with at least 50% available data of the whole reference period for each indicator. Number of companies entering the analysis is stated in Table 1. Data on companies are formatted and analysed separately for each sector.

Table 1: Number of companies included in the analysis according to particular sectors and selection strategies

Sector	Selection strategy A	Selection strategy B
Accommodation	958	2718
Administrative	768	2578
Food	4702	14600

Source: own calculation.

A panel data framework and panel regression were used for modelling purposes, what is in line for example with Holtemöller and Pohle (2020). Company indicators enter the regression gradually as dependent variables, with the main independent (explanatory) variable being the nominal minimum wage. To avoid spurious regression, time dummies are included into model. To assess possible changes inducted by Economic Adjustment Programme (EAP), structural break is tested in the middle of the EAP, i.e., at the end of 2012. The model is of the form

$$CI_{it} = \beta_0 + \beta_1 NMW_{it} + \beta_2 D13_{it} + \beta_3 NMW13_{it} + \beta_4 Dt1_{it} + \dots + \beta_{13} Dt9_{it}, \quad (1)$$

where *CI* means company indicator, *NMW* nominal minimum wage, *D13* dummy variable indicating period after structural break, *NMW13* is constructed as pairwise product of *D13* and *NMW*, further *Dt1*, ..., *Dt9* are time dummy variables (note that due to avoid multicollinearity not all years are covered by them), *i* means denotation of the unit and *t* stays for particular years. Finally, the relationship of company indicators and NMW are modelled and tested separately for the periods 2009–2012 and 2013–2019, what can be expressed by the model

$$CI_{it} = \beta_0 D12_{it} + \beta_1 NMW12_{it} + \beta_2 D13_{it} + \beta_3 NMW13_{it} + \beta_4 Dt1_{it} + \dots + \beta_{13} Dt9_{it}, \quad (2)$$

where, in addition to the previous model, *D12* as dummy variable indicating period before structural break is defined. Variable *NMW12* is constructed as pairwise product of *D12* and *NMW*. Models with fixed effects (FE) and random effects (RE) are estimated and assessed by Hausman test. Significance level is set to 0.05, calculations were performed in MATLAB R2023b and Gretl 2023c software.

3. Results

The corporate indicators obtained using the Selection Strategy A for 2013 are described in Table 2. At a glance, the average negative relative profitability indicators (EBIT and profit margins, ROA) for the Accommodation and Food sectors are visible. In terms of turnover, the Accommodation and especially the Administrative sectors show higher average values, EBIT is similarly graded, and in the case of profit/loss before tax the average value for the Administrative sector is considerably higher than for the other two sectors.

Table 2: Descriptive statistics of companies' indicators for different sectors in 2013, selection strategy A

Variable	Accommodation		Administrative		Food	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Cashflow [th. EUR]	173	895	118	619	20.3	335
Turnover [th. EUR]	1400	3920	1810	9220	511	3490
EBIT [th. EUR]	53.7	693	116	676	8.03	295
Profit/Loss before tax [th. EUR]	5.3	716	108	624	4.21	294
EBIT margin	-0.488	20	4.81	14.9	-6.23	16.2
Profit margin	-3.35	20.6	4	14.9	-6.98	16.4
Tangible fixed assets [th. EUR]	3100	11600	322	2670	159	1410
ROA using PL before tax	-0.574	13.2	5.4	15.1	-8.76	22.7
ROA using Net income	-1.39	12.4	3.08	13.5	-9.59	21.8
Liquidity ratio	3.42	8.16	3.08	4.69	2.47	5.34
Cost of employees [th. EUR]	404	1040	497	2410	143	994
Number of employees	24.9	55	28.2	160	12.8	79

Note: S.D. means standard deviation. *Source: own calculation based on Orbis database.*

Due to the nature of the business, tangible fixed assets are significantly higher in the Accommodation sector than in the remaining sectors. The average number of employees in the Accommodation and Administrative sectors is roughly double that of the Food sector. Using the cost of employees and number of employees indicators, the average monthly cost per employee can be estimated at EUR 931 in the Food sector, EUR 1352 in the Accommodation sector and EUR 1467 in the Administrative sector. These figures clearly indicate that the changes in the minimum wage should affect companies in the Food sector in particular. The relatively large standard deviations then

indicate that the data for the different sectors capture a wide variety of firms in terms of size, turnover or profitability.

The first step of the analysis was to estimate models for structural break detection (1). The resulting parameter estimates and their significance are summarized in Table 3. In the case of the Administrative sector, the *NMW13* variable is not significant in either case, and the *NMW* variable is exceptionally significant.

Table 3: Results of the panel regression model (1) for different sectors and company indicators, selection strategy A

Variable	Sector	<i>const</i>	<i>D13</i>	<i>NMW</i>	<i>NMW13</i>	Time
Cashflow	Accommodation	1333.39	x	-2.245	1.155**	y
Turnover		1957.63	x	-1.236	1.924*	n
EBIT		2248.56*	x	-4.233*	1.653***	y
Profit/Loss before tax		2436.74*	x	-4.710*	1.817***	y
EBIT margin		33.61*	x	-0.064*	0.032***	y
Profit margin		31.00	x	-0.066*	0.035***	y
Tangible fixed assets		-7903.82*	x	20.690**	-3.887**	n
ROA using PL before tax		29.81**	x	-0.055*	0.022***	y
ROA using Net income		24.33*	x	-0.046*	0.018***	y
Liquidity ratio		-10.66***	4.50	0.025***	-0.010	n
Cost of employees		822.95***	-1164.2***	-0.740**	2.091***	y
Number of employees		54.87***	-29.33	-0.053***	0.063*	n
Cashflow	Administrative	-383.02	186.58	0.885	-0.345	n
Turnover		1854.14	-509.76	-0.079	1.572	n
EBIT		-950.78**	763.76	1.885**	-1.376	n
Profit/Loss before tax		-852.48*	702.45	1.697**	-1.247	n
EBIT margin		3.18	3.71	0.003	-0.004	y
Profit margin		-1.30	7.17	0.009	-0.010	y
Tangible fixed assets		938.06*	-1363.10	-1.089	2.214	n
ROA using PL before tax		10.01	24.65	-0.008	-0.034	y
ROA using Net income		9.12	16.34	-0.011	-0.021	y
Liquidity ratio		-13.29***	12.12	0.029***	-0.021*	n
Cost of employees		-418.92	-397.55	1.618	0.671	n

Number of employees	7.94	-84.31	0.036	0.136	n
Cashflow	236.11***	-501.92***	-0.381***	0.866***	y
Turnover	585.16***	-1404.23***	-0.132	2.426***	y
EBIT	232.64***	-387.96***	-0.397***	0.706***	y
Profit/Loss before tax	201.54***	-354.97***	-0.349***	0.652***	y
EBIT margin	93.37***	-82.48***	-0.176***	0.166***	y
Profit margin	88.72***	-79.09***	-0.169***	0.161***	y
Tangible fixed assets	220.33	-932.35**	-0.108	1.446***	n
ROA using PL before tax	138.05***	-111.18***	-0.259***	0.232***	y
ROA using Net income	137.96***	-114.41***	-0.261***	0.235***	y
Liquidity ratio	-3.25***	3.35	0.010***	-0.005	y
Cost of employees	168.64***	-459.18***	-0.046	0.769***	y
Number of employees	22.40***	-34.64**	-0.017	0.059***	y

Note: 'Time' means significance (y) or insignificance (n) of at least some time dummies; 'x' means that variable was omitted from the final model; * means p-value below 0.1, ** p-value below 0.05, *** p-value below 0.01. *Source: own calculation.*

In the second step of the analysis, models (2) are estimated to provide information on the significance of the effect of NMW on company indicators before and after the structural break. The results of these models are not reported directly but combined with the significance detected by models (1) are presented in graphical form in Table 4.

The Administrative sector shows a positive response of EBIT, profit/loss before tax and liquidity to the increase in NMW before EAP. This dependence can be explained by the increase in wages in this sector indirectly caused by the increase in NMW, as managers see the increase in wages in other sectors directly caused by the increase in NMW and start to worry about employees leaving for similar positions in other sectors. An increase in salaries in connection with the fear of losing a job in an economic recession can cause enhanced efforts of employees leading to at least a temporary increase in their productivity, which will affect the profitability of the company.

In the case of the Accommodation sector, significant negative dependence on minimum wage growth is found for both ROA indicators before 2013, but from 2013 onwards the relationship is no longer significant. The same pattern of behaviour is present in the Food sector. Before the EAP, NMW appeared as a negative factor for the ROA indicators, since 2013 NMW is no longer a burden for ROA for both sectors. Within the Accommodation sector, the decrease in the cost of employees in relation to the increase in NMW before 2013 is noteworthy. The cause can be seen in the direct response to the NMW increase, which was a reduction in number of employees, to the

point that despite the rising NMW it meant a fall in the cost of employees; a side effect may have been an increase in liquidity. After 2013, the NMW no longer affects the number of employees, and the cost of employees is positively affected by the growth in the NMW, which can be expected.

Table 4: Significance and direction of NMW impact on companies' indicators in the period 2009–2012 (the first arrow) and the period 2013–2019 (the second arrow) according to model (2)

Variable	Accommodation	Administrative	Food
Cashflow	→ ■ →	→ □ →	↘ ■ ↗
Turnover	→ □ →	→ □ →	→ ■ ↗
EBIT	→ ■ →	↗ □ →	↘ ■ →
Profit/Loss before tax	→ ■ →	↗ □ →	↘ ■ →
EBIT margin	→ ■ →	→ □ →	↘ ■ →
Profit margin	→ ■ →	→ □ →	↘ ■ →
Tangible fixed assets	→ ■ ↗	→ □ →	→ ■ ↗
ROA using PL before tax	↘ ■ →	→ □ →	↘ ■ →
ROA using Net income	↘ ■ →	→ □ →	↘ ■ →
Liquidity ratio	↗ □ →	↗ □ →	↘ □ →
Cost of employees	↘ ■ ↗	→ □ →	→ ■ ↗
Number of employees	↘ □ →	→ □ →	→ ■ ↗

Note: The significance of the structural break detected by the model (1) is denoted by full square (significant) or empty square (insignificant). The symbol '→' means the insignificant effect of NMW change, '↗' significant positive effect and '↘' significant negative effect of NMW increase on companies' indicator. *Source: own calculation.*

Different relationships can be observed in the Food sector. Before the implementation of the EAP, the relationship between the indicators cost of employees and the number of employees on the growth of NMW was insignificant. Relatively small companies did not lay off their employees because they feared that in the future, they would not be able to find a similarly qualified workforce willing to work for relatively low wages. This strategy translated into a negative response to NMW growth in most financial indicators. After the implementation of the EAP, there was an increase in the cost of employees and an increase in the number of employees in response to the increase in NMW. Here it can be concluded that the increase in NMW acting on the wage growth in the Food sector, in combination with other parameters of the Portuguese economy,

was motivating the search for employment in this sector. Subsequently, a larger number of workers in the Food sector was able to generate higher turnover and cash flow. Absolute and relative indicators of profitability after EAP were no longer affected by the growth of NMW.

3.1. Robustness check

To check the robustness of the obtained results, analogous analyses are performed using data from the selection strategy B. Here, missing values are allowed in a proportion that does not threaten the estimation of the panel data models. The characteristics of the indicators of the companies selected by Strategy B are presented in Table 5.

Table 5: Descriptive statistics of companies' indicators for different sectors in 2013, selection strategy B

Variable	Accommodation		Administrative		Food	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Cashflow [th. EUR]	26.7	1210	70.9	877	2.22	259
Turnover [th. EUR]	898	3060	940	5940	308	2650
EBIT [th. EUR]	-44.6	1100	63.3	675	-6.4	257
Profit/Loss before tax [th. EUR]	-97.5	1350	56.5	678	-8.8	255
EBIT margin	-4.26	25.9	4.4	22	-12	22.1
Profit margin	-7.04	26.1	3.57	21.9	-13	22.1
Tangible fixed assets [th. EUR]	2420	9570	175	1690	105	1330
ROA using PL before tax	-2.29	17.1	4.85	21.2	-15	28.4
ROA using Net income	-3.12	16.2	2.13	19.1	-16	27.6
Liquidity ratio	4.2	10.6	3.53	6.99	2.44	6.8
Cost of employees [th. EUR]	279	925	272	1690	87.3	794
Number of employees	17.4	48.2	14.8	99.2	8.42	66.4

Note: S.D. means standard deviation. *Source: own calculation based on Orbis database.*

When comparing the average values of the indicators of the companies selected by strategy A, a decrease in the average values of cashflow, turnover, EBIT, EBIT margin, and ROA, i.e., indicators of some profitability, can be seen for all sectors. For the Food and Accommodation sectors, EBIT and Profit/loss before tax fall into negative numbers, while for the Administrative sector, the average indicators remain positive. The decline in average cost per employee and number of employees can be interpreted as mainly smaller companies being added as part of the selection strategy B. Standard deviations have increased in most cases, reflecting the characteristics of the companies added to the dataset. The standard deviations have decreased for turnover, tangible fixed assets, cost of employees and number of employees for all the sectors under consideration, indicating an 'increase in the concentration of indicators' of the newly included companies. For the Food sector, the decline was also observed for other indicators, which may be related to the large number of companies selected by strategy

B compared to strategy A (at least 12999 observations in the year 2013). Overall, there was no enormous change in variance for any of the indicators monitored.

Next, models analogous to those for the data selected using strategy A were constructed. In general, in the vast majority of cases, very similar parameter estimates were obtained, and the sign of the estimated parameter and the significance of the estimate were preserved. In some cases, the RE model was preferred to the FE model.

For the Food sector, when testing for the structural break, the newly significant *NMW* variable was observed for the dependent variables Turnover and Number of employees. In line with this, a significant negative relationship was found between Turnover and the Number of employees on *NMW* before 2013. In addition, there is an almost significant negative effect of *NMW* on the cost of employees ($p = 0.052$) before 2013 and a significant positive effect of *NMW* on the liquidity ratio in the period 2013–2019. All these changes can be seen as refinements due to substantially more observations.

For the Accommodation sector, *NMW13* was not found to be significant for cash flow, EBIT and profit/loss before tax. In terms of the significance of the effect in each period, there is no change, with the effect still insignificant in both periods. For these three indicators, there appears to be instability in the model. Newly, *NMW* for the selection strategy B is significant for the EBIT margin, Profit margin and both ROA indicators. The sign of the parameters and roughly their value are retained. Similarly, *NMW13* is newly significant for the dependent variable number of employees. These changes in the structural break models are likely due to the higher number of observations and are not inconsistent with the model results for the selection strategy A. In terms of the direction of the dependence, has now been identified a significant negative dependence on *NMW* growth for the EBIT margin and profit margin indicators in both observation periods.

In the case of the Administrative sector, only one change has been made for strategy B, namely the newly significant variable *NMW* for the ROA using the net income indicator while retaining the sign of the parameter from the model for strategy A data. Growth in *NMW* is the newly significant variable causing a decline in ROA using net income over the period 2009–2012.

Overall, it can be stated that most of the results obtained, given their significance and direction of influence, remained stable when the models were applied to the data obtained by selection strategy B. In the case of divergent results, the vast majority were newly significant results maintaining the previous sign and magnitude of the parameter. In only three cases did the originally significant variable turn out to be newly insignificant in the model verifying the structural break; in the model of dependence on *NMW* in different periods, *NMW* was already insignificant in the models based on the data of selection strategy A. Thus, the estimates obtained can be declared stable and provide a plausible basis for further judgements.

4. Discussion

Quite surprising are the differences between the Accommodation and Food sectors. These two sectors are often analysed together, mainly due to the unavailability of separate data. The Accommodation sector shows a more diverse mix of employees with different skills (especially for the larger hotels), which is reflected in very different wages. It can be assumed that there are also employees working here at wages similar to the Food sector, but unlike here, employees such as senior management are more likely to be represented. The impact of the economic recession on the two sectors will also be different. Given the tourist attractiveness of Portugal, it can be assumed that a significant proportion of accommodation is intended for foreign tourists. They will, of course, also use restaurant services, but the majority of food will be eaten by Portuguese residents. Both the Accommodation and Food sectors have thus been affected by a partial outflow of foreign tourists, but the Food sector has additionally been affected by a fall in domestic demand as a reflection of the financial problems of the domestic population.

The results of our work will now be compared with those of other authors. Draca et al. (2011) report a negative impact of NMW on firm profitability, which is not in line with our results. The systematic negative effect of NMW growth on profitability indicators was observed in the Food sector before EAP, i.e., in an economically unfavourable period. Note that Draca et al. (2011) researched a situation, where NMW is newly introduced. Eriksson and Pytlikova (2004) and Chorna (2021) found that the minimum wage increase had a large positive effect on wage costs, which is consistent with our findings for the Accommodation and Food sectors. The paper of Bodnár et al. (2018) is mainly oriented in a different direction, but productivity improvement is mentioned there as the possible reaction of companies to NMW growth, which supports our findings for the Administrative sector.

Addison et al. (2013) and Kim and Jang (2020) investigated the effect of minimum wage increases on restaurant employment in the USA and revealed that increasing the minimum wage negatively influences restaurant employment. Our study confirms this behaviour for the Accommodation sector before EAP, but not for the Food sector. This is probably due to the specific conditions when Portugal was in an economic recession, but there was also a strong belief in an early economic recovery, among other things thanks to the EAP. The resulting impact of the minimum wage increase on companies from the Accommodation sector is not uniform. Hollander (2022) and Mun and Woo (2021) present positive effects while O'Neill and Sean (2016) conclude that raising the minimum wage will have a negative economic impact. Our results suggest a rather zero or insignificant impact of increasing NMW for Accommodation sector companies in the 'standard' post-EAP period. The exception is the growth of the cost of employees, which is contrary to the work of Song et al. (2022).

Another way of expressing the significance of the minimum wage setting for company indicators can be the ratio of the minimum wage to the median or average wage, also referred to as the Kaitz index. This ratio is available, for example, in the OECD or ILOSTAT databases. The advantage of this index is that it better captures the

position of the minimum wage at the wage level. The Kaitz index takes values in the interval (0;1). Values close to 1 have the greatest potential to affect sectoral actors (Dolton, 2010). The Kaitz index can be modified as a sectoral index, but this poses problems in the absence of sectoral minimum wages in countries with nominal minimum wages. Conversely, in countries without a minimum wage, where minimum wages are currently negotiated by collective agreements on a sectoral basis, both a national Kaitz index and a sectoral Kaitz index can be used. The latter has been applied, for example, to detect of share of underpaid employees and describe the differences in various sectors in Italy, see Garnero (2018).

The importance of the Kaitz index is also evident in the European Union. The Directive (European Parliament, 2022) on a fair minimum wage in the EU has just been implemented. Member States are obliged to apply indicative reference values such as 60% of the gross median wage and 50% of the gross average wage when considering the adequacy of statutory minimum wages. Despite the above advantages of using the Kaitz index, it should be noted that this index is not suitable for assessing the dependence of firm indicators on the NMW, as movements in the Kaitz index may be induced by changes in the average wage and mistakenly attributed to NMW growth. The directive in question (European Parliament, 2022) is tricky in this respect, as it forces the NMW to grow regardless of the specific state of the economy, which may harm companies; this will be the case not only in Portugal but also in many other EU countries.

Thus, it is very important to develop economic policies addressed to favour real production per head and per worker that allow to increase real wage. Guisan and Vazquez (2013) present a comparison of 96 European Union regions, regarding Employment, average Wage, Industrial and Non-Industrial Production per head, and labour Mean Productivity, and estimate interesting econometric relationships for the year 2010 that show the great impact of production per head, and productivity, on real wages.

5. Conclusions

The minimum wage is currently a much-discussed instrument that has both positive and negative consequences. Our study focuses on the impact of the nominal minimum wage on companies in selected sectors in Portugal before and after the implementation of the Economic Adjustment Programme, and it shows the varying effects of the minimum wage in different sectors and periods. As expected, the Food sector is the most affected industry, but it turns out that a rise in the minimum wage can also have positive consequences for companies. Here, higher wages driven by an increase in the minimum wage induce more interest from the workforce to be employed in the Food sector, leading up to an increase in the company's turnover.

A significant circumstance here is the Economic Adjustment Programme, which was intended to stabilise the Portuguese economy. From the point of view of nominal minimum wage growth, this programme can be judged a success, since, compared with the situation before the programme was implemented, the effects of minimum wage growth have been in line with economic expectations, or sectors with higher average wages have not been affected at all. In order for minimum wages to play a correct role in the economy, the consequences of their growth need to be monitored and evaluated

systematically, especially in sectors with a large share of employees earning close to the minimum wage.

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