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Is it worth raising the normal retirement age? A new model to estimate the employment effects

HERMES MORGAVI, Ph.D.*

Article**
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Abstract

Pension reforms, that raise the normal retirement ages, are crucial yet controversial in ageing developed countries. While cross-country studies confirm positive significant effects, their estimated effects are modest compared to those from country-specific studies using micro data. This study attempts to reconcile these differences by introducing greater heterogeneity into the cross-country approach. Starting from a standard cross-country panel error correction model, several empirical innovations are introduced to better capture the influence of the demographic composition of countries, the possibility of retiring at an earlier age, and the importance of private pension funds and early exit pathways. These changes result in larger and more heterogeneous predicted effects of changes in the normal retirement ages on the older-age employment rate and average age of labour market exit across countries. The proposed model, allows for simulations on the effects of pension policy reforms.

Keywords: normal retirement ages, employment rate, labour market policy, older workers

1 INTRODUCTION AND SUMMARY OF RESULTS

Pension reforms, especially those increasing the normal retirement age, play an important and controversial role in many developed and ageing countries. The rising fiscal costs of public pensions and the strong opposition often faced by governments contemplating such interventions make evident the importance of reliable quantifications of their effects, especially on the labour market. As shown by IMF (2024), the frequency of protests related to pension reforms has significantly increased over the years, particularly since 2010. This underscores the contentious nature of pension reforms and the need for evidence-based policy design to address both fiscal sustainability and public concerns. Many empirical papers, using cross-country macro models, have estimated the impact of raising the normal retirement age on aggregate older-age employment. The estimates from such studies unequivocally point towards a positive and statistically significant effect on labour force participation and the employment rate. However, the magnitude of this effect is surprisingly modest when expressed in terms of *average age of labour market exit*: most studies suggest that a 1-year increase in the *normal* retirement age only raises the *average age of labour market exit*[1] by 1-2½ months (see table 1).

[1] The average age of labour market exit is the average age of all persons withdrawing from the labour force in a given period, whether during any particular year or over any five-year period. The average age of labour market exit (AALME) is thus simply the sum of each year of age weighted by the proportion of all withdrawals from the labour force occurring in that year of age (see Boulhol and Keese, 2021).

Empirical research using microdata from individual countries often suggests much stronger effects, for instance:

- Mastrobuoni (2009), using U.S. microdata, finds that a 2-month increase in the normal retirement age raises the effective retirement age[2] by approximately 1 month;
- Fehr, Kallweit and Kindermann (2012), using a calibrated general equilibrium model, estimate that the 2007 pension reform in Germany, which increased the normal retirement age by 2 years, delayed retirement by an average of 9 to 12 months;
- Etgeton (2018), instead, by estimating a dynamic discrete choice model from the biographical data of social insurance agencies in Germany, quantified that the effect of the same 2-year increase in the normal retirement age delayed, in the years 2012-13, the average age of labour market exit by 8.4 months;
- Hanel and Riphahn (2012), using data from the Swiss Labour Force Survey, analysed a two-step pension reform in Switzerland that raised the normal retirement age for women from 62 to 63 in 2001 and then to 64 in 2005, finding that the combined reform delayed retirement entry by 7.7 months;
- Lalive and Staubli (2015), by contrast, using data from the Swiss social security database, found that the 2001 rise in the retirement age only delayed labour market exit by 7.9 months;
- Morris (2021) estimated that the 1994 Australian pension reform, which raised the normal retirement age for women from 60 to 65, increased the average age of labour market exit by 9 months;
- Fodor, Roehn and Hwang (2022) found that an increase in the minimum and normal retirement age by one year in Slovakia would lead to a 7-month rise in the average age of labour market exit.

The results in Turner and Morgavi (2021) show that, when heterogeneity across pension systems and demographics are adequately modelled, the cross-country panel estimates align more closely with the country-specific effects. However, that study relies on a database that is difficult to update[3], as it includes the labour force participation rate computed by single year of age and is limited to a restricted group of mainly EU countries. The objective of this paper is to examine whether these results can be replicated at a more aggregate level; using a broader definition of the older age employment rate (defined on the population aged 55-74) as the dependent variable; and with a wider set of countries on a dataset which is both more up-to-date and can be replicated using recent datasets.

[2] For the purpose of this paper, the terms "average age of labour market exit" and "effective retirement age" are used interchangeably.

[3] Turner and Morgavi (2021), in fact, used a dataset collecting the labour market variables by education, sex and single year of age from the Eurostat Labour Force Surveys for the European countries, the Current Population Survey for the United States and the Statistics Canada Labour Force Survey for Canada. Most of the European countries instead provide data in 5-year age bands.

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Table 1

The effect of raising the normal retirement age in previous OECD and IMF studies

	Effect of raising the normal retirement age by 12 months on average age of labour market exit (months)
Blöndal and Scarpetta (1999)	1.1 to 1.4
Gal and Theising (2015)	1.4
Égert and Gal (2017)	1.4
Grigoli, Koczan and Tapalova (2018)	2.3
Geppert et al. (2019)	2.4
Turner and Morgavi (2021)	2.7-4.7

Note: The original studies reported their findings in terms of an effect on the employment rate or labour force participation rate. The figures reported here are the result of the author's calculations, which are detailed in Turner and Morgavi (2021) and the appendix, and are made both to provide all estimations on a comparable basis and provide an estimate of the absolute effect on the average age of labour market exit to compare with an increase in the normal retirement age of 12 months. The calculations are based on estimated parameters reported in the respective studies, but also involve some additional assumptions. Hence, the figures in the table should be regarded as approximate, although they are robust to reasonable variations in these assumptions.

Source: Author's calculations described in the appendix.

The present work proposes several innovations to the empirical model used to quantify the effects of pension reforms. To give a sense of the importance of each modification, a standard cross-country panel error correction model (ECM) is estimated as a base model and innovations are introduced incrementally. The base model includes the normal retirement age as the main variable capturing the retirement policies, as in most of the cross-country empirical papers, as well as a set of other labour market polices and control variables. According to the base model, a 1-year increase in the normal retirement age has an estimated effect on the employment rate of those aged 55-74, equal to 1.3 percentage points. This implies a median estimated effect on the average age of labour market exit of 3.2 months, from a 1-year increase in the normal retirement age (see the appendix for the underlying calculation). The present work proceeds by incrementally introducing a number of features. The effect of each feature on quantifying the impact on old age employment age of an increase in normal retirement ages by 12 months are summarised below and in figure 1.

The innovations introduced by the present work produce much higher effects on the employment rate than implied by previous pooled country estimations, so that raising the normal retirement age is a much more worthwhile proposition for policymakers. The flexibility of the model better captures country-specificities of demography and pension systems, resulting in more heterogeneous predicted effects both across countries and through time. The model proposed, which distinguishes between minimum and normal retirement ages, enables simulations to be made on the impact of raising normal retirement ages and reducing the gap between normal and minimum retirement ages. In some countries with the lowest employment rates closing these gaps could lead to significant increases in employment rates. A few countries, in contrast, could reap substantial benefits by harmonising normal retirement ages between genders.

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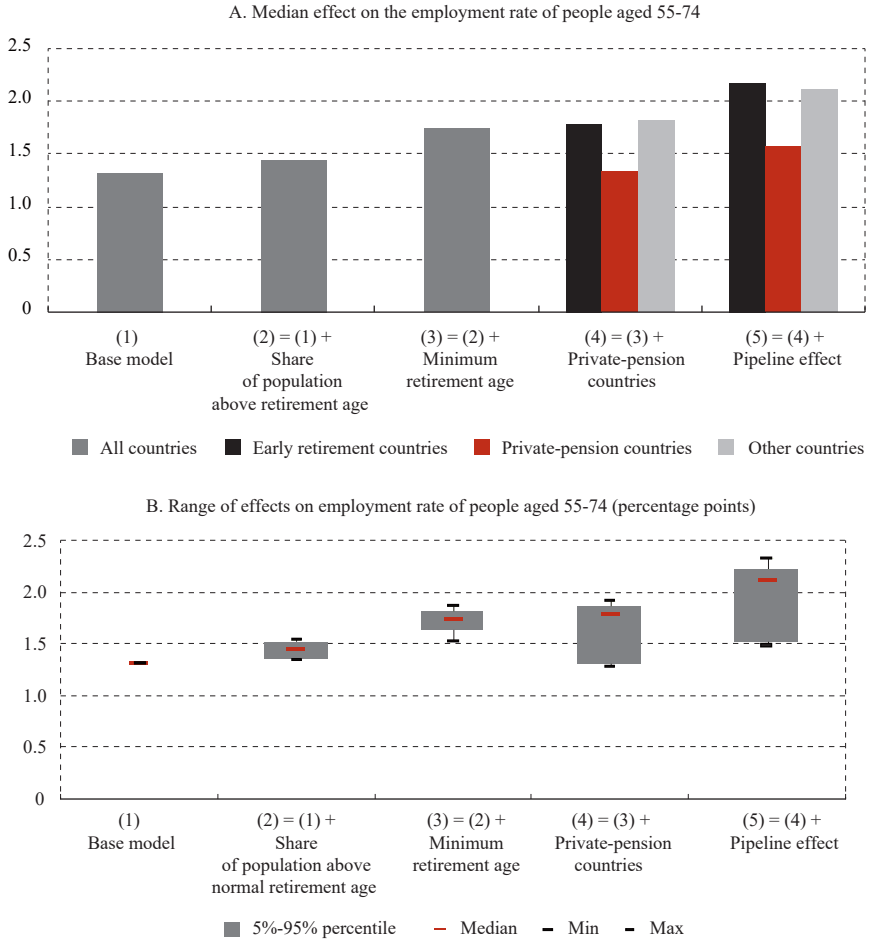
FIGURE 1

Model innovations give larger employment effects from raising the retirement age



Note: The figures compare the effect on the old age employment rate of a rise of the normal retirement age by 1 year among the models expressed in percentage points. On the x-axis the modelling innovation introduced with respect to the previous model is shown. The model specifications reported in the figure correspond to the one shown in table 3 where the results of each innovation are compared. For the models including the effects of minimum retirement age and of the pipeline effects, these are also assumed to move by 1 year in line with the change in the normal retirement age. The effects are calculated using the data for year 2020 or latest year available to compute the long-term effects. The data cover 27 countries, mostly in the European Union, but also Switzerland, Canada and the United States.

Source: Author's calculations.

The remainder of the paper is organised as follows: section 2 presents the base model, which is used as a term of comparison to measure the effects of each innovation; sections 3 to 6 introduce each innovation to the model and quantify the effects in term of goodness of fit, median effect on the older age employment rate of a 1-year increase in the normal retirement age, and heterogeneity of the estimated effects; section 7 compares the model predictions with those coming from

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empirical research using microdata from individual countries; section 8 shows how the model can be used for policy simulation and in particular to quantify the effects of the minimum retirement age on old age employment rates; finally, section 9 concludes.

2 THE BASE MODEL

The base model that is the starting point of the present analysis uses the employment rate for those aged 55-74 as the dependent variable and the normal retirement age as the main policy instrument. The normal retirement age is calculated as the weighted average of the normal retirement ages for men and women, using the respective population shares as weights. The normal retirement age is here defined as the age at which an individual, who entered the labour market at age 25 and had a full career, becomes eligible for a full pension from all mandatory pension schemes.[4] The model is estimated using the two-steps Engle-Granger procedure, where the long-term relationship is estimated using the dynamic OLS methodology with one lead and one lag and robust standard errors. The model can be written as follows:

$$\begin{aligned} ER_{c,t} &= \alpha_c + \alpha_P \cdot RA_{c,t} + \sum_j \alpha_j X_{j,c,t} + \varepsilon_{c,t} \\ \Delta ER_{c,t} &= \beta_c + \beta_t + \pi \cdot \hat{\varepsilon}_{c,t-1} + \beta_P \cdot \Delta RA_{c,t} + \sum_j \beta_j \cdot \Delta X_{j,c,t} + \eta_{c,t} \end{aligned} \tag{1}$$

where $ER_{c,t}$ is the employment rate of people aged 55-74; $RA_{c,t}$ is the normal retirement age of country c at time t; α_c and β_c are a set of country fixed effects; β_t are a set of time fixed effects; $X_{j,c,t}$ is a set of labour market policy variables and control variables also used to capture differences among countries in the labour and product market regulation (see table 2).

The labour and product market variables are the gross unemployment benefit replacement rate (UBGR); the detrended spending on active labour market policies per employed person, expressed as a share of GDP per capita (ALMP); the average tax wedge on the mean income; the excess coverage[5]; the EPL indicator for regular contracts[6]; and the OECD indicator of product market competition on the network industries (ETCR).[7] In addition, the life expectancy at 65 and the prime age employment rate, defined on the age group 25-54, are also included as control variables. Consistently with the overall approach to capturing the age composition of the population, life expectancy at 65 is computed by multiplying the life

[4] The retirement ages are taken from the country notes of past editions of the OECD publication *Pensions at a Glance* for both men and women separately. For the base model, the two retirement ages are then aggregated using a weighted average, with the share of population by sex as weights.

[5] The excess coverage variable is defined as the difference between the coverage of wage bargaining agreement and the share of covered workers who are represented by unions. This variable is computed from the data in the ICTWSS database.

[6] The OECD indicators of employment protection legislation (EPL) evaluate the regulations on the dismissal of workers on regular contracts and the hiring of workers on temporary contracts. For the present work the indicator for regular contracts is used. They cover both individual and collective dismissals.

[7] The OECD indicators of regulation in energy, transport and communications (ETCR) summarise regulatory provisions in seven sectors: telecoms, electricity, gas, post, rail, air passenger transport, and road freight.

expectancy at 65 for women and for men by the share of men and women aged 65+ in the population aged 55-74 expressed as a percentage. The first one captures the effect of health and longevity of the workforce and the long-term demographic trends. The latter captures overall trends in the labour markets; the impact of labour market policies not included in the model whose effects on older workers are not different than those that affect prime age workers; it also accounts for the importance of early career patterns, and of labour market attachment. The data cover 27 countries, mostly in the European Union, but also Switzerland, Canada and the United States. The panel is unbalanced. The data coverage of the estimation sample is summarized in table 2.

Table 2

Summary table of the variables

	Minimum	Median	Mean	Maximum	Standard deviation
ER 55-74	13.3	32.0	32.7	57.5	9.7
UBGR	1.9	26.7	23.5	55.5	12.7
ALMP	2.3	27.7	31.2	97.5	21.4
Average tax wedge	1.9	31.0	30.0	48.3	9.2
Excess coverage	-4.7	20.7	29.6	87.3	26.7
EPL	0.1	2.3	2.1	4.6	0.9
ETCR	0.5	1.8	2.1	5.4	1.0
ER 25-54	58.4	80.2	79.0	88.6	5.4
LE 65	74.4	93.4	92.9	115.0	8.1

Note: ER 55-74 is the employment rate of people aged 55-74 expressed in percentage; UBGR is the gross unemployment benefit levels expressed in percentage of the previous gross earning; ALMP is the detrended active labour market policy spending on employment as a share of GDP per capita; Average tax wedge is the average tax wedge for a couple with 2 children and prime earner at 100% and second earner at 67% of the average wage; Excess coverage is the difference between the coverage of wage bargaining agreement, expressed in percentage, and the share of workers who are represented by unions covered; EPL is the OECD Strictness of employment protection for regular contract from individual and collective dismissals, the indicator, which measures the strictness of employment protection on a scale from 0 to 6, where higher values indicate more stringent regulations; ETCR is the component on regulation of network industries of the OECD PMR indicator, which measures the pro-competitive regulatory settings on a scale from 0 to 6, where higher values indicate more restrictive regulations; ER 25-54 is the employment rate of people aged 25-54 expressed in percentage; LE 65 is the life expectancy at 65. This last variable is computed by multiplying the life expectancy in years for women and for men by the share of men and women aged 65+ on the population aged 55-74 expressed as percentage. These statistics are calculated on the estimation sample, which starts from 1992 and ends in 2019, with different coverage among countries.

Source: For ER 55-74, OECD Employment database; for UBGR, OECD Social Protection and Well-being database; for ALMP, OECD Labour database; for Average tax wedge, OECD Tax statistics database; for Excess coverage, ICTWSS database; for EPL, OECD Labour database; for ETCR, OECD PMR indicator database; for ER 25-54, OECD Employment database; for LE 65, OECD Health database; and OECD Employment database.

To better compare the effects of each innovation, we kept the same set of policy and control variables constant for the long-term equation across all models. Only variables that were statistically significant in all the models were retained. Based on this criterion, the only variable included in the model was the EPL indicator. However, other labour market policies, which affect the prime age employment rate, were also included as control variables. Hence the inclusion of a labour market policy in the model is to be interpreted as the differential effect of this policy on the old age group employment rate, with respect to the prime age group. Thus, the estimated models suggest that the labour market policies affect the old age employment rate in a similar way as the prime age employment rate, except for the stricter EPL, which tends to favour older age employment age. For the short-term equation, instead, a stepwise regression was performed to select the dependent variables. Only the pension policy variables were excluded from the stepwise procedure and were always included in the short-term equations.

3 INNOVATION 1: INTRODUCING DEMOGRAPHICS

While the normal retirement age has been a common choice as a policy variable in empirical pooled-country studies on old-age labour market choices, it has limitations. This choice is equivalent to estimating the average effect among the countries in the sample or to assuming a uniform effect on the old-age employment rate of a rise in the normal retirement age, regardless of the current normal retirement age or the demographic composition[8].

A better alternative is to use the share of population aged above the normal retirement age as a pension policy variable. This is estimated as the sum of the share of men whose age is above the normal retirement age for men on the total population aged 55-74 and the share of women whose age is similarly above the normal retirement age for women on the total population aged 55-74. This approach addresses two aspects of the heterogeneity of pension systems: the differences in the normal retirement ages by sex, and the demographic compositions. It creates a direct link between normal retirement ages, demographic composition of the country and the aggregate employment rate.

Introducing the share of the population above the retirement age as an alternative pension policy variable, the proposed model fits the data better than the base model (compare models (1) and (2) in table 3), while the estimates for the common variables are similar.

[8] For further discussion on the subject, see the appendix.

TABLE 3

Long term equations explaining the older age employment rate

Explanatory variables	Dependent variable: employment rate of the 55-74 age group				
	Variant equations				
	(1) Base model	(2) (1) + % pop. above normal ret. age	(3) (2) + Minimum retirement age	(4) (3) + Private-pension countries	(5) (4) + Pipeline effect
Labour and product market regulations					
EPL regular contracts	5.863**	6.283**	7.932**	8.138**	8.448**
Pension policies					
Normal retirement age	1.320**				
Pipeline effect					-0.087
% pop. above minimum ret. age			-0.098	-0.095	-0.132
% pop. above normal ret. age		-0.286**	-0.243**		
% pop. above normal ret. age (private pensions countries)				-0.172	-0.176
% pop. above normal ret. age (non-private pensions countries)				-0.256**	
% pop. above normal ret. age (early exit countries)					-0.265**
% pop. above normal ret. age (other countries)					-0.275***
Other variables					
ER 25-54	0.615***	0.608***	0.586***	0.583***	0.606***
Life expectancy 65+	0.561***	0.538***	0.506***	0.516***	0.493***

	Dependent variable: employment rate of the 55-74 age group				
	Variant equations				
Explanatory variables	**(1) Base model**	**(2) (1) + % pop. above normal ret. age**	**(3) (2) + Minimum retirement age**	**(4) (3) + Private-pension countries**	**(5) (4) + Pipeline effect**
RMSE	2.66	2.60	2.61	2.60	2.60
Adjusted R^2 (%)	91.8	92.2	92.1	92.1	92.1
Obs.	522	522	522	522	522
Countries	27	27	27	27	27
Time coverage	1992-2019	1992 - 2019	1992-2019	1992-2019	1992-2019

Note: The table shows the estimated coefficients of the long-term equation of the model. Model (1) corresponds to the base model. Model (2) is the same as model (1) but instead of using the normal retirement age for pensions as pension policy variable, the share of population above the normal retirement age is used. Model (3) uses the database created by Geppert et al. (2019) integrated with the data from OECD (2021, 2023), which distinguish between minimum retirement age and normal retirement age. Model (4) introduces the distinction between countries where the private pension funds are important. Model (5) is equivalent to model (4), but the pipeline effect for early exit countries is added. The RMSE and the adjusted R^2 *shown in the table refer to the long-term equation only and hence are computed excluding the lagged and leading variables used in the Dynamic OLS methodology to estimate it.*

**** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.*

Source: Author's calculation.

4 INNOVATION 2: DISTINGUISHING BETWEEN THE MINIMUM AND NORMAL RETIREMENT AGE

Most countries' pension schemes allow workers to retire some years before the normal retirement age, with benefits often reduced for each year taken before the normal retirement age (see OECD, 2023).

Providing an early retirement option within the old age pension system allows greater flexibility in accounting for differences in individual circumstances, including underlying health. However, such early retirement possibilities may have a negative impact on the older age employment rate. It also undermines the effects of increasing the normal retirement age if the rise is not accompanied by a correspondent rise in the minimum retirement age.

Taking advantage of the database put in place by Geppert et al. (2019), it is possible to refine the estimates and isolate the effects of the early retirement possibilities. Analysing the retirement conditions of the OECD countries, they built a database where the minimum retirement ages and the normal retirement ages are collected for the countries of the European Union plus Japan, United States, Switzerland, and Canada for the period 1990 to 2017. This database was updated with the last data available from OECD (2021, 2023). The definition of normal retirement age, accepted in the present work, is the age at which an individual, who entered the labour market at age 25 and had a full career, becomes eligible for a full pension from all mandatory pension schemes. The minimum retirement age, instead, is the age at which an individual, who entered the labour market at age 25 and had a full career, becomes eligible for a reduced pension from a mandatory pension scheme at an earlier age than the normal one[9]. In many countries a significant fall in the employment rate at these earlier ages can be observed, especially for less-educated individuals[10].

Distinguishing both ages adds the variable "Share of population above the minimum retirement age" as well as "Share of population above the normal retirement age". Incorporating these variables enables the model to account for both the minimum and normal retirement ages for men and women efficiently. Model (3) in table 3 and figure 1 shows that the presence of such possibilities of retiring before the normal retirement age dampens the employment rate of older workers. Moreover, isolating the effect of the minimum retirement age, the median estimated effect of a rise of the normal retirement age by 1 year, assuming both the minimum and normal retirement ages move in parallel, is slightly higher by around 0.30 percentage points and the range of estimates rises by 0.15 percentage points with respect to the previous model, varying between 1.53 and 1.87 percentage points (see figure 1, panel B).

This approach reduces multicollinearity issues, as the four retirement ages are highly correlated (see table 4). By using only two variables with a correlation of 0.37, the model remains parsimonious.

[9] These variables are calculated based on the country notes of the past editions of *Pensions at a Glance* for both men and women separately.

[10] Manoli and Weber (2016) using Austrian administrative data on the 2000 and 2004 pension reform estimated that, a 1-year increase in the minimum retirement age led to a 4.8-month increase in the average job-exiting age and a 6-month increase in the average retirement age.

Table 4

Correlation among retirement ages

	Minimum retirement age		Normal retirement age	
	Men	**Women**	**Men**	**Women**
Minimum retirement age (men)	1.00			
Minimum retirement age (women)	0.73	1.00		
Normal retirement age (men)	0.28	0.41	1.00	
Normal retirement age (women)	-0.10	0.52	0.59	1.00

Note: The table shows the correlation among the retirement age variables.

Source: Author's calculation.

5 INNOVATION 3: DISTINGUISHING COUNTRIES WITH IMPORTANT PRIVATE PENSION FUNDS

The importance of private pension funds reduces the relevance of the public normal retirement age in favour of the rules and the incentives set by the private pension funds. Private pension funds often allow individuals to customise their retirement planning based on their financial situation preferences. Some private pension funds offer incentives for delaying retirement, such as increased benefits or bonuses. This can incentivise working longer, even beyond the public normal retirement age, to maximise their private pension benefits. Workers with lower salaries may have little room for financial commitments such as contributions to voluntary private pension schemes and may be forced to withdraw funds from their private pension accounts to meet more pressing short-term financial challenges. As a result, individuals may prioritise the rules and incentives offered by private pension funds over the fixed public retirement age and sometimes may be forced by necessity to work even after the normal retirement age to achieve a dignified retirement.

Following the approach in Turner and Morgavi (2021) it is possible to differentiate for countries where private pension funds are important (henceforth "private pension countries"[11]). They find that these groups of countries are less responsive to changes in the normal retirement age. For the present work, countries are considered as having an important voluntary private pension system (private pension countries) if voluntary private pensions cover a large share of the working population and the replacement rate from such schemes is at least 60% of that in the public mandatory pension scheme.

[11] For the purposes of the current estimation, countries are characterised as having an important voluntary private pension system if voluntary private pensions cover a large share of the working population and the replacement rate from such schemes is at least 60% of that in the public mandatory pension scheme. Using data from tables 5.3 and 9.1 in OECD (2019), this includes Canada, Ireland, Israel, Japan, Mexico, the United Kingdom, and the United States.

The estimated parameters confirm the lower responsiveness of the private pension countries[12]. The estimated coefficient for private pension countries, in fact, is equal to -0.172, even if the parameter is not statistically significant, to be compared with -0.256 for the other countries, see model (4) in table 3. Thus, a 1-year increase in the normal retirement age in the median private pension country raises the older age employment rate by 1.3 percentage points, compared to 1.8 for the median country among the other ones, see model (4) in figure 1, panel A. Differentiating the effect of changes in the normal retirement age of private pension countries, slightly increases the estimated effects on the other countries. Consequently, the median estimated effect of a rise of the normal retirement age by 1 year on the older age employment rate is 0.04 percentage points higher and the range of estimates is 0.29 percentage points greater with respect to model (3), varying between 1.29 and 1.92 percentage points (see figure 1, panel B).

6 INNOVATION 4: DISTINGUISHING COUNTRIES WITH ALTERNATIVE EARLY EXIT PATHWAYS

The concept of early exit pathways, as developed by Kohli (1991), refers to institutional arrangements linked to managing the transition between work exit and entry into the regular old-age pension system. Early exit pathways, shaped by economic challenges like the high unemployment in the late 1970s and early 1980s, take the form of early retirement pensions, disability benefits, and extended unemployment benefits. These pathways provide easily accessible and relatively generous benefits, influencing older workers to withdraw from the labour market. Despite the initial economic rationale fading, early exit pathways persisted, becoming ingrained in workers' and employers' expectations, decoupled from the business cycle, often serving as pull factors for older workers to withdraw from the labour market, by offering easily accessible and relatively generous benefits.

In the countries where alternative early exit pathways are important, the labour force participation falls already 1 or 2 years before the minimum retirement age (a so-called "pipeline effect"), especially for less-educated individuals. This is captured in the model by the inclusion of an additional variable, called "the pipeline effect", which is defined as the share of the population aged 55-74 whose age is higher than one year below the minimum retirement age and who also have a "less educated"[13] background[14]. The importance of the early exit pathways reduces the importance of the normal retirement ages for individuals' labour market choices.

[12] The two coefficients are estimated separately by creating two variables: the first one is obtained by interacting the variable "share of population above the retirement age" with a dummy variable assuming value 1 if the country is a "private pension" one and zero otherwise; the second one is obtained by interacting the variable "share of population above the retirement age" with a dummy variable assuming value 1 if the country is not a "private pension" one and zero otherwise. This method reduces the power of the estimators but avoids problems of multicollinearity.

[13] For the purpose of this paper, "less-educated" corresponds to the levels 0-2 of the 2011 standard of the International Standard Classification of Education (ISCED).

[14] Staubli (2011) show that tighter eligibility criteria in the Austrian disability insurance program induced an increase in employment of 1.6 to 3.4 percentage points and brought important spillover effects into the unemployment and sickness insurance program. Borghans, Gielen and Luttmer (2014) show that more stringent criteria for accessing the disability insurance benefits induced in the Netherlands an increase in the employment rate by 2.9 percentage points and, at the same time, an increase in other social assistance programmes.

For the present work, countries are considered as having important early exit pathways ("early exit countries") if their effective retirement age is below its minimum retirement age in the current year and in the 4 previous ones. This implies that the list of early exit countries changes every year: for example, in 1997 only Luxembourg is considered an early exit country; in 2008, Austria, Belgium, France, Italy, the Netherlands, and Poland; in 2019, Belgium, France, Greece, Hungary, Italy, the Netherlands, Poland, and Spain. Model (5) distinguishes early exit countries and captures the effect of the presence of the pipeline effect for those countries. The estimated parameters confirm the lower responsiveness of the early exit countries and the presence of a pipeline effect, even if restricted to the first year before the minimum retirement age and for the less-educated individuals only[15]. Isolating the pipeline effect increases the estimated minimum retirement and normal retirement effects. Consequently, the median estimated effect of a rise of the normal retirement age by 1 year on the older age employment rate is 0.33 percentage points higher and the range of estimates is 0.52 percentage points greater than in model (4), varying between 1.49 and 2.35 percentage points (see figure 1, panel B).

7 COMPARISON WITH SINGLE-COUNTRY ESTIMATES

This section compares the estimated effects of historical pension reforms or of pension reform proposals, using the presented model, with quantifications from single-country studies analysing the same policy changes.

Discrepancies might be expected from the ability of single-country studies to account more accurately for the unique characteristics of each nation's pension system, other relevant policies, demographics, and economic conditions. Additionally, the use of microdata in these studies allows for a more granular analysis that cannot be captured by macro-level models. The capacity of micro-level models to include a wide range of variables, such as employment history, income distribution, health status, and retirement intentions, contributes to a more comprehensive understanding of how pension reforms impact different segments of the population.

Nevertheless, despite the differing methodologies, the estimated effects from the two approaches are remarkably similar, with the panel estimates of reform effects being within 20% of the country-specific estimates in 5 out of the 7 cases considered (table 5). Macro-models often fail to capture the complexity and the many differences among the countries pension systems and for this reason are frequently considered inferior to studies using micro data. However, the innovations proposed in the present study, which improve the capture of country-specific demographics and pension system characteristics, show that cross-country macro estimations can give results that are comparable to those derived from micro-level data. This approach can be particu-

[15] Staubli and Zweimüller (2013), using the social security data for Austria, estimate that the gradual rise in the minimum retirement age from 55 to 58.25 for women and from 60 to 62 for men between 2001 and 2010 resulted in an increase in the employment rate by 9.75 percentage points for men and 11 percentage points for women. They also estimated that, at the same time, unemployment increased by 12.5 percentage points among men and by 11.8 percentage points among women.

larly advantageous in situations where micro data are scarce or difficult to obtain, as it allows for meaningful analysis of retirement policies across different countries without requiring extensive individual-level data. This is particularly important in broad comparative studies or where access to granular data is limited.

Table 5

The predictions of the model are consistent with those of single-country studies

	(1)	(2)	(3)	(4)	(5)
Study	**Country**	**Year of reform**[1]	**Increase in normal retirement age (months)**	**Effect on average effective age of retirement (months)**	
				Original study	**Proposed model**
Mastrobuoni (2009)	USA	2000	2	1	0.6
Fehr, Kallweit and Kindermann (2012)	DEU	2008	24	9-12	8.4
Hanel and Riphahn (2012)	CHE	2001 & 2005	12	2.3-5.4	4.2-4.3
Lalive and Staubli (2015)	CHE	2001	12	7.9	4.2
Etgeton (2018)	DEU	2012	24	8.4	8.1
Fodor, Roehn and Hwang (2022)	SVK	2020	7	7	5.7

Note: (1) The year refers to the year of the pension reform analysed or to the year of reference of the quantification. (2) The quantification using the proposed model is made by estimating the effect of a 1-year increase in the country's normal retirement age for the specified year, using the estimates from model (5) in table 3 and the data on the demographic composition in the estimation sample for the specific year. The estimated impact for a 1-year increase was subsequently rescaled to the actual change.

Source: Author's calculations.

8 THE EFFECT OF CHANGING THE GAP BETWEEN MINIMUM AND FULL NORMAL RETIREMENT AGES

The quantifications considered above compute the effects on the older age employment rate of raising the normal retirement age by 1 year, assuming that the minimum retirement age also increases simultaneously by 1 year. However, the experience of past OECD pension reforms demonstrates that this is not always the case and that reforms sometimes increase the gap between the two pension ages[16]. The proposed model in section 6, by distinguishing between the normal age of retirement and a

[16] For example, in Belgium the normal retirement age for women in the period 1998-2007 was raised 5 times from 60 to 65 while the minimum retirement age remained constant at 60; in Switzerland the normal retirement age for women was raised twice, in 2001 and 2005 while the minimum retirement age remained constant at 62. In the Czech Republic, the normal retirement age was for both men and women raised twice, in 2019 and 2020 while the minimum retirement age remained constant; in Germany the normal retirement age for both men and women was raised in 2018 while the minimum retirement age remained constant; and in Portugal the normal retirement age for women was raised 3 times in the period 1994-8 while the minimum retirement age remained constant. Other countries instead raised the statutory retirement age while at the same time they lowered minimum retirement age: for example, Italy for male workers in 2012.

minimum age of retirement, permits simulation of the effects of closing the gap between these two ages rather than raising them both concomitantly. The presence of minimum retirement ages gives more freedom for the workers to choose to forego a part of their pension and retire at an earlier age than the normal age at which they are eligible for a full pension. If the reduced pension is correctly calibrated to account for the longer retirement period, no additional financial pressure is exerted on the pension system. Greater choice allows for differences in individual circumstances, in particular health, with potentially positive effects on wellbeing. This may be the case in occupations where the decline in physical or cognitive abilities of older workers pose a risk to themselves or others, such as those in public security and safety services or manual occupations characterised by challenging working conditions that, over extended periods, could lead to adverse health outcomes. However, as pointed out in OECD (2023), these cases can primarily be dealt with by policies outside the realm of old-age pensions such as health and safety regulations; reskilling and upskilling frameworks to facilitate career transitions; accessible, efficient and responsive long-term sickness benefits and disability insurances; and special pension schemes covering workers in hazardous or arduous jobs.

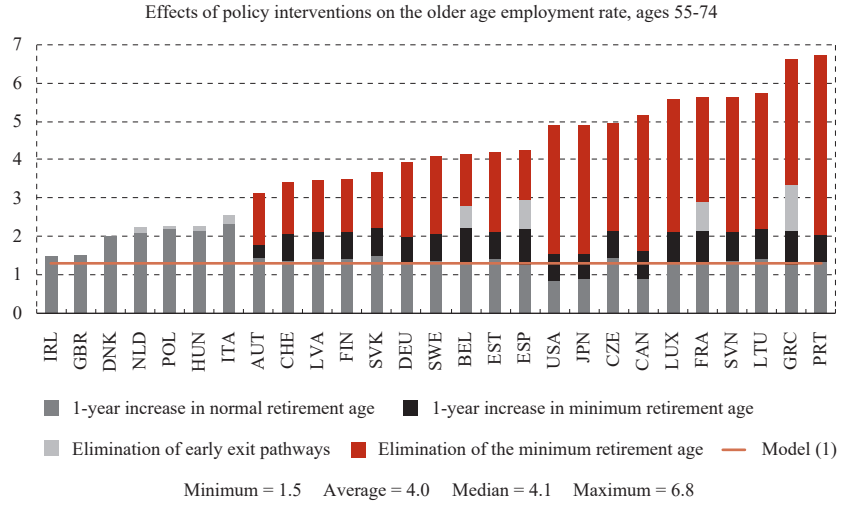
Four possible policy changes related to rises in the retirement ages are evaluated in figure 2 using the final model (5), incorporating all the modelling innovations[17]:

1) A 1-year increase in the normal retirement age, keeping the minimum retirement age unchanged.
2) A 1-year increase in the minimum retirement age, keeping the full normal retirement age unchanged after the previous one-year increase. This effect is only relevant for countries that offer a minimum retirement age option. It further assumes the corresponding "pipeline effect" introduced in section 6 also shifts by one year.
3) Elimination of the early exit pathway. This effect is positive only for the early exit countries.
4) Elimination of the minimum retirement ages, assuming that the minimum retirement age becomes equal to the normal retirement age. To better assess the scale of such effects the policy change is considered simultaneously with a 1-year increase in the normal retirement age and the elimination of the early exit pathways.

[17] The correspondent underlying model is described in the appendix while figure A1 visualise the effects of the four reforms using the underlying model.

FIGURE 2

Policy simulations changing the gap between the minimum and normal retirement ages (percentage points)



Note: This figure shows the effects of a set of policy changes by country based on the estimated model (5) using the data for the year 2020: the effects of raising the normal retirement ages by 1 year (without any changes in the minimum retirement ages), raising the minimum retirement ages by 1 year and correspondingly moving the pipeline effect by 1 year; eliminating the early exit pathways, if present, for all the countries in the sample, based on the estimated model. The elimination of the early exit pathways is equivalent to moving the correspondent effect to the minimum retirement age, incorporating the 1-year increase in the minimum retirement age. The elimination of the minimum retirement age is equivalent to raising the minimum retirement age, and the correspondent pipeline effect, to be equal to the normal retirement age, incorporating the 1-year increase in the normal retirement age and the elimination of the early retirement pathways. The estimated effects are compared with those obtained in the base model.

Source: Author's calculations.

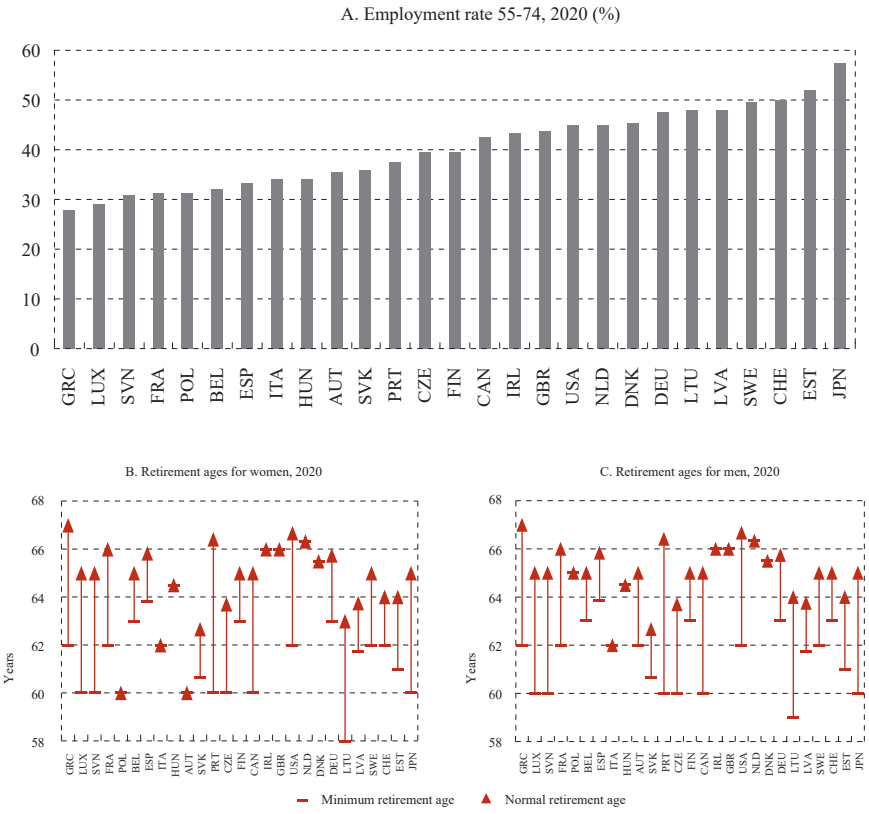
The results presented in figure 2 show that the employment effect of raising the normal retirement age is much smaller if the minimum retirement age remains unchanged. The rise in the minimum retirement age impacts a younger, and therefore generally greater, share of the population. The elimination of early exit pathways ("pipeline" effects) can have substantial effects, as in the case of France, Spain, and Greece, which have a minimum retirement age between 2 and 5 years before the normal retirement age. Italy, the Netherlands, Poland, and Hungary by contrast did not have a distinct minimum retirement age in 2020, (so that the minimum retirement age is the same as the normal retirement age) hence, the elimination of the early exit pathway affects a much older, and therefore generally smaller, share of the population.

Many countries have recently (or are in the process of) reducing the distance between the two retirement ages, as for example, in Belgium, Spain, Finland, France, and Hungary (figure 3, panels B and C). Some of the countries with the lowest

older age employment rates have significant scope for a reduction of the distance between the normal and the minimum retirement age; this includes Greece, Luxembourg, Slovenia, and France (figure 3, panel A). The normal retirement age of these countries is equal to or above the median normal retirement age of the sample, but the possibility to retire early on a reduced pension likely reduces their old age employment rate. Other countries like Poland and Austria can instead reduce the differences in the normal retirement ages between men and women.

FIGURE 3

The countries with the lowest old age employment rate also have big retirement age gaps



Source: OECD Employment database; and OECD Pension at a Glance database.

9 CONCLUSIONS

The employment rate at older ages is affected, as is any other age group, by fiscal and activation policies, wage setting institutions and labour and product market regulations. What is peculiar to this age group is the importance of the pension policies in conjunction with the demographic dynamics. Pension policies specifically affect the population approaching the retirement ages. Predicting the effects of changes in the retirement ages requires a model that effectively integrates two key aspects of pension policies: retirement rules and demography. Neglecting either pension policies or demographic considerations leads to ineffective analysis.

The proposed model introduces several innovations to the base model. Replacing the normal retirement age with the share of population above the normal retirement age as the main pension policy variable allows for different effects of policy reforms among countries. This variable efficiently combines policy and demographic information and is closely linked to the policy instruments to allow for policy simulations. Given its foundation on a single age year model, the model can be easily generalised to incorporate specific dynamics like education, gender, presence of early exit pathways, etc. Distinguishing between minimum and normal retirement ages allows inclusion of the undermining effect of the presence of minimum retirement ages in the model. Accounting for pension systems specificities allows quantification of the undermining effect of alternative early exit pathways and the reduced responsiveness to changes to normal retirement ages due to the importance of private pension systems.

The models estimated using this approach better fit the data and provide predictions of the effects of pension reforms that are closer to the estimates coming from country-specific studies. The quantifications are different among countries, based on both the pension policies put in place by the government and the demography of the country. The innovations to the model introduced by the present work, tend toward greater diversification of the estimated effects and closer predicted effects to those estimated in single-country studies, compared to the base model. This results in a higher median effect, compared to the base model: the median estimated effect of an increase in the normal retirement ages on employment rate by adopting model (5) is around 60% greater than the one estimated using the base model. The effects range between 1.49 and 2.35 percentage points, while it is the same for all countries in the base model, which estimates the average effect in the sample.

The proposed model, distinguishing between minimum and normal retirement ages, allows one to make policy simulations on the effects of raising the normal retirement ages and of reducing the distance between the normal retirement age and the minimum retirement age. Some of the countries with the lowest older age employment rate have significant retirement age gaps. Reducing this gap can have significant effects on the employment rate. Other countries can instead benefit from reducing the differences in the normal retirement ages between men and women. The adjusting horizon for changes in the retirement ages is quite long, probably

due to grandfathering options. For this reason, it is important to anticipate the effects of demographic changes or to include automatic adjustment mechanism for the retirement ages.

Disclosure statement

The author has no conflicts of interest to declare.

REFERENCES

1. Boulhol, H. and Keese, M., 2021. *A method for calculating the average age of labour market exit.*
2. Blöndal, S. and Scarpetta, S., 1999. The retirement decision in OECD countries. *OECD Economics Department Working Papers*, No. 202. https://doi.org/10.1787/565174210530
3. Borghans, L., Gielen, A. C. and Luttmer, E. F. P., 2014. Social Support Substitution and the Earnings Rebound: Evidence from a Regression Discontinuity in Disability Insurance Reform. *American Economic Journal: Economic Policy*, 6(4), pp. 34-70. https://doi.org/10.1257/pol.6.4.34
4. Égert, B. and Gal, P., 2017. The quantification of structural reforms in OECD countries: A new framework. *OECD Economics Department Working Papers,* No. 1354.
5. Etgeton, S., 2018. The effect of pension reforms on old-age income inequality. *Labour Economics,* 53, pp. 146-161. https://doi.org/10.1016/j.labeco.2018.05.006
6. Fehr, H., Kallweit, M. and Kindermann, F., 2012. Pension reform with variable retirement age: a simulation analysis for Germany. *Journal of Pension Economics and Finance*, 11(3), pp. 389-417. https://doi.org/10.1017/S1474747211000643
7. Fodor, J. Roehn, O. and Hwang, H., 2022. Determinants of labour market exit of older workers in the Slovak Republic. *OECD Economics Department Working Papers,* No. 1700. https://doi.org/10.1787/2161918e-en
8. Gal, P. and Theising, A., 2015. The macroeconomic impact of structural policies on labour market outcomes in OECD countries: A reassessment. *OECD Economics Department Working Papers,* No. 1271. https://doi.org/10.1787/5jrqc6t8ktjf-en
9. Geppert, C. [et al.], 2019. Labour supply of older people in advanced economies: the impact of changes to statutory retirement ages. *OECD Economics Department Working Papers*, No. 1554. https://doi.org/10.1787/b9f8d292-en
10. Grigoli, F., Koczan, Z. and Tapalova, P., 2018. Drivers of Labor Force Participation in Advanced Economies: Macro and Micro Evidence. Chap. 18/150 in *IMF Working Papers,* No. 150. https://doi.org/10.5089/9781484361528.001
11. Hanel, B. and Riphahn, R. T., 2012. The timing of retirement – New evidence from Swiss female workers. *Labour Economics*, 19(5), pp. 718-728. https://doi.org/10.1016/j.labeco.2012.05.013
12. IMF, 2024. *World Economic Outlook.* Washington: International Monetary Fund.
13. Kohli, M. (ed.), 1991. *Time for retirement: Comparative studies of early exit from the labor force.* Cambridge University Press.
14. Lalive, R. and Staubli, S., 2015. How does raising women's full retirement age affect labor supply, income, and mortality? *NBER Working Paper,* No. 18660.
15. Manoli, D. and Weber, A., 2016. The Effects of the Early Retirement Age on Retirement Decisions. NBER Working Paper, No. 22561. https://doi.org/10.3386/w22561

16. Mastrobuoni, G., 2009. Labor supply effects of the recent social security benefit cuts: Empirical estimates using cohort discontinuities. *Journal of Public Economics,* 93(11-12), pp. 1224-1233. https://doi.org/10.1016/j.jpubeco.2009.07.009
17. Morris, T., 2021. The unequal burden of retirement reform: Evidence from Australia. *Economic Inquiry,* 60(2), pp. 592-619. https://doi.org/10.1111/ecin.13034
18. OECD, 2019. *Pensions at a Glance 2019: OECD and G20 Indicators*. Paris: OECD. https://doi.org/10.1787/b6d3dcfc-en
19. OECD, 2021. *Pensions at a Glance 2021: OECD and G20 Indicators.* Paris: OECD. https://doi.org/10.1787/ca401ebd-en
20. OECD, 2023. *Pensions at a Glance 2023: OECD and G20 Indicators.* Paris: OECD. https://doi.org/10.1787/678055dd-en
21. Staubli, S., 2011. The impact of stricter criteria for disability insurance on labor force participation. *Journal of Public Economics*, 95(9-10), pp. 223-1235. https://doi.org/10.1016/j.jpubeco.2011.05.008
22. Staubli, S. and Zweimüller, J., 2013. Does raising the early retirement age increase employment of older workers? *Journal of Public Economics,* 108, pp. 17-32. https://doi.org/10.1016/j.jpubeco.2013.09.003
23. Turner, D. and Morgavi, H., 2021. Revisiting the effect of statutory pension ages on the Participation Rate. *Public Sector Economics*, 45(2), pp. 257-282. https://doi.org/10.3326/pse.45.2.4

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APPENDIX

THE UNDERLYING MODEL

The employment rate at age 55-74 can be written in the following way:

$$ER_{55-74} = \frac{Empl_{55-74}}{POP_{55-74}} = \frac{\sum_{a=55}^{74} Empl_a}{POP_{55-74}} = \frac{\sum_{a=55}^{74} ER_a \cdot POP_a}{POP_{55-74}} = \sum_{a=55}^{74} P_a \cdot ER_a \quad \text{(A1)}$$

where:

$P_a = \frac{POP_a}{POP_{55-74}}$ is the share of population of age a on the total of population aged 55-74;

$ER_a = \frac{E_a}{POP_a}$ is the employment rate at age a.

The present model is based on the one estimated by Turner and Morgavi (2021) using single year age class data. The original model used the participation rate by age class while the present model uses the employment rate, as dependent variable. It assumes that there is a natural friction in the employment rate: the older is the worker the less likely he is to be working, independently of the retirement age. In the model proposed in the present work this assumption was dropped. It also assumes that the employment rate at the retirement ages falls by the same amount for all countries, independently of the retirement age. The employment rate for each country sex, age, year combination (c, s, a, t) can therefore be written as follows:

$$ER_{c,s,a,t} = \theta_c + \theta_t + \theta_r \cdot I\left(a \geq retirement\ age_{c,s,t}\right) + \sum_j \theta_j X_{j,c,t} \quad \text{(A2)}$$

where θ_c is a country fixed effect, θ_r is the retirement age effect, X_j are a set of control variable variables of interest and θ_j their associated coefficients. Consequently, the employment rate of population is assumed to remain constant at $\theta_c + \theta_t + \sum_j \theta_j X_{j,c,t}$ until the year before the retirement age when it falls by θ_r percentage points.

Aggregating equation (3) by age, becomes:

$$ER_{c,t} = \theta_c + \sum_s \theta_r \cdot P_{c,\left(a \geq \text{retirement age}_{c,s,t}\right),s,t} + \sum_j \theta_j X_{j,c,t}$$

Which is equivalent to the proposed model.

Grouping together the country and year fixed effects and the control variables $X_{j,c,t}$ in equation (3), which for a given country at a given year are constant, in the constant θ_0, the model can be rewritten in the following way:

$$ER_a = \theta_0 + \theta_r \cdot RET_a, \text{ where } RET_a = \begin{cases} 1, \text{ if } a \geq \text{retirement age} \\ 0, \text{ otherwise} \end{cases}$$

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Therefore, if the retirement age if equal to R_a

$$\begin{aligned} ER_{55-74}\left(R_a\right) &= \sum_{a=55}^{74} P_a \cdot ER_a = \sum_{a=55}^{74} P_a \cdot \left[\theta_0 + \theta_r \cdot RET_a\right] \\ &= \sum_{a=55}^{74} P_a \cdot \theta_0 + \theta_r \cdot \sum_{a=55}^{74} P_a \cdot RET_a = \theta_0 + \theta_r \cdot \sum_{a=R_a}^{74} P_a \end{aligned} \tag{A3}$$

If, instead, the retirement age is raised to $R_a + 1$, it can be written:

$$ER_{55-74}\left(R_a + 1\right) = \theta_0 + \theta_r \cdot \sum_{a=R_{a+1}}^{74} P_a$$

The effect on the employment rate of the raise of the retirement age from R_a to $R_a + 1$ is

$$ER_{55-74}\left(R_a + 1\right) - ER_{55-74}\left(R_a\right) = \left(\theta_0 + \theta_r \cdot \sum_{a=R_{a+1}}^{74} P_a\right) - \left(\theta_0 + \theta_r \cdot \sum_{a=R_a}^{74} P_a\right) = -\theta_r \cdot P_{R_a}$$

The effect is equal to the parameter θ_r multiplied by the share of population at the initial retirement age P_{R_a}.

In the same way, it can be demonstrated that the effect of a 1-year change in the minimum and in the normal retirement age is given by:

$$\begin{aligned} &ER_{55-74}\left(minR_a + 1, normR_a + 1\right) - ER_{55-74}\left(minR_a, normR_a\right) \\ &= -\theta_{minret} \cdot P_{minR_a} - \theta_{normret} \cdot P_{normR_a} \end{aligned}$$

While the effect of increasing the normal retirement age by 1 year and the eliminating of the early exit pathways, that is letting the minimum retirement age be equal to the normal retirement age, can be quantified as follows:

$$\begin{aligned} &ER_{55-74}\left(minR_a + 1, normR_a + 1\right) - ER_{55-74}\left(minR_a, normR_a\right) \\ &= -\theta_{pipeline} \cdot \sum_{a=\min R_a - 1}^{normR_a} P_a - \theta_{minret} \cdot \sum_{a=\min R_a}^{normR_a} P_a - \theta_{normret} \cdot P_{normR_a} \end{aligned}$$

Figure A1 shows the effect of a pension reform on the employment rate by age, according to the underlying model. The employment rate is assumed to remain constant until the age year before the retirement ages. A first fall in the employment rate occurs the year before the minimum retirement age due to the pipeline effect, for the early exit countries only. This fall is equal to the pipeline effect $\theta_{pipeline}$. The second additional reduction in employment rate occurs at the minimum retirement age (*minret*), if present, and it is equal to the early retirement age effect, θ_{minret}. A share of the population prefers to renounce to part of the full pension to retire some years before the normal retirement age normal retirement rate ($normR_a$). At this age workers eligible for a full pension from all mandatory pension schemes. This fall is equal to the normal retirement age effect, $\theta_{normret}$.

If one assumes that all the population shares P_a are constant, formula (A3) can be rewritten in the following way.

$$ER_{55-74}\left(R_a\right) = \theta_c + \theta_t + \theta_r \cdot \sum_{a=R_a}^{74} \frac{1}{20} = \theta_c + \theta_t + \theta_r \cdot \frac{74 - R_a}{20} \tag{A4}$$

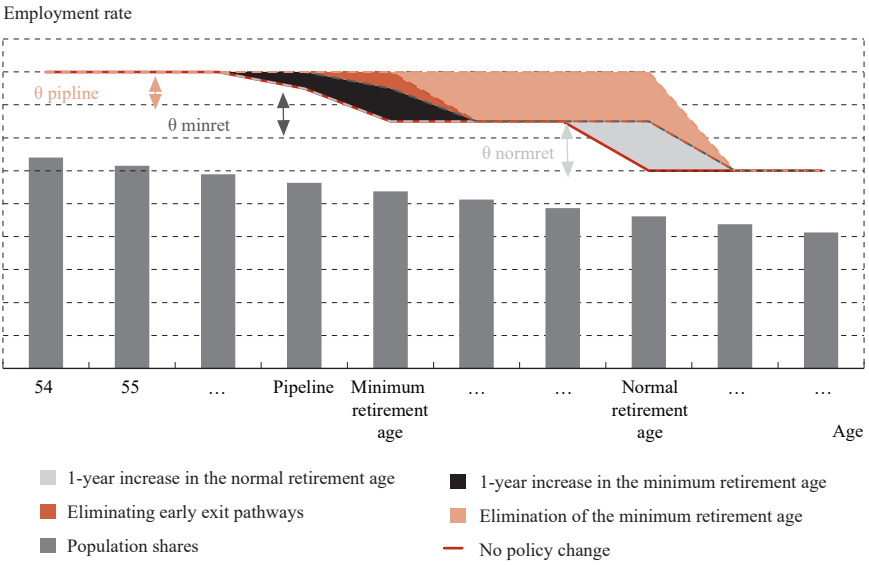
Hence

$$\begin{aligned} &ER_{55-74}\left(R_{a+1}\right) - ER_{55-74}\left(R_a\right) \\ &= \left(\theta_c + \theta_t + \theta_r \cdot \frac{74 - R_{a+1}}{20}\right) - \left(\theta_c + \theta_t + \theta_r \frac{74 - R_a}{20}\right) = -\frac{\theta_r}{20} R_a \end{aligned} \tag{A5}$$

This shows that using the normal pension age in the regression model is equivalent to the proposed model, assuming that the population shares are constant and the parameter θ_r is -20 times the estimated parameter using the normal pension age variable, or -1/5 if, as it is the case in the present work, the shares are expressed in percentage.

FIGURE A1

Model visualisation



Note: The disaggregated model underlying model (5) is shown together with the effect of three possible pension reforms: a 1-year raise in the normal retirement age, a 1-year raise in the minimum retirement age, and the elimination of early exit pathways, consistent with the quantification in figure 2. An increase of 1 year in the minimum and in the normal retirement age has an effect that is proportional to the population shares at those ages. The effect of eliminating the early exit pathways, that is to move the minimum retirement age to the normal retirement age, instead is proportional to the share of population whose age is included between the age year before the initial minimum retirement age and the final normal retirement age.

Source: Author's illustration.

APPROXIMATED EFFECTS ON THE AVERAGE AGE OF LABOUR MARKET EXIT

The employment rate at age 55-74 can be written in the following way:

$$ER_{55-74} = \frac{Empl_{55-74}}{POP_{55-74}} = \frac{\sum_a Empl_a}{POP_{55-74}} = \frac{\sum_a ER_a \cdot POP_a}{POP_{55-74}} = \sum_a ER_a \cdot P_a \qquad \text{(A6)}$$

If, as it implicit in the proposed model, changes in the retirement age affect the labour market choices of the population whose age is equal at the initial retirement age and assuming no changes in the age composition of the population, the effect on the employment rate of a change in the retirement ages is given by:

$$\Delta ER_{55-74} = \sum_{a=55}^{74} \Delta ER_a \cdot P_a = \Delta ER_{R_a} \cdot P_{R_a} \qquad \text{(A7)}$$

Ignoring deaths, assuming the age structure is stable, that nobody retires before age 55 and everyone retires by age 75, the average age of labour market exit can be calculated as[18]:

$$AALME = \sum_{a=55}^{74} a \cdot \frac{A_{a-1} \cdot P_{a-1} - A_a \cdot P_a}{A_{54} \cdot P_{54}}$$

where:

$AALME$ is the average age of labour market exit;

A_a is the participation rate at age a.

The effect of a change in the retirement age on the average age of labour market exit is:

$$AALME\left(R_a + 1\right) - AALME\left(R_a\right) = \Delta\, AALME = \sum_{a=55}^{74} a \cdot \frac{\Delta A_{a-1} \cdot P_{a-1} - \Delta A_a \cdot P_a}{A_{54} \cdot P_{54}} \qquad \text{(A8)}$$

Where the Δ express the difference between before and after the reform. Expanding the RHS of (A8) gives:

$$\Delta AALME = \frac{1}{A_{54} \cdot P_{54}} \qquad \text{(A9)}$$

$$\cdot \left[\left(\Delta A_{54} \cdot P_{54} - \Delta A_{55} \cdot P_{55} \right) \cdot 55 + \ldots + \left(\Delta A_{R_a - 1} \cdot P_{R_a - 1} - \Delta A_{R_a} \cdot P_{R_a} \right) \cdot R_a \right.$$

$$\left. + \left(\Delta A_{R_a} \cdot P_{R_a} - \Delta A_{R_{a+1}} \cdot P_{R_a + 1} \right) \cdot \mathrm{R}_{a+1} + \ldots + \left(\Delta A_{73} \cdot P_{73} - \Delta A_{74} \cdot P_{74} \right) \cdot 74 \right]$$

If one assumes that there is no unemployment and therefore all the active population is employed, the formula above can be rewritten in the following way.

[18] See: https://www.oecd.org/els/soc/Labour-Market-Exit-Age-Methodology.pdf.

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$$\Delta AALME = \frac{1}{A_{54} \cdot P_{54}} \cdot \Big[\left(\Delta ER_{54} \cdot P_{54} - \Delta ER_{55} \cdot P_{55} \right) \cdot 55 + \ldots + \left(\Delta ER_{R_a - 1} \cdot P_{R_a - 1} - \Delta ER_{R_a} \cdot P_{R_a} \right) \cdot R_a + \left(\Delta ER_{R_a} \cdot P_{R_a} - \Delta ER_{R_{a+1}} \cdot P_{R_a + 1} \right) \cdot R_{a+1} + \ldots + \left(\Delta ER_{73} \cdot P_{73} - \Delta ER_{74} \cdot P_{74} \right) \cdot 74 \Big] \quad \text{(A10)}$$

If, as above, one assumes that changes in the retirement age affect the labour market choices of the population whose age is equal at the initial retirement age and that no changes in the age composition of the population occur, the equation above can be written in the following way:

$$\Delta AALME = \frac{1}{A_{54} \cdot P_{54}} \cdot \Big[\left(0 \cdot P_{54} - 0 \cdot P_{55} \right) \cdot 55 + \ldots + \left(0 \cdot P_{R_a - 1} + \Delta ER_{earR_a - 1} P_{R_a} \right) \cdot R_a + \left(\Delta ER_{R_a} \cdot P_{R_a} - 0 \cdot P_{R_a + 1} \right) \cdot \left(R_a + 1 \right) + \ldots + \left(0 \cdot P_{73} - 0 \cdot P_{74} \right) \cdot 74 \Big] = \frac{1}{A_{54} \cdot P_{54}} \cdot \Delta ER_{R_a} \cdot \left(R_{a+1} - R_a \right) \cdot P_{R_a} = \frac{\Delta ER_{R_a}}{A_{54} \cdot P_{54}} \cdot P_{R_a} = \frac{\Delta ER_{55-74}}{A_{54} \cdot P_{54}} \quad \text{(A11)}$$

Following the same logic, it can be demonstrated that the same result is valid for all the models.

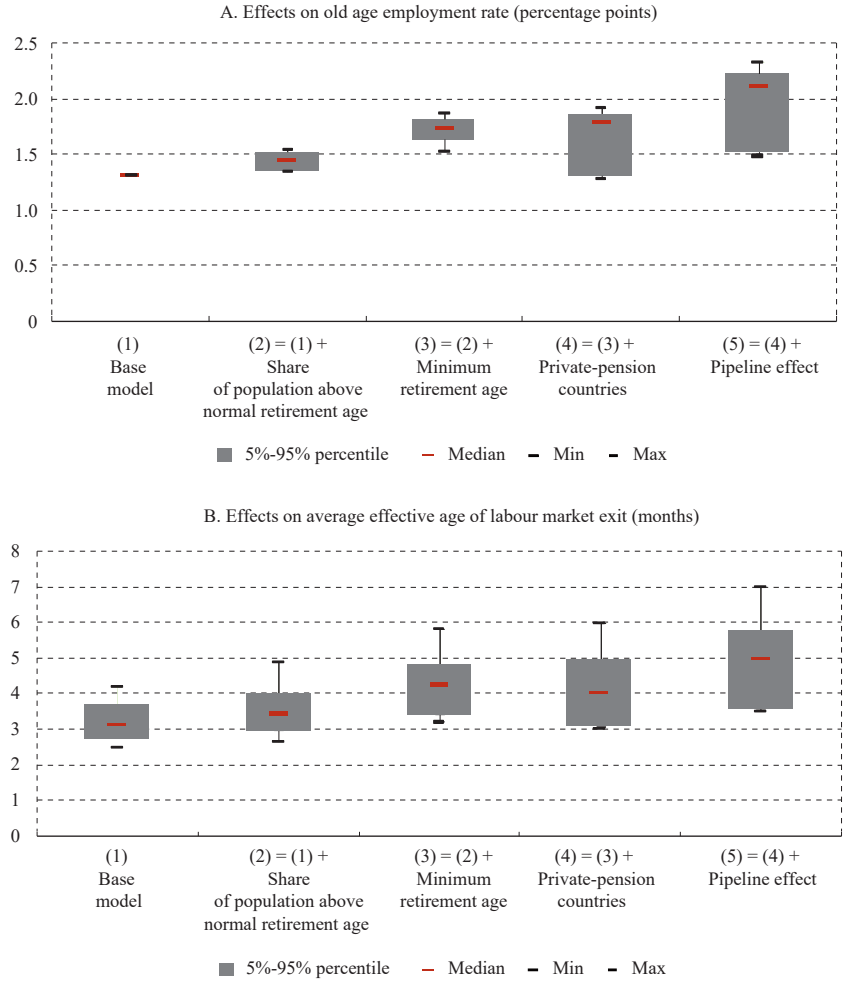
Equation (A11) can thus be used to have an order of magnitude of the correspondent effects on the average age of labour market exit of a 1-year increase in the normal retirement age for each model. Given the strong assumptions they are based on the resulting estimated effects have no ambition of precision. They can however give an order of magnitude.

This formula was used for the computations in table 1. Given the different set of countries included in the estimation samples of the different studies, the values of A_{54} and P_{54} are the correspondent OECD averages. The set of models in the present work are instead compared using the data of the estimation sample, which is the same for all the models. In the case of model (1) the effect on the employment rate is equal to 1.32 for all the countries. Hence the variability in entirely due to the variability in A_{54} and P_{54}. Thus, the estimated effects on the average age of labour market exit ranges between 2.53 and 4.22 months with a median of 3.17 months. The effects of pension reforms on the employment rate in the other models instead

are more dispersed. The estimated effect on the average age of labour market exit is affected by the joint variation of A_{54}, P_{54} and the effects on the employment rate. The estimated effects on the average age of labour market exit consequent to model (2) range between 2.68 and 4.91 months, with a median of 3.47 months. The range of the estimated effects is thus 0.54 months greater than those consequent to the base model and the median is 0.30 months higher. The estimated effects on the average age of labour market exit consequent to model (3) range between 3.23 and 5.84 months, with a median of 4.26 months. The range of the estimated effects is thus 0.38 months greater than those consequent to model (2) and the median is 0.79 months higher. The estimated effects on the average age of labour market exit consequent to model (4) range between 3.06 and 6.00 months, with a median of 4.04 months. The range of the estimated effects is thus 0.33 months greater than those consequent to the base model and the median is 0.22 months lower. The estimated effects on the average age of labour market exit consequent to model (5) range between 3.52 and 7.14 months, with a median of 5.02 months. The range of the estimated effects is thus 0.67 months greater than those consequent to the base model and the median is 0.97 months lower. Figure A2 compares the models both in terms of the effects on the old age employment rate and on the average age of labour market exit.

FIGURE A2

Comparing the effects on ER-55-74 and on AALME under the proposed model



Note: The figure compares the long-term effect on the old age employment rate and on the average age of labour market exit of a raise of the normal retirement age by 1 year among the models expressed in percentage points and months, respectively. On the x-axis, for each model, the main innovation introduced with respect to the previous model is shown. For the models including the effects of minimum retirement age and of the pipeline effects, these are also assumed to move by 1 year. The red horizontal marks show the median of the distribution of the effects among the countries in the sample; the blue boxes show the distance between the fifth and the ninety-fifth percentile; and the whiskers show the minimum and the maximum values. The effects are calculated using the data for year 2020 or latest year available.

Source: Author's calculations.

Public debt and GDP growth in BRICS: unravelling time-scale complexities through wavelet analysis

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Abstract

This study examines the impact of public debt on economic growth in BRIC nations – Brazil, Russia, India, and China – over 1996-2022 using wavelet coherence and cross-wavelet analysis to capture both short-term dynamics and long-term trends. The findings reveal a positive but heterogeneous co-movement between public debt and GDP, intensifying during COVID-19. Russia exhibits short-to-medium-term co-movement, while Brazil, India, and China show medium-to-long-term patterns. In Brazil and Russia, public debt drives growth during economic distress, whereas in India and China, growth leads to debt accumulation. Granger causality tests confirm the directionality of these relationships, supporting the robustness of the wavelet-based results. The study highlights the need for tailored debt management strategies aligned with country-specific economic conditions to support sustained and inclusive growth.

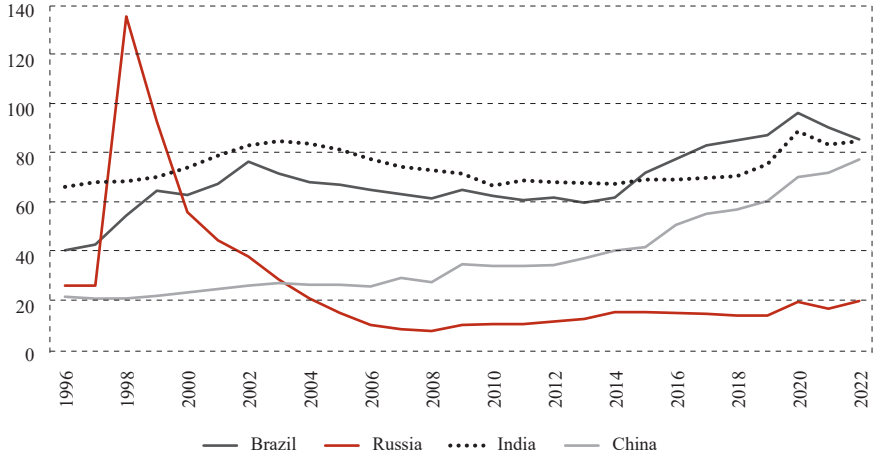
Keywords: public debt, economic growth, BRICS, wavelet analysis, emerging nations, COVID-19

1 INTRODUCTION

Countries across the world are grappling with astronomical levels of sovereign debt. Since the Global Financial Crisis in 2008, countries have been consistently trying to contain their debt ratios; however, the issue was exacerbated exponentially after the COVID-19 pandemic disrupted fiscal health globally. This time, the impact is seen as more severe in the emerging market economies. As many as 47 developing countries are expected to hit external debt indebtedness thresholds by or before 2029. These countries will have to shell out a whopping $400 billion to service external debt in FY 2024-25 alone (IMF, 2024). Within the emerging market economies, the central role of four major countries, i.e., the original members of the BRIC nations (Brazil, Russia, India, and China) is becoming magnified; their contribution to world economic output grew from 18% in 2010 to more than one-fourth in 2021, registering an astounding growth of 44% in just 12 years. In parallel with their economic output, these nations account for slightly more than 40 percent of the world population and 16 percent of global trade. Unlike advanced economies, which thrive on global demand, government spending is the central axis around which the domestic demand-driven growth in the emerging market economies revolves. However, rising debt servicing and repayment costs reduce the elbow room for capital-intensive fiscal policies in these countries. Figures 1 and 2 showcase the changes in public debt levels and GDP growth rates over the years in BRIC countries.

Figure 1

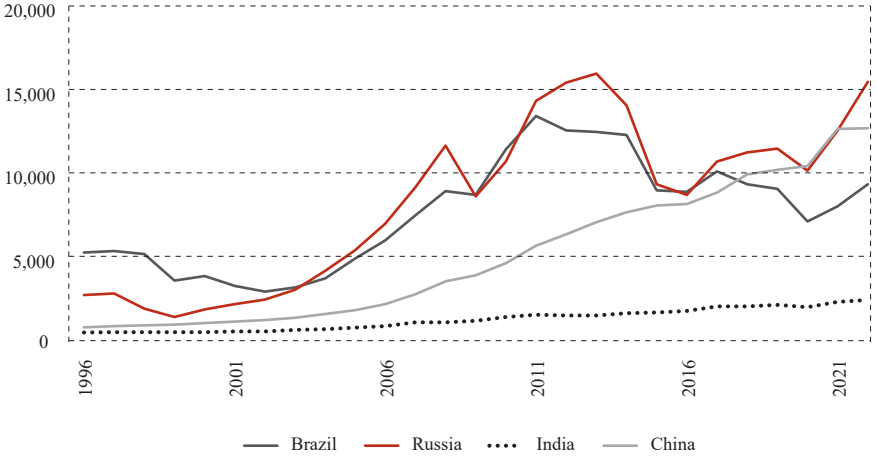
Public debt from 1996 to 2022 in BRIC countries (general government debt as a percentage of GDP)



Source: Authors' compilation.

Figure 2

GDP growth from 1996 to 2022 in BRIC countries (GDP per capita in USD; current price)



Source: Authors' compilation.

The existing studies on the connection between public debt and economic growth reveal a lack of consensus on several key aspects. Scholars present conflicting views regarding the threshold levels, their long-term and short-term effects, and the asymmetric nature of the relationship, leading to ongoing debates in the literature. Additionally, there is a notable absence of multi-scale analytical approaches, such as wavelet analysis, in examining this relationship. Moreover, recent studies have predominantly focused on the 2008 global financial crisis (Turan and Iyidogan, 2023;

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Kassouri et al., 2021; Butkus et al., 2021) as a pivotal event shaping the discourse. The significant increase in government spending due to the COVID-19 pandemic and the resultant surge in borrowing by governments worldwide has received insufficient attention. Furthermore, most empirical studies have concentrated on developed economic blocs (Abubakar and Mamman, 2021; Esteve and Tamarit, 2018; Baum, Checherita-Westphal and Rother, 2013), overlooking the unique challenges faced by emerging nations characterized by underdeveloped private investment, inadequate financial infrastructure, and consistent policy uncertainty. Consequently, the changing aspects of public debt and growth in these contexts warrant further investigation to provide a more contextual understanding of the issue.

Existing empirical literature on the debt-growth dynamics, although it has adopted extensive datasets and robust econometric methods, remains inconclusive. Reinhart and Rogoff's (2010) influential study, based on two centuries of data from 44 countries, suggested that gross domestic product tends to slow down after the debt-to-GDP ratio crosses the threshold of 90%. However, this threshold has been contested due to variations in data, countries, and methodologies, as highlighted by subsequent studies (Eberhardt and Presbitero, 2015; Panizza and Presbitero 2014; Herndon, Ash and Pollin, 2013; Baum, Checherita-Westphal and Rother, 2013). Notably, research indicates a much lower debt threshold for emerging economies (Asteriou, Pilbeam and Pratiwi, 2021; Law et al., 2021; Gunarsa, Makin and Rohde, 2019; Ndoricimpa 2017; Mencinger, Aristovnik and Verbic, 2015; Woo and Kumar, 2015).

Considering the economic importance of the BRIC countries and the potential global repercussions of mismanaged public debt within these nations, this paper will empirically analyse the influence of public debt on the economic growth of BRIC from 1996 to 2022, utilizing the wavelet method, thus covering both systemically significant events, i.e., the 2008 global financial crisis (GFC) and the 2019 coronavirus pandemic. The primary contribution of this paper lies in the application of a wavelet transformation method, which allows for a detailed analysis of public debt and economic growth dynamics across different time scales. This approach provides deeper insights regarding the causality between public debt and gross domestic product. The wavelet power spectrum characterizes the spectral density or energy of the time series. Annual data for the time-period is plotted on the horizontal axis from 1996 to 2022, and periods or scales are represented on the Y-axis for the wavelet transformation. Periods or scales are akin to camera lenses, which help expand or contract the wavelet power in varying intervals, i.e., short, medium, and long-term, thus providing simultaneous insights into both time and frequency domains.

The public debt-growth relationship is indeed a dynamic subject, and the literature available on its role in a nation's macroeconomic stability and progress is continuously evolving. The wavelet spectrum model adopted in this study is an extension of existing studies that investigate the nuances of this debt-growth nexus. The study also brings the spotlight on the emerging group of countries that are becoming systemically very important for driving future global economic growth. The

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unexplored novelty in terms of methodology and data sample will provide deeper insights into the critical linkages of public debt and gross domestic product. When it comes to emerging nations, this topic remains a scantily studied dimension in the literature, and yet it is pivotal for policymakers to consider these contextual realities while devising future borrowing programs.

The remaining paper is ordered as follows. Section 2 provides a brief theoretical background and a detailed review of the existing studies *vis-à-vis* the debt-growth nexus, highlighting the dominant threads in terms of sample, methodologies, and findings. In section 3, we explain the data and the research methodology adopted in the study. The empirical results and findings are presented in section 4. Finally, in the last section, we provide the conclusion of our manuscript while also embarking on the theoretical and policy implications.

2 LITERATURE REVIEW

Since the mid-18th century, the interaction of public debt and economic growth has been extensively debated both theoretically and empirically (Hume, 1752; Smith, 1776; Ricardo, 1820; Keynes, 1935; Hansen, 1938; Samuelson, 1938; Barro, 1974; Buchanan, 1976; Blanchard, 1985). Classical economists (Hume, 1752; Smith, 1776; Ricardo, 1820) argued that government borrowing, as a politically convenient but inefficient fiscal tool, leads to capital waste and burdens future generations, emphasizing long-term negative impacts. Conversely, the Keynesian school (Keynes, 1935; Hansen, 1938; Samuelson, 1938) posits that sovereign debt can stimulate economic output by increasing aggregate demand and boosting private investment. Neoclassical theorists introduced the Ricardian Equivalence Theory (Barro, 1974), suggesting debt neutrality, where rational agents anticipate future taxes to offset debt, thus leaving aggregate demand, growth, and interest rates unaffected. Contemporary empirical evidence is extending these theoretical frameworks in several directions.

The global financial crisis of 2008 rekindled the interest of the research community in the dynamics of public debt and its interaction with economic growth. Several studies with wider data sets and modern econometric methodologies were conducted to put established theories to the test. One such study was conducted by Carmen Reinhart and Kenneth Rogoff in 2010 using a dataset of 44 countries with around two centuries of observations. The study found that growth tends to be negatively affected once the debt-to-GDP ratio crosses 90%, and for emerging market economies, growth turns negative at only 60% in the case of the external debt portion. Further studies by Checherita-Westphal and Rother (2010) and Afonso and Jalles (2012) complemented the non-linear influence of debt on economic growth. These studies were followed by an intensified debate about the generalization of these threshold levels. A study by Herndon, Ash and Pollin (2013) questioned the conclusions of Reinhart and Rogoff on the grounds of choice of data, coding errors, and statistical relevance. The study established that after correcting for data and statistical inconsistencies, growth rates do not vary below or above the threshold of 90%. The threshold levels were, however, found to be significantly dependent

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on the choice of period and country. A number of other studies also contested the universality of the debt threshold level (Eberhardt and Presbitero, 2015; Egert, 2015; Panizza and Presbitero, 2014).

In addition to this, the empirical evidence also suggested that the threshold levels vary between advanced countries and emerging and developing nations (Mencinger, Aristovnik and Verbic, 2015). Using a dynamic threshold panel methodology, a study by Baum, Checherita-Westphal and Rother (2013) focused on twelve European area countries for the 1990-2010 period. The results suggested a significant positive short-term influence on GDP growth with 67% as a turning point for the public debt-to-GDP ratio, where the significance of the impact becomes zero. The study also found that above a threshold of 95%, there is an adverse impact of incremental debt on economic output. Using growth regressors, Cecchetti, Mohanty and Zampolli (2011) conducted a study on OECD countries during 1980-2010. Their results suggested that debt impacts economic growth negatively after hitting a threshold of 85% of the gross domestic product. Some studies focused on advanced economies (Abubakar and Mamman, 2021) extended the field of study into more detailed nuances like sovereign debt's transitory and permanent effect on economic growth. On the other hand, research with data sets from emerging and developing nations suggested much lower debt threshold levels. A recent work on emerging and developing market economies by Kassouri et al. (2021) adopted the interactive fixed effects (IFEs) approach and dynamic panel threshold methodology on panel data of 62 emerging and developing market countries for the 2000-2018 period. The results reveal an inverted U-shaped relationship between public debt and economic growth, which becomes statistically significant in the long run. In contrast, the short-run relationship lacks substantial statistical significance. Additionally, the study did a separate analysis for the low-income sub-sample, and it was found that the threshold level at which an increase in public debt harms economic output tends to be lowest among low-income countries across all income sub-groups. A study conducted by Law et al. (2021) focused on a panel of seventy-one developing countries from 1984 to 2015. In this study, the dynamic panel threshold technique was used to examine the threshold debt value. Diverging from previous studies, the results showed a lower threshold value of 51.65 percent.

3 DATA AND METHODOLOGY

3.1 DATA

The two variables under study, i.e., the gross domestic product as well as the gross government debt have been taken from the World Development Indicators database of the World Bank and the International Monetary Fund (IMF) respectively. The sample comprises four emerging nations of the BRIC block, i.e., Brazil, Russia, India, and China in the shape of panel data for the 1996-2022 period. The choice of the period was primarily driven by data availability. Table 1 explains the dependent and independent variables used in the study. Wavelet analysis was used to determine the relationship between levels of public debt (explanatory variable) and economic growth.

Table 1
Variables, definitions, and sources

Variables	Measurement	Source	Type
Gross domestic product	Annual percentage growth rate of GDP at market prices based on constant local currency	World Development Indicators – World Bank	Dependent
Gross government debt	General government debt, total (% of GDP)	International Monetary Fund	Independent

Source: Authors' compilation.

Economic growth, the dependent variable, is expressed in the annual percentage growth rate of gross domestic product (GDP), measured at market prices based on constant local currency. GDP aggregates are based on constant 2015 prices, expressed in U.S. dollars.

Public debt, the independent variable, is expressed in general government debt (GGD) as a percentage of GDP. GGD is the gross debt of the general government. Its components include currency and deposits; debt securities, loans; insurance, pensions and standardised guarantee schemes, and other accounts payable. As per the existing literature, GGD is a key indicator for measuring the sustainability of government finance as well as for assessing the changes in government debt over time. It primarily reflects the impact of past government deficits (Afonso and Alves, 2014).

3.2 METHODOLOGY

Public debt has been steadily increasing worldwide, particularly in emerging countries, following the 2008 global financial crisis and the recent COVID-19 pandemic. This study will attempt to analyse the growing public debt in the case of BRIC nations and its influence on economic growth by adopting the wavelet approach. Using a multi-scale analytical approach, we shall be looking through the lens of time as well as the frequency dimension.

By incorporating both time and frequency domains, wavelet analysis addresses the limitations of conventional time series analysis in studying economic dynamics. Three main properties of wavelet analysis that improve the comprehension of information hidden in economic data include: 1) Immunity to non-stationarity of data, 2) Resolution of data in different time scales, 3) localization of data in both time as well as frequency domains (Albu and Albu, 2021). To substantiate the consistency of the results we conducted a country-wise Granger causality analysis.

This study aims at uncovering the causal relations between Public Debt and Economic Growth for various time scales. Besides analysing causality for the original frequency, using wavelet analysis we will also investigate this relationship at different frequencies in the context of the time scales by decomposing the series appropriately. Table 2 shows the time scales corresponding to different frequencies that have been obtained using the wavelet transformation.

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Table 2
Time scale intervals

Time scale	Horizontal axis (in years)
1-5	1996-2000
6-10	2001-2004
11-15	2005-2008
16-20	2009-2012
20-25	2013-2016
26-30	2017-2022

Source: Authors' compilation.

The fact that most of the data in economic time series is a result of economic agents making decisions with varying time horizons, bifurcating time series data into different layers of frequency makes wavelet analysis the most appropriate tool. This is done by assuming the original time series as a function of time, which is then sliced into its low and high-frequency components by adopting wavelet scaling filters. Finally, the wavelet coefficients obtained at each frequency level are a representation of its corresponding time scale.

In this analysis, the wavelet model (ψ) is a modified form of the Morlet wavelet. The corresponding equation for this wavelet is shown in equation (1).

$$\Psi(t) = \pi^{\frac{1}{4}} e^{-i\omega 0t} e^{-t\frac{2}{2}} \tag{1}$$

Research by Rua and Nunes (2009) confirms that the Morlet wavelet is widely utilized in analysis. In this model, (ω) represents frequency, commonly set to 6 to achieve a balance between the time and frequency domains, while (t) represents the precise point at which the wavelet is applied to a time series with closely spaced observations. Wavelet coherence measures the localized correlation between two-time series over a range of frequencies and time scales (Torrence and Webster, 1999).

The wavelet coherence equation, as defined by Torrence and Webster (1999), is presented in equation 2.

$$R^2(u,s) = \frac{|\, \mathrm{s}\left(s^{-1} w_{xy}(u,s)\right)|^2}{\mathrm{s}\left(s^{-1}|\, w_x(u,s)|^2\right) s\left(s^{-1}\,|\, w_y(u,s)|^2\right)}, \tag{2}$$

In wavelet coherence analysis, the smoothing factor (s) is critical; without it, coherence would reach a value of 1 across all frequency and time dimensions. Coherence values range from 0 to 1, analogous to correlation coefficients, indicating the degree of co-movement. Values near 1 imply a strong correlation, while those close to 0 suggest a weak or no correlation (Kiviaho et al., 2012). Graphical representations employ colour coding to convey the strength of co-movement, with red signifying high correlation and green indicating no correlation. Significant regions are identified using dark colours within a cone of significance at the 5% level, while areas outside this cone are considered insignificant.

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The Cross-wavelet representation is given by equation 3:

$$W_{(xy)}(u,s) = W_x(u,s).W_y*(u,s) \quad (3)$$

where (Wx) and (Wy) are the transformed wavelets, (u) denotes location, and (s) represents scale. Arrows play an essential role in image analysis (Loh, 2013). When arrows point from right to left, the series move together and are in phase. Conversely, arrows pointing from left to right indicate opposite movement or anti-phase. An upward arrow shows that the first time series leads, while a downward arrow suggests that the second series leads.

4 RESULTS AND DISCUSSION

Using annual data, the study has taken a sample of four BRIC member states to analyse the relationship between GDP growth and public debt for 1996-2022 period. The data was extracted from World Bank and IMF databases. Table 3 provides a detailed overview of the descriptive statistics for the data collected from the four countries. The mean and median help to measure central tendency, indicating the typical value for each variable. The maximum and minimum values give a sense of the range within which the data points fall. The standard deviation quantifies the variability or spread of the data, showing how much individual data points deviate from the average. Skewness measures the asymmetry of the data distribution, while kurtosis assesses the peakedness of the distribution, providing additional insights into the shape of the data. We used RStudio as the software tool for the analysis. The WaveletComp package in R was employed to calculate the wavelet power spectrum for the selected variables, while wavelet coherency analysis was applied to assess the correlation between GDP growth and general government debt (Roesch and Schmidbauer, 2016). This approach enabled a detailed examination of both the strength and pattern of the relationship between these variables across different time and frequency scales. We also included Granger causality analysis to check the reliability of the wavelet results.

Table 3

Descriptive statistics

	Brazil		Russia		India		China	
	GGD	GDP	GGD	GDP	GGD	GDP	GGD	GDP
Minimum	40.23	-3.60	07.45	-7.80	20.60	02.24	66.00	-5.80
Maximum	96.01	07.53	135.20	10.00	77.10	14.20	88.50	09.05
Mean	68.49	02.20	26.03	02.77	37.64	08.47	74.00	06.16
Median	64.70	02.21	15.14	04.02	33.77	08.45	71.50	07.24
LCL mean	63.23	01.10	14.81	01.00	30.92	07.47	71.30	04.99
UCL mean	73.74	03.29	37.25	04.54	44.37	09.46	76.70	07.33
Variance	176.40	07.66	804.60	20.00	289.10	06.32	46.90	08.80
St. dev.	13.28	02.77	28.37	04.48	17.00	02.51	06.85	02.97
Skewness	00.07	-0.40	02.56	-0.55	00.97	-0.28	00.61	-2.40
Kurtosis	-0.30	-0.30	06.33	-0.55	-0.38	00.73	-1.13	07.09

Note: Number of observations = 27.
Source: Authors' computer estimation.

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4.1 WAVELET COHERENCE SPECTRUM: ECONOMIC GROWTH AND PUBLIC DEBT

The wavelet coherence spectrum characterizes the spectral density or energy of the time series. Annual data for the time-period is plotted on the horizontal axis from 1996 to 2022, and periods or scales are represented on the Y axis for the wavelet transformation. The scales exhibited in table 2 allow for the adjustment of wavelet power, either expanding or compressing it to capture variations across short-term, medium-term, and long-term intervals. Shorter time scales (near the bottom of the graphs – figures 3 to 6) capture short-term relationships, while longer time scales (near the top) capture long-term relationships. This flexibility enables a more granular analysis of patterns and fluctuations within different time horizons, enhancing the interpretive depth of the wavelet analysis. In the wavelet power spectrum, the intensity of the power is represented by colours. Blue signifies the periods with a lower wavelet power spectrum while red depicts a higher wavelet power spectrum. If there is a substantial variability in the wavelet power spectrum colour, it represents the inherent volatility of the series of variables.

In all four heat maps (figures 3-6) of the wavelet power spectrum of the BRIC countries, the white cone-shaped curve shows the cone of effect, showcasing the demarcation beneath which the discontinuity impacts the wavelength strength. The dark black contour represents a 5% significance level calculated by the Monte Carlo simulation.

4.1.1 Brazil

As indicated by the black contour regions, the wavelet coherence spectrum for Brazil depicted in figure 3 reveals strong coherence in specific periods, particularly around 2009-2012, 2013-2016, and 2017-2022. The coherence is more pronounced in the medium-to-long-term scales (above 10 years), suggesting that the relationship between Brazil's public debt and economic growth strengthens over longer horizons. The red and yellow zones signify high synchronization, while blue areas indicate weak or no correlation. The 2009-2012 coherence could be linked to the global financial crisis and Brazil's fiscal responses, the 2013-2016 period aligns with Brazil's economic recession and debt struggles, and debt policies, economic recovery, and COVID-19 may influence the 2019-2022 coherence.

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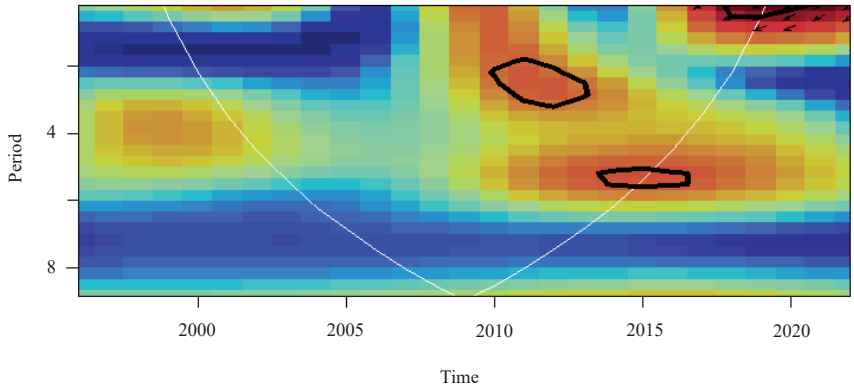
Figure 3
Brazil wavelet coherence spectrum

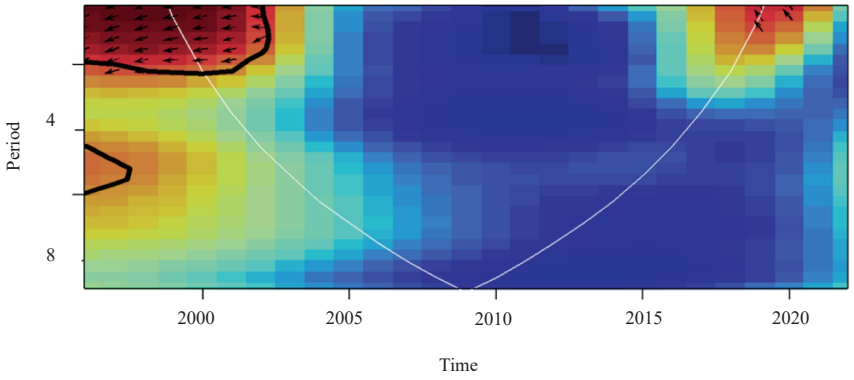


Source: Authors' computer estimation.

4.1.2 Russia

The wavelet coherence spectrum for Russia depicted in figure 4 reveals strong coherence primarily in the early years (1996-2000) and towards the end of the sample period (2017-2022), as indicated by the black contour regions. The coherence is concentrated in shorter time scales, suggesting that the relationship between public debt and economic growth in Russia is more significant in the short-to-medium term than in the long run. The red and yellow zones signify high synchronization, whereas the blue areas indicate weak or no correlation. The early period coherence might be linked to Russia's financial crisis of 1998 and its economic restructuring after the disintegration of the USSR, while the more recent coherence could be influenced by fiscal policies, COVID-19 shock, and geopolitical factors, including sanctions and oil price fluctuations. This suggests that the debt-growth relationship is stronger in Russia in crisis-driven periods.

Figure 4
Russia wavelet coherence spectrum



Source: Authors' computer estimation.

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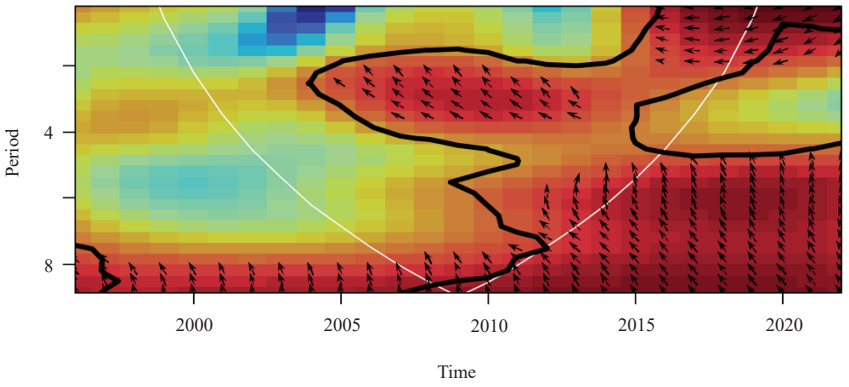
4.1.3 India

Unlike the other three countries of the BRIC block, the wavelet coherence spectrum of India depicted in figure 5 shows strong coherence across multiple periods, particularly from 2003-2008, 2010-2016, and 2018-2022, as indicated by the black contour regions. The widespread coherence across medium-to-long-term scales suggests a persistent and evolving relationship between public debt and economic growth in India. The dominance of red and yellow zones signifies high synchronization, whereas minimal blue regions indicate that the correlation remains relatively strong over time. The coherence observed during 2003-2008 may be linked to India's deepening global economic integration after the economic liberalization of the 1990's, 2010-2016 could be influenced by fiscal consolidation and global economic events after the GFC, while 2018-2022 likely reflects the impact of rising public debt, structural reforms, and the economic fallout of COVID-19.

Figure 5

India wavelet coherence spectrum



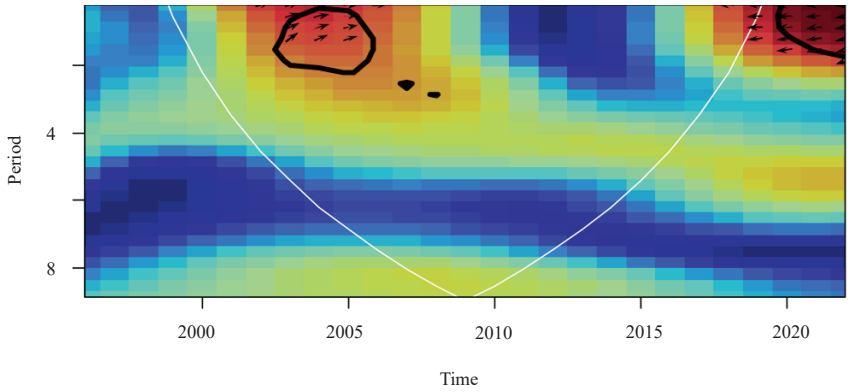
Source: Authors' computer estimation.

4.1.4 China

The wavelet coherence spectrum depicted in figure 6 highlights key periods where public debt and economic growth in China were closely linked, aligning with the country's economic conditions. The strong coherence around 2003-2007 coincides with China's rapid industrial expansion and WTO accession (2001), which fuelled economic growth and government spending on infrastructure. The weaker coherence from 2010-2018 aligns with China's shift towards a consumption-driven economy, tighter financial regulations, and efforts to curb excessive local government debt, reducing the immediate impact of public debt on growth. The renewed strong coherence in 2019-2022 reflects China's aggressive fiscal stimulus and rising debt levels in response to the COVID-19 pandemic, reinforcing the link between debt-financed stimulus and economic performance. The mid-term dominance (10-15 years) suggests that debt policies in China have long-term cyclical impacts, likely influenced by major policy shifts, global economic conditions, and internal structural changes.

Figure 6

China wavelet coherence spectrum



Source: Authors' computer estimation.

Across all four countries, the highest wavelet coherence values are observed during 2019-2022, coinciding with the global financial distress caused by the COVID-19 pandemic, reinforcing the heightened interaction between public debt and economic growth. However, each country also displays unique patterns beyond the pandemic period. In Brazil, strong coherence appears in the medium-to-long-term scales, particularly during 2009-2012, 2013-2016, and 2019-2022, linked to the global financial crisis, the country's economic recession and debt management strategies. Russia exhibited strong coherence in the early years (1996-2000) and again in 2017-2022, with a short-to-medium-term dominance, likely reflecting the economic restructuring post-USSR and the recent impact of fiscal policies, COVID-19, and geopolitical events. India's wavelet coherence spectrum, unlike the other BRIC nations, shows persistent and widespread coherence across multiple periods, particularly from 2003-2008, 2010-2016, and 2018-2022, suggesting an evolving and long-term relationship between public debt and economic growth, influenced by economic liberalization, fiscal consolidation, and post-COVID recovery measures. China's wavelet coherence spectrum on the other hand highlights three key periods: 2003-2007, marked by industrial expansion and WTO accession; 2010-2018, characterized by a shift towards a consumption-driven economy and financial tightening; and 2019-2022, when rising debt levels and aggressive fiscal stimulus in response to the COVID-19 pandemic reinforced the debt-growth nexus.

The wavelet coherence spectrum analysis demonstrates that both the COVID-19 pandemic and the past financial crises significantly influenced the public debt-economic growth relationship across the BRIC nations. While Brazil, India, and China show varying medium-to-long-term interactions, Russia exhibits a more persistent and short-to-medium-term coherence, suggesting structural differences in debt management and economic policy across these nations.

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Table 4

Summary: wavelet coherence spectrum for the BRIC nations

Country	Key periods of strong coherence	Dominant time scale	Underlying economic drivers
Brazil	2009-2012, 2013-2016, 2019-2022	Medium-to-long-term (>10 years)	Global financial crisis, economic recession, COVID-19 debt policies
Russia	1996-2000, 2017-2022	Short-to-medium-term	Post-USSR restructuring, financial crisis (1998), fiscal policies, economic sanctions, COVID-19 impact
India	2003-2008, 2010-2016, 2018-2022	Medium-to-long-term	Economic liberalization, fiscal consolidation, structural reforms, COVID-19 economic impact
China	2003-2007, 2019-2022	Mid-term dominance (10-15 years)	Industrial expansion, WTO accession, financial tightening, fiscal stimulus in response to COVID-19

Source: Authors' compilation.

4.2 CROSS-WAVELET COHERENCE ANALYSIS: PUBLIC DEBT AND ECONOMIC GROWTH

We employed cross-wavelet analysis to investigate the timing and directional relationship between changes in general government debt and gross domestic product within the BRIC nations. This approach enables us to observe how shifts in one variable may precede or follow shifts in the other, capturing their dynamic interaction across time and frequency domains. As a result, it provides a deeper understanding of the correlation strength over different time periods. Wavelet coherence for each pair is plotted in figures 7-10, which presents the interdependence and co-movement of the time series, defined by arrows. Given the fact that the calculations are done on annual data, we have plotted time on the horizontal axis while frequency is plotted on the vertical axis. The colour schemes represent co-movement. Stronger co-movement is signified in red while weaker co-movement is represented in blue. Besides this, a significance of 5% for wavelet coherence is represented by the black contour in the figures.

Moreover, the small arrows in the figure depict phase differences. For the two variables to be in complete synchronization, the direction of the arrows has to be toward the right. The left pointing arrows represent that the variables move in anti-phase.

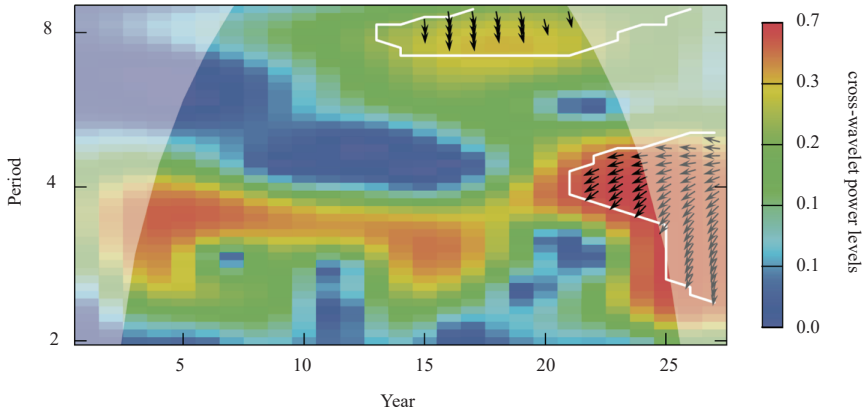
If the arrows point to the upper right or lower left, this indicates that the first variable is ahead of, or leading, the second. Conversely, if the arrows point to the lower right or upper left, it shows that the second variable is ahead, while the first is trailing.

4.2.1 Brazil

In figure 7, the cross-wavelet analysis for Brazil reveals a strong relationship between public debt and economic growth, particularly during 2009-2013 and 2017-2022, where increased fiscal intervention and crises led to greater coherence. The 2017-2022 period aligns with Brazil's rising debt, recessionary pressures, and COVID-19-related stimulus, with phase arrows suggesting that public debt changes led to economic growth. Similarly, 2009-2013 reflects Brazil's post-2008 financial crisis recovery, where stimulus measures strengthened the debt-growth link. Conversely, 1996-2009 shows weak coherence, indicating a less direct impact of debt on growth during early economic reforms and pre-global financial crisis stability. The results suggest that Brazil's public debt significantly influences economic growth during periods of crisis and intervention, particularly in medium-term cycles (4-8 years)

Figure 7

Brazil cross wavelet coherence



Source: Authors' computer estimation.

4.2.2 Russia

Figure 8 illustrates the cross-wavelet analysis for Russia. It shows a strong relationship between public debt and economic growth during 1996-2005 (Time Scale 1-10 years), with high coherence indicating a significant interaction influenced by Russia's post-Soviet economic transition, the 1998 financial crisis, and subsequent recovery. The phase arrows in this period predominantly point rightward and slightly upward, suggesting that public debt was leading economic growth, meaning that changes in debt levels influenced growth dynamics with a short lag. This reflects Russia's economic recovery heavy dependence on government intervention and debt management. After 2005, the coherence weakens, aligning with Russia's improved fiscal discipline, high oil revenues, and reduced reliance on public debt. From 2010-2022, the lack of strong coherence suggests that economic growth was more independent of debt, driven instead by resource exports and geopolitical strategies. Overall, public debt played a leading role in shaping economic growth during times of crisis and transition but became less relevant as Russia stabilized economically.

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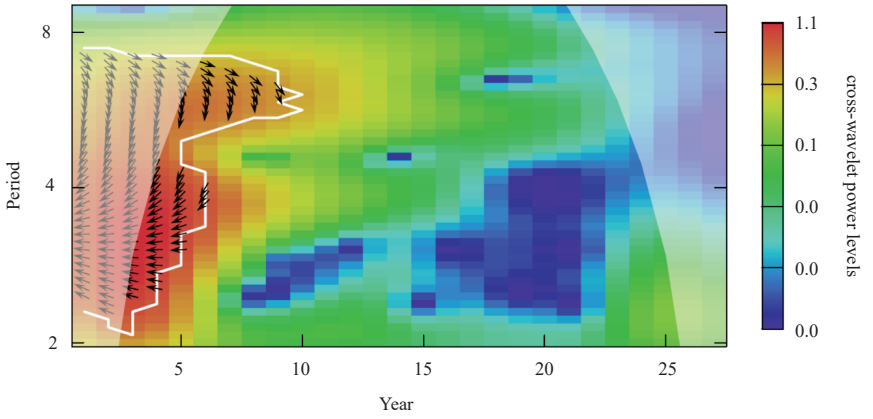
FIGURE 8

Russia cross wavelet coherence



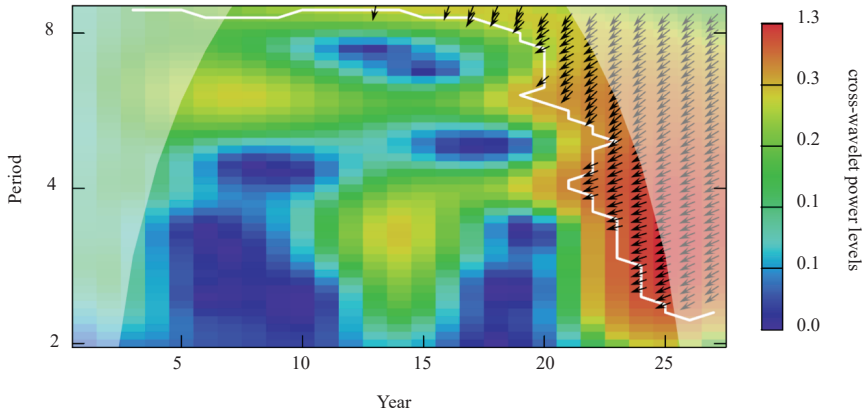
Source: Authors' computer estimation.

4.2.3 India

Figure 9 depicts the cross-wavelet analysis for India. It reveals a strong relationship between public debt and economic growth during 2015-2022, as indicated by the high coherence (red region) in this period. The phase arrows in this section predominantly point rightward and slightly downward, suggesting that economic growth is leading public debt, meaning growth fluctuations influenced debt accumulation, likely due to increased fiscal spending in response to economic expansions and contractions. This period aligns with India's major economic reforms, including the 2016 demonetization, the Goods and Services Tax (GST) rollout, and COVID-19-related stimulus measures, which significantly impacted both growth and public debt. Before 2015, coherence is relatively weaker, indicating a less direct relationship between debt and growth, potentially due to India's stable pre-2010 economic performance and cautious fiscal policies. The results suggest that in recent years, India's economic cycles have played a key role in shaping public debt trends rather than the other way around.

FIGURE 9

India cross wavelet coherence



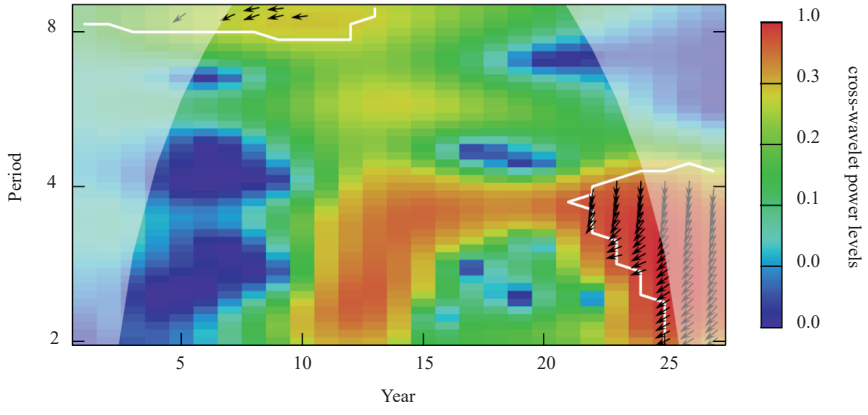
Source: Authors' computer estimation.

4.2.4 China

Figure 10 illustrates the cross-wavelet analysis for China. It indicates a strong relationship between public debt and economic growth during 2017-2022, where high coherence (red region) suggests a significant interaction between the two variables. The phase arrows in this period predominantly point rightward and slightly downward, indicating that economic growth is leading public-debt, meaning fluctuations in growth influenced the accumulation of debt. This aligns with China's COVID-19 stimulus measures, rising local government debt, and economic slowdowns due to pandemic restrictions and global trade uncertainties. Before 2017, coherence is weaker, suggesting a less direct link, particularly during China's high-growth period driven by infrastructure expansion and export-led strategies rather than debt-financed policies. The findings imply that in recent years, China's economic conditions have dictated debt accumulation rather than debt playing a dominant role in driving growth.

FIGURE 10

China cross wavelet coherence



Source: Authors' computer estimation.

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The cross-wavelet analysis exhibits heterogeneous patterns across the BRIC nations. For Brazil, significant coherence is observed during 2017-2022 and 2009-2013, periods associated with economic crises and fiscal interventions. The results suggest that public debt led economic growth during these times, emphasizing the role of fiscal policy in shaping macroeconomic stability. In Russia, the strongest correlation is witnessed during 1996-2005, a period marked by post-Soviet economic transitions and financial crises, where debt played a pivotal role in driving economic recovery. However, after 2010, the coherence diminishes as economic growth becomes more independent of public debt. In India, a significant relationship is found between 2015 and 2022, with arrows indicating that economic growth led public debt, suggesting that fluctuations in GDP influenced debt accumulation, especially during major policy reforms and COVID-19-related fiscal responses. Similarly, in China, strong coherence is evident during 2017-2022, where economic growth appears to lead public debt, reflecting the impact of pandemic-related stimulus measures and evolving fiscal policies.

The findings reveal that the debt-growth relationship varies across time and regions, with public debt playing a leading role during periods of economic distress in Brazil and Russia, whereas economic growth appears to drive public debt accumulation in India and China.

Table 5

Summary: cross-wavelet coherence analysis

Country	Periods of strong coherence	Leading variable	Economic context
Brazil	2009-2013, 2017-2022	Public debt	Economic crises, fiscal stimulus, post-2008 recovery
Russia	1996-2005	Public debt	Post-Soviet transition, financial crisis, fiscal interventions
India	2015-2022	Economic growth	Economic reforms (GST, demonetization), COVID-19 fiscal response
China	2017-2022	Economic growth	COVID-19 stimulus, rising local government debt

Source: Authors' estimation.

4.3 GRANGER CAUSALITY ANALYSIS

To check the consistency of wavelet analysis, we employed country-wise Granger causality tests (Granger, 1969). The test results provide further insights into the reliability of the lead-lag relationship between public debt (GGD) and economic growth (GDP), serving as a robustness check for the wavelet coherence findings.

Table 6
Granger causality test results

Country	F-statistic	P-value	Direction
Brazil	0.8332	0.4485	GDP → GGD
Brazil	0.8364	0.4472	GGD → GDP
Russia	1.7530	0.1977	GDP → GGD
Russia	4.7221	0.0203**	GGD → GDP
India	0.0243	0.0457**	GDP → GGD
India	3.5863	0.9760	GGD → GDP
China	3.4764	0.0051***	GDP → GGD
China	6.8495	0.0496**	GGD → GDP

Source: Authors' computer estimation.

In Brazil, the bidirectional causality between GDP and GGD is statistically insignificant, with high p-values (0.4485 and 0.4472), suggesting that neither variable strongly predicts the other. The wavelet coherence analysis, however, showed medium-to-long-term interactions with negligible immediate causal links. In Russia, the results indicate that GGD significantly influences GDP ($p = 0.0202$). However, the reverse causality is statistically insignificant ($p = 0.1977$). The results are consistent with the cross-wavelet analysis, which indicated public debt represented by GGD leading economic growth (GDP).

India exhibits unidirectional causality from GDP to GGD ($p = 0.0457$), while the reverse relationship is insignificant ($p = 0.9760$), indicating that economic growth plays a dominant role in shaping public debt rather than the other way around. This is in line with the cross-wavelet analysis where economic growth was leading public debt in the case of India, suggesting a structural relationship influenced by fiscal policies and economic reforms. For China, a bidirectional relationship is observed, with GGD causing GDP at a 5% significance level ($p = 0.0496$) and GDP influencing GGD more strongly ($p = 0.0051$). The latter also substantiates the cross-wavelet results where GDP was leading GGD in the case of China. This reinforces the wavelet findings that indicate strong coherence during industrial expansion, financial tightening, and fiscal stimulus periods. Overall, the Granger causality test reinforces the wavelet coherence and cross-wavelet findings by confirming the directionality of the debt-growth relationship across the BRIC nations, demonstrating structural linkages.

5 CONCLUSION

In its 2024 Global Economic Prospects report, the World Bank stressed that the global economy had experienced its slowest five-year growth period in 30 years spanning 2020 to 2024, even in the absence of a recession (World Bank, 2024). At just 3.3 percent in 2023, the global GDP is forecast to decelerate to only 3.1 percent by 2029. Compared to dismal growth numbers oscillating between 1.7 to 1.8 percent in advanced countries, the burden of growth is expected to be borne primarily by emerging nations. Emerging countries led by the BRIC block are

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expected to register economic growth between 4.2 to 3.9 percent by 2029 (IMF, 2024). Therefore, the role of emerging countries, particularly the BRIC bloc, in driving global economic growth is crucial for maintaining worldwide economic stability.

The rising public debt in emerging countries, on the other hand, is posing a serious challenge in realizing even these humble growth projections. Moreover, rising geopolitical tensions, such as the Russia-Ukraine conflict and Israel-Palestine disputes, are fracturing global trade into blocs. The borrowing program of emerging countries and their policy of using debt as a tool can decide the fate of global growth and its impact on socio-economic variables like employment and income levels (Ayoub, Wani and Sultan, 2024).

Against the backdrop of these unfolding realities, we studied the impact of public debt on economic growth of selected emerging countries from the BRIC block. Taking annual data for Brazil, Russia, India and China for the 1996-2022 period, we used wavelet analysis to analyse the relationship between gross government debt and gross domestic product. Wavelets have the capability to break down time series data into various time scales, enabling the detection of the way in which sovereign debt interacts with economic growth. Such influences may not be apparent when analysing data solely at its observed sampling rate, as the sampling blends multiple frequencies and conceals distinctions between short-term and long-term relationships (González-Concepción, Gil-Fariña and Pestano-Gabino, 2018; Aslan, Apergis and Yildirim, 2014). This distinction is crucial in studying the aforementioned relationship, as different factors may affect the connection between levels of public debt and economic output over short-term periods compared to long-term ones. We have used the wavelet coherence spectrum and cross wavelet coherence for our analysis. To further reinforce the findings, we used Granger causality tests for robustness.

The findings of our study indicate that (1) public debt and economic growth showed positive co-movement during the analysed period from 1996 to 2022 for all the four BRIC nations and economic growth in BRIC nations was notably vulnerable during the COVID-19 pandemic and the 2008 global financial crisis, with specific events such as the disintegration of the USSR affecting Russia during the early phase of the period under study. (2) For Russia, the co-movement was seen as strong in the short and medium term while as in case of Brazil, India, China the co-movement between public debt and economic growth was more pronounced in the medium-to-long run. (3) Across all four nations, public debt plays a crucial role in shaping economic growth dynamics, particularly during economic downturns. In Brazil and Russia, public debt serves as the primary driver of economic growth, especially in times of financial distress. Conversely, in India and China, economic growth appears to influence the accumulation of public debt, suggesting a growth-led debt expansion.

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5.1 THEORETICAL AND EMPIRICAL IMPLICATIONS

The results contribute to the existing literature in several ways. Firstly, wavelet coherence analysis reveals notable differences in the debt-growth relationship among the BRIC countries, reflecting each country's unique economic context. The link between debt and growth is shown as heterogeneous, with country-specific factors influencing the interaction, and no uniform threshold or frequency emerged at which public debt consistently triggered an effect on economic growth. These findings align with the empirical studies of Eberhardt and Presbitero (2015), Egert (2015), Panizza and Presbitero (2014), and Herndon, Ash and Pollin (2013). Secondly, our findings suggest that the debt-to-GDP ratio at which public debt most significantly impacts economic growth varies across time and frequency domains and varies among BRIC countries. This complements the empirical studies of Albu and Albu (2021), which focused on Eurozone countries with different economic structures and fiscal realities. By extending the analysis to emerging economies like the BRIC bloc, our results provide a broader understanding of the co-movements and causal directions of the debt-growth relationship. These results provide valuable insights enabling policymakers to have a better grasp of how public debt impacts economic growth in emerging markets.

5.2 POLICY IMPLICATIONS

The research findings exemplify the multi-faceted nature of the relationship between public debt and economic growth within emerging economies, particularly the BRIC countries. The increase in public debt during the COVID-19 pandemic has further normalized the already alarming trends of debt-to-GDP ratios in these countries. This development is alarming for policymakers. While public borrowing has played a critical role in mitigating the economic impact of the pandemic and supporting growth, the findings emphasize the importance of carefully managing debt policies to avoid negative long-term effects on economic stability.

Policymakers should be acutely aware of the directional causality between public debt and economic growth, as identified in this study, and the significant country-specific factors that influence this relationship. The results suggest that while debt can facilitate short-term economic expansion, unchecked borrowing may produce diminishing returns over time. Therefore, it is crucial to adopt debt policies that not only promote growth but also ensure debt sustainability by prioritizing fiscal responsibility and debt management strategies.

Given the higher debt levels observed in the wake of the pandemic and the ongoing geo-political upheavals, these findings should prompt prudent borrowing. Policymakers must focus on maintaining a healthy fiscal balance to avoid excessive reliance on debt that could stifle future growth. In particular, the findings stress the need for targeted borrowing strategies that align with the economic realities of emerging countries that underpin global growth prospects in the near future. By instituting policies that promote efficient debt usage, fiscal discipline, and sustainable development, emerging economies can safeguard both their long-term economic growth and their fiscal stability.

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6 SCOPE FOR FUTURE WORK AND LIMITATIONS

Challenges related to data availability restricted the selection of countries for this study. As a result, key emerging members of the BRIC group, such as South Africa, were excluded. Improved data access in terms of the number of countries, could significantly expand the scope of future research.

In addition to expanding the geographic scope, future research could benefit from the use of longer time series data. By incorporating data spanning several decades, researchers can better account for long-term structural changes in the global economy, the effects of historical crises, and the evolving role of public debt over time. This would provide deeper insights into the cyclical nature of debt and its impact on growth, particularly in the context of shifting global economic dynamics.

Disclosure statement

The authors have no conflict of interest to declare.

REFERENCES

1. Abubakar, A. B. and Mamman, S. O., 2021. Permanent and transitory effect of public debt on economic growth. *Journal of Economic Studies*, 48(5), pp. 1064-1083. https://doi.org/10.1108/JES-04-2020-0154
2. Afonso, A. and Alves, J., 2014. The role of government debt in economic growth. *ISEG-UTL Economics Department Working Paper*, No. 16.
3. Afonso, A. and Jalles, J. T., 2012. Revisiting fiscal sustainability: panel cointegration and structural breaks in OECD countries. *ECB Working Paper*, No. 1465. https://doi.org/10.2139/ssrn.2128484
4. Albu, A.-C. and Albu, L.-L., 2021. Public debt and economic growth in Euro area countries. A wavelet approach. *Technological and Economic Development of Economy*, 27(3), pp. 602-625. https://doi.org/10.3846/tede.2021.14241
5. Aslan, A., Apergis, N. and Yildirim, S., 2014. Causality between energy consumption and GDP in the US: evidence from wavelet analysis. *Frontiers in Energy*, 8, pp. 1-8. https://doi.org/10.1007/s11708-013-0290-6
6. Asteriou, D., Pilbeam, K. and Pratiwi, C. E., 2021. Public debt and economic growth: panel data evidence for Asian countries. *Journal of Economics and Finance*, 45(2), pp. 270-287. https://doi.org/10.1007/s12197-020-09515-7
7. Ayoub, A., Wani, T. A. and Sultan, A., 2024. External debt crisis & socio-economic fallout: Evidence from the BRICS nations. *Regional Science Policy & Practice*, 16(6). https://doi.org/10.1016/j.rspp.2024.100029
8. Barro, R. J., 1974. Are government bonds net wealth? *Journal of Political Economy*, 82(6), pp. 1095-1117. https://doi.org/10.1086/260266
9. Baum, A., Checherita-Westphal, C. and Rother, P., 2013. Debt and growth: New evidence for the euro area. *Journal of International Money and Finance*, 32, pp. 809-821. https://doi.org/10.1016/j.jimonfin.2012.07.004
10. Blanchard, O. J., 1985. Debt, deficits, and finite horizons. *Journal of Political Economy*, 93(2), pp. 223-247. https://doi.org/10.1086/261297
11. Buchanan, J. M., 1976. Barro on the Ricardian equivalence theorem. *Journal of Political Economy*, 84(2), pp. 337-342. https://doi.org/10.1086/260436
12. Buthelezi, E. M. and Nyatanga, P., 2023. The dynamic relationship between government debt, fiscal consolidation, and economic growth in South Africa: A threshold analysis. *Cogent Economics & Finance*, 11(2), 2261329. https://doi.org/10.1080/23322039.2023.2261329
13. Butkus, M. [et al.], 2021. Empirical evidence on factors conditioning the turning point of the public debt–growth relationship. *Economies*, 9(4). https://doi.org/10.3390/economies9040191
14. Cecchetti, S., Mohanty, M. S. and Zampolli, F., 2011. *Achieving growth amid fiscal imbalances: The real effects of debt in achieving maximum long-run growth*. A symposium sponsored by The Federal Reserve Bank of Kansas City, September 2012. Federal Reserve Bank of Kansas City.
15. Checherita-Westphal, C. and Rother, P., 2010. The impact of high and growing government debt on economic growth. An empirical investigation for the Euro Area. *ECB Working Paper*, No. 1237. https://doi.org/10.2139/ssrn.1659559

16. Eberhardt, M. and Presbitero, A. F., 2015. Public debt and growth: Heterogeneity and non-linearity. *Journal of International Economics*, 97(1), pp. 45-58. https://doi.org/10.1016/j.jinteco.2015.04.005
17. Égert, B., 2015. Public debt, economic growth and nonlinear effects: Myth or reality? *Journal of Macroeconomics*, 43, pp. 226-238. https://doi.org/10.1016/j.jmacro.2014.11.006
18. Esteve, V. and Tamarit, C., 2018. Public debt and economic growth in Spain, 1851-2013. *Cliometrica*, 12(2), pp. 219-249. https://doi.org/10.1007/s11698-017-0159-8
19. González-Concepción, C., Gil-Fariña, M. C. and Pestano-Gabino, C., 2018. Wavelet power spectrum and cross-coherency of Spanish economic variables. *Empirical Economics*, 55, pp. 855-882. https://doi.org/10.1007/s00181-017-1295-5
20. Granger, C. W. J., 1969. Investigating Causal Relations by Econometric Models and Cross-Spectral Methods. *Econometrica*, 37(3), pp. 424-438. https://doi.org/10.2307/1912791
21. Gunarsa, S., Makin, T. and Rohde, N., 2020. Public debt in developing Asia: a help or hindrance to growth? *Applied Economics Letters*, 27(17), pp. 1400-1403. https://doi.org/10.1080/13504851.2019.1683147
22. Hansen, A. H., 1938. The consequences of reducing expenditures. *Proceedings of the Academy of Political Science*, 17(4), pp. 60-72. https://doi.org/10.2307/1172352
23. Herndon, T., Ash, M. and Pollin, R., 2013. Does high public debt consistently stifle economic growth? A critique of Reinhart and Rogoff. *Cambridge Journal of Economics*, 38(2), pp. 257-279. https://doi.org/10.1093/cje/bet075
24. Hume, D., 1752. Of Public Credit. In: E. F. Miller, ed. *Essays Moral, Political and Literary*. Liberty Fund, pp. 205-213.
25. IMF, 2024. *World Economic Outlook: Policy Pivot, Rising Threats*. Washington: International Monetary Fund.
26. Kassouri, Y. [et al.], 2021. New insights on the debt-growth nexus: A combination of the interactive fixed effects and panel threshold approach. *International Economics*, 168, pp. 40-55. https://doi.org/10.1016/j.inteco.2021.08.001
27. Keynes, J. M., 2024. *A Treatise on Money: Vol. I*. BoD–Books on Demand.
28. Kiviaho, J. [et al.], 2012. The Co-movement Dynamics of European Frontier Stock Markets. *European Financial Management*, 20(3), pp. 574-595. https://doi.org/10.1111/j.1468-036X.2012.00646.x
29. Law, S. H. [et al.], 2021. Public debt and economic growth in developing countries: Nonlinearity and threshold analysis. *Economic Modelling*, 98, pp. 26-40. https://doi.org/10.1016/j.econmod.2021.02.004
30. Loh, L., 2013. Co-movement of Asia-Pacific with European and US stock market returns: A cross-time-frequency analysis. *Research in International Business and Finance*, 29, pp. 1-13. https://doi.org/10.1016/j.ribaf.2013.01.001
31. Mencinger, J., Aristovnik, A. and Verbic, M., 2015. Revisiting the role of public debt in economic growth: The case of OECD countries. *Engineering Economics*, 26(1), pp. 61-66. https://doi.org/10.5755/j01.ee.26.1.4551

32. Ndoricimpa, A., 2017. Threshold effects of debt on economic growth in Africa. *African Development Review*, 29(3), pp. 471-484. https://doi.org/10.1111/1467-8268.12282
33. Panizza, U. and Presbitero, A. F., 2014. Public debt and economic growth: is there a causal effect? *Journal of Macroeconomics*, 41, pp. 21-41. https://doi.org/10.1016/j.jmacro.2014.03.009
34. Reinhart, C. M. and Rogoff, K. S., 2010. Growth in a Time of Debt. *American Economic Review*, 100(2), pp. 573-578. https://doi.org/10.1257/aer.100.2.573
35. Ricardo D., 1951. On the principles of political economy and taxation. In: P. Sraffa, ed. *The works and correspondence of David Ricardo* (Vol. 1). Cambridge: Cambridge University Press.
36. Rösch, A. and Schmidbauer, H., 2016. *WaveletComp 1.1: A guided tour through the R package.*
37. Rua, A. and Nunes, L. C., 2009. International co-movement of stock market returns: A wavelet analysis. *Journal of Empirical Finance*, 16(4), pp. 632-639.
38. Samuelson, P. A., 1938. A note on the Pure Theory of Consumer's Behaviour. *Economica*, 5(17), pp. 61-71.
39. Smith, A., 1776. *An inquiry into the nature and causes of the wealth of nations*. London: Uninted Kingdom. MetaLibri Digital Library.
40. Torrence, C. and Webster, P. J., 1999. Interdecadal changes in the ENSO-monsoon system. *Journal of Climate*, 12(8), pp. 2679-2690. https://doi.org/10.1175/1520-0442(1999)012<2679:ICITEM>2.0.CO;2
41. Turan, T. and Iyidogan, P. V., 2023. Non-linear Impacts of Public Debt on Growth, Investment and Credit: A Dynamic Panel Threshold Approach. *Prague Economic Papers*, 32(2), pp. 107-128. https://doi.org/10.18267/j.pep.825
42. World Bank, 2024. *Global Economic Prospects, June 2024*. Washington, DC: International Monetary Fund. https://doi.org/10.1596/978-1-4648-2058-8
43. Zucker-Marques, M., Gallagher, K. P. and Volz, U., 2024. *Debt Sustainability and the Race for the 2030 Agenda and Paris Agreement: Defaulting on Development And Climate*. Washington: International Monetary Fund.

Explaining wage developments in Croatia: the role of the firm composition effect

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Abstract

While wage developments are primarily driven by changes in real economic activity, the role of labour force allocation is often overlooked. Using Croatian establishment-level data (2002-2023), we apply static and dynamic Olley-Pakes decompositions to assess how labour reallocation impacts wages and productivity. The wage allocation premium, defined as the ratio between actual aggregate wage and wage under random worker distribution, reveals a countercyclical impact until 2021, turning procyclical after the pandemic. Dynamic decomposition supports these findings and demonstrates that entering firms depress average wages, while exiting firms raise them slightly. Applying the same approach to productivity, we find that labour reallocation mitigated productivity losses during the recession and moderated growth during the recovery. Unlike wage patterns, this countercyclical effect on productivity persisted post-pandemic. Since 2020, wage allocation premium growth has outpaced the gross value added (GVA) allocation premium, which may have pressured firms to raise prices, potentially contributing to inflation.

Keywords: wages dynamics, decomposition, allocation premium, productivity, firm composition effect

1 INTRODUCTION

Wage developments are usually explained by macroeconomic factors, such as economic activity, labour demand and inflation. During periods of economic growth, increased demand for labour typically leads to rising wages. Conversely, during recessions characterized by low demand for workers and rising unemployment, there is a downward pressure on wages. The inverse relationship between wages and unemployment is traditionally described by the Phillips curve, which suggests that tighter labour markets push wages higher as firms compete for a limited workforce, whereas weaker demand tends to suppress wage growth (Cuadrado and Tagliati, 2018; ECB, 2022).

However, cyclical drivers alone cannot entirely capture wage developments (Nickel et al., 2019). While wages are influenced by cyclical factors, they also often reflect acyclical developments due to institutional characteristics (such as the wage-bargaining setup and the level of unionization) and structural factors (including demographics, migration, and globalization).

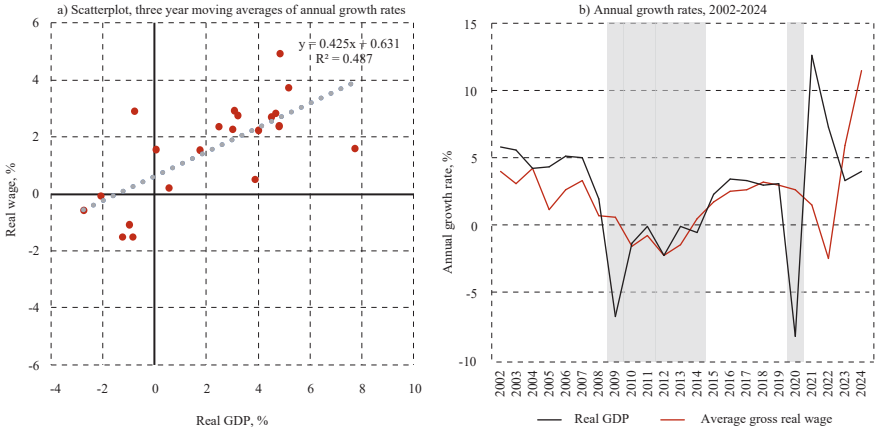
The acyclical behaviour of wages has been attributed in the literature to the composition effects, which exert a countercyclical influence (Abraham and Haltiwanger, 1995; Verdugo, 2016; Daly and Hobijn, 2017; ECB, 2019; Nickel et al., 2019; Christodoulopoulou and Kouvavas, 2022). During recessions, the elimination of low-paying jobs, which are then excluded from average wage calculations, leads to a lower decrease in the average wage than would otherwise occur. Conversely, during economic upturns, the re-entry of these workers to the labour market exerts a downward pressure on aggregate wages.

There are two main approaches to analysing composition effects on wages: examining changes in the structure of the workforce and worker characteristics (worker composition effect) and changes in the structure of firms and firm characteristics (firm composition effect). Worker composition effects refer to changes in aggregate wages driven by variations in employee attributes such as education, experience, occupation, or demographic factors (Daly and Hobijn, 2017). For example, if higher-skilled or more experienced workers account for a larger share of the labour force, average wages may rise even if individual wages remain unchanged. In contrast, firm composition effects arise from differences in productivity, industry dynamics, or wage-setting policies across the firms. More productive firms, firms with higher market power, or those operating in capital-intensive industries may offer higher wages irrespective of the employee mix. In particular, due to employer heterogeneity, even among workers with identical skills, there could exist wage differentials (Card, Heining and Kline, 2013).

In this paper, we examine changes in firm composition and analyse how variations in firm size influence aggregate wages in Croatia. In particular, although highly correlated, wage developments in Croatia, cannot be fully explained by the dynamics of real economic activity (figures 1a and 1b). During the prolonged recession in Croatia from 2009 to 2014, real GDP dropped by 11%, while average gross real wages decreased less, by only 5%. From 2014 to 2019, real GDP grew by 16%, and wages again grew less, by about 13%. In addition, amidst the pandemic crises, real GDP growth dropped by more than 8% in 2020 and the real gross wage increased by 2.6%. Since the end of the pandemic, wages in Croatia have shown a significant increase, driven by both the rebound in economic activity and the loss of purchasing power due to elevated inflation.

FIGURE 1

Real GDP and gross wage in Croatia, 2002-2024



Note: Shaded areas indicate period of negative real GDP growth.

Sources: CBS and authors' calculations.

Following the work of Adamopoulou et al. (2019), our assumed background mechanism is that workers move from low-paying firms to high-paying firms. These shifts can lead to changes in aggregate wages, even if wages within individual firms remain unchanged. As a result, aggregate wages can increase not only because individual firms raise their wages, but also because workers move to better paying firms. For example, in a simple economy with only two firms, each with the same number of employees, one firm might pay twice as much as the other. In this scenario, aggregate wage can increase through wage increases at one or both firms, but also through the reallocation of workers from the lower-paying firm to the higher-paying firm. As higher paying firms are likely also more productive (Abowd, Kramarz and Margolis, 1999), this has a positive effect on aggregate productivity as well, as a significant part of the productivity growth in industry reflects reallocation of inputs (capital or labour) from low to high productivity firms (Maliranta and Määttänen, 2015).

In estimating the firms' composition effect on the aggregate wage, we apply the Olley and Pakes (below: OP) decomposition. The OP decomposition was introduced in the realm of aggregate productivity (Olley and Pakes, 1996; Melitz and Polanec, 2015; Hyytinen, Ilmakunnas and Maliranta, 2016) and is a standard method of measuring allocative efficiency (CompNet, 2021; Valdec and Zrnc, 2018). To the best of our knowledge, only Adamopoulou et al. (2019) have applied this method to a firm-level dataset and interpreted changes in wages due to firm composition within the framework of allocative efficiency.

We further extend our analysis with a dynamic component accounting for entering and exiting firms based on Melitz and Polanec (2015).

The data from the Croatian Financial Agency database (below Fina) on establishments in Croatia from 2002 to 2023 are used in our analysis.[1] While our analysis focuses solely on firm-level data without information concerning individual workers, we hypothesize that changes in the composition term reflects the reallocation of workers between low-wage and high-wage firms. Thus, in addition, we also measure the impact of labour reallocation on the productivity, proxied by gross value added (GVA) per worker, and interpret our results in the context of allocative efficiency. There is only limited scope for comparison of these Croatian results, which we have been able to correlate with the results found in Adamopoulou et al. (2019). Keeping this main shortcoming in mind, we hope that our analysis will inspire further research and discussions. The main contribution of this study lies in its enrichment of the existing literature and its provision of a deeper understanding of wage dynamics in Croatia. As far as we know, ours would be the first application of OP decomposition techniques to detailed firm-level data on wages for Croatia.

[1] Financial Agency in Croatia is the institution responsible for the data as it collects and analyses annual financial reports of firms in Croatia. However, the data provider is the Croatian National Bank, which processes raw data obtained from FINA.

The paper is structured as follows. In chapter 2 we proceed with the review of the existing literature. After that, in chapter 3 we explain the data used and the data cleaning process. In the methodological part in chapter 4 we describe the static and dynamic Olley and Pakes (OP) decomposition and the OP term, representing the covariance between firm size and wage (productivity per worker). We derive the indicator of wage allocation premium, which reflects how much higher the aggregate wage is compared to the scenario with random worker allocation. In addition, we introduce the indicator of wage and GVA per worker allocation premium. Moreover, to isolate the contribution of the worker reallocation from low wage (productivity) to high wage (productivity) firms to the aggregate wage (productivity) dynamics, we calculate counterfactual or fixed-weight wage (productivity) growth, i.e., that which would obtain if the allocation was the same as in the base year. The obtained results of OP decomposition on wages and productivity are presented in chapter 5 while we conclude in chapter 6.

2 LITERATURE OVERVIEW

Wage developments are typically attributed to macroeconomic factors, such as overall economic activity and inflation. In general, there is a negative relationship between the wages and the labour market slack. Traditionally, the Phillips curve, which captures the inverse relationship between wages and unemployment, has been used to describe wage developments, augmented with past and/or anticipated inflation and productivity (ECB, 2022). The Phillips curve model is a standard framework in monetary policy analysis and wage growth forecasting (Cuadrado and Tagliati, 2018; Bishop and Greenland, 2021; ECB, 2022).

However, macroeconomic factors alone cannot entirely capture observed wage developments. For example, in the euro area, there was a continued overestimation of the wage growth after the Great Recession based on Phillips curve. The analysis conducted for the euro area and other European Union countries by Nickel et al. (2019) showed that cyclical factors (labour market slack, low inflation, and muted productivity growth) could not fully explain overall subdued wage growth. Thus, apart from cyclical factors, factors such as labour market institutions (Koeniger, Leonardi and Nunziata, 2007), bargaining power (Budrys, Porqueddu and Sokol, 2022), and educational and skill mismatches (Allen and van der Velden, 2001) can further distort wage dynamics.

Wage stickiness, or the tendency for wages to be resistant to change in response to economic shocks, can prevent wages from adjusting quickly to market conditions (Goette, Sunde and Bauer, 2007; Babecky et al., 2012; Branten, Lamo and Rõõm, 2018). Even though wages could be sticky in both directions, a peculiar downward rigidity has been observed (Halton, 2013). If this was not case, then in recession when demand for goods and services falls, wages would adjust accordingly.

The phenomenon of wage rigidity is analysed starting from the seminal works of Blinder and Choi (1990), Agell and Lundborg (1995), Campbell and Kamlani (1997).

A high level of unionization and the wage bargaining system are usually cited as factors determining downward wage rigidity (or "stickiness"). Branten, Lamo and Rõõm (2018) analyses downward wage rigidity for a large number of European Union countries (including Croatia) as part of the Wage Dynamic Network (WDN) project. They identified the presence of nominal wage downward rigidity during the Great Recession and in the period 2010-2013 characterised by low wage growth.

The literature has highlighted not only wage rigidity but also the significance of employee and firm composition effects in explaining wage dynamics (Kydland and Prescott, 1993; Abraham and Haltiwanger, 1995; Puente and Galán, 2014; Verdugo, 2016; Christodoulopoulou and Kouvavas, 2022; Daly and Hobijn, 2017; ECB, 2019; Nickel et al., 2019). A significant role of composition is seen during downturns, when low-paid workers are disproportionately affected, influencing average wage growth. During recessions, the loss of low-paying jobs, which are then excluded from average wage calculations, leads to a lower decrease in the average wage than would otherwise occur, demonstrating the countercyclical nature of composition effects and mitigating observed wage decreases (Adamopoulou et al., 2019).

Worker or employee composition effects refer to changes in aggregate wages resulting from shifts in employee characteristics, such as education, experience, occupation, or demographic factors. The employee composition effect was observed in the euro area (ECB, 2019) with an upward impact on aggregate wages during downturns as lower-paid workers, such as the young and less skilled, are typically the first to be laid off. Conversely, during economic upturns, the re-entry of these workers on the labour market exerts a downward pressure on aggregate wages. Daly and Hobijn (2017) found evidence of the acyclical behaviour of aggregate real wages in the United States due to composition effects, as procyclical movements in incumbent wages are offset by countercyclical movements in wages of entering and exiting workers.

The firm composition effect explains increases in the aggregate wage due to changes in firm characteristics, such as productivity, profitability or sectoral shifts. The findings of Gruetter and Lalive (2004) point to the importance of the firm composition effect. By using Austrian matched employer-employee data, they analysed the role of firms in wage setting. They utilised data at the worker level and studied how their salary changed after switching jobs. They found that sectoral differences comprise three quarters of the variance in wages, while firms' characteristics account for one quarter of the variance. Nevertheless, even though workers switching jobs within sector may experience lower wage changes than those who switch sectors, such shifts are important to study because they happen more frequently. Job changers moving between firms also have higher wage growth than those moving within firms in the UK, as revealed by the analysis of Office for National Statistics (2019). They also showed that job changers' wage growth is more cyclical and reacts faster to an economic downturn than that of job stayers, who are more linked to wage settlements which lag the cycle.

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Adamopoulou et al. (2019) use the phrase *firm composition* to describe worker reallocation among firms, and thus changes in the overall structure of firms. These shifts can lead to changes in aggregate wages, even if wages within individual firms remain unchanged. As a result, aggregate wages can increase not only because individual firms raise their wages, but also because workers move to higher paying firms. The authors observed the growing impact of firms' characteristics on aggregate wage growth in Italy, outweighing that of workers' characteristics. To distinguish the firm composition effect from other influences, they applied Olley and Pakes (OP) decomposition to wages (Olley and Pakes, 1996). To our knowledge, this represents the only published research utilizing OP decomposition on aggregate wages. The authors' primary idea was that worker reallocation among firms and subsequent changes in firm market share could affect aggregate wages without altering individual firm wages. Their findings revealed that the increase in average wage was more pronounced in more productive sectors and interpreted an increase of the correlation term between average wage and size ("OP term") as an improvement in allocative efficiency.

As for wage developments in Croatia, the prevailing literature is relatively scarce, mainly focusing on wage trends and analysing differences between wages in the public and private sector (Nestić, Lovrinčević and Mikulić, 2001; Nestić, 2005; 2009; Rubil, 2013; Nestić, Rubil and Tomić, 2015). Insightful are findings from the Work Dynamic Network (WDN) project on the wage-setting system in Croatia (Kunovac and Pufnik, 2015; Branten, Lamo and Rõõm, 2018). It is only CNB (2019) that provides an analysis of the composition effect on wages in Croatia using aggregate data and focusing on changes in the employment structure.

Nestić (2005) uses micro data from the Labour Force Survey in Croatia and applies a quantile regression technique for estimating wage determinants, concentrating on the public-private sector wage gap. The author found that wages in Croatia increase with educational level, however there is still a gap between male and female wages, and public sector employees enjoy a wage premium compared to the private sector (further research on the public sector wage premium can be found in Rubil, 2013 and Nestić, Rubil and Tomić, 2015) Moreover, the authors noted that wages are higher in larger firms, indicating the positive covariance between firm size and wage, which is one of the assumptions used in the OP decomposition. Kunovac and Pufnik (2015) analysed in more detail the results of the third wave of the WDN for Croatia, mainly on wage setting practices at firm level as well as firm and institutional characteristics. The authors observed that during the 2009-2014 recession, the prevailing strategy in response to adverse macroeconomic shocks was a reduction in employment rather than wage cuts.[2] CNB (2019) estimated the employee composition effect by using aggregate wage data in the period from 2009 to 2018. The estimated impact of the composition effect, although not particularly pronounced, was positive during the crisis, but

[2] For example, total employment in 2014 was 11% lower than in 2008, while at the same time nominal wages increased (in real terms, however, they decreased).

subsequently became negative. During the crisis, the composition effect increased the average wage because employment decreased the most in segments with lower wages, but its impact was reversed during the recovery period.

Ivanac, Kunovac and Nadoveza (2024) depart from previous studies by investigating the relationship between wages and inflation in Croatia, inspired by the discussion of the wage price spiral. The authors found that an increase in nominal wages can contribute to higher inflation in an environment driven by demand shocks. In addition, Nadoveza (2025) analysed the potential inflationary risk of public sector wage growth and found that its overall contribution to inflation is modest, driven primarily by indirect effects.

3 DATA DESCRIPTION AND CLEANING

The data used in the analysis are based on financial reports collected by the Croatian Financial Agency (Fina) on establishments in Croatia from 2002 to 2023. The database contains annual data from the balance sheets and profit and loss accounts of all Croatian firms that are liable to submit annual financial statements, that is, all companies that were liable to pay profit tax in the reference year.

The Fina database covers the period 2002-2023. The number of observed firms consistently grew, from around 63 thousand in 2002 to over 156 thousand in 2023. The total number of employees in those firms increased from around 771 thousand in 2002 to over 1.1 million in 2023, encompassing about 67% of total employment in Croatia, and 77% of all employees in legal entities, according to the Croatian Bureau of Statistics (CBS). The discrepancies arise mostly because the Fina database does not include self-employed persons, private farmers, non-profit firms, financial companies, or public sector institutions such as ministries, government agencies, municipalities and institutions in the education and health sector.

Using the Fina database requires a data cleaning process, as outliers or incorrect data points could skew results or misrepresent the underlying trends within a dataset. We focused on the gross value added (GVA) of companies as a key metric for inclusion or exclusion, as it already accounts for wages. We calculated GVA as a sum of total cost of personnel, amortisation, financial costs and profit or loss before taxes.

First, companies with zero employees were removed from the sample, as such companies could not have any effect on wage developments in Croatia. Next, we filtered out firms at both the lower and upper ends of gross value added to eliminate outliers. Specifically, we excluded firms with a GVA per worker below the 0.5th percentile and those above the 99.5th percentile.

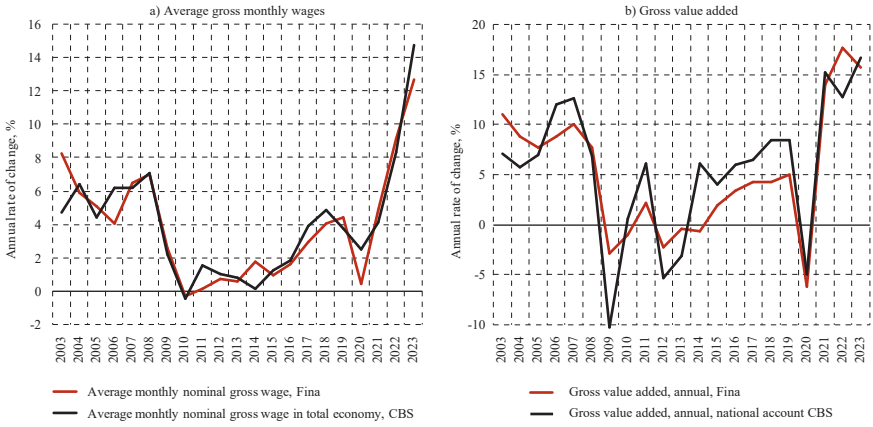
Applying these criteria led to the exclusion of a significant portion of companies from the sample. On average, about 30% of companies were removed from the dataset for each year, vast majority being removed for their lack of employees. Despite this reduction in the number of firms, it is important to note that the impact on the total number of employees was minimal. The firms removed accounted for only approximately 2% of the total employees in the dataset.

Analysis after data cleaning reveals that the gross average wage remained relatively consistent between the filtered and unfiltered samples. Gross wages were, on average, about 1% lower in the filtered than in the unfiltered sample. In contrast to wage data, data on gross value added are more volatile. The ratio between raw data and cleaned data is less stable, with gross value added being 8% lower after cleaning. Nevertheless, we interpret this share as satisfying and use it later on in our analysis.

The good coverage of firm and employee population ensures that data on wage level and growth closely track the official data, provided by the CBS (figures 2a and A2a). The observed differences primarily reflect the different coverage of employees, primarily the exclusion of public sector employees (employees working in non-government education and health sector are included, although their share is small), and self-employed workers, as well as differences in methodology, for example the treatment of part-time workers. Developments in gross value added (GVA) from Fina are mostly in line with national accounts data published by the CBS, with disparities mainly arising from differences in coverage (figures 2b and A2b).

FIGURE 2

Average gross monthly wage and gross value added compared to administrative data (annual rate of change, %)



Source: Fina, CBS and authors' calculations.

After data cleaning, the sample contains slightly fewer than 50 thousand firms in the first year (2002), growing to 110 thousand in 2023. The number of employees grew from 768 thousand in 2002 to over 1.1 million in 2023. Notably, the number of firms increased in the aftermath of the 2009-2014 recession, even though employment decreased. This is consistent with average firm size, which decreased throughout the period. While the average firm in 2002 had 15 employees, in 2023 it had only 10 (table A1). Over the 20-year period, both average gross monthly wage and productivity (GVA per worker) doubled.

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Looking at firm size, small firms (fewer than 25 employees) dominate the population in the entire period (figures A3a and A4a). Furthermore, their share increased to almost 95% in 2023. At the same time, the share of medium firms (25-249 employees) decreased to 5%, while the share of large firms (>250 employees) was just below 0.5%.

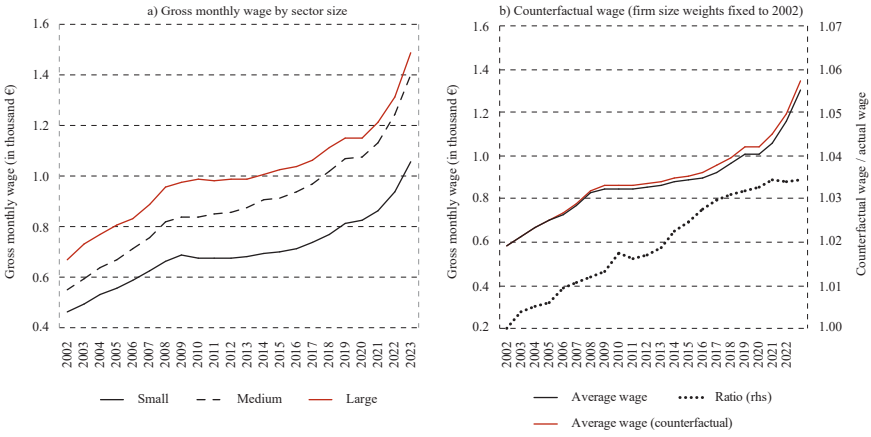
Despite their small absolute number, large firms employ a large share of the workforce, although the trend is decreasing (figures A3b and A4b). In 2023, 32% of employees were employed in large firms (44.2% in 2002). Over time, the percentage of workers employed in small firms grew to 36% in 2023, with 31.5% in medium-sized firms. Similarly, the largest share of GVA is generated by large firms, although this share has been declining (54% in 2002 compared to 38% in 2023). Meanwhile, GVA in small and medium-sized firms has been increasing over time to around 30% in 2023 (figures A3c and A4c).

Looking at wages, there is a positive correlation between firm size and wages (in line with findings from Nestić, 2005). Large firms paid higher wages than small and medium firms, and medium firms paid higher wages than small firms (figure 3a). In 2002, wages in small firms amounted to about 69.3% of those in large firms, slightly catching up, to 71.3%, in 2023. Medium firms, however, caught up much faster, from 82.9% in 2002 to 94.3% in 2023. Wage premium in larger firms in consistent with the literature (Oi and Idson, 1999), which suggests that higher wages in larger firms may be explained by factors such as the economies of scale, higher productivity, or unionization and the corresponding increased bargaining power of workers over the negotiated wages.

The increased share of lower=paying small firms suggests that the composition effects may have had a negative influence on aggregate wages. Indeed, had the size structure of the firms remained unchanged since 2002, the aggregate wage in 2023 would have been 3.4% higher (figure 3b).

FIGURE 3

Firm size composition effect on gross monthly wage



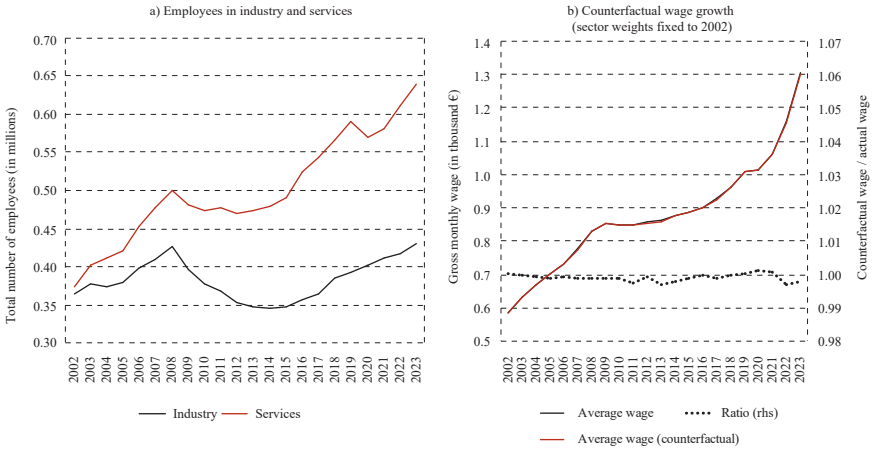
Note: Counterfactual wage is average wage with firm size weights fixed to 2002 as a base year.
Source: Fina and authors' calculations.

What is more, over the observed period there was a significant shift from industry to services (figure 4a). The category "Industry" here includes NACE 2007 sections B-F (Industry including construction), while "Services" include sections G-U. Agriculture (section A) is excluded from this analysis. While in 2002 the total numbers of employees in industry and services were similar, in 2023 the share of services employees increased to almost 60%. Wages in services tended to be somewhat higher than in industry, although the wages in industries have been catching up and difference between the sectors decreased in the years leading up to pandemic (figure A5b).

Unlike the change of firm size composition, the change of sectoral composition seems to have had a positive impact on aggregate wages, although the effect seems much less significant (figure 4b).

FIGURE 4

Sectoral composition effect on gross monthly wage



Notes: Industry refers to NACE 2007 sections B-F (Industry including construction), while "Services" include sections G-U. Counterfactual wage is average wage with sector weights fixed to 2002 as a base year.

Source: Fina and authors' calculations.

The observed changes in firm size and shifts in sectors signal that their effects on wages are not trivial. However, they do not consider changes in structure within the group, arising from worker reallocation, for example, workers moving from one firm in industry to another firm in industry, or from a low-paying small firm to a better-paying small firm. To analyse such effects, we conduct Olly and Pakes decomposition on firms in Croatia in 2002-2023 period.

In addition to the static decomposition, we apply a dynamic version that accounts for firms entering and exiting the market. Specifically, we categorize firms into three mutually exclusive groups: entrants, exiters, and survivors. Entrants are firms that are active in the current year and will remain active in the following

year, but were not active in the previous year. Survivors are firms that were active in the previous year and continue to be active in both the current and following year**.** Exiters are firms that were active in the previous and current year but will no longer be active in the following year[3].

In Croatia, our sample shows that, on average, 12% of firms enter and around 8% exit each year. However, post-pandemic data reveals a decline in both entry and exit rates, indicating reduced firm dynamism and, consequently, a slowdown in the process of *creative destruction*, with potential negative effects on productivity growth. On average, 4% of workers are employed in both entering firms and those likely to exit in the following year. The wages of both entering and exiting firms are lower than those of continuing firms, which is in line with the literature (Schröpf, 2023). The main characteristics of entering and exiting firms, including the number of firms and employees, wages, and GVA per worker, can be found in the appendix.

4 OP DECOMPOSITION

The OP decomposition was initially introduced in the realm of aggregate productivity analysis (Olley and Pakes, 1996; Murao, 2017; Brown et al., 2018; CompNet, 2021), where aggregate productivity, calculated as a weighted average, is decomposed into the unweighted average of productivity and the covariance between firm size (measured by people employed) and productivity. A higher covariance implies a stronger relationship between a company's productivity and its size. An increase in covariance suggests that resources are being distributed across firms such that more productive firms are utilizing above-average resources. The OP term is seen as an indicator of labour allocation efficiency (Valdec and Zrnc, 2018). Furthermore, Melitz and Polanec (2015) proposed an extension of the static OP decomposition which accounts for the impact of the firms surviving, entering firms and firms exiting the market on the aggregate productivity change. The authors proved that their dynamic version, does not suffer from the biases (theoretical direction and magnitude of those biases are not known) in the contributions of the firms' entering and exiting the market that could occur when other methods are used.

Given that the aggregate wage is calculated as a weighted average, the OP decomposition method can be easily reproducible within the wage context. The OP decomposition method then decomposes change in the aggregate wage into two components: the unweighted, systematic changes affecting all firms (such as macroeconomic trends and average firm characteristics), and the change that consist of the reallocation of workers to higher-paying firms. A drawback of the OP decomposition approach is that it ignores changes in the workforce composition, assuming constant worker characteristics. However, Adamopoulou et al. (2019) discovered in their study on Italian establishments that even after adjusting for occupational level, the effect of worker reallocation remained substantial and exhibited similar dynamics, although it decreased slightly.

[3] The criteria used to distinguish between exiting, entering, and continuing firms are important, as the results vary depending on whether these three categories are mutually exclusive or not.

4.1. STATIC OP DECOMPOSITION

The static OP decomposition separates the overall aggregate wage dynamics into two components: the change in the average firm wage (the "within" firm component) and the change in correlation term between firm wage and firm and size (the "between" firm component, or OP term). The first term reflects changes in wage common to all firms, while the second term assumes reallocation of workers from low to high-wage firms, driven by wage differential between firms. Workers are willing to move from one firm to another, conditional on other factors being similar, only when a new firm pays more than the existing one (Office for National Statistics, 2019). In this static version, only surviving firms are used in calculations, while the dynamic version accounts for firm entry and exit.

The aggregate wage in an economy is defined as the weighted average, with weights being the share of firm employment in total employment. This aggregate wage is then decomposed into unweighted average of the wages across firms $\tilde{\omega}_{jt}$ (which represents the average wage in a hypothetical scenario where there is no correlation between the firm wage and firm size) and an OP term representing the covariance between firm wage and firm size. If there were no correlation between firm size and firm wage (or, in a special case, if all firms were of the same size), the unweighted average wage would be identical to the average wage. However, since data show that larger firms (measured by employment size) tend to offer higher wages, this method allows us to measure the wage premium associated with larger firms. In this way, growth in aggregate wages can reflect either an increase in the average wage within firms or the reallocation of workers toward higher-wage firms.

$$\overline{w}_t = \tilde{\omega}_{jt} + \sum\nolimits_{j \epsilon J} (w_{jt} - \tilde{\omega}_{jt})(s_{jt} - \frac{1}{|J|}) \qquad (1)$$

where:

$\overline{w}_t$ is average aggregate wage, i.e. employment weighted average wage across firms

$\tilde{\omega}_{jt} = \frac{1}{|J|} \sum_{j \epsilon J} \omega_{jt}$ is unweighted average of the wages across firms,

$\sum_{j \epsilon J} (w_{jt} - \tilde{\omega}_{jt})(s_{jt} - \frac{1}{|J|})$ is the covariance between firm wage and firm size relative to the average firm size, or OP term,

J is a sample of firms,

$s_{jt} \equiv \frac{e_{jt}}{E_t} = \frac{e_{jt}}{|J| e_t}$ is the employment share of firm j at time t, with E_t aggregate employment and e_t average firm size.

The covariance between the firm wage and its employment share $\sum_{j \epsilon J} (w_{jt} - \tilde{\omega}_{jt})(s_{jt} - \frac{1}{|J|})$ (below, the OP term) would be equal to zero in the

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scenario with a purely random distribution of workers among firms. In this case, aggregate wage would be equal to the within component. On the contrary, when workers are reallocated to the high-wage firms, the correlation becomes positive, the OP term increases ($\Delta OP_t > 0$), and the average wage increases above the unweighted average ($\Delta\tilde{\omega}_t = 0$) entirely as a result of the composition effect, that is, even if all firms continue to pay the same wages.

As complement to OP term, we derive the indicator of the wage allocation premium as follows:

$$\varepsilon_t = \frac{\overline{w}_t}{\tilde{\omega}_t} \tag{2}$$

When aggregate wage is equal to the within component, the wage allocation premium ε is equal to 1, which would correspond to a random distribution of workers among firms. When ε>1, then aggregate wages are greater than within component, which suggests a shift from random distribution so that more workers are allocated to higher paying firms. The wage allocation premium reflects how much higher the aggregate wage is than the unweighted average due to the OP term. In essence, it's a wage premium from non-random worker allocation.

In addition, we construct a counterfactual (fixed-weight) aggregate wage. This approach allows us to isolate the contribution of the worker reallocation from low-wage to high=wage firms to the aggregate wage dynamics and its interpretation, as in Adamopoulou et al. (2019). Counterfactual (fixed-weight) wage growth is one which would be realised if the wage allocation premium in year $b+s$ was the same as in the base year b. We apply this by fixing workers allocation to a specific base year b, and then by using the identity $1 = \frac{\tilde{\omega}_{b+s}}{\overline{w}^c_{b+s}} + \frac{OP_b}{\overline{w}_b}$ we obtain

$$\overline{w}^c_{b+s} = \frac{\tilde{\omega}_{b+s}}{1 - \frac{OP_b}{\overline{w}_b}} = \frac{\tilde{\omega}_{b+s}}{\frac{1}{\varepsilon_b}} = \tilde{\omega}_{b+s}\varepsilon_b \tag{3}$$

Where:

$\overline{w}^c_{b+s}$ is counterfactual average wage in year $b+s$

$\tilde{\omega}_{b+s}$ is unweighted average wage in year $b+s$

$1 - \frac{OP_b}{\overline{w}_b}$ is inverse of wage allocation premium ε_b in base year b

ε_b is wage allocation premium in base year b.

4.2 DYNAMIC OP DECOMPOSITION

The dynamic OP decomposition, proposed by Melitz and Polanec (2015), extends the static version by separating the impact of surviving firms on aggregate wage changes from the effects of firms entering and exiting the market. We would expect that the firms entering and exiting market have lower wages than incumbent firms. An empirical analysis of establishments in Germany showed that starts-up tend to pay lower wages and that this wage differential tends to decline over time as these firms become older (Brixy, Kohaut and Schnabel, 2007). In addition, we would expect that exiting firms also have lower wages due to their lower productivity. The analysis of Schröpf (2023) showed that exit rates decline with wage levels. Moreover, firms with the lowest wages, as compared to their peers in the same cohort, have the highest risks of exiting the market.

Inclusion of entry and exit in the static OP decomposition, as discussed by Brown et al. (2018), is important because entering and exiting firms often differ in key characteristics such as productivity and size. For example, if an entrant firm has higher productivity than incumbents, it can gain market share from them, thereby contributing to aggregate productivity growth. Similarly, when a firm with below-average wages and a small employment share exits the market, the dynamic decomposition does not interpret this as a decline in the allocative premium, whereas the static OP decomposition may incorrectly attribute it to one. For this reason, it is important to decompose aggregate productivity or wages into components associated with each group of firms, which is presented in the dynamic OP decomposition.

Equation (4) represents the dynamic OP decomposition, constructed of four components, namely: changes in average productivity of the surviving firms; change in covariance of surviving firms; the contribution of the entrants in the second period; and contribution of the exiting firm.

$$\Delta\overline{w}_t = \Delta\tilde{\omega}_t^S + \Delta OP_t^S + \sum_{j\epsilon E} s_{jt}(\overline{w}_t^E - \overline{w}_t^S) - \sum_{j\epsilon X} s_{jt-1}(\overline{w}_{t-1}^X - \overline{w}_{t-1}^S) \qquad (4)$$

where:
superscript S refers to surviving firms, E for entering and X for exiting firms.

The first two terms on the right side of the equation represent static Olley and Pakes decomposition, estimating the contribution of the surviving firm to the changes in average wage between time t and t-1 and covariance between employment share and average wage of surviving firms. The contributions of the entering and exiting firms are equal to the employment share of entering firm j (exiting firm j) within the total employment of entering firms (exiting firms) and difference between average wage of entering firms (exiting firms) and surviving firms.

All the mentioned formulas on static and dynamic OP decomposition are equally applied to productivity, measured as GVA per worker, in the same manner as for the wages.

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5 RESULTS

The contributions of the static OP term to aggregate wage growth in different time periods and by sector are shown in table 1. To calculate the contribution of worker reallocation effect, we fix the allocation premium coefficient to the base year (eq. 3). Over the entire analysed period, from 2002 to 2023, the impact of allocation premium on aggregate wage dynamic is small (4.9%). However, if we analyse different time periods, the impact of the allocation premium becomes evident. From the start of our sample in 2002, until the onset of the recession in 2008, wages grew significantly (42.8%). However, this increase would have been even greater (by 1.9 percentage points) had the allocation premium remained at its 2002 level. During the recession period (2008-2014), wage growth slowed considerably. Wages in 2014 were 5.7% higher than in 2008. However, most of this growth (about 80%) was driven by the reallocation of workers from lower-paying to higher-paying firms, as the unweighted wage component rose by only 1.0%. This pattern is evident in both the services and manufacturing sectors.

Table 1

Contribution of the change in OP term to aggregate wage growth in different periods, by sector (NACE 2007)

		2002-08	2008-14	2014-19	2019-20	2020-23	2002-23
Total economy	WG (%)	42.8	5.7	14.8	0.5	29.1	124.7
	CWG (%)	44.7	1.0	17.0	1.6	25.8	118.6
	CAP (p. p.)	-1.9	4.7	-2.2	-1.1	3.3	6.1
Industry (including construction)	WG (%)	44.5	5.9	17.2	1.1	26.3	128.9
	CWG (%)	41.9	1.3	19.9	2.2	26.0	122.0
	CAP (p. p.)	2.6	4.6	-2.7	-1.2	0.3	6.8
Services	WG (%)	40.0	5.2	13.4	-0.1	31.0	118.5
	CWG (%)	46.3	0.4	16.0	1.4	25.8	117.4
	CAP (p. p.)	-6.3	4.7	-2.6	-1.4	5.1	1.1

Notes: Counterfactual wage growth is one which would be realised if the wage allocation premium were the same as in the base year. Industry (including construction) refers to B-F, while services are residual. WG refers to wage growth, CWG to counterfactual wage growth, CAP to contribution of allocation premium.

Source: Fina and authors' calculations.

The obtained results are in line with Adamopoulou et al. (2019) who reported that in the period from 2004 to 2015, allocation of employees can explain 32% of the increase in the aggregate wage in Italy. Because their analysis concludes with data up to 2015, it would be useful for future research to compare our results with Italian data from periods beyond 2015.

In the period following the recession and up to the onset of the COVID-19 pandemic (2014-2019), wage growth was again dampened by a decline in the wage allocation premium. This trend is observed in both the services and the manufacturing sectors.

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A detailed sectoral analysis in table A2 shows that similar trends are broadly visible within most sectors. The increase in wage allocation premium after 2020 is visible in industry (excluding construction), and in some service sectors, most notably retail, accommodation and food services, ICT, professional and administrative services and non-government public sector activities.

Overall, from 2002 to 2019, the wage allocation premium displayed countercyclical behaviour, tending to rise during downturns and decline during expansions (figure 5a). However, in the period from 2020 to 2023, this pattern shifted and became procyclical: the wage allocation premium decreased and slowed the wage growth in 2020, when GDP decreased due to the pandemic outbreak, and then increased from 2020 to 2023 as GDP experienced strong post-pandemic growth. This contrasts with what we observe in the GVA per employee data, which we analyse in the next section.

FIGURE 5

Static OP decomposition, wage and GVA, three year moving average

Notes: Shaded areas indicate period of negative real GDP growth in Croatia. Industry refers to NACE 2007 sections B-F (Industry including construction), while "Services" includes sections G-U.

Sources: Fina and authors' calculations.

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The effect of changes in the allocation premium has been much more noticeable for GVA per employee. From 2002 to 2008, GVA per employee increased by 31.2% (table 2). However, had the allocation of workers among the firms remained unchanged, the growth would be even greater (45.8%). This negative effect of reallocation is especially pronounced in industry.

Table 2

Contribution of the OP term to aggregate GVA per worker growth in different periods, by sector (NACE 2007)

		2002-08	2008-14	2014-19	2019-20	2020-23	2002-23
Total economy	GVA growth (%)	31.2	4.6	15.8	-3.9	37.8	110.4
	CGVA growth (%)	45.8	-8.4	18.0	-2.6	44.2	121.4
	CAP (p. p.)	-14.6	13.0	-2.2	-1.3	-6.4	-11.1
Industry (including construction)	GVA growth (%)	24.3	10.9	14.0	-0.9	33.1	107.1
	CGVA growth (%)	42.4	-9.7	20.5	-0.5	35.9	109.7
	CAP (p. p.)	-18.1	20.6	-6.6	-0.4	-2.9	-2.5
Services	GVA growth (%)	33.6	-1.2	17.4	-6.3	41.6	105.7
	CGVA growth (%)	46.3	-9.3	16.7	-3.7	49.2	122.6
	CAP (p. p.)	-12.7	8.1	0.7	-2.6	-7.6	-16.9

Notes: Counterfactual GVA growth is one which would be realised if the allocation premium were the same as in the base year. Industry (including construction) refers to B-F, while services are residual. CGVA growth refers to counterfactual GVA growth, CAP to contribution of allocation premium.

Source: Fina and authors' calculations.

During the recession (2008-2014), GVA per worker increased (4.6%), but had the allocation remained as in 2008, it would have decreased (8.4%). The reallocation effect was, again, especially pronounced in industry, as shown in figure 5c, which experienced a sharper decline in employment than the services sector, but this decline was also present in services sector, where it moderated the decrease in GVA per employee.

In the period of growth (2014-2019), the reallocation premium continued exhibiting the countercyclical behaviour, moderating the growth in GVA per employee. This is attributed to its effect in industry, while the allocation premium in services grew slightly.

In 2020, the GVA allocation premium made a negative contribution to GVA per employee growth, further deepening the decline in GVA caused by the pandemic. However, unlike the wage allocation premium, which increased from 2020 to 2023, the reallocation premium for GVA per worker returned to its countercyclical

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behaviour after 2020. Thus, in the post-pandemic period workers were reallocated to higher paying firms, but these wage-based reallocation effects were not reflected in value-added terms.

Looking at detailed sector data (table A3), the decrease in the reallocation premium after 2020 was broadly based, with an exception in the accommodation and food services sector (which was particularly hard hit by pandemic shock in 2020).

The allocation premium of both wages and productivity (eq. 2) exhibited countercyclical behaviour in the period 2002-2019, including the period before and during the prolonged recession, which is in line with the results of Adamopoulou et al. (2019). Following the onset of the prolonged recession in Croatia in 2009, the wage allocation premium began to rise, reflecting the stronger negative impact of the recession on lower-paying, less productive firms, particularly in the construction sector (as shown in figure 5a). However, since 2020, the wage allocation premium has exhibited clear pro-cyclical behaviour, suggesting some form of anomaly in the economy. It should be noted that, amid the COVID-19 pandemic recession in Croatia, significant government measures to preserve employment could have distorted allocation premium trends – an effect that was not present during the 2009-2014 recession. This is in line with findings of Lalinsky, Meriküll and Lopez-Garcia (2024), who report that the productivity-enhancing reallocation was weaker in the pandemic than in the Great Recession and in countries with more generous support. It is possible that the procyclical impact of the COVID-19 recession on the allocation premium reflected government measures to preserve employment (for more details on firms that received government support, see CNB, 2020).

One possible explanation is that government support measures during the pandemic may have encouraged labour hoarding, allowing firms to retain workers and maintain wage levels even when productivity (as measured by GVA per worker) did not keep pace. In this context, the increase in wages without a corresponding rise in productivity could have pressured firms to raise prices to maintain margins. As a result, this dynamic may have contributed to the post-pandemic inflationary pressures, particularly in sectors where labour costs represent a substantial share of total costs.

In addition, COVID-19 measures may have hindered natural market dynamics, contributing to *zombification* and negatively impacting productivity growth. Typically, during a recession, the processes of creative destruction and the *cleansing effect* facilitate the reallocation of jobs from low-productivity to high-productivity firms (Konings, Magerman and Escbroeck, 2023). However, Croatia was one of the countries with the broadest coverage of employees under COVID-19 support measures, coupled with one of the highest levels of government assistance. As a result, the usual productivity-enhancing reallocation may have been stifled by the generous government support.

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Finally, we conclude with the dynamic OP analysis. This analysis has missing observations at both the beginning and end of the period. In the first year (2002), it is not possible to distinguish between firms that are entering, exiting, or continuing. Similarly, in the last year (2023), we cannot determine which firms will survive or predict the number of firms entering or exiting.

Accounting for entering and exiting firms shows that these firms have a negative effect on the average wage in every year. These results align with our assumptions that entering and exiting firms have low wages compared to incumbent firms. Thus, firms entering the market exert a downward pressure on aggregate wages, while exiting firms have an upward impact. However, since the effect of entering firms is greater than that of exiting firms, the overall effect is negative (figure 6).

Overall, the dynamic OP decomposition on the sample of continuing firms yields similar results to the static OP analysis (figure 7). During Croatia's prolonged recession (2009-2014), both wages and GVA per worker exhibited counter-cyclical behaviour. However, while wages continued to display a counter-cyclical pattern throughout the recovery period and up to the COVID-19 crisis, GVA per worker reallocation began to decline after peaking during the recession. The decline in productivity-enhancing reallocation further intensified following the COVID-19 crisis, whereas wages started to exhibit a slightly pro-cyclical pattern thereafter.

FIGURE 6

Contributions of entering and exiting firm to wage change, %

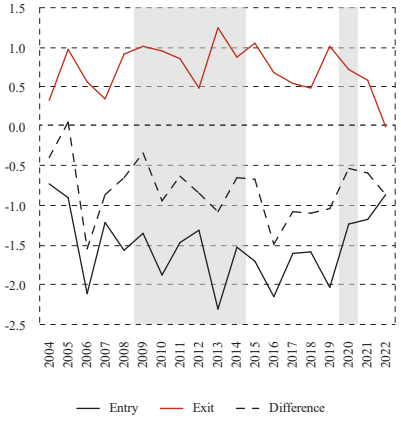
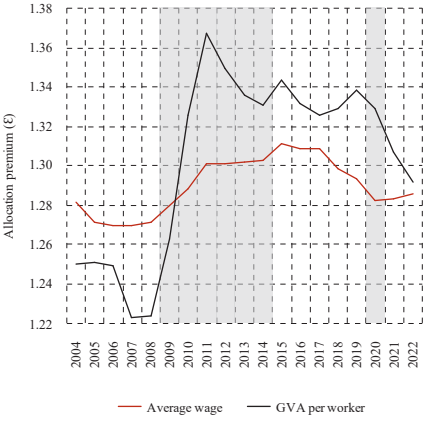


FIGURE 7

Dynamic OP decomposition (three year moving average)



Note: Shaded areas indicate period of negative real GDP growth in Croatia.

Sources: Fina and authors' calculations.

6 CONCLUSION

After a period of stagnation following the 2009-2014 recession, nominal wages in Croatia grew strongly. Wage developments depend not only on firm-level wage setting policies, but also on the firm composition, which is often overlooked and not evident in aggregate data. The objective of this paper was to uncover the role of firm composition effects on aggregate wage dynamics, employing the Olley and Pakes decomposition and its dynamic variant to account for entering and exiting firms.

Our application of the OP decomposition revealed that allocation premium, which we defined as a ratio between actual observed wages and "unweighted wages" (wages in a hypothetical scenario where there is no correlation between firm size and firm wages, that is, in which the allocation of workers among the firms is random) behaved countercyclically before the COVID-19 pandemic. During economic downturns, particularly evident during the recession starting in 2009, allocation premium increased, as lower-paying firms were disproportionately affected by the recession. Thus, the composition effect decreases the severity of the negative impact on wages during economic downturns and also diminishes the positive effects during the periods of growth. In the period 2008-2014, this composition effect explains about 80% of the aggregate wage growth. Conversely, during the periods of growth, the allocation premium decreases, moderating the wage growth, as lower-paying firms increase their employment more than high-paying firms. This finding aligns with the results from Adamopoulou et al. (2019), which studied the composition effect on Italian firms.

However, in the post-pandemic period (2020-2023), the wage allocation premium exhibits a procyclical behaviour, increasing the aggregate wages. One possible explanation for this unexpected behaviour can be found in the extensive government support measures implemented during the COVID-19 pandemic. These programs may have allowed firms to retain employees and maintain wage levels even when output declined.

We extend our analysis by applying the same decomposition method to productivity, using gross value added per worker as a proxy. We found that the effect of changes in allocation premium has been much more significant for productivity than for wages. Moreover, this reallocation effect has remained countercyclical through the entire examined period, including after the COVID-19 pandemic. As a result, employees were reallocated toward higher-paying firms, but without a corresponding increase in productivity, as reflected in the declining GVA per employee allocation premium. This disconnect suggests that wage-based reallocation was not productivity-driven and may have put upward pressure on prices, potentially contributing to the broader inflationary trends observed in the post-COVID period.

Finally, the dynamic OP decomposition showed that firms entering the market tend to exert downward pressure on aggregate wages. This suggests that new firms typically pay lower wages, which is consistent with the literature indicating start-ups usually offer lower initial wages that rise over time as they stabilize. At the same time, exiting firms have an upward impact on aggregate wages (as exiting firms typically pay lower wages compared to surviving firms), but this effect is weaker than the effect of new entrants.

We hope our paper enhances the understanding of wage developments in Croatia and inspires further research. A promising direction for future study could be exploring how sectoral differences in allocation efficiency – especially given post-pandemic high inflation and wage growth – might influence the potential impact of wage growth on inflation.

Disclosure statement

The authors have no conflict of interest to declare.

REFERENCES

1. Abowd, J. M., Kramarz, F. and Margolis, D. N., 1999. High wage workers and high wage firms. *Econometrica*, 67(2), pp. 251-333. https://doi.org/10.1111/1468-0262.00020
2. Abraham, K. G. and Haltiwanger, J. C., 1995. Real Wages and Business Cycle. *Journal of Economic Literature*, 33(3), pp. 1215-1264.
3. Adamopoulou, E. [et al.], 2019. Reallocation and the role of firm composition effects on aggregate wage dynamics. *IZA Journal of Labor Economics*, 8(1). https://doi.org/10.2478/izajole-2019-0003
4. Agell, J. and Lundborg, P., 1995. Theories of Pay and Unemployment: Survey Evidence from Swedish Manufacturing Firms. *The Scandinavian Journal of Economics*, 97(2), pp. 295-307. https://doi.org/10.2307/3440530
5. Allen, J. and van der Velden, R., 2001. Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search. *Oxford Economic Papers*, 53(3), pp. 434-452. https://doi.org/10.1093/oep/53.3.434
6. Babecky, J. [et al.], 2012. How do European firms adjust their labour costs when nominal wages are rigid. *Labour Economics*, 19(5), pp. 792-801. https://doi.org/10.1016/j.labeco.2012.03.010
7. Bishop, J. and Greenland, E., 2021. Is the Phillips Curve Still a Curve? Evidence from the Regions. *Reserve Bank of Australia Research Discussion Paper,* No. 2019-09. https://doi.org/10.47688/rdp2021-09
8. Blinder, A. and Choi, D. H., 1990. A shred of evidence on theories of wage stickiness. *The Quarterly Journal of Economics*, 105(4), pp. 1003-1005. https://doi.org/10.2307/2937882
9. Branten, E., Lamo, A. and Rõõm, T., 2018. Nominal wage rigidity in the EU countries before and after the Great Recession, evidence from WND survey. *ECB Working Paper Series*, No. 2159.
10. Brixy, U., Kohaut, S. and Schnabel, C., 2007. Do newly founded firms pay lower wages? First evidence from Germany. *Small Business Economics*, 29(1/2), pp. 161-171. https://doi.org/10.1007/s11187-006-0015-x
11. Brown, D. J. [et al.], 2018. Decomposing firm-level productivity growth and assessing its determinants: evidence from Americas. *The Journal of Technology Transfer*, 43(6), pp, 1571-1606. https://doi.org/10.1007/s10961-018-9678-0
12. Budrys, Ž., Porqueddu, M. and Sokol, A., 2022. Striking a bargain: narrative identification of wage bargaining shocks. *European Central Bank Research Bulletin*, No. 98.
13. Campbell, C. and Kamlani, K. S., 1997. The reasons for wage rigidity: evidence from a survey of firms. *Quarterly Journal of Economics*, 112(3), pp. 759-789. https://doi.org/10.1162/003355397555343
14. Card, D., Heining, J. and Kline, P., 2013. Workplace Heterogeneity and the Rise of West German Wage Inequality. *Quarterly Journal of Economics*, 128(3), pp. 967-1015. https://doi.org/10.1093/qje/qjt006
15. CBS, 2024. *Statistical Reports*. Zagreb: Croatian Bureau of Statistics.

16. CEA, 2018. *How much are workers getting paid? A primer on wage measurement*.
18. Christodoulopoulou, S. and Kouvavas, O., 2022. Wages, compositional effects and the business cycle. *ECB Working Paper Series*, No. 2653.
19. CNB, 2019. The Impact of Changes in Employee Structure on the Average Wage in Croatia for the Period 2009-2018. *Macroeconomic developments and Outlook,* No. 7.
20. CNB, 2020. Analiza poslovnih subjekata kojima su isplaćene potpore Vlade RH za očuvanje radnih mjesta. *Makroekonomska kretanja i prognoze, 5(8).*
21. CompNet, 2021. *User Guide for the 8th vintage of the CompNet dataset* (Last update: October 31, 2023).
22. Cuadrado, P. and Tagliati, F., 2018. Wage moderation in Spain and in the euro area. *Banco de Espana Economic Bulletin*, No. 4/2018.
23. Daly, M. C. and Hobijn, B., 2014. Downward Nominal Wage Rigidities Bend the Phillips Curve. *Journal of Money, Credit and Banking*, 46(S2), pp. 51-93. https://doi.org/10.1111/jmcb.12152
24. Daly, M. C. and Hobijn, B., 2017. Composition and Aggregate Real wage growth. *American Economic Review*, 107(5), pp. 349-52. https://doi.org/10.1257/aer.p20171075
25. ECB, 2019. The effects of changes in the composition of employment on euro area wage growth. *ECB Economic Bulletin*, No. 8/2019.
26. ECB, 2022. Wage developments and their determinants since the start of pandemic. *ECB Economic Bulletin*, No. 8/2022.
27. Goette, L., Sunde, U. and Bauer, T., 2007. Wage rigidity: measurement, causes and consequences. *The Economic Journal*, 117(524), pp. F499-507. https://doi.org/10.1111/j.1468-0297.2007.02093.x
28. Gruetter, M. and Lalive, R., 2009. The importance of firms in wage determination. *Labour Economics*, 16(2), pp. 146-160. https://doi.org/10.1016/j.labeco.2008.09.001
29. Haltom, R., 2013. Sticky wages. *Federal Reserve Bank of Richmond Econ Focus*, 1(1), p. 10.
30. Hyytinen, A., Ilmakunnas, P. and Maliranta, M., 2016. Olley-Pakes productivity decomposition: computation and inference. *Journal of the Royal Statistical Society. Series A,* 179(3), pp. 749-761. https://doi.org/10.1111/rssa.12135
31. Ivanac, F., Kunovac, D. and Nadoveza, O., 2024. Kako porast plaća utječe na inflaciju. *HNB blog*.
32. Koeniger, W., Leonardi, M. and Nunziata, L., 2007. Labour Market Institutions and Wage Inequality. *Industrial and Labor Relations Review*, 60(3), pp. 340-356. https://doi.org/10.1177/001979390706000302
33. Konings, J., Magerman, G. and Escbroeck, Van D., 2023. The impact of firm-level Covid rescue policies on productivity growth and reallocation. *European Economic Review*, 157, 104508. https://doi.org/10.1016/j.euroecorev.2023.104508
34. Kunovac, M. and Pufnik, A., 2015. Features of the labour market and wage setting in Croatia: Firms survey results. *Croatian National Bank Surveys*, S-19.

35. Kydland, F. E. and Prescott, E. C., 1993. Cyclical Movements of the Labor input and its Implicit Real wage. *Federal Reserve Bank of Cleveland Economic Review*, 29(2), pp, 12-23.
36. Lalinsky, T., Meriküll, J. and Lopez-Garcia, P., 2024. Productivity-enhancing reallocation during the Covid-19 pandemic. *ECB Working Paper Series*, No 2947.
37. Maliranta, M. and Määttänen, N., 2015. An augmented static Olley-Pakes productivity decomposition with entry and exit: Measurement and interpretation. *Economica*, 82(328), pp.1372-1416.
38. Melitz, M. J. and Polanec, S., 2015. Dynamic Olly-Pakes productivity decomposition with entry and exit. *The RAND Journal of Economics*, 46(2), pp. 362-375. http://dx.doi.org/10.1111/1756-2171.12088
39. Murao, T., 2017. Aggregate productivity growth decomposition: an overview. *Public Policy Review*, 13(2017), pp. 269-285.
40. Nadoveza, O., 2025. Do increases in public sector wages affect inflation? *Public Sector Economics*, 49(1), pp. 1-44. https://doi.org/10.3326/pse.49.1.1
41. Nestić, D., 2005. The determinants of wages in Croatia: Evidence from earning regressions. In: *Proceedings of the 65th Anniversary Conference of the Institute of Economics.* Zagreb: Ekonomski institut, pp, 165-195.
42. Nestić, D., 2009. Plaće u Hrvatskoj: trendovi, problemi i očekivanja. In: V. Franičević and V. Puljiz, eds. *Rad u Hrvatskoj: pred izazovima budućnosti.* Zagreb: Centar za demokraciju i pravo Miko Tripalo; Pravni fakultet Sveučilišta u Zagrebu, pp.165-195.
43. Nestić, D., Lovrinčević, Ž. and Mikulić, D., 2001. Plaće u Hrvatskoj – stanje i makroekonomske implikacije različitih scenarija budućih kretanja. *Ekonomski pregled*, 52(1-2), pp. 234-277.
44. Nestić, D., Rubil, I. and Tomić, I., 2015. Analiza razlika u plaćama između javnog sektora, poduzeća u državnom vlasništvu i privatnog sektora u Hrvatskoj 2000.-2012. *Privredna kretanja i ekonomska politika*, 24(136), pp. 7-51.
45. Nickel, C. [et al.], 2019. Understanding low wage growth in the euro area and European countries. *ECB Occasional Paper Series*, No. 232. https://doi.org/10.2139/ssrn.3447190
46. Office for National Statistics, 2019. Analysis of job changers and stayers. *Economic Review*: April 2019.
47. Oi, W. Y. and Idson, T. L., 1999. Firm size and wages. In: O. Ashenfelter and D. Card, eds. *Handbook of Labor Economics*. Amsterdam: Elsevier, pp. 2165-2214. https://doi.org/10.1016/S1573-4463(99)30019-5
48. Olley, G. S. and Pakes, A., 1996. The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, 64(6), pp. 1263-1297. https://doi.org/10.2307/2171831
49. Puente, S. and Galán, S., 2014. Analysis of Composition Effects on Wage Behaviour. *Banco de Espana Economic Bulletin*, February.
50. Rubil, I., 2013. The Great Recession and the public-private wage gap: distributional decomposition evidence from Croatia 2008-2011. *MPRA Paper*, No. 46798.

51. Schröpf, B., 2023. The dynamics of wage dispersion between firms: the role of firm entry and exit. *Journal of Labour Market Research*, 57(1). https://doi.org/10.1186/s12651-022-00326-3
52. Valdec, M. and Zrnc, J., 2018. Mikroekonomski aspekti kretanja produktivnosti tijekom velike recesije u Hrvatskoj: rezultati istraživanja modula za produktivnost Istraživačke mreže za konkurentnost (CompNet). *Pregledi,* P-39.
53. Verdugo, G., 2016. Real wage cyclicality in the Eurozone before and during the Great Recession: Evidence from micro data. *European Economic Review*, 82(2016), pp. 46-69. https://doi.org/10.1016/j.euroecorev.2015.11.001

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APPENDIX

Table A1

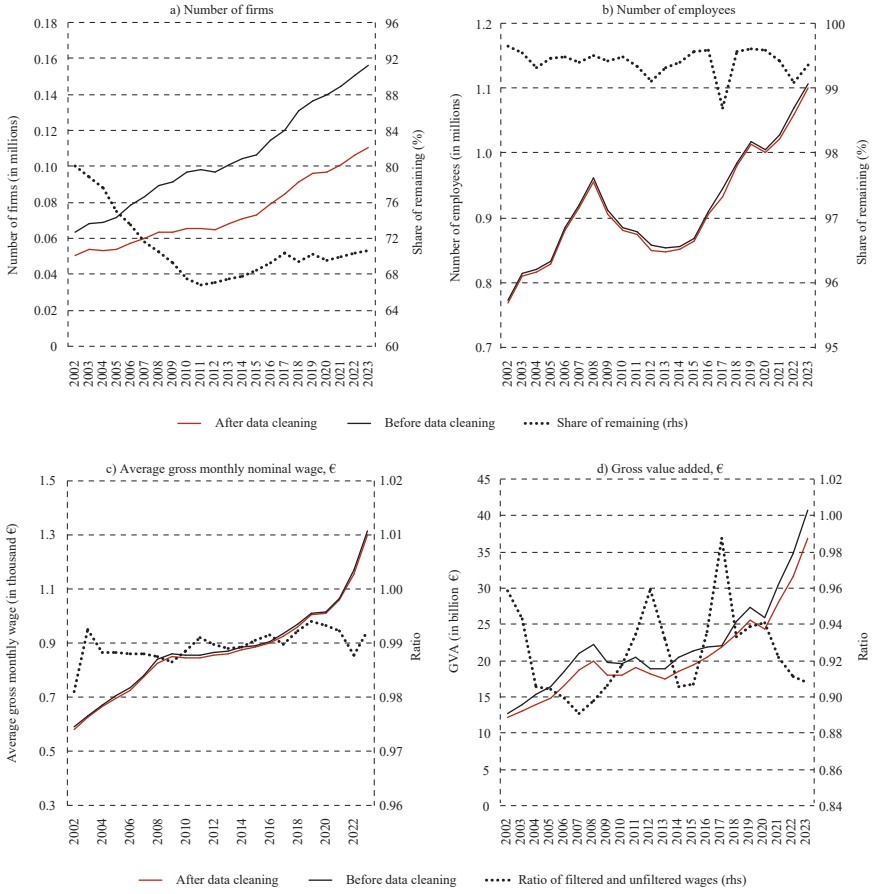
Data overview

	Number of firms	Total employees	Average firm size	Average gross monthly wage (€)	GVA per worker, annual (€)
2002	50,891	768,424	15	579	15,947
2003	53,708	809,297	15	627	16,222
2004	53,511	814,578	15	664	17,034
2005	53,862	827,545	15	698	17,939
2006	57,742	880,450	15	726	18,881
2007	59,866	914,647	15	773	20,474
2008	63,248	955,572	15	827	20,924
2009	63,294	905,258	14	849	19,821
2010	65,329	879,106	13	846	20,515
2011	65,792	873,144	13	847	21,908
2012	65,216	848,701	13	854	21,324
2013	68,259	846,980	12	859	20,691
2014	70,819	850,089	12	875	21,881
2015	72,997	863,958	12	883	22,394
2016	79,405	905,427	11	898	22,640
2017	84,621	931,200	11	924	23,435
2018	91,289	979,971	11	962	24,154
2019	96,017	1,012,616	11	1,004	25,343
2020	97,300	1,001,474	10	1,009	24,350
2021	101,139	1,022,360	10	1,058	27,465
2022	106,331	1,059,715	10	1,155	29,864
2023	110,524	1,100,504	10	1,302	33,549

Source: Fina and authors' calculations.

FIGURE A1

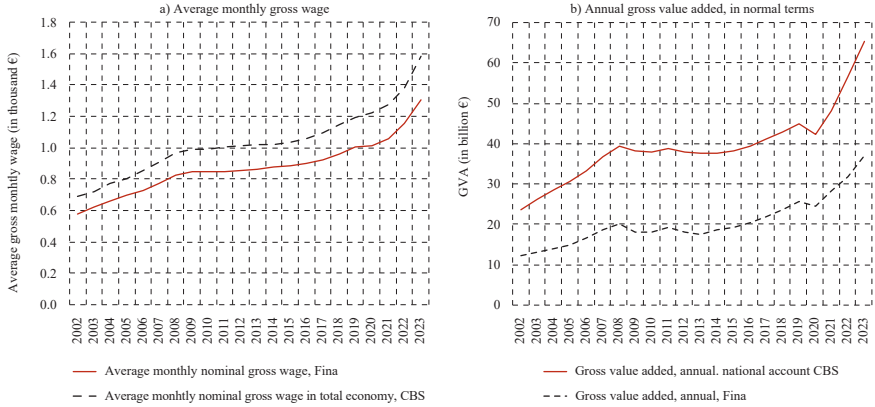
Data before and after the cleaning procedure



Sources: Fina and authors' calculations.

FIGURE A2

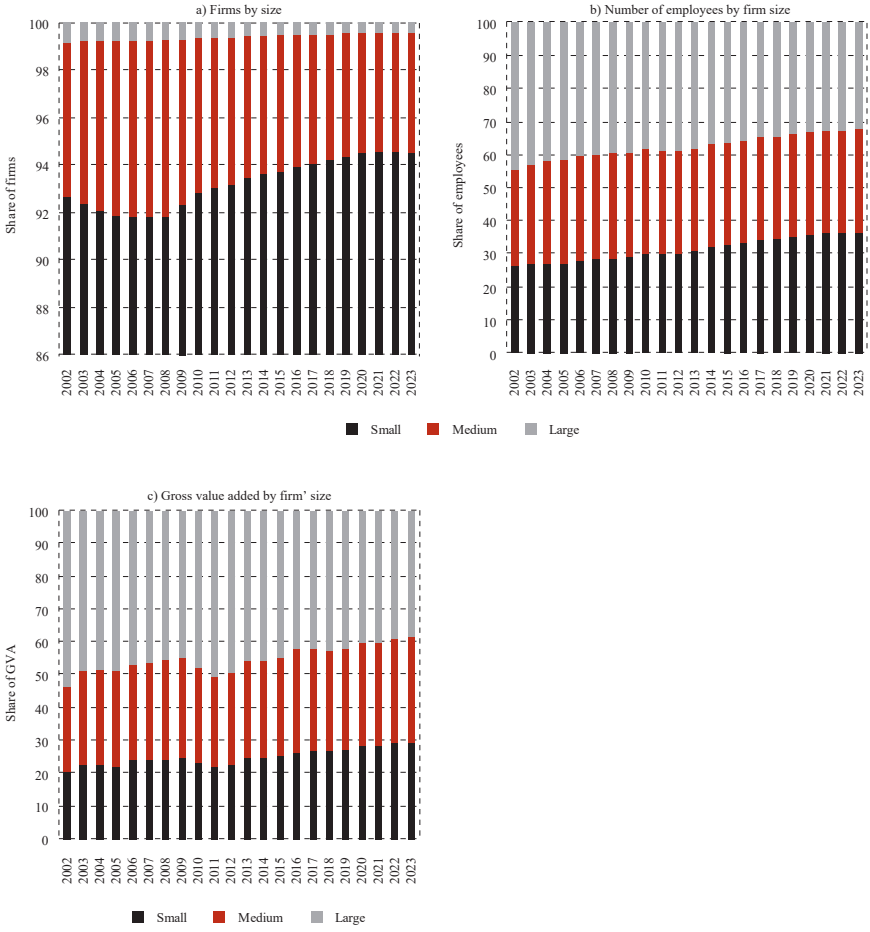
Average gross wage and gross value added compared to administrative data



Sources: Fina, CBS and authors' calculations.

FIGURE A3

Distribution of firms, employees and GVA (in %)



Sources: Fina and authors' calculations.

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FIGURE A4

Firm characteristics by size

Sources: Fina and authors' calculations.

FIGURE A5

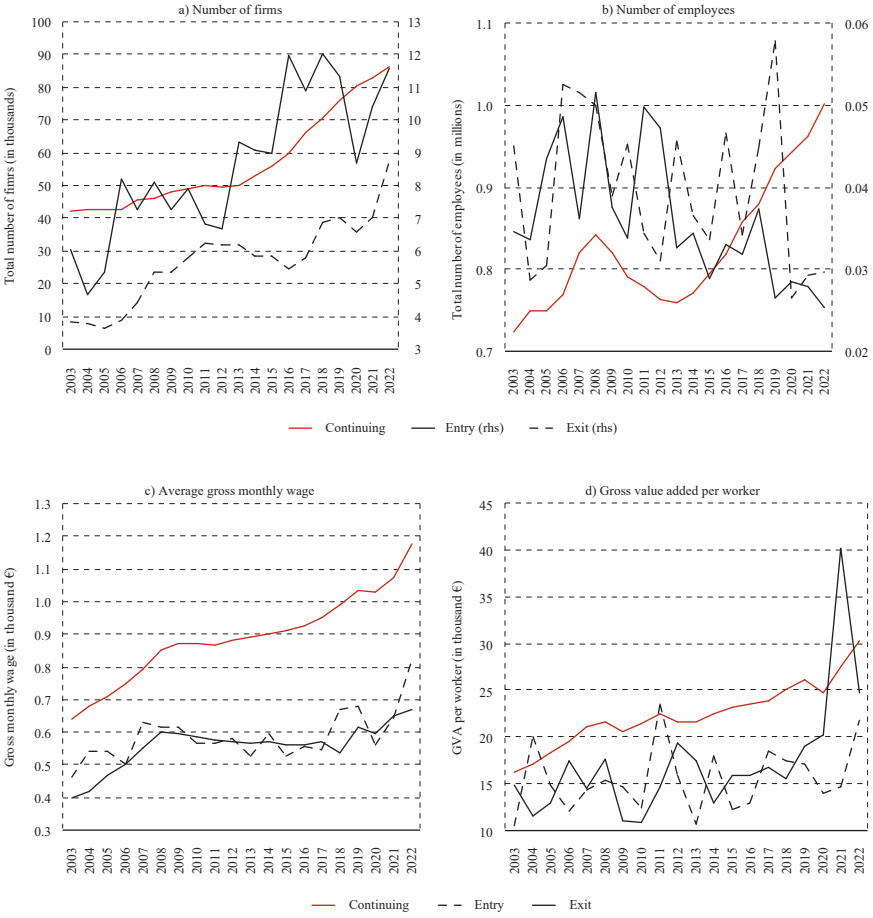
Firm characteristics by sector

Note: Industry refers to NACE 2007 sections B-F (Industry including construction), while "Services" includes sections G-U.

Sources: Fina and authors' calculations.

FIGURE A6

Main characteristics of entering and exiting firms



Note: The continuing firms are the same as surviving or incumbent firms.

Sources: Fina and authors' calculations.

Table A2

Contribution of the change in OP term to aggregate wage growth in different periods, by sector (NACE 2007)

		2002-08	2008-14	2014-19	2019-20	2020-23	2002-23
Industry (excluding construction)	WG (%)	46.2	7.0	16.5	1.2	26.8	133.7
	CWG (%)	42.6	2.8	20.8	1.0	25.8	125.1
	CAP (p. p.)	3.5	4.2	-4.4	0.2	1.0	8.7
Construction	WG (%)	44.0	-3.4	25.5	1.2	26.9	124.3
	CWG (%)	43.9	-2.3	21.4	4.3	27.6	127.0
	CAP (p. p.)	0.0	-1.1	4.2	-3.1	-0.7	-2.7
Retail	WG (%)	45.2	6.9	19.6	1.5	30.3	145.5
	CWG (%)	45.7	3.6	21.3	1.7	25.0	132.8
	CAP (p. p.)	-0.6	3.3	-1.7	-0.3	5.3	12.6
Transportation	WG (%)	37.3	5.1	5.7	-0.9	20.3	81.7
	CWG (%)	44.7	2.2	11.6	2.2	24.0	109.2
	CAP (p. p.)	-7.4	2.9	-5.9	-3.1	-3.8	-27.5
Accommodation and food services	WG (%)	43.6	9.2	9.4	-13.7	53.3	126.8
	CWG (%)	46.7	14.4	7.1	-2.1	36.7	140.6
	CAP (p. p.)	-3.0	-5.2	2.3	-11.6	16.6	-13.7
ICT	WG (%)	36.7	7.2	12.4	4.5	34.2	131.0
	CWG (%)	45.8	-4.9	26.2	3.5	26.1	128.3
	CAP (p. p.)	-9.1	12.1	-13.8	1.0	8.1	2.7
Financial sector	WG (%)	24.8	-4.2	19.2	7.3	4.9	60.3
	CWG (%)	31.4	-10.7	10.8	4.7	20.8	64.4
	CAP (p. p.)	-6.6	6.4	8.4	2.6	-15.9	-4.1
Real estate	WG (%)	53.2	5.6	-1.6	-16.9	19.1	57.5
	CWG (%)	28.5	9.5	16.8	-0.7	19.3	94.9
	CAP (p. p.)	24.7	-3.9	-18.4	-16.3	-0.2	-37.3
Professional and administrative services	WG (%)	41.1	-1.9	14.1	1.0	27.3	103.0
	CWG (%)	49.5	-5.9	13.6	0.7	22.6	97.4
	CAP (p. p.)	-8.4	3.9	0.5	0.3	4.7	5.6
Non-government public sector activities	WG (%)	48.1	3.2	13.7	0.7	30.1	127.7
	CWG (%)	48.2	2.5	11.1	0.9	23.5	110.3
	CAP (p. p.)	-0.1	0.7	2.6	-0.2	6.6	17.3
Art and other	WG (%)	26.2	7.4	16.0	0.2	29.7	104.5
	CWG (%)	28.1	-2.8	26.1	4.7	26.5	108.0
	CAP (p. p.)	-1.9	10.2	-10.1	-4.5	3.2	-3.5

Notes: Counterfactual wage growth is one which would be realised if the allocation premium was the same as in the base year. Industry (excluding construction) refers to B-E. Professional and administrative services refer to M-N, non-government public sector services to O-Q, and Art and other to R-S. WG refers to wage growth, CWG to counterfactual wage growth, CAP to contribution of allocation premium.

Source: Fina and authors' calculations.

TABLE A3

Contribution of the change in OP term to aggregate GVA per worker growth in different periods, by sector (NACE 2007)

		2002-08	2008-14	2014-19	2019-20	2020-23	2002-23
Industry (excluding construction)	GVA growth (%)	22.8	14.1	12.8	-0.6	33.3	109.4
	CGVA growth (%)	38.6	-5.2	22.8	-1.2	37.9	119.9
	CAP (p. p.)	-15.8	19.3	-10.0	0.6	-4.6	-10.5
Construction	GVA growth (%)	38.7	-7.9	27.1	-1.2	35.8	118.0
	CGVA growth (%)	51.4	-17.1	20.7	1.1	36.2	108.8
	CAP (p. p.)	-12.7	9.2	6.4	-2.3	-0.4	9.2
Retail	GVA growth (%)	40.9	-6.2	31.3	1.6	38.4	143.8
	CGVA growth (%)	42.1	-8.3	28.4	0.2	40.5	135.3
	CAP (p. p.)	-1.2	2.1	2.9	1.4	-2.1	8.5
Transportation	GVA growth (%)	32.6	12.7	7.6	-9.3	34.7	96.2
	CGVA growth (%)	51.9	-4.0	0.7	-9.4	51.4	101.3
	CAP (p. p.)	-19.3	16.6	6.9	0.1	-16.8	-5.2
Accommodation and food services	GVA growth (%)	38.2	22.1	7.2	-46.1	147.0	140.6
	CGVA growth (%)	54.8	20.6	-9.0	-27.7	122.5	173.5
	CAP (p. p.)	-16.5	1.4	16.1	-18.5	24.5	-32.9
ICT	GVA growth (%)	16.3	-8.5	6.9	3.1	20.7	41.6
	CGVA growth (%)	34.8	-9.9	40.3	8.8	47.1	172.9
	CAP (p. p.)	-18.5	1.3	-33.4	-5.7	-26.4	-131.4
Financial sector	GVA growth (%)	54.0	9.7	45.9	-21.0	-8.9	77.3
	CGVA growth (%)	12.0	-14.3	17.5	-20.3	34.0	20.5
	CAP (p. p.)	42.0	24.1	28.4	-0.7	-42.9	56.9
Real estate	GVA growth (%)	44.6	15.4	-2.1	-6.8	19.9	82.4
	CGVA growth (%)	40.3	15.6	19.9	-3.0	25.9	137.7
	CAP (p. p.)	4.3	-0.3	-22.1	-3.8	-6.0	-55.3
Professional and administrative services	GVA growth (%)	43.2	-13.7	15.3	-2.7	38.0	91.4
	CGVA growth (%)	61.4	-17.1	14.5	-2.9	42.1	111.3
	CAP (p. p.)	-18.2	3.4	0.8	0.2	-4.1	-19.8

		2002-08	2008-14	2014-19	2019-20	2020-23	2002-23
Non-government public sector activities	GVA growth (%)	58.6	-2.6	18.5	-3.2	36.5	142.0
	CGVA growth (%)	60.9	-2.7	8.6	-0.9	37.1	130.7
	CAP (p. p.)	-2.2	0.1	9.9	-2.2	-0.6	11.2
Art and other	GVA growth (%)	19.3	19.7	27.0	-10.3	54.6	151.2
	CGVA growth (%)	18.1	-11.5	22.7	-10.6	58.2	81.4
	CAP (p. p.)	1.2	31.1	4.3	0.2	-3.6	69.8

Notes: Counterfactual GVA growth is one which would be realised if the allocation premium were the same as in the base year. Industry (including construction) refers to B-F, while services are residual. CGVA growth refers to counterfactual GVA growth, CAP to contribution of allocation premium.

Source: Fina and authors' calculations.

WISEs and their potential to transform the Croatian skill-formation regime

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Article**
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Abstract

Work Integration Social Enterprises (WISEs) combine social and economic goals and support vulnerable groups by offering employment and skill development opportunities. This paper explores their potential to transform Croatia's skill-formation regime. By analysing data from 13 European countries, we examine the current state of WISEs in Croatia, assess their capacity to influence skill development practices and position them in a broader post-socialist context. The findings suggest that while Croatian WISEs are limited by the small size of the sector, the absence of systematic support and comparative underinvestment in staff, they still hold the potential to transform the Croatian skill formation regime in the direction a more coordinated/collectivized approach. Authors recommend introducing a clearer distinction between WISEs primary orientated towards permanent or transitional labour market integration; and incentivizing WISEs oriented towards transitional integration to engage with the provision of vocational education and training, adult education and active labour market policy.

Keywords: work integration, work integration social enterprises, social enterprises, skill formation, Croatia

1 INTRODUCTION

This paper stands thematically at a crossroads of two research traditions in contemporary social science. The first one is close to the field of social policy and is concerned with developing interventions cutting across educational, welfare and (active) labour market systems (Taylor-Gooby, 2004; Armingeon and Bonoli, 2006; Hemerijck, 2013; Cooney, 2016). It is based on a broadly accepted argument that support for vulnerable social groups in modern societies necessarily needs to be multidimensional in order to have a relevant chance of success. This is because barriers to social inclusion that individuals belonging to vulnerable social groups face are also usually multidimensional and highly interconnected; meaning that support in one area is unlikely to meet the mark if not matched with timely and adequate interventions in others. For instance, educational support for students with disabilities will usually mean little if issues such as material deprivation, access to basic health services and transportation are also not resolved in a timely and satisfactory manner. Work integration social enterprises (hereafter: WISEs) are one type of social innovation that attempts to bridge that gap. WISEs are organizations dedicated to achieving successful insertion of workers with support needs (hereafter: WSNs) into the labour market, while adapting their overall business model and day-to-day functioning to varying limitations characteristic for their respective workforce. WISEs also tend to function within their own institutional policy framework, as outlined in the following section.

The other research tradition this paper relies upon emerged in the field of political economy and is concerned with the structure, internal dynamics and social impact of skill-formation regimes (Streeck, 1992; Thelen, 2012; Busemeyer and Trampusch, 2012; Tūtlys et al., 2022). The relationship between stability and change (Buković, 2021), the structural features of regimes and their impact on social mobility/social

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inequalities (Nikolai and Ebner, 2012; Doolan, Lukić and Buković, 2016) and the quality of skills they produce (Streeck, 2012) are some of the more interesting aspects of this research tradition from the perspective of this paper.

The paper sets out to achieve two overall objectives. Firstly, it summarizes findings on the state of play in the WISE sector in Croatia. Secondly, the paper assesses the transformational potential of the WISE sector for the workings of the Croatian skill formation regime. Analysis builds on the existing theoretical and empirical sources, primarily research undertaken within the Erasmus Plus project: "Blueprint for Sectoral Cooperation on Skills in Work Integration Social Enterprises[1]". The analysis will draw on the synthesis research report covering the state of WISEs across 13 participating EU countries[2] (Galera et al., 2022). This is supplemented with comparisons of segregated data for Croatia, Bulgaria, Latvia and Slovenia across several survey items relevant for the objectives of the paper.

The following section outlines the current state of affairs concerning development of the WISE sector in Croatian and European contexts. The third section elaborates on logical linkages between the WISEs and skill formation regimes on a theoretical basis, while the fourth section underpins this logic with selected findings of the B-WISE project research report. The fifth section provides an assessment of the current transformational potential of the Croatian WISE sector relying on segregated data collected for the purpose of the B-WISE research report. The sixth section entails discussion of possible directions of policy reforms, preconditions for their success and possible sources of policy learning. The concluding section summarizes key findings and outlines the broader contribution of ideas developed in this paper as well as their current limitations.

2 WISEs IN THE EUROPEAN AND CROATIAN CONTEXT

2.1 CHARACTERISTICS AND TRENDS OF WISEs IN EUROPE

Work integration social enterprises are a diverse group of firms that function at the crossroads between the educational system, welfare system and (open) labour market with the explicit goal of addressing social exclusion (Spear et al., 2001). Their basic purpose involves helping individuals who are at risk of permanent social exclusion as well as disadvantaged groups in the labour market (like the long-term unemployed, migrants, low-qualified workers, ex-prisoners, and persons with disabilities; in this paper also referred to as workers with support needs) to integrate into the labour market and into society via productive activity. They produce two types of output simultaneously: goods and services sold to private or public clients according to market and contractual logic; and work integration services that stimulate the development of skills and competencies that enable disadvantaged workers to be competitive in the open labour market (Galera, 2010). For integration purposes, WISEs provide a range of services: training, social support and employment by which disadvantaged persons are developing professional and social competencies,

[1] Project website: https://www.bwiseproject.eu/en/project.

[2] Austria, Belgium, Bulgaria, Croatia, France, Greece, Italy, Latvia, The Netherlands, Poland, Romania, Slovenia and Spain.

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while at the same time reinforcing their economic independence (Defourny and Nyssens, 2008; Defourny, Gregoire and Davister, 2004).

They appeared in Europe as early as the 70s, and soon after they were recognized as stakeholders in the process of developing active labour market policies (Nyssens et al., 2012), having incrementally evolved to become today a tool for implementing national and regional labour market policies (Cooney, 2016). Nowadays WISEs are well recognised across Europe. Mapping of the social enterprise ecosystem in Europe (Borzaga et al., 2020) indicates that social and economic integration of the disadvantaged and excluded (work integration and sheltered employment) are key activities of social enterprises in Europe. The European Social Economy Action Plan of the European Commission (2021) recognises work integration social enterprises as a common type of social enterprise across Europe that specialises in providing work opportunities for disadvantaged people[3]. The International Comparative Social Enterprise Models Project (ICSEM) compared social enterprise models worldwide, and observed that in both Western and Eastern Europe, distinct clusters of WISEs emerge in different social entrepreneurship models (Defourny and Nysseny, 2021) witnessing to their diversity and proliferation. Nyssens (2014) states that more than 50 different variations of social enterprise initiatives for labour integration have emerged in the European environment. A significant number of EU countries have statuses recognising WISEs (Galera et al., 2022).

As compared with their significance, WISEs have not generated an appropriate volume of research. Based on recent estimates made within the framework of the B-WISE project, there are 75,000 active WISEs in Belgium, Italy and Spain alone (Galera et al., 2022). The economic sector in which WISEs are the most active in 2022 is transport, followed by waste collection and treatment, provision of temporary staff/employment facilitation, agriculture and environment, construction, public works and textile sectors (ENSIE, 2022). Similarly, Galera et al. (2022) claim that WISEs are most prevalent in, manufacturing, construction, cleaning, gardening and maintenance of green areas. They also assert that many WISE sectors are in labour-intensive industries that predominantly cater for low added-value jobs. The Impact WISEs Study (ENSIE, 2022) reports positive outcomes related to professional outcomes for most workers in European WISEs. In 2022 a majority of those who followed integration pathways in WISEs either found a job in the open labour market, became self-employed or started with an educational program[4].

Defourny, Gregoire and Davister (2004) established four main modes of labour market integration commonly deployed by WISEs[5]: transitional occupation, creation

[3] Looking beyond Europe an argument can be made that WISEs now constitute a major sphere of social enterprises activity globally (Cooney, 2016).

[4] In 2022, the results for the 80,113 disadvantaged workers, who have followed an integration pathway in 2,072 work integration social enterprises from 10 countries, are as follows: 40% – Found a job on the labour market; 21% – Became self-employed or started an education program; 39% – Other (unemployment, sickness, retirement, etc).

[5] The typology was done based on the study of the 160 WISEs in the PERSE project (The socio-economic performance of social enterprises in the field of work-integration): https://emes.net/research-projects/work-integration/perse/.

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of permanent self-financed jobs, professional integration of WSNs with permanent subsidies and socialisation through a productive activity. Their analysis defined four main categories of WISEs, which are most clearly distinguished by the mode of integration they adopt: a) enterprises offering occupational integration supported by permanent "subsidies" (which include mostly the oldest forms of WISE, i.e. those for the persons with disabilities (PWDs); b) WISEs that provide permanent, self-subsidised employment, i.e. stable jobs, economically sustainable in the medium term to people who are disadvantaged in the labour market; c) WISEs that mostly aim to (re)socialise people through productive activities (generally do not provide employment but rather an occupational activity; and not a work contract but rather an occupational status); and d) WISEs offering transitional employment or traineeship (this group was the largest one).

In the context of this paper the key functional distinction is the one between WISEs offering transitional workplaces[6] that provide work experience and on-the-job training with a view to supporting the integration of the target group into the open labour market and those that create permanent self-financed jobs that are sustainable alternatives for workers disadvantaged in the open labour market (Galera, 2010). Recent analysis (Galera et al., 2022) also recognizes the emergence of two distinct models of integration: a permanent and a transitional one[7] and that in most European countries the permanent model is dominant. WISEs that predominantly adopt a transitional or mixed model of integration tend to integrate a wider range of workers with support needs (hereafter: WSNs) than WISEs aiming to permanently employ WSNs.

2.2 WISEs IN A CROATIAN CONTEXT: A SHORT INTRODUCTION

Social enterprises as a specific area of practice are a relatively new phenomenon in Croatia. WISEs are part of the social entrepreneurship field, which is rather unrecognized in Croatian policy and practice (Vidović, 2019; Baturina and Babić, 2021). The Strategy for Development of Social Entrepreneurship in Croatia 2015-2020 (Ministry of Labour, Pension System, Family and Social Policy, 2015) triggered a stronger interest in social enterprises. That period saw the emergence of new social enterprises, new courses and educational programmes, incubators, accelerators and other forms of development (Ferreira et al., 2018; Vidović, 2019). However, the Strategy has not been fully implemented, and currently we are witnessing a diminished policy interest in the social economy and social enterprise (Vasseur et al., 2021; Baturina and Babić, 2021; Vidović, Šimleša and Baturina, 2023).

There is no "rich" tradition of WISE development in Croatia. Disadvantaged persons are predominantly supported through state measures (Marković et al., 2017). However, besides the "old fashioned" WISE that stems from the sheltered

[6] The transitional model is a more recent and dynamic evolution of the traditional (permanent) model of integration and it was not the priority of all the first initiatives of WISEs that emerged in Europe in the 1980s (Borzaga, Galera and Nogales, 2008.; Galera et al., 2022).

[7] Same authors also note that some WISEs simultaneously adopt both integration pathways, acting as a springboard to the labour market for some of the integrated workers, while offering permanent jobs to others.

workshops tradition, we observe the rise of WISEs coming from the third sector (Marković, Baturina and Babić, 2017), mostly from the association or (social) cooperative initiatives. WISEs are not a legal form *per se* but can operate under different legal forms such as associations, (social) cooperatives, veterans' social working cooperatives, limited liability companies, sheltered or integrative workshops, and public benefit organizations.

A report on WISEs in Croatia has estimated that there are some 80 of them in Croatia (Anđelić et al., 2023); some others, however, estimate more modest numbers, like 23 (Majetić et al., 2019). WISEs exist in different organizational forms and fields (Šimleša et al., 2015; Vidović, 2019; Vidović and Baturina, 2021; Anđelić et al., 2023). WISEs operate in various industries; in Croatia, they are involved in the wood industry, textile industry, food processing and catering. Other companies pursuing explicit social aims that operate as not-for-profits are present in the IT industry, namely hi-tech assistive technology for PWDs, sustainable tourism of local communities, and the metal industry (Šimleša et al., 2015; Vidović and Baturina, 2021). Šimleša and associates (2018) established that most WISEs surveyed in the year before worked with PWDs, long-term unemployed and persons over 55 years old and a very few with Roma people, homeless people, refugees and early school leavers. A Croatian social entrepreneurship monitors research study (Vidović, Šimleša and Baturina, 2023) states that 60% of organizations from the sample have disadvantaged social groups as their users (mostly children and youths, persons with physical disabilities and long-term unemployed). The existing research does not include specific data on the structure of the workforce, but we can reasonably assume that PWDs, the long-term unemployed and other vulnerable groups (like the Roma population or nowadays migrants) are the most commonly employed by Croatian WISEs. Croatian social entrepreneurship monitor (Vidović, Šimleša and Baturina, 2023) noted hybrid financing (their income comes from the market and various non-market activities) as an important feature of social entrepreneurship in Croatia.

Research conducted within the B-WISE project (Galera et al., 2022) ascertains that the permanent model of integration is dominant among different WISE legal forms in Croatia. Results of other studies also indicate orientation towards the more permanent mode of integration (for example Baturina and Mrdeža-Bajs, 2023).

Galera and associates (2022) also note that Croatia is among the countries that have a weak support system for WISEs. A specific analysis of the Croatian context (Anđelić et al., 2021) shows the absence of comprehensive support measures addressed to WISEs (targeting either entrepreneurs or WSNs). There is no differentiation between measures for those who provide transitional labour market integration and those focused on more permanent labour market integration. However, some specific forms of support do exist. The strongest support system is in place for those who work with PWDs, with some specific measures[8] and a well-established

[8] For example, The Act on Vocational Rehabilitation and Employment of PWDs defines some aspects of financial and expert support for the employment of PWDs. Also, the Ordinance on incentives for the employment of PWDs allows for certain subsidies.

quota system. Those measures are not specifically tailored to WISEs, but are extensively used by those focused on permanent labour market integration. Sheltered and integrative workshops have characteristics of WISEs (Vidović, 2019), by legal requirements are orientated towards PWDs and can access forms of support for that population. Apart from that, the most notable support for the education and employment of WSNs for WISEs in different legal forms in Croatia comes from the possibility of access to different measures of active labour market policies. Active labour market policy measures (hereafter: ALMPS; some of which will be mentioned later) provide compensation designed to encourage enterprises to employ and educate disadvantaged workers. Analysis (Anđelić et al., 2021) also highlights the role of EU funds, particularly the European Social Fund, in funding a variety of programs for the development of skills and activities oriented towards the social and work integration of vulnerable population. However, this kind of support for WISEs is sporadic, given the nature of the available funding opportunities. Other forms of WISE, such as veteran social working cooperatives, also have some specific forms of support (sporadically provided by the Ministry of Croatian Veterans) but are currently largely under-researched in the Croatian context (Tišma et al., 2023).

3 WISEs AND SKILL FORMATION REGIMES: THE MISSING LINK?

Research on skill formation still largely revolves around typology developed by Busemeyer and Trampush (2012: 12). Entailing two cross-cutting dimensions: public commitment to vocational training and involvement of firms in initial vocational training; this typology discriminates between four main types of skill formation regimes, outlined in table 1.

Table 1

Typology of skill formation regimes in advanced industrial democracies

Public commitment to vocational training	High	Statist skill formation (Sweden, France)	Collective skill formation (Germany, Austria, Denmark, The Netherlands…)
	Low	Liberal skill formation (USA, UK, Ireland)	Segmentalist skill formation (Japan)
Involvement of firms in initial vocational training		Low	High

Source: Busemeyer and Trampusch (2012: 12).

Busemeyer and Trampusch (2012: 16) supplemented the conceptual framework with 4 additional questions ("neuralgic points" is the exact quote): (1) who controls skill formation? (2) who provides skill formation? (3) who pays for skill formation? (4) what is the relationship between vocational education and training and general education?

The primary function of these additional questions is to explain the considerable variation within each regime type. The typical response to each question is differ-

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ent for each of the four types. However, individual country-cases are best thought of as situated along a continuum, with considerable differences in the degree to which this response is applicable to them. For instance, although both belong to the statist type, France and Sweden differ in the degree of control exercised by the state; while Austria and The Netherlands both belong to the collective type of skill formation, but Austrian employers as a rule invest more in skill formation than their Dutch counterparts.

Recent research in the field acknowledged that this research framework, while highly potent in the context of advanced industrial democracies, fails to fully meet the mark when it comes to countries that fall outside this spectrum. The most ambitious development in this context (Tūtlys et al., 2022) covered 12 European country-cases with post-communist legacies, including Croatia (Matković and Buković, 2022). This research programme points to a considerable variation within the group of post-communist countries. It also outlines the emergence of new, hybrid sub-types of skill formation regimes that tend to "borrow" from one or more Western "role-models", but end up with institutional frameworks and policy outcomes that ultimately look rather different. Croatia is no exception here.

Matković and Buković (2022: 266) label the Croatian skill formation regime as "predominantly statist, with partial collectivism in training for occupations in skilled trades". This is because central state actors with their subsidiaries control, deliver and fund most of the skill formation in Croatia. General educational tracks enjoy more social prestige than the vocational ones, another common indicator of statism. However, a notable exception, inserting an important degree of hybridity into the regime, relates to the involvement of the Croatian Chamber of Trades and Crafts (hereafter: CCTC), which plays a significant role in the design, delivery and administration of programmes for occupations in skilled trades (for more detail see: Buković, 2021; 2022).

But why is all this important to WISEs, or more specifically, why even analyse WISEs from the perspective of skill-formation? There are two main reasons. Firstly, WISEs are firms, but usually skill providers as well. The latter especially holds true for WISEs primarily oriented towards temporary labour market integration, which is about equipping individuals with skills necessary to succeed in the open labour market. This is very similar to what vocational schools, training centres or adult education institutions aim to achieve. Thus, it is logical to assume their functioning is influenced by workings of the skill formation regime they belong to. Secondly, and more importantly from the aspect of this paper, some results of the B-WISE research synthesis report indicate that across different EU countries WISEs approach skill formation in a way that might have broader transformational implications, especially for skill formation regimes such as Croatian.

4 THE WISE APPROACH TO SKILL FORMATION AND ITS TRANSFORMATIONAL POTENTIAL

The primary data collection method in that research was a face-to-face survey conducted on a purposive sample of three categories of workers employed in WISEs. The first category of workers, dubbed "enablers", correspond to managers, coordinators or in specific cases, high-ranking specialists (for instance, in charge of ICT or finance). The second category of surveyed workers are "supporters", whose job (among other things) includes providing direct help and instruction to the third category of respondents: "workers with support needs" (hereafter: WSNs). This paper relies on findings based on data collected from enablers and supporters.

The research team selected some 5-10 relevant WISEs per country, taking into consideration the varieties of WISE models. The rationale involved parameters such as: size, legal forms, target groups, model of integration, fields of economic activity and geographic focus (Galera et al., 2022: 196). In the Croatian case, the survey was conducted among enablers coming from six different WISEs, while supporters were recruited from three WISEs. In view of the estimate of fewer than 80 WISEs currently operating in Croatia (Anđelić et al., 2021) this small sub-sample represents a considerable share of the entire sector. The results for Croatia should be considered as informative, but not definitive, particularly because all participating WISEs came from the northern part of Croatia and not all possible WISE legal forms were covered by the sub-sample. Corresponding estimates of total number of WISEs are 256 for Bulgaria (Hristova, Dobreva and Seyfetinova, 2023), 53 for Latvia (Zeiļa and Švarce, 2023) and 486 for Slovenia (Cotič, 2023). Similar limitations also apply when interpreting results of comparative analysis for these countries[9].

Looking at survey results, two findings particularly stand out. Firstly, as visible from table 2, when confronted with skill gaps, WISEs across 13 countries included in this research usually respond by either providing or securing training courses for their workers.

Table 2

*Measures in the pipeline to address skill gaps for enablers, supporters and workers with support needs (% values)**

Type of measure	Enablers	Supporters	WSNs
Training courses	51.7	65.2	54.5
Recruitment of new staff	27.0	27.0	20.7
Internal re-organization of staff	27.0	23.6	24.1
No measures	19.1	11.2	19.3
Other measures	12.4	15.7	22.1

**Data for enablers and supporters is based on responses from enablers, while data for WSNs is based on responses from supporters.*

Source: Galera et al. (2022: 135).

[9] Rationale behind specific country-case selection is outlined in section 5.

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Secondly, WISEs covered by the B-WISE research effort commonly fund upskilling of their workers from their own income. Such practices are followed by strong reliance on public funding (table 3). Use of these two options need not be mutually exclusive, as indicated by the high share of WISEs relying on public co-funding, rather than full funding.

Table 3
*WISEs training activities funding schemes (% values)**

Self-funded	67.1
Co-funded by public funds	55.2
Funded by public funds	35.5
Funded by private funding schemes	9.2
Paid by employees	2.6
Other	2.6

**Responses from enablers.*
Source: Galera et al. (2022: 137).

Reliance on training, equitably funded by employers and the state, as the primary mechanism of responding to skill gaps, indicates that most WISEs covered by this research actually practise a collective approach to skill formation. Typical response of employers in segmentalist regimes would also be to upskill, but usually in-house. In the statist regime, the state would be expected to adapt the curricula of vocational schools and set up public training schemes for adults. Most employers in liberal regimes would either pursue headhunting or proceed to find ways to cut costs in order to restore competitiveness, even if that entails considerable de-skilling. Following that logic, it is not surprising that collective regimes are commonly praised for their simultaneous ability to invest in their workforce and be responsive to changes in market conditions (Busemeyer and Trampusch, 2012: 4), with Germany commonly being outlined as the frontrunner of this group (Culppeper and Finegold, 1999).

The Croatian business community has demonstrated little appetite for a collective approach to skill formation thus far. One notable exception is active involvement of employers in delivering three-year vocational programmes for occupations in skilled trades. This arrangement is mediated by the relatively strong institutional position of the CCTC, which can be traced to legislative changes of 1993. However, even in this segment CCTC's own commissioned research established numerous problems in implementation, including the common practice of withholding the legally guaranteed allowance from apprentices or widespread deviations from the official training curricula (Herceg, 2010).

Matković and Buković (2022) see abundance of skilled and relatively cheap labour during the first 25 years of Croatian independence as a main factor de-stimulating many employers from even considering skill formation as a relevant element of their business models. Similarly, Mršić (2018) states that most employers in Croatia tend to base their competitiveness strategies on efficiency (in other words, cost reduc-

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tion), rather than innovation and high quality of production, which are key pillars of competitiveness in most collective (and segmentalist) skill formation regimes. Also, the latest Eurostat results of the continuing vocational training survey for 2020 indicate that Croatia lags behind the EU-27 average by some 19% (48.2% vs. 67.4% respectively) in total share of firms over 10 employees that in the respective year provided training for their employees (Eurostat, 2022). For these reasons, it is very interesting to examine if practices of the Croatian WISE sector are closer to those of the "B-WISE-13" or those of the broader Croatian business community, which is subject of the following section.

5 ASSESSING THE TRANSFORMATIVE POTENTIAL OF CROATIAN WISE SECTOR IN COMPARATIVE CONTEXT

To enrich this analysis, segregated data for Croatia are compared with those for Bulgaria, Slovenia and Latvia. When considering case selection, the idea was to achieve a reasonable degree of commonality allowing for comparison, while also leaving some room for variation. All these countries are small, "new" EU member states, joining the Union in the last three rounds of accession. They all share the legacy of communist/socialist rule and experience of multiple transitions in the early 1990s: from single party rule to democracy; from public (or in the Croatian case, social) to private ownership and from a socialist planned economy to a capitalist market economy. However, as Bohle and Greskovits (2012) point out in their seminal contribution on the varieties of capitalism in post-communist countries, important differences existed during the socialist/communist rule, and commonly persisted or even expanded after the transitions of the 1990s[10].

Latvia, belonging to the group of "Baltic tigers", opted for "shock therapy" of abrupt and radical decoupling from the communist past that was characterized by direct Soviet rule, high degree of political repression and practically no autonomy in the area of economic policy. It emerged as one of the prime examples of neoliberal economic (and) social regimes. The remaining three countries covered by this comparison: Bulgaria, Croatia and Slovenia in Bohle and Greskovits' classification of post-communist capitalist regimes belong to the same group: the South East European. However, the authors are clear that this is by far the most diverse group of post-communist regimes. It included countries that experienced communism quite differently: Slovenia and Croatia through the Yugoslav "self-management experiment" and comparatively higher levels of personal and political freedoms; and Bulgaria (with Romania), under indirect Soviet rule, executed by a national communist leaderships that exercised some level of autonomy. Transitions were also markedly different, with Slovenia avoiding the devastations of war and emerging as the clear frontrunner of the group in terms of economic performance, relying on gradual transition coupled with policies aimed at protecting most of the strategic industries. This resulted in the successful insertion of the country's economy into European value production chains. It also developed

[10] The avoidance of treating CEE as homogenous, which research has shown is not the case is also noted in cases of sectors close to WISEs like civil society (Mayer et al., 2020; USAID, 2021).

comparatively effective state governance capacities and elements of institutional design compatible with coordinated market economies (Hall and Soskice, 2001), which largely overlaps with that of collective skill-formation regimes. Croatia suffered war devastation, an economic transition that for the most part can be considered as predatory, leaving the country without most strategic industries and relatively reliant on tourism, construction and the (foreign-owned) financial sector. Bulgaria was also unsuccessful in protecting production capacity during the economic transition, but although avoiding war emerged with a weaker state policy capacity than Croatia and especially Slovenia. All this contributed to its position as the least developed EU member state, which it retained even after the Croatian accession.

Relevant insights also came from literature covering the fields of welfare state transformation and social entrepreneurship development in post-communist countries. Kuitto (2016) states that there is no Central and Eastern European model of welfare. Instead, this author verifies the emergence of differing hybrid models of welfare across the post-communist countries but also highlights the economic crisis that impacted the scope of welfare benefits as well as criteria for acquiring them. Generally, post-socialist countries have poor coverage of services of general interest and limited recourse to implement ALMPMs, which can provide space for the development of alternative integration pathways such as social entrepreneurship (Ciepielewska-Kowalik et al., 2021).

A closer examination of social entrepreneurship in Latvia, Bulgaria and Slovenia (Līcīte, 2018; Jeliazkova, 2019; Rakar and Kolarič, 2019; Kalkis et al., 2021; Marinova and Yoneva, 2021) indicates that factors that enabled its development were related to the transition to a market economy (and problems caused by that transition), fast expansion of nonprofits and other similar organizations; but also the weakness of the welfare state. The situation was particularly compounded by a combination of multiple economic crises, leading to poverty and social exclusion for part of the population. Although some policies, (in some countries even specific laws), new legal forms and funding mechanisms were developed, the social entrepreneurship sector is still rather small, unrecognized and lagging behind many developed European countries.

Comparative analysis in the CEE region highlights the employment-generation mission in social entrepreneurship models and notes that focus on the employment of disadvantaged groups is tempting for all actors as it facilitates access to public funding. Furthermore, legal frameworks were designed to promote such initiatives because work integration ranks very high on the political agenda (Defourny, Nyssens and Brolis, 2021).

Finally, it is worth mentioning an important commonality among these countries: despite differences in economic performance and emerging welfare regimes, all four have developed a predominantly permanent model of integration within their WISE sectors (Galera et al., 2022: 44). For this reason, it makes sense to compare the

transformational potential of the Croatian WISE sector with those that have a similar overall approach to integration and some similarities in the social and economic contexts, but differ in terms of current economic structure and overall policy capacity.

As a main proxy for examining WISE sectors' potential for transforming skill-formation regimes we use relationship to training. Namely, we examine how often WISEs use training to respond to skill shortages among different categories of workers, how they fund their delivery and what they perceive as the main barriers to making this happen. Notably, this proxy primarily works as an indicator of the WISE sector's capacity to transform in the direction of collective or segmentalist skill-formation regime, as it points towards their potential to disseminate know-how on direct firm involvement in skill formation and/or support policy initiatives to that end. Seeing that the focus of this paper is Croatia, with a predominantly statist regime of skill formation with some element of partial collectivism, we consider this to be a legitimate approach, especially in the light of positive contributions collective regimes exhibit to economic competitiveness and social welfare. Naturally, the dataset allows for different types of queries as well, for instance by specifically assessing WISE's potential to push skill-formation regimes in a more liberal direction. However, considering that in almost all countries WISE sectors function within regulated institutional frameworks and enjoy some degree of state protection, we deem this option less feasible.

Table 4

*Use of training to address skill gaps for enablers, supporters and WSNs/selected countries (ratio between responses per item and total number of responses)**

Country/category of workers	Bulgaria	Croatia	Latvia	Slovenia
Enablers	2/5	3/6	2/6	3/9
Supporters	4/5	2/6	1/6	7/9
WSNs	3/7	2/6	0/4	11/12

** Data for enablers and supporters is based on responses from enablers, while data for WSNs is based on responses from supporters.*

Source: B-WISE F2F survey (2021).

Findings outlined in table 4 present propensity to use training in order to address skill gaps among three different categories of workers[11]. These findings clearly establish Slovenia as a frontrunner in terms of training offer for supporters and WSNs, with data for enablers offering less of a clear picture. Interesting is the case of Bulgaria which presents a particularly strong showing when it comes to training provision for supporters. Findings for Croatia are not particularly encouraging from the standpoint of transformative potential, indicating that Croatian WISEs are less prone to training supporters and WSNs compared to their Slovenian, or even Bulgarian counterparts.

[11] Instead as percentages, data is presented as a ratio between responses per item and total number of respondents. We consider this approach more appropriate and informative when dealing with small-n (sub) samples, such as in this case.

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The lower response rate should be taken into account when considering reliability of findings outlined in table 5. This issue notwithstanding, data point towards relative prevalence of combining WISEs' own resources and public funding schemes to co-fund participation of WISE staff in training activities across all four countries. In that sense, all four countries in broad terms follow a pattern established through the analysis of the entire dataset, but to a different degree. It especially stands out that all Slovenian WISEs covered by this research make use of co-funding schemes in order to secure participation of their workers in training activities. Considered in conjunction with the already established frontrunner status of Slovenian WISE sector in terms of training offer, this finding also points towards the importance of a stable and adequate system of public (co)funding in shoring up training provision for WISE workers.

Table 5

*WISEs training activities funding schemes/selected countries (ratio between responses per item and total number of responses)**

Country/source of funding	Bulgaria	Croatia	Latvia	Slovenia
Paid by employees	0/2	0/4	0/4	0/9
Self-funded	2/2	2/4	4/4	4/9
Co-funded by public funds	1/2	2/4	3/4	9/9
Funded by public funds	1/2	2/4	0/4	2/9
Funded by private funding schemes	0/2	1/4	0/4	0/9
Other	0/2	0/4	0/4	0/9

**Responses provided by enablers.*

Source: B-WISE F2F survey (2021).

The issue of barriers to shoring up adequate training provision for WISE workers is examined in table 6. Financial barriers feature prominently among Bulgarian and Slovenian respondents. The latter points towards a "need for more" type of attitude among Slovenian respondents, showing that despite widely accessible co-funding schemes (as per data in table 5) current educational offer fails to meet their needs. Latvian respondents point towards a lack of tailored training opportunities as a key reason for abstaining from training WISE staffers. This indicates that poverty of educational offer may also represent an important barrier, irrespective of financial commitments made by public bodies and firms (which according to findings outlined in table 5 in the Latvian case seem adequate). As for the values for Croatia, they indicate that the most commonly recognized challenge is lack of time to organize/involve staff in training, which is very much in line with features of the existing skill-formation regime where training and upskilling expectations are typically directed towards the state. It is interesting that two Croatian respondents reported no barriers in securing training provision. As both of these respondents earlier reported their WISE delivering some type of training for their staffers, this tentatively may point towards a small core of organizations that remain committed to investing in their workers, even in the face of unfavourable institutional conditions.

Table 6

*Barriers to providing training for WISE staff/selected countries (ratio between responses per item and total number of responses)**

Country/source of funding	Bulgaria	Croatia	Latvia	Slovenia
Lack of funds	4/5	2/6	2/6	7/9
Lack of time to organize/involve staff in training	0/5	3/6	2/6	5/9
Lack of knowledge about training opportunities	0/5	1/6	0/6	0/9
Lack of tailored training opportunities fully matching the WISE skill gaps	0/5	2/6	4/6	4/9
Other	0/5	0/6	0/6	0/9
Not applicable (no barriers detected)	0/6	2/6	1/9	0/9

**Responses provided by enablers.*

Source: B-WISE F2F survey (2021).

In sum, the findings of this comparative segment indicate a rather limited transformational potential of the Croatian WISE sector, particularly compared to the Slovenian one, which emerged as a relative frontrunner of the group. However, this is hardly a foregone conclusion. As noted before, findings are best considered informative, primarily due to sample limitations. Apart from not being representative, the Croatian sample for instance does not include sheltered and integrative workshops, WISE organizational forms with the greatest tradition and institutional stability in the Croatian context. Additionally, the mere existence of the B-WISE project points towards the emergence of a more tightly knit international network of organizations and actors that can exchange information, practices and possibly launch joint initiatives. All this has the potential to shake up the *status quo*. In the following section we provide a (very broad) blueprint for action in two fields considered instrumental for boosting the transformational potential of Croatian WISEs in the field of skill formation: policy reforms and mutual learning.

6 POLICY REFORMS FOR DEVELOPING AND HARNESSING TRANSFORMATIVE POTENTIAL OF CROATIAN WISEs

The authors of this paper are not opponents of permanent labour market integration *per se*. We assess that for certain categories of WSNs, having a stable job which is fully aligned with their abilities, in an organizational environment that is supportive of their needs, may be the best possible outcome; even if that job is in a WISE that provides a permanent type of integration. Considering evidence that sheltered workshops in Croatia are increasingly operating as entrepreneurs (Galera et al., 2022: 30) responding to palpable social and economic needs, albeit within a more regulated institutional framework, we see no need to forcefully push them into the open labour market. However, we see the rationale for incentivising those WISEs with capacities, managerial affinities and necessary WSN profile to move from a permanent towards a transitional mode of integration. Some larger organizations can also move towards a mixed mode of integration, where they can differentiate

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between jobs aimed at permanent or temporary integration. Apart from creating a system that aids WSNs to achieve their full professional potential, developing a strong group of WISEs oriented towards temporary integration would radically boost the sector's capacity to influence a broader skill-formation regime. Although at times necessary and useful, permanent integration is likely to remain more closely connected to the welfare system. WISEs providing temporary integration are positioned at the intersection of the educational system and broader business community. As such, they are in a good position to influence both.

The first step is profiling WISEs with the objective of examining their existing capacities, interest and willingness to move towards a temporary approach to labour market integration. Apart from scoping, this exercise could also be used for awareness raising, because it is likely that many WISEs never took the time to consider the possibility of profiling their operations into one direction or the other. With an estimate of around 80 WISEs currently operating in Croatia, this ought to be feasible.

The next step is developing a support system that differentiates between WISEs that are primarily oriented towards permanent compared to those oriented towards temporary or mixed integration. Defining the criteria appropriately will likely make all the difference. The Strategy for Development of Social Entrepreneurship in Croatia 2015-2020 (Ministry of Labour, Pension System, Family and Social Policy, 2015) serves as a vivid cautionary tale, failing to implement its most fundamental measure – establishing a national register of social entrepreneurs (Babić and Baturina, 2020; Vasseur et al., 2021; Baturina and Babić, 2021). As establishing feasible criteria represents a critical assumption for the success of the entire support system, a comprehensive and thorough consultation process is highly recommended. Another important aspect is deciding upon the most adequate way of recognizing/regulating status of WISEs generally; and those oriented towards temporary vs. permanent integration specifically. This primarily relates to the choice between regulation or some forms of "softer" recognition, such as labels or integration of criteria into an appropriate strategic policy document(s). In doing so policymakers should keep in mind that the research (Galera et al., 2022) ascertained that lack of clear recognition does not always translate into lack of strong supportive policies for WISEs and vice versa.

Furthermore, an existing support system needs to be updated and expanded. This primarily refers to WISEs deciding to specialize, fully or partially, towards temporary integration. Stable institutional links need to be established with the regular vocational schooling, system of active labour market policy and adult education. In the regular upper-secondary vocational system, WISEs could play a critical role, offering apprenticeships or other type of work-based placements, depending on the type of vocational programme. The target group should be pupils facing certain disadvantages or are at risk of early school leaving, but who are nevertheless assessed as feasible candidates for subsequent employment in the open labour market. This would represent a form of well-targeted early social investment (Hemerjick, 2017; Bežovan, 2019: 88), with an additional potential of making WISEs hubs of knowledge on how to conduct work-based learning with pupils facing more severe disadvantages in regular vocational schooling. This would be highly useful consid-

ering that vocational programmes, particularly those lasting up to three years, are commonly attended by a disproportionate share of pupils facing different forms of social exclusion (Matković et al., 2013; Doolan, Lukić and Buković, 2016).

Further, WISEs could find a more significant role in the implementation of active labour market policy[12]. It seems that some of the existing ALMPMs could be adapted to accommodate a more meaningful insertion of WISEs into this system. This is particularly important in the light of a prevailing discrepancy between the continuously high share of long-term unemployed registered with the Croatian Employment Service and their participation in ALMPMs. For instance, the annual share of those unemployed for over a year in total registered unemployment stood at 46.4% in 2021 and 38.7% in 2022[13]; while that group accounted for only 17.1% and 11.8% respectively of participants of ALMPMs. Naturally, this translates into extremely low coverage: in 2021 only 8.8% of those who were unemployed for over a year took part in an ALMPM, with the share even slightly decreasing in 2022 to 7.6%. Comparatively, coverage in the traditionally "most employable" group, those who were registered as unemployed for up to 6 months stood at 46.6% in 2021 and even at 58.7% in 2022 (HZZ, 2023: 17; 39). This is in line with well-documented failures of Croatian employment policy to design active measures that effectively target those who are in greatest need of such an intervention (Franičević, 2008; Matković, 2019; Ipsos and HZZ, 2016).

WISEs could cater towards those from vulnerable and disadvantaged groups, disproportionately represented among the long-term unemployed CES beneficiaries. The greatest potential lies in adapting existing or previously implemented work-based placement interventions, which could be coupled with some forms of additional professional and psychological support. For instance, it would make sense to recast the measure of traineeship without commencing employment (in Croatian: *stručno osposobljavanje bez zasnivanja radnog odnosa).* This ALMPM was unceremoniously, and for the most part justifiably, abandoned after series of evaluations establishing its adverse effects on employment (Ipsos and HZZ, 2016; Ipsos, 2019). However, if recast as a measure targeting disadvantaged groups of unemployed adults, giving them an opportunity to attend a year-long traineeship in a well-established WISE, traineeship without commencing employment still may become an effective tool. Similarly, public works could also be reformed to rely more extensively on WISEs. This would entail moving away from this ALMP's exclusive emphasis on activation and introducing a simultaneous focus on short-term skill development, aiming ultimately for a more permanent (open) labour market integration. Allowing for local adaptations, implementation of public works has already shown some characteristics of social innovation in Croatia (Bežovan, Matančević and Baturina, 2016). It is important to note that similar policy practices are documented in Austria where a subset of WISEs[14] delivers ALMPMs providing temporary employment for various vulnerable groups, particularly the long-term unemployed (Galera et al., 2022: 111).

[12] Dobrotić (2016) asserts that policymakers in Croatia mostly ignore a "productivist" function of the welfare state, resulting in low employment rates, underdeveloped ALMPMs and social inclusion measures.
[13] These are the latest available annual averages published by the Croatian Employment Service.
[14] These are specifically socioeconomic enterprises (SÖB) and common benefit employment projects (GBP).

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Adult education is another sector that might see a more significant inclusion of WISEs, as it is currently undergoing a significant sectoral expansion through the voucher schemes that feature very prominently within the National Recovery and Resilience Plan 2011-2026 (Vlada RH, 2021: 36) and ESF+ Programme "Efficient Human Resources 2021-2027" (Vlada RH, 2021: 134-136). In advocating their involvement WISEs could also invoke the Council Recommendation on Upskilling Pathways: New Opportunities for Adults (Council of the European Union, 2016) which represents a vital EU policy framework aimed at supporting adults without the upper-secondary (EQF 3 or 4) educational qualification or equivalent. WISEs could be vital providers of work-based learning components for low-qualified and low-skilled adults within a broad spectrum of adult education programmes. For instance, the Amsterdam-based WISE called Roetz Bikes specialized in reusing and recycling old bikes has been providing apprenticeship programmes to WSNs as a part of a broader educational scheme entitled MBO Praktijkleren (Galera et al., 2022: 228-229). Naturally, such infrastructure and know-how could also be used within the framework of regular secondary vocational schooling or ALMPMs delivered by WISEs.

Expected public investment into adult education could also be used for setting up a feasible system of educational support and upskilling for all categories of WSN workers: enablers, supporters and WSNs. However, in order to shore up sustainability, but also maintain collective character of their own skill formation, all public investment should be matched with those coming from WISEs' market generated income.

Apart from stability of public (co)funding, another key precondition for success of these reforms is effective inclusion of the WISE sector in processes of formulation, monitoring and evaluation of dedicated policy efforts. This on one hand entails creating some type of formal or non-formal structure capable of conducting consultations within the WISE sector and articulating its interests in the policy spheres. On other hand, such structure should be included in key deliberative policy forums in fields of vocational education policy, adult education policy and active labour market policy. Those that come to mind as the most prominent are National Human Resource Development Council, Council for Vocational Education and Training and Advisory Body for Adult Education. Naturally, these structures should in fact exercise some palpable degree of policy influence, which according to existing sources (Matković and Buković, 2022; Buković, 2018) is not a foregone conclusion. Finally, WISEs in Croatia should respond to these favourable changes in their institutional environment with enhanced openness towards international learning and additional investment into internal capacities to adapt and integrate best practices. The B-WISE project highlights the emergence of an international network of organizations and actors that can exchange information, practices and foster joint collaboration. This is vital because Croatian social enterprises and the WISE sector thus far have not been strongly involved in international networks. Recent research (Vidović, Šimleša and Baturina, 2023) shows that around half of social enterprises stated that they are not part of any supportive network.

7 CONCLUSIONS

WISEs in Croatia are small, niche sector[15] with underdeveloped policy or support mechanisms. This sector can operate under a variety of legal forms, however there is no clear recognition of the sector. By the nature of their work WISEs could be an integral part of the undeveloped welfare mix in Croatia (Bežovan, 2010; Matančević, 2014) in the development of new ways for the welfare state to develop skills and integrate disadvantaged groups. This requires a more elaborated differentiation between WISEs orientated towards transitional labour market integration and the ones focused on more permanent labour market integration.

The Croatian labour market and ALMPMs have been struggling with the integration of the different disadvantaged groups, in this paper referred to as WSNs. On the other hand, there are different challenges to develop their skills. The development of their skills in an innovative way in WISEs and the potential role of WISEs in the changing skills production regimes towards more collectivist ones in Croatia has been the focus of this paper. Research shows there is a need for personal, systematic, personalised and sustained support over time to facilitate the transition from work-integrated social enterprises to ordinary markets (Yurrebaso, Arostegui and Villaescusa, 2023) and the specificities of upskilling the most vulnerable have also been a challenge for the public educational system.

Apart from the wider consideration of the WISEs' unique position in training and work integration, this paper puts forward an analysis based on insight gained from the research conducted as a part of the "B-WISE" project. The paper also entails a comparison of the results with those of selected countries from similar post-socialist contexts (Slovenia, Bulgaria and Latvia) to position Croatian WISEs in a wider perspective.

Findings of this comparative segment indicate the limited potential of Croatian WISEs to transform the Croatian skill formation regime towards a more coordinated/collectivized approach. Croatian WISEs are for example comparatively less likely to train supporters and WSNs in other countries. Croatian WISEs, like their counterparts from other countries covered by the comparison, rely on the combination of their own resources and public funding schemes to co-fund the participation of WISE staff in training activities. However, it seems that in terms of scope and stability of available funding opportunities Slovenia represents a clear frontrunner of the group. Barriers to shoring up adequate training provision for WISE workers in Croatia are mostly related to the lack of time to organize/involve staff in training, largely consistent with a statist tradition of skill formation. However, the sample did not involve all the WISE organizational forms in Croatia, sheltered and integrative workshops that tend to exhibit the highest degree of institutional stability.

[15] There is also a certain recognized "danger" of narrowing the meaning of the wider social entrepreneurship sector to WISEs as governmental agencies are mostly interested in the employment of marginalized social groups feature of the sector (Vidović, 2019; Vidović and Baturina, 2021).

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This means that the book on WISEs' potential to transform the Croatian skill production regime remains largely unfinished. In this vein, this paper sets forward a set of policy reforms aimed at maximising WISEs' transformational potential in the context of skill formation. The key proposals entail profiling WISEs with a primary orientation towards permanent versus temporary labour market integration and developing a coherent system of support for both groups. This should primarily entail a more pronounced role in the delivery of secondary vocational schooling, adult education and ALMPMs. Their ability to provide a comprehensive and well-adjusted support to different types of disadvantaged groups should be fully capitalized here. It is vital to increase WISE sectors' involvement in the processes of formulating, monitoring and evaluating respective policy fields. Finally, embedding Croatian WISEs into international peer networks should result in a significant increase of their capacity to raise funding for their programmes, transfer and adapt best practices; and constructively participate in the processes of formulating, monitoring and evaluating relevant policies.

There are two critical limitations to the policy proposals set out in this paper. Firstly, they are based on a highly limited analytical effort. While the desk segment of this analysis can be considered relatively thorough (albeit hampered by relative scarcity of secondary sources), the comparative segment is quite narrow as its setup was determined by the relevant data available within the B-WISE research which ultimately had a set of overall objectives that considerably differed from those of this paper. For this reason, we propose a more comprehensive research effort as a first reform step, outlined in more detail in section 6. Secondly, it is important to reiterate that the transformational potential of the Croatian WISE sector in the area of skill formation is largely determined by its small size. Namely, a group of some 80 organisations that at this point lack even a basic coordinating structure cannot hope to impact the skill formation system comprehensively, but rather follow a niche strategy as developed in the literature on social innovation (for example: Geels, 2002).

As for broader contributions of this paper, it represents a pioneering effort to apply the theoretical toolbox of skill formation to WISEs. We consider this approach promising as it may open pathways to deeper understanding of WISEs' role in the broader political economy, but also their potential to impact one of its vital segments (which skill formation most certainly is). For this reason, it may even serve as a basis for constructing a more ambitious comparative research programme. In a more practical sense, the proposals for policy reforms set out in this paper could spur a meaningful public deliberation, ultimately leading to a better recognition of WISEs in the Croatian context and the development of a more effective support system. This in turn should allow them to be more successful in fulfilling their dual social and economic purpose.

Disclosure statement

The authors have no conflict of interest to declare.

REFERENCES

1. Anđelić, J. [et al.], 2021. *B-WISE country report: Croatia.* Brussels: B-WISE project.
2. Anđelić, J. [et al.], 2023. *B-WISE country fiche: Croatia.* Brussels: B-WISE project.
3. Armingeon, K. and Bonoli, G., 2006. *The politics of post-industrial welfare states. Adapting Post-war Social Policies to New Social Risks.* London: Routledge. https://doi.org/10.4324/9780203099520
4. Babić, Z. and Baturina, D., 2020. Current challenges and future potentials of social economy in Croatia. *Calitatea Vieții*, 31(1), pp. 5-23. https://doi.org/10.46841/RCV.2020.01.02
5. Baturina, D. and Babić, Z., 2021. *Socijalna ekonomija i socijalno poduzetništvo*. Zagreb: Pravni fakultet Sveučilišta u Zagrebu.
6. Baturina, D. and Mrdeža Bajs, I., 2023. Examples of collaboration between work integrations social enterprises (WISEs) and conventional enterprise in Croatia. In: G. Galera and B. Franchini, eds. *Production and Employment Chains: Examples of collaboration between work integration social enterprises and conventional enterprises in Croatia, Spain and France*. Trento: EURICSE, pp. 12-25.
7. Bežovan, G., 2010. *Achievements and Challenges of the Development of Welfare Mix in Croatia (Research Report)*. Zagreb: CERANEO.
8. Bežovan, G., 2019. Hrvatska socijalna politika u vremenu globalizacije i europeizacije. In: G. Bežovan, ed. *Socijalna politika Hrvatske*. Zagreb: Pravni fakultet Sveučilišta u Zagrebu, pp. 59-108.
9. Bežovan, G., Matančević, J. and Baturina, D., 2016. Socijalne inovacije kao doprinos jačanju socijalne kohezije i ublažavanju socijalne krize u europskim urbanim socijalnim programima. *Revija za socijalnu politiku*, 23(1), pp. 61-80. https://doi.org/10.3935/rsp.v23i1.1279
10. Bohle, D. and Greskovits, B., 2012. *Capitalist Diversity on Europe's Periphery*. Ithaca; London: Cornell University Press.
11. Borzaga, C. [et al.], 2020. *Social enterprises and their ecosystems in Europe. Comparative synthesis report*. Luxembourg: Publications Office of the European Union.
12. Borzaga, C., Galera, G. and Nogales, R. (eds.), 2008. *Social enterprise: a new model for poverty reduction and employment generation. An Examination of the Concept and Practice in Europe and the Commonwealth of Independent States*. Bratislava: UNDP Regional Bureau.
13. Buković, N., 2018. Analiza mogućnosti transfera politike iz austrijskog u hrvatski sustav razvoja vještina. *Suvremene teme,* 9(1), pp. 97-118.
14. Buković, N., 2021. Institucionalni ustroj i formulacija politike srednjeg strukovnog obrazovanja u Hrvatskoj: akteri, strategije i „promjena koja ništa ne mijenja". *Politička misao*, 58(3), pp. 208-242. https://doi.org/10.20901/pm.58.3.08
15. Buković, N., 2022. *Akteri, kontinuitet i promjena: analiza institucionalnoga ustroja hrvatske politike strukovnoga obrazovanja*. PhD thesis. University of Zagreb.

16. Busemeyer, R. M. and Trampusch, C., 2012. The Comparative Political Economy of Collective Skill Formation. In: R. M. Busemeyer and C. Trampusch, eds. *The Political Economy of Collective Skill Formation*. Oxford: Oxford University Press, pp. 3-40. https://doi.org/10.1093/acprof:oso/9780199599431.003.0001
17. B-WISE, F2F Survey, 2021. *Enablers and Supporters* [internal project database]. Brussels: B-WISE project.
18. Ciepielewska-Kowalik, A. [et al.], 2021. The Influence of Historical and Institutional Legacies on Present-Day Social Enterprises in CEE Countries: Lessons From Poland, Hungary, the Czech Republic and Croatia. In: J. Defourny and M. Nyssens, eds. *Social Enterprise in Central and Eastern Europe*. New York: Routledge, pp. 201-217. https://doi.org/10.4324/9780429324529-15
19. Cooney, K., 2016. Work integration social enterprises in the United States: operating at the nexus of public policy, markets, and community. *Nonprofit Policy Forum*, 7(4), pp. 435-460. https://doi.org/10.1515/npf-2016-0009
20. Cotič, G., 2023. *B-WISE synthetic country fiche: Slovenia.* Brussels: B-WISE project.
21. Council of the European Union, 2016. Council recommendation of 19 December 2016 on upskilling pathways: new opportunities for adults. *Official Journal of the European Union*, C 484/1.
22. Culpepper, P. D. and Finegold, D. (eds.), 1999. *The German Skills Machine: Sustaining Comparative Advantage in a Global Economy.* New York: Berghahn Books. https://doi.org/10.1515/9781789203806
23. Defourny, J. and Nyssens, M., 2008. Social enterprise in Europe: recent trends and developments. *Social Enterprise Journal*, 4(3), pp. 202-228. https://doi.org/10.1108/17508610810922703
24. Defourny, J. and Nyssens, M., 2021. *Social enterprise in Central and Eastern Europe: Theory, models and practice.* New York: Routledge. https://doi.org/10.4324/9780429324529
25. Defourny, J., Gregoire, O. and Davister, C., 2004. Work integration social enterprises in the European Union: An overview of existing models. *EMES Working Papers,* No. 04/04.
26. Defourny, J., Nyssens, M. and Brolis, O., 2021. Testing the relevance of major social enterprise models in Central and Eastern Europe. In: J. Defourny and M. Nyssens, eds. *Social Enterprise in Central and Eastern Europe*. New York: Routledge, pp. 273-290 https://doi.org/10.4324/9780429324529-19
27. Dobrotić, I., 2016. Crisis and Croatian Welfare State: A New Opportunity for Welfare State Retrenchment? In: S. Schubert, P. de Villota and J. Kuhlmann, eds. *Challenges to European Welfare Systems*. Switzerland: Springer International, pp. 301-324. https://doi.org/10.1007/978-3-319-07680-5_14
28. Doolan, K., Lukić, N. and Buković, N., 2016. The Embodiment of Class in Croatian VET System. *European Journal of Education, Research and Policy*, 51(3), pp. 345-359. https://doi.org/10.1111/ejed.12183

29. ENSIE, 2022. *2022 IMPACT-WISEs study results*. *The empowerment of people through social entrepreneurship for a sustainable and inclusive society*.
30. ESF+ Programme "Efficient Human Resources 2021-2027", 2021. *Official website of the Ministry of Science, Education and Youth.*
31. European Commission, 2021. Communication from the Commission to the European Parliament, the Council, the European Economic, COM(2021) 778 final.
32. Eurostat, 2022. *Statistics on continuing vocational training in enterprises*. Eurostat.
33. Ferreira, S. [et al.], 2018. The multidimensional reality of social enterprise in Central and Eastern Europe. *Stakeholders brief,* No. 1.
34. Franičević, V., 2008. *Decent work country report-Croatia.* International Labour Office, Regional Office for Europe and Central Asia.
35. Galera, G. [et al.], 2022. *Report on trends and challenges for work integration social enterprises (WISEs) in Europe. Current situation of skills gaps, especially in the digital area.* Brussels: B-WISE project.
36. Galera, G., 2010. Social enterprises and the integration of disadvantaged workers. In: L. Becchetti and C. Borzaga, eds. *The Economics of Social Responsibility.* Abingdon: Routledge, pp. 117-134.
37. Geels, F. W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy,* 31(8-9), pp. 1257-1274. https://doi.org/10.1016/S0048-7333(02)00062-8
38. Hall, P. A. and Soskice, D., 2001. An Introduction to Varieties of Capitalism. In: P. A. Hall and D. Soskice, eds. V*arieties of Capitalism: The Institutional Foundations of Comparative Advantage*. Oxford University Press: Oxford, pp. 21-74. https://doi.org/10.1093/0199247757.003.0001
39. Hemerijck, A., 2013. *Changing welfare state*s. Oxford: Oxford University Press.
40. Hemerijck, A., 2017. Social Investment and Its Critics. In: A. Hemerijck, ed. *The Uses of Social Investment.* Oxford: Oxford University Press, pp. 3-39. https://doi.org/10.1093/oso/9780198790488.003.0001
41. Herceg, I., 2010. *Povezanost kvalitete izobrazbe za obrtnička zanimanja i zapošljivosti,* No. 70669. Zagreb: Hrvatska obrtnička komora.
42. Hristova, N., Dobreva, N. and Seyfetinova, S., 2023. *B-WISE synthetic country fiche: Bulgaria.* Brussels: B-WISE project.
43. HZZ, 2023. *Godišnjak 2022.* Zagreb: Hrvatski zavod za zapošljavanje.
44. Ipsos and HZZ, 2016. *Vanjska evaluacija mjera aktivne politike tržišta rada 2010.-2013. Sumarno evaluacijsko izvješće.* Zagreb: Ipsos; HZZ.
45. Ipsos, 2019. *Evaluacija Inicijative za zapošljavanje mladih u sklopu Operativnog programa Učinkoviti ljudski potencijali 2014. – 2020. za 2018. godinu. Završno izvješće.* Zagreb: Ipsos.

46. Jeliazkova, M., 2019. *Social enterprises and their ecosystems in Europe. Country report Bulgaria*. Luxembourg: Publications Office of the European Union.
47. Kalkis, H. [et al.], 2021. Challenges for social enterprises in Latvia. In: J. Defourny and M. Nyssens, eds. *Social Enterprise in Central and Eastern Europe*. New York: Routledge, pp. 102-122. https://doi.org/10.4324/9780429324529-8
48. Kuitto, K., 2016. *Post-communist welfare states in European context: Patterns of welfare policies in Central and Eastern Europe*. Cheltenham: Edward Elgar Publishing. https://doi.org/10.4337/9781784711986
49. Līcīte, L., 2018. *Social enterprises and their ecosystems in Europe: country report Latvia*. Luxembourg: Publications Office of the European Union.
50. Majetić, F. [et al.], 2019. Performance of work integration social enterprises in Croatia, Slovenia, and Italian regions of Lombardy and Trentino. *Economics & Sociolo*gy, 12(1), pp. 286-368. https://doi.org/10.14254/2071-789X.2019/12-1/17
51. Marinova, T. and Yoneva, E., 2021. Social enterprises in Bulgaria: Historical and institutional perspective. In: J. Defourny and M. Nyssens, eds. *Social Enterprise in Central and Eastern Europe*. New York: Routledge, pp. 23-39. https://doi.org/10.4324/9780429324529-3
52. Marković, L., Baturina, D. and Babić, Z., 2017. Socijalna poduzeća za radnu integraciju u postsocijalističkim zemljama. *Hrvatska revija za rehabilitacijska istraživanja*, 53(1), pp. 129-148. https://doi.org/10.31299/hrri.53.1.11
53. Matančević, J., 2014. *Characteristics of the welfare mix model in the provision of social services in Croatia.* PhD thesis. Zagreb: Pravni fakultet, Zagreb.
54. Matković, T. [et al.], 2013. *Destination Uncertain? Trends, Perspectives and Challenges in Strengthening Vocational Education for Social Inclusion and Social Cohesion*. Luxemburg: Office for Official Publications of the European Communities.
55. Matković, T. and Buković, N., 2022. Croatia: Impact of Europeanization on Skill Formation. In: V. Tūtlys [et al.], eds. *Skill formation in Central and Eastern Europe. A search for Patterns and Directions of Development*. Peter Lang, pp. 265-290.
56. Matković, T., 2019. Politika zapošljavanja i nezaposlenost. In: G. Bežovan, ed. *Socijalna politika Hrvatske*. Zagreb: Pravni fakultet Sveučilišta u Zagrebu, pp. 195-285.
57. Meyer, M. [et al.], 2020. Civil Society and Its Institutional Context in CEE. *Voluntas*, 3, pp. 811-827. https://doi.org/10.1007/s11266-019-00106-7
58. Ministry of Labour, Pension System, Family and Social Policy, 2015. *Strategija razvoja društvenog poduzetništva u Republici Hrvatskoj za razdoblje od 2015. do 2020. godine*. Zagreb: Ministry of Labour, Pension System, Family and Social Policy.
59. Mršić, A., 2018. *Procesi definiranja problema i prioriteta u stvaranju inovacijske politike u Hrvatskoj iz perspektive diskurzivnog institucionalizma.* Ph.D thesis. Zagreb: University of Zagreb.

60. Nikolai, R. and Ebner, C., 2012. The Link between Vocational Education and Training and Higher Education in Switzerland, Austria and Germany. In: R. M. Busemeyer and C. Trampusch, eds. *The Political Economy of Collective Skill Formation*. Oxford: Oxford University Press, pp. 234-258. https://doi.org/10.1093/acprof:oso/9780199599431.003.0009
61. Nyssens, M. [et al.], 2012. *Work integration social enterprises and public policy: an analysis of the European situation*. Liege: EMES.
62. Nyssens, M., 2014. European Work Integration Social Enterprises: Between social innovation and isomorphism. In: J. Defourny, L. Hulgård and V. Pestoff, eds. *Social Enterprise and the Third Sector: Changing European Landscapes in a Comparative Perspective.* Abingdon; Oxon: Routledge, pp. 211-229.
63. Rakar, T. and Kolarič, Z., 2019. *Social Enterprises and Their Ecosystems in Europe: Country Report Slovenia*. Publications Office of the European Union.
64. Šimleša, D. [et al.], 2015. *Mapiranje novih obzora. Izvještaj o stanju društvenog poduzetništva u Hrvatskoj*. Zagreb: Institut društvenih znanosti Ivo Pilar.
65. Šimleša, D. [et al.], 2018. *D.T1.1.4 Regional Report Croatia*. INNO-WISEs project report.
66. Spear, R. [et al.], eds., 2001. *Tackling social exclusion in Europe. The contribution of the social economy.* Aldershot: Ashgate Publishing Ltd.
67. Streeck, W., 1992. *Social Institutions and Economic Performance: Studies of Industrial Relations in Advanced Capitalist Economies*. London: Sage.
68. Streeck, W., 2012. Skills and Politics: General and Specific. In: R. M. Busemeyer and C. Trampusch, eds. *The Political Economy of Collective Skill Formation*. Oxford: Oxford University Press, pp. 317-352. https://doi.org/10.1093/acprof:oso/9780199599431.003.0012
69. Taylor-Gooby, P., ed., 2004. *New risks, new welfare: the transformation of the European welfare state*. Oxford: Oxford University Press. https://doi.org/10.1093/019926726X.001.0001
70. Thelen, K., 2012. Foreword. In: R.M. Busemeyer and C. Trampusch, eds. *The Political Economy of Collective Skill Formation*. Oxford: Oxford University Press, pp. v-x.
71. Tišma, S. [et al.], 2023. Braniteljske socijalno-radne zadruge kao potencijalni model društvenog poduzetništva u Republici Hrvatskoj. *Nova prisutnost,* 21(2), pp. 301-315. https://doi.org/10.31192/np.21.2.4-
72. Tūtlys, V. [et al.], eds., 2022. *Skill formation in Central and Eastern Europe. A search for Patterns and Directions of Development*. Berlin: Peter Lang.
73. USAID, 2021. *2020 Civil society organization sustainability index. Central and Eastern Europe and Eurasia.* Washington: United States Agency for International Development.
74. Vasseur, T. [et al.], 2021. *Vrednovanje djelotvornosti, učinkovitosti i učinka operativnog programa učinkoviti ljudski potencijali 2014. – 2020. GRUPA 7: Vrednovanje društvenog poduzetništva. Završno izvješće o provedenom vrednovanju*. Zagreb: Ministarstvo rada, mirovinskoga sustava, obitelji i socijalne politike.

75. Vidović, D. and Baturina, D., 2021. Social enterprise in Croatia: Charting new territories. In: J. Defourny and N. Nyssens, eds. *Social Enterprise in Central and Eastern Europe.* New York: Routledge, pp. 40-55. https://doi.org/10.4324/9780429324529-4
76. Vidović, D., 2019. *Social enterprises and their ecosystems in Europe: Country report – Croatia*. Luxembourg: Publications Office of European Union.
77. Vidović, D., Šimleša, D. and Baturina, D., 2023. *Hrvatski monitor društvenih poduzeća 2022.* Čakovec: ACT Grupa.
78. Vlada RH, 2021. *Nacionalni plan oporavka i otpornosti 2021.-2026.* Zagreb: Government of the Republic of Croatia.
79. Yurrebaso, G., Arostegui, I. and Villaescusa, M., 2023. Transition from work integration social enterprises to ordinary employment in situations of low employability: results of an intervention programme. *Social Enterprise Journal*, 19(5), pp. 502-518. https://doi.org/10.1108/SEJ-11-2022-0109
80. Zeiļa, R. and Švarce, L., 2023. *B-WISE synthetic country fiche: Latvia.* Brussels: B-WISE project.

Excellence comes from distance: the case of a Croatian higher education institution

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Abstract

In this paper, we empirically test the impact of motivation on educational outcomes by using distance to home region as a proxy variable. The data come from the Faculty of Economics and Business, University of Rijeka. We develop two econometric models with GPA and number of courses passed as dependent variables, while controlling for physical distance from the home region to Rijeka and students' educational abilities. Our results show that distance negatively affects the number of courses passed, but has no effect on GPA. We argue that these results show that distance from the home region is a strong motivating factor for earlier rather than later graduation and that educational policies at the faculty level are needed to increase the motivation of local students to stay level with their "foreign" peers. This would help to minimize opportunity costs for local students and lower the student to academic staff ratio.

Keywords: cost of education, educational outcomes, student motivation, student cost of living

1 INTRODUCTION

For students, attending university usually means a higher future income, but it also incurs opportunity costs. Opportunity costs include living costs, tuition fees and the most important variable – the income that could have been earned during the period of study. As in other countries that have adopted the "Bologna Process", the average duration of studies in Croatia has increased from four to five years, as the first cycle leading to a bachelor's degree was and still is not properly recognised by employers and as a result earns less on the labour market than the second cycle graduates (Crosier, Purser and Smidt, 2007; Kroher et al., 2021). As a result, most students opt for a five-year programme to obtain a Master's degree. In view of this exogenous increase in the opportunity costs of studying, endogenous factors that influence the duration of studies come to the fore. In a country like Croatia, with households that are on average relatively poor as compared with western EU member states, the endogenous factors correlate very strongly with the exogenous factors such as the cost of living and the duration of studies, as tuition fees are paid by the state.

In addition to extending the duration of studies, the introduction of the Bologna system also had a positive effect on university participation, as, among other things, information restrictions were reduced (Di Pietro, 2012). Higher participation means in practice that students from poorer households are the main beneficiaries of the reform, as information restrictions are hardly an obstacle for students from richer households. This in turn means that these students are likely to be more motivated to complete their studies on time, especially if their chosen university is not in their home region.

Since students' motivation is the most important factor in educational success, in this paper we analyse the effects of distance from home on students' academic performance. Distance from home is a proxy variable for cost of living and an

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indirect variable for student motivation. For academic performance, we use grade point average (hereafter: GPA) and the number of courses passed after three years of study. We observe the generation of full-time students who enrolled in the 2019/2020 academic year. Our hypothesis is that students studying in their home region are less motivated to pass all first-cycle exams in time (three years) than students coming from other regions. On the other hand, GPA should not differ between these two groups of students because GPA depends mainly on students' ability and motivational factors that are the same for all students, especially institutional factors such as the quality of the curriculum and the quality of teaching. In addition, we control for students' ability by including school grades and type of school programme, distinguishing between academic high school ("gymnasium") and vocational high schools.

The remainder of the paper is organized as follows. Section 2 contains an overview of the literature. In section 3, we present the methodology used as well as the descriptive statistics of the dataset, while section 4 contains the results of the estimations. Finally, in section 5 we discuss the implications of the results and draw a conclusion.

2 LITERATURE REVIEW

In this section we give a brief overview of two strands of the literature, one regarding students' abilities and one regarding the impact of the student environment on academic performance.

Student ability can be measured in a variety of ways and in the past, it has been tested using standardized admission tests (SAT). The results of these tests have been shown to reflect test preparation rather than a student's actual ability (Geiser and Santelices, 2007). The results of a 2002 study by Geiser and Studley show that high-school grades are the best predictors of academic performance because they reflect students' cumulative performance over time. Therefore, they are proofed against different "test-wise" strategies that students can employ to obtain better SAT results. In our paper we use high school points that reflect the knowledge that students acquired over the four years of high school education. Moreover, using theoretical models and the empirical results of the research done by Brunello and Checchi (2007) we differentiate between students who completed academic and those who completed vocational high school.

There is well-established research on the relationship between student residence and academic performance. Back in 1989, Blimling found that after controlling for academic ability, there are no differences in GPA between students living on campus, off campus in the city in which they are studying or at home. Since the influence of residence on academic performance is multifaceted, subsequent research focused on different aspects of living and learning conditions (Bektas-Cetinkaya and Oruc, 2011). Findings show that academic success is highly influenced by several environmental elements, including living conditions in student residences.

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The availability of private, quiet work areas, general noise levels, and accessibility of academic resources are important variables. A quiet and distraction-free environment is critical to promoting concentration and allowing students to engage effectively with the subject matter. Housing factors that directly impact academic performance include comfort, cleanliness and room layout. These factors can also affect students' ability to concentrate and their mental health. Peer engagement and intellectual collaboration within the residence hall provide social support that increases motivation and decreases feelings of isolation, which further enhances academic performance. Physical aspects that impact students' ability to learn well and stay healthy include lighting, ventilation and room layout. Living close to campus facilities such as the library and study centres encourages regular participation in academic activities, which improves academic performance. Finally, the overall residence hall environment has a significant impact on academic progress, whether it fosters a culture of academic excellence or social distraction. It is important that students live in an ideal environment that promotes their academic and personal development. In our paper, we control for whether student lives on campus (variable *sd*) and expect that the estimated coefficient will be positive and significant in the model [2] that explains the outcome variable number of courses passed after three years of studying.

Over the past decade, research on associated variables such as well-being, environmental impact, and student involvement has widely examined the relationship between academic achievement and student housing. An analysis of student engagement found that behavioural engagement, which can be influenced by living arrangements, has a significant impact on academic achievement (Çali, Lazimi and Luna, 2024). In addition, a study on distance education conducted during the epidemic revealed that there is no significant correlation between students' academic achievement and their ability to engage in distance education. This implies that the environment, including place of residence, may have a subtle influence on academic outcomes (Olvido, Sanchez and Alejandro, 2024). Another relevant study emphasises the critical importance of mental health to academic success, showing that stress and anxiety, possibly exacerbated by inappropriate living conditions, are negatively related to academic success (Hou, Hou and Peng, 2024). In addition, a study on sleep quality, which is strongly influenced by the living environment, found a modest negative relationship with academic achievement, highlighting the need for a favourable living environment for academic success (Lalwani and Sushmitha, 2024). The research findings highlight the complex and multifaceted relationship between students' living situations and their academic achievement and indicate that living circumstances can indirectly affect academic outcomes through various behavioural and psychological processes.

Contemporary research has repeatedly investigated the significant influence of motivation on educational outcomes. One prominent study examined the influence of learning motivation, work ethic, and environmental variables on students' academic performance and emphasised that external support and engagement in

activities are critical for improving students' motivation and academic achievement (Syukur et al., 2025). Another study conducted with nursing students participating in involuntary distance learning found that the use of digital concept mapping techniques can reduce learning anxiety and increase motivation, leading to better academic performance (Tang and Tang, 2024). In addition, studies conducted with architecture students have shown the importance of learning motivation in mediating the relationship between professional development efforts and employment capacities. This means that intrinsic motivation plays a crucial role in improving employability (Fan and Yeh, 2024). In the field of engineering, project-based learning (PBL) has been shown to significantly improve both conceptual understanding and motivation, especially in technical disciplines such as electricity (Rendón and Martínez, 2024). Research conducted in Malaysia has shown that leadership styles and motivation play a crucial role in shaping students' entrepreneurial inclinations. Motivation has been identified as an important factor contributing to differences in entrepreneurial tendencies (Abiddin and Ro'is, 2024). The combined findings underscore the complex influence of motivation on educational outcomes and highlight the critical importance of both internal and external elements in promoting academic achievement and future career prospects.

Kadio (2025) examines the impact of peer effects, school quality and socioeconomic background on educational outcomes in sub-Saharan Africa. The results show significant differences influenced by school characteristics and socioeconomic status, which in turn affect student performance and parents' school choice. Kaye (2023) confirmed that the cumulative effects of socioeconomic disadvantage on educational achievement are significant, highlighting the increasing inequality in educational achievement at secondary level and the relative importance of specific risk factors. A study by Daniele and Geys (2016), based on European data, examines the impact of strong family ties on socioeconomic outcomes, including education. It concludes that family support can mitigate the negative consequences of low socioeconomic status in low-income European countries; however, it can also limit upward mobility. The overarching theme of these studies is that socioeconomic status has a significant impact on educational outcomes, with school quality, family support and systemic disadvantage playing a crucial role. Although support systems can mitigate some of the negative effects, they often exacerbate existing inequalities and limit upward mobility.

3 METHODOLOGY AND DATA

For the empirical part of our research, we developed following econometric models:

$$GPA_i = \beta_0 + \beta_1 hs_i + \beta_2 home_i + \beta_3 sd_i + \beta_4 gym_i + u_i \quad (1)$$

and

$$courses_i = \beta_0 + \beta_1 hs_i + \beta_2 home_i + \beta_3 sd_i + \beta_4 gym_i + u_i \quad (2)$$

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where *GPA* stands for grade point average, *hs* are high school obtained points that serve for ranking students' applications for a faculty and here serve as a proxy for students' abilities, *home* is a dummy variable with value 1 if students are domestic, where we define being domestic if a student primary residence is in Primorje-Gorski Kotar County. Variable *sd* is a dummy variable with value 1 if students use campus facility (dormitory), while *gym* is a dummy variable with value 1 if students completed academic high school. The final term, *u,* presents an idiosyncratic error term that varies across students. In model (2) *courses* stands for the number of courses passed after three years of studying. For both models we calculate and present robust and clustered error terms. For the clustering unit we use the track that students choose; there are six of them: Economics, Finance and Accounting, Marketing, Management, International Business and Entrepreneurship. We do so to allow for correlation of error terms among students within a particular track, which is expected as there are differences among tracks in the courses and lecturers, which can have an impact on GPA as well as the number of courses passed but are the same within a track.

We estimate both models using ordinary least squares (OLS) estimator, while as robustness check we estimate model (2) using Poisson estimator as well as negative binomial estimator, since the dependent variable is a count variable. Residuals calculated after estimating model (1) are normally distributed, which confirms the suitability of the estimator chosen. Poisson regression diagnostics indicated the issue of overdispersion since the conditional variance is higher than the conditional mean (likelihood-ratio test resulted in the value of chi2 statistics of 304.13 and rejection of H_0 that overdispersion constant is zero), therefore we also estimated the model using a negative binomial estimator. Here we show results from OLS estimation only since the results from negative binomial regression models are quantitatively similar. Moreover, since the starting academic year of our analysis is the year that was hampered by the Covid-19 pandemic, we estimated models (1) and (2) for each academic year separately. The results are not significantly different from those presented in table 2, which shows that Covid-19 didn't affect our results.

Table 1 shows the values of the descriptive statistics of the data. The 2019/2020 generation of students enrolled in the first cycle of the Bologna degree programme in economics and business at EFRI with 249 students was observed over three academic years. The dataset was created from three sources: https://admin.postanistudent.hr/ was the source of the variables HS points, Home students and academic high schools; ISVU.hr was the source of the variables GPA and total number of exams passed; Student Center Rijeka was the source of the variables Student dormitory. The maximum number of courses a student could complete during the observation period was thirty-five. In the sample 11% of students used the services of student dormitories (living on campus) during the entire period, while 59% of students came from other counties in Croatia.

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Table 1
Descriptive statistics

Variable	Mean	SD	Min	Median	Max
GPA	3.33	0.40	2.00	3.30	4.59
Total no. of exams passed	26.65	9.51	1.00	31.00	35.00
HS points	309.22	40.78	220.00	309.60	398.40
Home students	0.41	0.49	0.00	0.00	1.00
Student dormitory	0.11	0.31	0.00	0.00	1.00
Gymnasium	0.39	0.49	0.00	0.00	1.00

Note: Observations = 249.

Source: Authors' calculations.

Apart from the data shown in table 1, we conducted Jarque-Berra tests for normality of GPA and HS points. The results showed that HS points are normally distributed at 5% significance level (p-value 7.09%), while GPA points are not, indicating that there is potentially one or more variables that influence the GPA, apart from students' abilities proxied by HS points.

4 EMPIRICAL RESULTS

We present the results of the estimates of models (1) and (2) in table 2. The results of model (1) are in line with our expectations and show that students' ability (high school scores) and better general knowledge (completed gymnasium) positively influence grade point average, while other variables are not significant. These results are qualitatively comparable with previous studies. On the other hand, the second columns in table 2 show the estimation results for model (2), in which the number of courses passed is the dependent variable. In this case, the coefficients of all independent variables are significantly different from zero, and while the signs for the coefficients of the HS scores and Gymnasium are the same, the magnitudes are much larger, confirming that ability is an important determinant of academic performance when using different proxies to measure it. However, in the context of our study, these two variables are control variables, while we focus on the estimated coefficients of the home region and dormitory variables. The coefficients of the Home region and the Students dormitory variables contribute to the understanding of the specific part of academic performance that directly influences the opportunity costs of studying. Their signs are consistent with our expectations, negative for the Home region variable and positive for the Students' dormitory variable. Students who use the services of the student dormitories have, after three years of study, passed, on average, more than four courses more than other students. In addition, students from the home region passed more than two courses fewer than students from other regions during the same period. Consequently, these students will prolong their studies into a fourth year (at least), therefore increasing the opportunity costs of studying and increasing the student/academic staff ratio.

Table 2
Estimation results of models (1) and (2)

	(1)	(2)
	GPA	**No. of courses passed**
High school points	0.006*	0.080*
	(0.000)	(0.015)
Home region	0.015	-2.425*
	(0.035)	(0.535)
Student dormitory	0.176**	4.184*
	(0.073)	(0.959)
Gymnasium	0.250*	3.723*
	(0.039)	(1.075)
_cons	1.478*	0.909
	(0.097)	(5.387)
N	249	249
R^2	0.428	0.190

*Note: Standard errors in parentheses. ** $p < 0.10$, * $p < 0.05$.*
Source: Authors' calculations.

We can also observe significant difference in the coefficients of determination (R^2) between two models, which indicates that the number of courses passed (R^2 two times lower than for model with GPA as dependent variable) is a more complex measure of academic performance that has more (at least one more) variables that affect it. As stated, institutional variables, which are time fixed (like professors), certainly have an impact on academic performance.

In table 3 we show standardized beta coefficients of independent variables of the models (1) and (2) to observe the relative importance of independent variables on the outcome variable. In both models, academic performance is dominantly influences by students' abilities but in the case of model (2) the importance of distance clearly rises, which corroborates our research hypothesis.

Table 3
Standardized beta coefficients of independent variables presented in table 2

	(1)	(2)
	GPA	**No. of courses passed**
High school points	0.567	0.344
Home region	0.018	-0.126
Student dormitory	0.136	0.137
Gymnasium	0.302	0.191

Source: Authors' calculations.

In table 4 we show the results of estimation of the model (2) for each year of study separately to check for the effects of attrition on the results, as well as of the possible influence of Covid-19 on the results.

Table 4

Estimation of model 2 for each year separately

	2019/2020 cohort (I year of study)	2019/2020 cohort (II year of study)	2019/2020 cohort (III year of study)
	no_courses	no_courses	no_courses
High school points	0.082*	0.080*	0.065*
	(0.015)	(0.010)	(0.008)
Home region	-2.659*	-1.260*	-0.572
	(0.403)	(0.427)	(0.599)
Student dormitory	4.257*	1.835*	1.426**
	(1.053)	(0.402)	(0.658)
Gymnasium	4.047*	1.633	2.089*
	(1.025)	(0.923)	(0.772)
_cons	0.676	4.111	8.833*
	(5.274)	(3.477)	(3.260)
N	243	224	209
R^2	0.205	0.280	0.287

Note: Standard errors in parentheses. ** *p < 0.10,* * *p < 0.05.*

Source: Authors' calculations.

Results in table 4 indicate that although Covid-19 did influence results in the first year of study, the signs remain the same, while the coefficient is not significant only in third year of study (academic year 2021/22).

5 DISCUSSION AND CONCLUSION

This paper addresses the effects of motivation on academic performance, with distance from home region as the key variable influencing motivation. We argue that as the opportunity costs of studying have increased due to the Bologna system and the unsuccessful integration of first cycle graduates into the labour market, an examination of the determinants of study duration is needed. Although there are many factors that influence study duration and overall academic performance, we focus on the most important ones – students' abilities, educational background, economic status and motivation. We measured study duration with the variable "number of courses passed after three years of study" and academic performance with the variable "GPA". Our results clearly indicate that distance from home is one of the key determinants of study duration and thus students' motivation to finish the programme on time. Results also confirm the importance of students' ability and the type of high school attended on both study duration and academic performance. Our findings on the impact of students' ability on the GPA are in line with the influential study of Geiser and Santelices (2007), which uses high school GPA as a predictor of university GPA. Student residence on campus was also shown to be a contributing factor to academic performance, thus confirming research results that go back as far as 1970 and the paper from Hountras and Brandt.

The results of our research suggest that faculty-level policies are needed and should be implemented to increase the motivation of local students to finish study programmes in time, so that they can catch up with their peers coming from other regions of the country. This would have positive effects on the student to academic staff ratio as well as on the labour market in general. For future research, it would be beneficial to examine other variables that might influence the relationship between academic achievement, motivation, and distance from home. In particular, there should be research into how various social, economic and psychological factors – such as homesickness, social integration and financial support – mitigate or attenuate the effects of distance on student motivation and duration of study. In addition, analysing the function of hybrid or online learning models that can mitigate the negative effects of physical distance can provide insightful information. To understand how motivation changes over time and at different stages of study, longitudinal studies that follow students throughout their academic careers would also be helpful. It would also be beneficial to examine how institutional elements, such as the campus environment and support services offered by the university, influence students' ability to overcome the difficulties associated with distance from home and achieve better academic outcomes.

Disclosure statement

The authors have no conflict of interest to declare.

REFERENCES

1. Abiddin, N. and Zand Ro'is, I., 2024. The Challenges and Implications of Entrepreneurial Motivation and its Relationship with Lifelong Learning. *Pakistan Journal of Life and Social Sciences*, 22(2), pp. 14311-14319. https://doi.org.10.57239/PJLSS-2024-22.2.001029
2. Bektas-Cetinkaya, Y. and Oruc, N., 2011. Effects of Socioeconomic Status and Physical Learning Environment on Motivation of University Students. *European Journal of Social Sciences,* 21(1), pp. 71-79.
3. Blimling, G. S., 1989. A meta-analysis of the influence of college residence halls on academic performance. *Journal of College Student Development*, 30, pp. 298-308.
4. Brunello, G. and Checchi, D., 2007. Does school tracking affect equality of opportunity? New international evidence. *Economic Policy*, 22(52), pp. 782-861. https://doi.org/10.1111/j.1468-0327.2007.00189.x
5. Çali, M., Lazimi, L. and Luna, B. M., 2024. Relationship between student engagement and academic performance. *International Journal of Evaluation and Research in Education*, 13(4), pp. 2210-2210.
6. Crosier, D., Purser, L. and Smidt, H., 2007. *Trends V: Universities shaping the European higher education area*. Brussels: European University Association.
7. Daniele, G. and Geys, B., 2016. Family Ties and Socio-Economic Outcomes in High vs Low Income Countries. *Journal of Development Studies*, 52(6), pp. 813-823. https://doi.org/10.1080/00220388.2015.1098630
8. Di Pietro, G., 2012. The Bologna Process and widening participation in university education: new evidence from Italy. *Empirica*, 39, pp. 357-374. https://doi.org/10.1007/s10663-011-9172-5
9. Fan, Z. M. and Yeh, J-L., 2024. Career development impact on architecture undergrads' employment: learning motivation mediation. *International Journal of Evaluation and Research in Education*, 13(5), pp. 3231-3231. http://doi.org/10.11591/ijere.v13i5.28446
10. Geiser, S. and Santelices, M. V., 2007. Validity of High-School Grades in Predicting Student Success beyond the Freshman Year: High-School Record vs. Standardized Tests as Indicators of Four-Year College Outcomes. *Research & Occasional Paper Series*, CSHE.6.07.
11. Geiser, S. and Studley, R., 2002. UC and the SAT: Predictive Validity and Differential Impact of the SAT I and SAT II at the University of California. *Educational Assessment,* 8(1), pp. 1-26. https://doi.org/10.1207/S15326977EA0801_01
12. Hou, J., Hou, J. and Peng, C., 2024. Mental health and academic performance of college students: Knowledge in the field of mental health, self-control, and learning in college. *Acta Psychologica*, 248, pp. 104351-104351. https://doi.org/10.1016/j.actpsy.2024.104351
13. Hountras, P. T. and Brandt, K. R., 1970. Relation of Student Residence to Academic Performance in College. *The Journal of Educational Research*, 63(8), pp. 351-354. https://doi.org/10.1080/00220671.1970.10884029

14. Lalwani, R. and Sushmitha, M., 2024. Investigeting The Relationship Between Sleep Quality, Adherence to Proper Sleep Hygiene Practices, And Academic Performance Among Students. *International Journal For Multidisciplinary Research*, 6(4), pp. 1-15. https://doi.org/10.36948/ijfmr.2024.v06i04.25130
15. Kadio, E., 2025. *Socioeconomic Background, School Quality and Peer Effects in Sub-Saharan Africa.* http://dx.doi.org/10.2139/ssrn.5119617
16. Kaye, N., 2023. The cumulative impact of socioeconomic disadvantage on educational attainment during austerity: a comparative cross-cohort approach. *Oxford Review of Education,* 50(2), pp. 186-206. https://doi.org/10.1080/03054985.2023.2234287
17. Kroher, M. [et al.], 2021. Did the "Bologna Process" Achieve Its Goals? 20 Years of Empirical Evidence on Student Enrolment, Study Success and Labour Market Outcomes. *IZA Discussion Papers*, No. 14757. https://doi.org/10.2139/ssrn.4114283
18. Olvido, M. M. J., Sanchez, J. M. P. and Alejandro, I. M. V., 2024. Impact of distance learning on the university students' academic performance and experiences. *International Journal of Evaluation and Research in Education,* 13(4), pp. 2116-2125. https://doi.org/10.11591/ijere.v13i4.25847
19. Rendón, A. and Martínez, F., 2024. Impact of project-based learning on conceptual achievements and motivation of technology students in electricity. *World Journal of Advanced Engineering Technology and Sciences*, 12(2), pp. 001-008. https://doi.org/10.30574/wjaets.2024.12.2.0262
20. Syukur, Y. [et al.], 2025. Examining the impact of learning motivation, desire to work, and curiosity of students in the post-COVID-19 pandemic era. *Journal of Education and Learning,* 19(1), pp. 202-209. https://doi.org/ 10.11591/edulearn.v19i1.21352
21. Tang, S.-C. and Tang L.-C., 2024. Exploring the impact of digital concept mapping methods on nurse students' learning anxiety, learning motivation. *Evaluation and Program Planning*, 106, pp. 102466-102466. https://doi.org/10.1016/j.evalprogplan.2024.102466

Overeducated yet underskilled: graduate labour market mismatch in Morocco and Serbia

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Abstract

This paper analyses the phenomenon of qualification and skill mismatch among university graduates in two countries in Morocco and Serbia. These countries are located within the super-periphery of the EU and face similar challenges in fostering competitive economies capable of trading with and receiving investment from their northern neighbours. Effective skill development and successful labour market matching of university graduates are crucial instruments to meet these challenges. We explore the different dimensions of this requirement based on an analysis of qualification and skill mismatch on the graduate labour market. Our survey reveals simultaneous overqualification and underskilling of university graduates, a high incidence of graduate mismatch combined with low-wage penalties in the public sector, high levels of mismatch and associated relatively high-wage penalties among women graduates, and an amelioration of skill mismatch over time due to on-the-job learning and job switching.

Keywords: qualification mismatch, skill mismatch, higher education systems, graduate labour markets, Morocco, Serbia

1 INTRODUCTION

North Africa and the Western Balkans are regions on the edge of the EU that face similar challenges in their economic development. As regions within the super-periphery of the EU economic space, they are heavily influenced by developments in the EU yet lack the same access to EU support in times of economic difficulty that is available to the EU member states of Southern and Eastern Europe (Bartlett and Prica, 2017).[1] As a result, their labour markets are more vulnerable to economic cycles and they suffer from higher unemployment rates and more precarious employment prospects for young people. They also suffer from large skill mismatches on the labour market with negative effects on productivity and prospects for innovation and economic growth. The low incidence of high-tech manufacturing sectors in GDP in the EU super-periphery has provided fertile conditions for graduate over-qualification to become an embedded feature of the higher education-labour market ecosystems, as argued also for the case of Southern Europe by Marques, Suleman and Costa (2022).

This paper investigates the extent, nature and causes of labour market mismatches in these EU-adjacent regions, with a focus on two country case studies: Morocco and Serbia. They have been selected as countries representative of the two regions due to their strong relationships with the EU.[2] Each country has robust economic linkages with the EU in terms of trade, investment flows and migration. For exam-

[1] In the EU, these sources of support include the EU Cohesion Funds, while the countries in the super-periphery rely on far more modest IPA III pre-accession assistance funds from the EU.

[2] In the case of Morocco, the EU-Morocco Association Agreement entered into force in 2000, and Morocco joined the EU European Neighbourhood Policy on 2003, culminating in a joint declaration for a Shared Prosperity Partnership in 2019. In the case of Serbia, a European Partnership was adopted in 2008, and Serbia signed a Stabilisation and Association Agreement with the EU in 2013 and accession negotiations were opened with Serbia in June 2013.

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ple, in the goods exports of Morocco 64% (European union, 2021) and of Serbia 66%[3] go to the EU. They have similar economic structures, with shares of industrial value added in GDP in 2023 of 24% in Morocco and 26% in Serbia,[4] and each has attracted foreign direct investment in the automotive components industry linking them into global value chains (Amachraa, 2024; Bartlett, Krasniqi and Ahmetbasić, 2019). Both countries also face substantial labour market challenges. In 2023, for example, the unemployment rate was 9.1% in Morocco and 8.7% in Serbia, while the youth unemployment rate is extremely high at 35.8% in Morocco[5] and 21.5% in Serbia.[6] They also differ in some socio-economic aspects that are important for this study. For example, GDP per capita is higher in Serbia than in Morocco (as is the average wage), while the 5.8% unemployment rate of those with advanced education is far lower in Serbia than the 25.9% in Morocco.

The surplus of unemployed graduates in Morocco suggests an oversupply of graduates on the labour market. Since employers are in an advantageous position on the labour market they can employ more highly educated/skilled workers for jobs that require a lower level of education/skills.[7] Therefore, a proportion of graduates may find themselves in jobs that require lower levels of qualification and skills than they attained at their university. The prevalence of such overeducation among university graduates is likely to be higher in Morocco than in Serbia (where the oversupply of graduates appears to be lower, judging by the lower level of graduate unemployment). At the same time, the higher education systems in the EU super-periphery score poorly on international rankings of universities world-wide due to the relatively low quality of the education that is offered.[8] This may give rise to the production of many graduates with levels of qualifications and skills that are below those required by the more advanced high-technology sections of the labour market and give rise to relatively high rates of underskilling of graduate employees. High levels of graduate qualification or skill mismatch on the labour market represent a misallocation of resources in the public education sector which may undermine the competitive potential of these economies.

This paper analyses graduate mismatch to identify the extent to which universities succeed in preparing students for their future careers in Morocco and Serbia. Our analysis compares, the extent of qualification mismatch on their labour markets, how these vary across the public/private sectors of activity and gender, and their

[3] https://neighbourhood-enlargement.ec.europa.eu/sites/default/files/2022-12/Serbia_12.22.jpg.
[4] These data and those in the rest of this paragraph are taken from the World Bank World Development Indicators online database.
[5] These data are from the High Commission for Planning of Morocco (HCP, 2023).
[6] Data are from the online database of the Statistical Office of the Republic of Serbia Q3 2024.
[7] This sometimes referred to as "bumping down" (Léné, 2011).
[8] According to the Times Higher Education Supplement, only one university in Morocco is ranked within the top 1,000 universities in the world (Mohammed VI Polytechnic University in Morocco), while Serbia has none ranked within the top 1,000 universities (Times Higher Education, 2025). In response to the perceived low quality of higher education in these EU-neighbouring regions, the European Commission has run two large assistance programmes – TEMPUS and ERASMUS MUNDUS – to support partnering and modernisation of the higher education systems in the region.

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consequences for the wage levels of university graduates.[9] It also compares the skill proficiencies attained at university in both countries and the level of skill mismatch involved. The next section (section 2) surveys the literature pertaining to the issue of qualification and skill mismatch, section 3 describes the survey instrument that was used to measure mismatch in the two countries, section 4 presents the survey findings on the extent of qualification mismatch and its consequences, while section 5 presents our findings on skills mismatch and its persistence over time. Section 6 presents our conclusions.

2 LITERATURE REVIEW

Qualification mismatch refers to the extent to which the qualification level achieved by a graduate is appropriate to the qualification required by a job.[10] Similar to qualification mismatch, skill mismatch is defined as the difference between the actual skill proficiency of an employee and the skill requirement of the job. Key concerns that have been raised in the literature revolve around the gender bias in graduate employment leading to a higher degree of female graduate mismatch, the persistence of graduate mismatch pointing to inefficiencies in labour allocation on the job market and the scarring effects of initial job mismatch, and the impact of mismatch on graduate earnings, pointing further to inefficiencies in labour market allocation as well as in higher education responsiveness to labour market changes. To this catalogue of woes, we add the differences in experience of mismatch for graduates who find jobs in the public sector rather than the private sector and differences in the demographic position of countries with some experiencing a graduate labour surplus and others experiencing a graduate labour shortage.

2.1 GRADUATE OVEREDUCATION AND THE ROLE OF EDUCATIONAL EXPANSION

The massive expansion in higher education in recent decades, stimulated by high expectations about its private and social benefits, has nevertheless led to concerns about the employability of recent graduates and the mismatches between their skills and the competences required by the labour market (Figueiredo et al., 2017; Osseiran, 2020; Green and Henseke, 2021). Several studies have found that cross-country differences in overeducation have resulted from variations in the oversupply of highly skilled labour (Verhaest aand Van der Velden, 2013). In the Western Balkans, in the 2000s there was a huge increase in enrolment in tertiary education that resulted in a substantial degree of overeducation throughout the region (Bartlett and Uvalić, 2019). Since then, enrolment levels have stabilised, large inflows of foreign direct investment have boosted economic growth which, together with substantial out-migration, have sharply reduced the levels of graduate unemploy-

[9] We identify several dimensions of HE graduates' skills and competencies: written communication, spoken communication, numerical analysis skills, foreign language skills, research skills, problem-solving skills, entrepreneurial skills, ability to manage time effectively, ability to work in teams, ability to work individually, digital skills, leadership skills, conflict management skills, and course-specific subject skills.

[10] Empirical studies have measured the extent of qualification mismatch (overeducation) in many countries (McGuiness, 2006; Chevalier and Lindley, 2009; Turmo-Garuz, Bartual-Figueras and Sierra-Martinez, 2019; Delaney et al., 2020; Chuang and Liang, 2022; Castro et al., 2023; Vecchia et al., 2023).

ment. Hence the enabling conditions for graduate overeducation have changed dramatically. In contrast, in Morocco, high levels of tertiary enrolment have led to continuing oversupply of graduates on the labour market. In such conditions one may expect a relatively high level of graduate overeducation. More generally in the EU, recent research has failed to find a link between educational expansion and overeducation (Delaney et al., 2020). We argue, however, that this relationship does characterise less developed countries and especially countries in the EU super-periphery, notably in the Western Balkans, where high levels of overeducation have been found to be linked to rapid expansion of tertiary level provision (Bartlett et al., 2016; Bartlett and Uvalić, 2019).

At the same time, some countries in the super-periphery of the EU are experiencing the simultaneous problem of undereducation. According to our interviews with the Chamber of Commerce and Industry in Morocco, technical courses are taught by theoretical instructors who are far removed from the realities of the field and so graduates usually need to undergo additional professional training to become employable. In Morocco, Draissi and Rong (2023) found that two fifths of their urban employee survey respondents considered themselves to be undereducated. More widely, in an empirical study of skill mismatch among engineering graduates in the Middle East and North Africa, Ramadi, Ramadi and Nasr (2015) found that the areas in which managers considered that graduates needed most improvement were in soft skills such as communication, time management, and continuous learning. In Serbia, Gazibara et al. (2015) found that medical graduates were unprepared for a practical work environment.

2.2 MISMATCH IN THE PUBLIC SECTOR

Neoclassical economic theory proposes that individuals with higher levels of education or skills will earn higher wages in the labour market due to their greater level of human capital. In a competitive market, each worker will find a job that equilibrates their marginal productivity with their wage, so there can be no over- or under-education. However, market rigidities can upset this equilibrium, and in less than perfect markets mismatch phenomena may arise.[11] Since the labour market for public sector jobs is less competitive than for private sector jobs, a higher level of overeducation can be expected in the public sector compared to the private sector. This is because employers, given the choice, will typically prefer to hire overqualified candidates to benefit from their greater human capital endowment (Verhaest et al., 2018). From the graduate perspective, public sector employment may provide greater job security and many graduates are attracted to work in the public sector for that reason, especially in countries with a high level of precarious employment (Patrinos, 1997). In North Africa, Alattas (2023) argued, credentialism is pervasive in the public sector, meaning that qualifications are prioritised over skills leading to an overstaffed and inefficient public sector, and she consequently

[11] Such mismatch is usually referred to as "vertical" mismatch. In contrast, "horizontal" mismatch occurs when an employee's job field is not well matched to their field of study.

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expects a higher rate of overeducation in the public sector than in the private sector. She found support for this hypothesis using the statistical approach to measuring mismatch which shows a higher rate of overeducation in the public sector than in the private sector. However, in her work normative and subjective approaches, produced contradictory results.

2.3 THE GENDER DIMENSION OF MISMATCH

Overeducation also has a gender dimension. In many countries, women face discrimination in the labour market, and this may be reflected in higher rates of overeducation where access to jobs appropriate to women's levels of education is restricted, forcing them to take jobs at a lower occupational or skill level. Higher rates of overeducation among female graduates have been found in Italy (Betti, D'Agostino and Neri, 2021). In Spain, women's overeducation rates have been found to be slightly higher than men, evolving over time as more women came onto the labour market. At the same time overeducated women tended to experience a higher wage penalty than men (Pascual-Sáez and Lanza-Leon, 2023). For 22 EU countries, Baran (2024) analysed labour force survey data using the statistical method to identify rates of over-education and found that women's overeducation rates exceeded those of men (by up to a factor of two) in 21 of the EU countries studied. In Morocco, women mostly work in low-productivity sectors and low-paying jobs that require low skills (Canuto and Kabbach, 2023).

Relatively little research has been carried out to address the gender dimension of skill mismatch. Shin and Bills (2021) report on studies that have found that female workers tend to experience a lower level of under-skill mismatch in relation to both literacy and numeracy skills than male workers. In contrast, in a study carried out in Taiwan, Chuang and Liang (2022) found that skill mismatch is a more serious problem for female than for male workers. Women are often limited in the range of jobs they can apply for, which may limit their ability to find well-matched jobs.

2.4 EARNINGS PENALTIES AND MISMATCH

Qualification mismatch is known to affect earnings (Quintini, 2011). Overeducated workers may be employed in jobs with low levels of technology leading to lower salaries (Vecchia et al., 2023). At the same time, the frustration resulting from being overeducated may reduce work effort and also lead to lower productivity and lower wages (Tsang and Levin, 1985). The evidence from several studies consistently finds a "wage penalty" for overeducated workers, compared to the wage achieved by workers with the same level of education in matched employment (Allen and Van der Velden, 2001; McGuinness and Sloane, 2011; Santos and Sequeira, 2013). Undereducated workers typically earn more than those with the same level of education who are well matched to their (less productive) jobs, but the wage penalty of overeducation is usually found to be greater than the wage benefit of undereducation. This asymmetry has been explained by "assignment theory" which states that the wage is determined by the mix of education level and the productivity of capital (Sattinger, 1993; McGuiness, 2006). The wages of overeducated workers

are constrained by the low productivity of the capital with which they work, while undereducated workers may benefit from working with capital assets that substitute for their relative lack of skill. A recent study of the wage penalty associated with overeducation in Jordan, Tunisia and Egypt identified a wage penalty associated with overeducation that varied widely from 17% in Egypt to 50% in Tunisia (El-amin, 2023). Additionally, Dolton and Vignoles (2000) argued that overeducated graduates in the public sector would earn less than over-educated graduates in the private sector because their skills would be less fully utilised due to the less competitive nature of the public sector.

This brief literature overview leads us to conclude that the key dimensions of interest in relation to the graduate labour market relate to differences in levels of mismatch in the public and private sectors of the economy, gender differences in mismatch, and the persistence of skill mismatch among graduates over time, while more broadly the balance of supply and demand for graduates may affect the balance between over- and under-education.

2.5 THE PERSISTENCE OF MISMATCH

Mismatch also has a time dimension, as individuals can become "trapped" in overeducation. Being overeducated in a first job after graduation can create a scarring effect and make it difficult for an individual to progress to more appropriate employment later on, especially if knowledge and skills gained at university become obsolete or depreciate over time. Several studies have found evidence of such persistence effects. Frenette (2004) found that Canadian graduates who are overqualified on entering the workforce are far more likely to remain overqualified in subsequent years. A study of persistence of overeducation during an individual's career was observed in Poland by Kiersztyn (2013) who found that more than half of those working in jobs below their level of education were still in that situation five years later. This was explained in part by the rapid increase in tertiary sector enrolment during the transition to a market economy and the economic recession that this induced. In a study conducted in Hungary, Poland, Lithuania and Slovenia, Robert (2014) found that mismatch in a graduate's first job has strong and long-lasting effect on the job match five years after the graduation. A later study in more stable conditions in Spain found that young workers who were overeducated in their first job were 40 percentage points more likely to be overeducated in a subsequent job compared to well-matched young workers (Acosta-Ballesteros, Osorno-del Rosal and Rodriguez-Rodriguez, 2018). Meroni and Vera-Toscano (2017) find evidence from 14 EU countries that overeducation at the beginning of a career leads to a greater likelihood of being overeducated later on. Similar findings have been reported for Germany (Schmelzer and Schneider, 2020; Erdsiek, 2021), Spain (Eguia, Gonzalez and Serrano, 2023) and Australia (Jackson and Li, 2022).

On the other hand, having a first job at a level below the individual's qualification or skills level can be a temporary stepping stone towards a more appropriate job at a later stage when labour markets are buoyant and when it is relatively easy to

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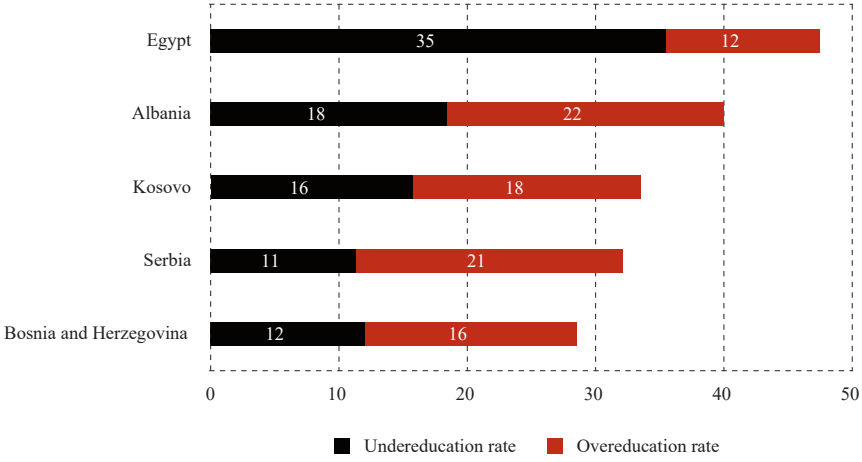
change jobs. A more recent study of the experience of university graduates in Spain found that job mobility partially corrects educational mismatch although there is still a strong persistence in educational mismatches four years after graduation (Albert, Davia and Legazpe, 2023). Thus, the picture appears to be mixed, partly depending on the balance between demand for skills resulting from labour market conditions and the rate of supply of graduates from the higher education system.

2.6 APPROACHES TO MEASURING QUALIFICATION AND SKILL MISMATCH

Three approaches to measuring such mismatch have been adopted in the literature: the statistical method (sometimes called the "realised matches" method), the normative method and the subjective method (McGuinness, Pouliakas and Redmond, 2018).

FIGURE 1

Mismatch among employees by the statistical method, 2023 (%)

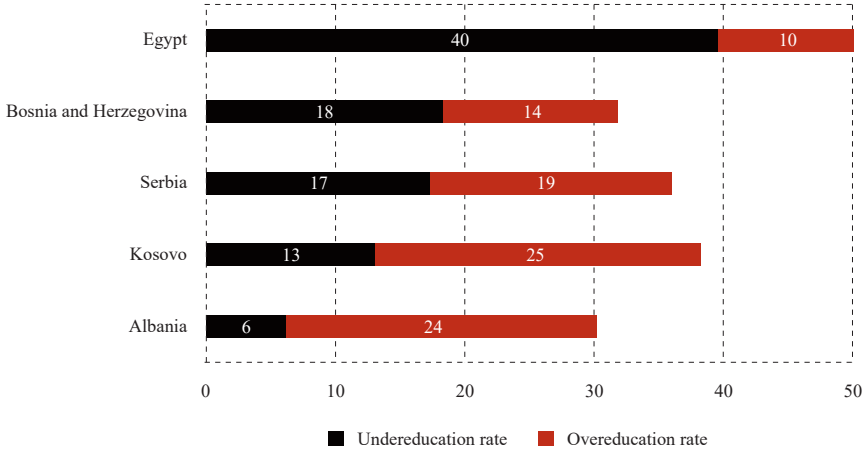


Source: ILOSTAT online data.

The statistical method compares a worker's actual level of education to the average level within an occupation. The advantage of this method is that it can be applied using existing labour force surveys; its disadvantage is that it does not provide any information on the skill levels actually required to do the job but simply reflects the average credentials of all workers within a given occupation. Moreover, if a large proportion of workers in an occupation are over- or under-qualified the statistical norm will reflect this, potentially underestimating the true extent of mismatch. Figure 1 shows the estimates of educational mismatch using the statistical method in several countries of North Africa and the Western Balkans for 2023, for those countries for which data is available; although Morocco is not included, Egypt could be taken as a North African proxy in the absence of Moroccan data. The figures show that Egypt has a higher overall level of mismatch than Western Balkan countries, with a comparatively high rate of undereducation. The overall qualification mismatch in Serbia was 32% in 2023 as measured by the statistical method, two thirds of which was accounted for by overeducation and one third by undereducation.

FIGURE 2

Mismatch among employees by the normative method, 2023 (%)



Note: 2019 is the most recent year for which data are available for all countries included in the chart.
Source: ILOSTAT database.

The normative method uses measurements of qualifications required in different occupations made by professional job analysts. Using data from labour force surveys, each individual is assigned a status based on whether their level of education corresponds to the qualifications required for their particular occupational group, based on the assumption that all jobs within a given occupational group require the same level of education (Quintini, 2011). Figure 2 shows estimates of educational mismatch using the normative method in 2023. As expected, the normative method produces slightly higher overall levels of mismatch. As with the statistical method the rate of undereducation exceeds the rate of overeducation in Egypt, while the opposite effect holds in most of the Western Balkan countries. Overall qualification mismatch in Serbia was 36% in 2023 as measured by the normative method, with a rough balance between overeducation and undereducation.

The "subjective" method, based on individual-level employee surveys, provides a more personalised method of assessing qualification or skill mismatch based upon the subjective perceptions of survey respondents. This method compares the highest level of qualification or self-assessed skill level of an employee with the self-assessed qualification or skill level required by the job. Unlike the other two methods, the subjective method also enables a measurement of over- and underskilling in addition to over- and underqualification mismatch.

In a major review of the literature, McGuinness, Pouliakas and Redmond (2018) found an average rate of overeducation of 25.9% based on over a hundred studies that used the statistical method, 25.5% in a smaller number of studies that used the normative method, and 21.5% from almost one hundred and fifty studies that used the subjective method. The ETF Skills and Jobs survey found an overeducation rate of 24% in Serbia (ETF, 2025). Thus, whichever method is used, overeducation appears

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to be a widespread phenomenon. Studies of undereducation find an incidence ranging from 26.3% using the statistical method, 15.8% using the normative method, and just 10.7% using the subjective method (McGuinness, Pouliakas and Redmond, 2018).

In analysing studies covering 30 countries, McGuinness, Pouliakas and Redmond (2018) found an average rate of overskilling of 27.5% and an average rate of underskilling of 13.2%. Similarly, the 2019 European Company Survey showed that 26% of employees in the EU had a higher level of skills than was needed in their job, ranging from 16% in Slovakia to 35% in Germany.[12] In a study based on a meta-analysis of thirty-eight papers, the average overskilling wage penalty was found to be 7.5% (McGuinness, Pouliakas and Redmond, 2018).

3 THE SURVEY INSTRUMENT

Unlike the statistical or normative methods, the subjective method enables a deep insight into the characteristics of the respondents such as age, gender, educational background and sector of activity. This is the approach that we adopt in this paper, especially since no aggregate data are available for Morocco.[13] To implement the research we carried out a graduate survey in Morocco and Serbia from March to July 2024 using a specially designed questionnaire to identify the characteristics of the respondents, their qualifications, their skills, and their wages in work. The questionnaire was distributed by local university alumni associations using Google Forms. The Moroccan survey received 184 responses and the Serbian 97. The survey was supplemented by a series on in-depth interviews with key stakeholders in each country from higher education and business associations.

In the Moroccan sample, most graduates hold a master's degree, while the Serbian sample is equally balanced between bachelor's and master's degree holders. In the Serbian sample, most are graduates of the Faculty of Economics and Business, University of Belgrade, while in the Moroccan sample 60% of the respondents are graduates of the Faculty of Legal, Social and Economic Sciences, Université Ibn Zohr, 11% are ex-Faculty of Technical Sciences and 9% are Business School graduates, while the rest are from other faculties. The Moroccan sample is well balanced by gender, while in the Serbian sample three quarters of graduates are female. The age composition of the two country samples also differs. Recent graduates (under 30) account for two thirds of the Moroccan sample but for only one fifth of the Serbian graduates. Job security is higher in Serbia where nearly 90% of graduates work in a full-time job, compared to only 56% in Morocco, while 83% of the Serbian graduates hold a permanent or open-ended employment contract compared to about 70% in Morocco. Almost one third of the Moroccan sample are clerical support workers compared to 4% in Serbia, while in Serbia many graduates work as managers, professionals and associated professionals. The average length of job tenure in the graduates' current main job is about seven years in Serbia and about four years in Morocco. Over half (54%) of the Serbian graduates work in large

[12] See European company survey online data visualisation available at: https://www.eurofound.europa.eu/surveys.

[13] For this reason we were unable to include Morocco in figures 1 and 2 above displaying the mismatch indicators provided by the ILO using the statistical and normative methods.

organisations with more than 250 employees, whereas only two fifths (38%) do so in Morocco. A slightly higher proportion of Serbian graduates (65%) is employed in the private sector compared to Morocco (55%). Over one fifth (22%) of the Moroccan sample are not in work, compared to only 3% in Serbia, reflecting the higher graduate unemployment rate in Morocco than in Serbia.[14] It also reflects the older age profile of the Serbian sample, since older graduates who have been pursuing their careers for longer are more likely to hold a steady job than more recent graduates. Excluding unemployed graduates, the effective sample for the mismatch analysis is 144 in Morocco and 94 in Serbia.

3.1 SKILL MISMATCH INDICATORS

The survey gathered information about graduate skills and the skills graduates needed during the course of their work. Graduates were asked to rate their level of proficiency for a set of fifteen skills on a scale of 1 to 7, where 1 stands for "none", and 7 stands for "top level" skill proficiency.[15] These "skill proficiency ratings" were collected for each graduate's highest education level and for their current level of proficiency.[16] For example, graduates were asked to rate the achievement of problem-solving skills at the end of their bachelor studies, at the end of their master studies and their current proficiency in problem solving. The graduates also rated the level of proficiency that is required of them in their current main job for the same fifteen skills, giving a set of "job skill proficiency ratings". For each skill, the mean skill proficiency rating was calculated across the graduates to obtain that skill's proficiency score. The skill proficiency score is continuous on the interval [1,7]. An Individual Skill Mismatch Indicator (ISMI) was constructed to measure both the incidence and intensity of skill mismatch, calculated by subtracting each graduates' skill proficiency ratings for 15 skills at various stages of their professional development from the job skill proficiency rating for each skill. Since ISMI is calculated by subtracting two interval variables that take discrete values between 1 and 7, an ISMI can take any discrete value between -6 and +6. An ISMI can hold a positive value, a negative value, or zero, capturing the three skill mismatch categories:

- "Overskill". A positive ISMI indicates a skill proficiency above the level required by the job in that particular skill. It takes discrete values on the interval [1,6].
- "Match". An ISMI of 0 indicates that the skill is well matched to the job requirement for that skill.
- "Underskill". A negative ISMI indicates that a graduate's skill proficiency is below the level required by the job for each skill. It takes discrete values on the interval [-1, -6].

[14] This is close to the national unemployment rates of 25.9% among workers with advanced educated in Morocco and 5.8% in Serbia as reported above.

[15] The 15 skills listed in the survey were: written communication, spoken communication, numerical analysis skills, foreign language skills, research skills, problem-solving skills. entrepreneurial skills, ability to manage time effectively, ability to work in teams, ability to work individually, digital skills, leadership skills, conflict management skills, and course-specific subject skills.

[16] A skill proficiency rating is an interval variable that can take discrete values on the interval [1,7] with a central value of 4.

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The frequency of a mismatch category for a skill is divided by the total number of participants to provide the share of the participants in each over-skill, match and underskill categories for that skill. Separating ISMI into the Underskill and the Overskill ISMI, allows a separate mean to be calculated for each mismatch category, which measures the intensity of skill mismatch and is called the Skill Mismatch Indicator (SMI). An Over-skill SMI of a skill is equal to the mean value of all Overskill ISMIs for that skill. An Underskill SMI is constructed in a similar way, using the Underskill ISMIs.

4 QUALIFICATION MISMATCH

In our survey, respondents were asked to report their qualification level and assess the qualification level required by the job they hold.[17] Qualification mismatch was calculated as the difference between these two measures.

Table 1

Qualification mismatch levels (%)

	Morocco	Serbia
Overqualified (overeducated)	38	32
Matched qualifications	49	66
Underqualified (undereducated)	13	2
Total	100	100

Source: Primary data.

Table 1 shows that almost two fifths of graduates in Morocco (38%) and almost one third in Serbia (32%) are overeducated. For Serbia, although the combined rate of over- and underqualification mismatch of 34% corresponds to the findings from the statistical and normative methods as shown in figure 1 (32%) and figure 2 (36%); the balance between overeducation and undereducation differs as we are here dealing with university graduates rather than the whole labour force. The correspondence to overall mismatch rates provides some confidence that these survey data are robust also for Morocco (for which the aggregate indicators of mismatch using the statistical and normative measures are not available). The overeducation rates for both countries are above the international survey average of 26.3% identified by McGuinness, Pouliakas and Redmond (2018) (as reported above). For Serbia, they are also down somewhat from the 39% graduate overeducation rate and the 15% undereducation rate for 2015 that was reported in Uvalić and Bartlett (2020). This progress might reflect a variety of factors, including a levelling off of the growth in graduates produced by the higher education system, or it may reflect improvements in graduate job search support institutions.

[17] Question 29 is phrased as: "Q29. Do the qualifications required in your current job match the level of qualification you obtained in your university education? PLEASE CHOOSE ONE
- My qualification level is lower than the qualification level required by my job
- My qualification level matches the qualification level required by my job
- My qualification level is higher that the qualification level required by my job."

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Table 2

Qualification mismatch and highest level of educational attainment (% graduates)

	Morocco		Serbia	
	Bachelor's degree	**Master's degree**	**Bachelor's degree**	**Master's degree**
Overqualified	38	39	23	40
Matched	38	52	75	58
Underqualified	23	9	2	2

Source: Primary data.

The extent of qualification mismatch varies by the level of degree attained. Among graduates with a bachelor degree, fewer than two fifths (38%) are well matched in Morocco, compared to three quarters in Serbia (75%) (see table 2). This may suggest that bachelor's degrees in Serbia are better aligned with labour market needs than in Morocco. However, the proportion of well-matched graduates with a master's degree is similar in both countries at just over one half, suggesting that the degree of alignment between qualifications and labour market needs improves in Morocco as graduates proceed through the higher education system, while there is no such improvement in Serbia. Considering overqualification, the proportion of bachelor's degree graduates who are overqualified is higher in Morocco at 38% than in Serbia at 23%, while the overqualification proportions with master's degrees are similar in the two countries at around two fifths (39% and 40% respectively). Overqualification affects bachelor's and master's degree holders similarly in Morocco, while in Serbia, master's degree holders are twice as likely to be overqualified as bachelor's degree holders, again suggesting a relatively weak labour market alignment in Serbia at master's level.[18] A further difference is that almost a quarter of bachelor's degree holders in Morocco are underqualified, a phenomenon which does not occur in Serbia, suggesting weaknesses in the Moroccan higher education system in delivering graduates with the right level of qualifications for the contemporary labour market.

Table 3

Public and private sector qualification mismatch (% across match status)

	Morocco		Serbia	
	Public sector	**Private sector**	**Public sector**	**Private sector**
Overqualified	43	38	41	27
Matched	45	48	59	70
Underqualified	13	14	0	3

Source: Primary data.

There are wide differences in the level of mismatch across public and private sectors (table 3). While the share of overqualified graduates in the public sector at just over two-fifths is similar in the two countries, in the private sector there is a much higher rate of overeducation in Morocco than in Serbia. This confirms Alattas' (2023) argument that credentialism plays a large role in the employment of

[18] This is similar to findings by Frenette (2004) for Canada.

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graduates in the public sector in North African countries in both sectors. In Serbia, the role of credentialism appears to be important only in the public sector, reflecting the dynamics of patronage and "state capture" that has been widely observed in that country leading to the hiring of a wide spectrum of graduates more on the basis of political favouritism than of suitability for a particular public sector position (Tomić and Pavlović, 2023). Thus, in both countries, the public sector attracts many more overqualified graduates than the private sector, especially in Serbia.

Table 4

Qualification mismatch by gender (% graduates)

	Morocco		Serbia	
	Female	**Male**	**Female**	**Male**
Overqualified	45	34	34	25
Matched	48	49	63	75
Underqualified	8	17	3	0

Source: Primary data.

There are also substantial gender differences in skill matching in both Morocco and Serbia. For example, a female participant in a focus group discussion with recent graduates carried out during our fieldwork in Morocco told us that women with personal commitments prefer local opportunities, which are often limited. Overqualification rates of women have been found to commonly exceed those of men in the EU (Baran, 2024). This is also the case in both Morocco and Serbia, more women than men are overqualified (see table 4). This may reflect gender discrimination in the labour market and the role of a patriarchal society in biasing the job search process in favour of men (for Serbia see: Anić and Krstić, 2019; Ognjenović, 2021).

4.1 QUALIFICATION MISMATCH AND EARNINGS

Our survey contains information on the negative impact of qualification and skill mismatch in terms of the wage penalty.[19] Overeducation and overskilling, like undereducation and underskilling, create various efficiency costs and so mismatched employees tend to receive lower wages than well-matched workers.

Table 5

Qualification mismatch levels and average monthly wage (euro equivalent)

	Morocco			Serbia		
	All	**Female**	**Male**	**All**	**Female**	**Male**
Overqualified	810	773	855	1,352	1,190	2,200
Matched	1,070	1,063	1,091	1,860	1,721	2,200
Underqualified	839	720	908	1,200	1,200	–

Source: Primary data.

[19] For general perspectives on the wage penalty associated with skill mismatch see Nordin, Persson and Rooth (2010), Pecoraro (2016). For studies of the wage penalty in Serbia see Vuksanović and Aleksić (2022), in Bosnia and Herzegovina see Veselinović, Mangafić and Turulja (2020), in the MENA region see Elamin (2023).

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As expected, overqualified graduates suffer a wage penalty in both Morocco and Serbia (table 5). The proportionate wage penalty for all overqualified graduates in Morocco is 24%, while in Serbia it is 27%. There is also a gender dimension. In both countries, mismatched female graduates' wages are around 30% lower than wages of well-matched female graduates; for male graduates the wage penalty of qualification mismatch is about 20% in Morocco and 0% in Serbia compared to well-matched male graduates. Against the theoretical expectation, underqualified graduates in both countries also suffer a wage penalty. This may be due to a lack of suitably qualified graduates in Morocco, while in Serbia the proportion of underqualified graduates is very low, as shown above, so the comparison with well-matched graduates cannot be taken at face value.

There is also evidence of gender discrimination in the graduate labour market, especially in Serbia. For well-matched graduates in Morocco there is practically no gender bias in wages, while in Serbia well-matched male graduates' wages are 28% higher than those for well-matched female graduates. Qualification-mismatch wage penalties are also gender biased in both countries. In Morocco, overqualified male graduates earn a wage 11% higher than overqualified female graduates, while in Serbia the equivalent comparison gives male graduates an 85% higher wage than females. In Morocco, underqualified male graduates also have a wage advantage amounting to 26%.

In summary, the employment position of female graduates is worse than for male graduates in both countries. Women have lower wages, take lower-paid jobs, and jobs for which they may be overqualified far more often than men. The misqualification wage penalty is also higher for female graduates compared to male graduates. This gender wage bias is higher in Serbia than in Morocco.

Table 6

Public and private sector qualification mismatch by average monthly wage (euro)

	Morocco		Serbia	
	Public	**Private**	**Public**	**Private**
Overqualified	1,029	669	1,150	1,507
Matched	1,220	1,068	1,121	2,157
Underqualified	1,133	700	–	1,200

Source: Primary data.

Average public sector wages of well-matched graduates do not differ much between Morocco and Serbia, which is surprising considering the difference in GDP per capita between the two countries. In contrast, private sector wages of a well-matched graduate in Morocco are only half the level of wages in Serbia (table 6).[20] Within each country, average wages differ across public and private sectors, but in op-

[20] GDP per capita in 2023: Morocco $3,672, Serbia $11, 361, i.e. about three times higher in Serbia compared to Morocco. No data on average wages is available for Morocco (World Bank WDI online database).

posite directions. In Morocco, the average wage of a well-matched graduate in the private sector is a tenth less than in the public sector, while in Serbia the average wage in the private sector is almost double the average wage in the public sector. It should also be noted that in Serbia public sector wages have been supressed through fiscal consolidation and public sector reform programmes carried out in the mid-2010s (Vladisavljević, 2017). This, combined with a limited supply of graduates as evidenced by the relatively low graduate unemployment rate in Serbia has boosted private sector wages, whether a graduate is well matched or overqualified. In Morocco, in contrast, the oversupply of graduates has led to a lower wage for overqualified graduates in the private sector compared to the relatively protected public sector.

Considering overqualified graduates, in the Moroccan public sector overqualified graduates have a wage penalty of 16% compared to well-matched graduates, while in Serbia there is no wage penalty for being overqualified in the public sector. In the private sector the wage penalty facing overqualified graduates is 37% in Morocco and 30% in Serbia relative to the wages of well-matched graduates, with similar wage penalties for under-qualification.[21] This pattern no doubt reflects the high degree of patronage and credentialism connected to public sector jobs compared to private sector jobs in the European super-periphery, with public sector wages bearing relatively little relation to the qualification or skill level of the public sector employees.

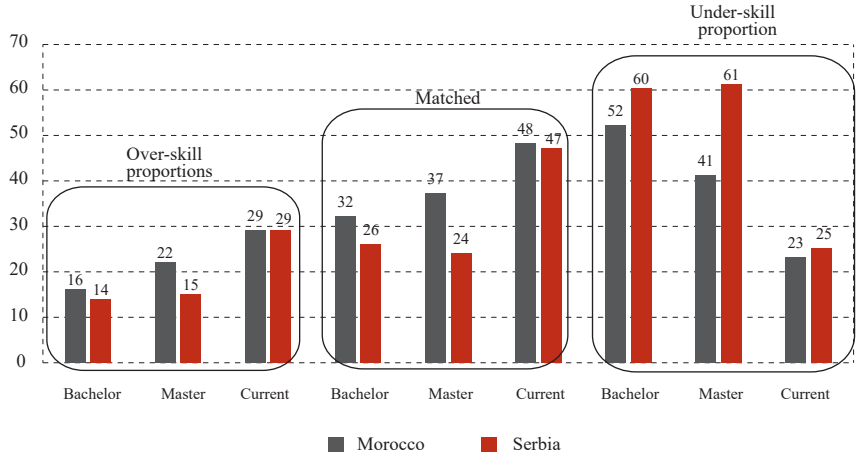
5 SKILL MISMATCH: PERSISTENCE EFFECTS

The persistence of mismatch can be measured by differences in skill mismatch on leaving university to the current level of skill mismatch experienced by a graduate. For the aggregate level (i.e., the mean over all 15 skills) the shares of overskill, match, and underskill among the graduates are shown in figure 3. These are shown in relation to the skills obtained from bachelor's degrees, master's degrees, and the current skill level at the time of the survey. A striking feature of this measurement of skill matching is that a greater proportion of graduates are in the under-skill category at both bachelor's and master's level (see figure 3), despite the relative preponderance of overqualification versus underqualification among graduates (see table 2 above).

[21] This finding contradicts the conjecture of Dolton and Vignoles (2020) who predicted that wage penalties would be higher in the public sector than the private sector.

FIGURE 3

Skill matching at different career stages, Morocco and Serbia (ISMI, % sample)



After graduating, two thirds of bachelor's degree graduates in Morocco (68% – the sum of over- and underskill) and three quarters in Serbia (74%) have skills that differ from the required level of skills for their job at the time of graduation, and the picture is similar for master's degree graduates (figure 3). At the time of the survey, in both countries three tenths of graduates were overskilled in relation to their "current" skill level and about one quarter were underskilled, these proportions being similar to those reported by McGuiness et al. (2018) in their review of the literature (see above).[22]

TABLE 7

Intensity of skill mismatch (SMI)

	Bachelor's degree skills			Master's degree skills			Current skill level		
	Over -skill	Match	Under -skill	Over -skill	Match	Under -skill	Over -skill	Match	Under -skill
Morocco, score	-1.66	0	2.40	-1.63	0	1.96	-1.79	0	1.34
Serbia, score	-1.83	0	2.47	-1.95	0	2.64	-2.01	0	1.35

Source: Primary data.

Table 7 shows the intensity of skill mismatch as measured by the mean of overskill and underskill SMIs. The higher the absolute value of the SMI, the stronger the mismatch effect. Skill mismatch at master's level ought to be less than at bachelor's level due to additional education leading to an improved level of matched skill and a lower level of underskill. In Morocco, there is indeed an improvement from bachelor's to master's level (the under-skill intensity falls from 2.40 to 1.96), but in Serbia the skill mismatch structure remains the same at master's level as at bachelor's level while the skill mismatch intensity increases, albeit marginally from 2.47 to 2.64. For current

[22] To recall, McGuinness, Pouliakas and Redmond (2018) found an average rate of overskilling of 27.5%.

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skill levels, the underskill mismatch is lower than at the point of graduation from bachelor's or master's degrees in both countries due to additional training, on-the-job learning and work experience since graduation. Correspondingly, the intensity of current over-skill mismatch is higher than for bachelor's and master's level reflecting additional skills gained over time in excess of that required by the job.

All the above suggests that graduates in both countries are *simultaneously over-qualified and underskilled for the jobs they hold*, especially in relation to the skills that were learned at university. As graduates pursue their careers they learn on the job or switch between jobs through the process of job mobility. This brings about a reduction in the proportion and intensity of underskill, and it even brings about an increase in the proportion and intensity of overskill.

6 CONCLUSIONS

As regions neighbouring the EU, North Africa and the Western Balkans face similar economic development challenges. Their labour markets are vulnerable to spillovers from economic cycles in the EU, which disturb their labour markets and skill matching processes. Yet, at the same time their labour market conditions differ with a high rate of graduate unemployment in Morocco and a relatively low rate in Serbia. We have used a graduate survey carried out from March to July 2024 in the two countries to identify mismatches on the respective labour markets.[23] Several findings relating to the extent of over-qualification are of note, relating to the incidence of mismatch among graduates, graduate mismatch in the public versus private sectors, gender discrimination, wage penalties of mismatch, and the persistence of mismatch.

The surveys reveal that almost two-fifths of graduates in Morocco and almost one third of graduates in Serbia are over-qualified for the job they hold, well above international norms. This suggests that there are too many graduates produced by the higher education systems in relation to labour market needs, especially in Morocco, and that many graduates are unable to find a suitable job that fully uses their level of education. Additionally, Morocco has a problem of underqualification, which particularly affects bachelor's degree holders and male graduates. This suggests that the higher education system in Morocco is not yet producing bachelor graduates of a sufficient level to meet the needs of the economy at the current level of technology.

The problem of overqualification is more severe in the **public sector** compared to the private sector in both countries. While over two-fifths of graduates in the public sector are overqualified in both countries, in Serbia only a quarter of graduates in the private sector are overqualified as are fewer than two-fifths in Morocco. This suggests that the public sector is attracting "too many" overqualified graduates, as compared to the private sector in both countries.

In both countries, **women graduates** suffer higher levels of overqualification mismatch than do men. While equal proportions of men and women are well matched

[23] As with all online surveys and a relatively small sample size it should be noted that the survey is not representative, and our findings are meant to be only suggestive of the key relationships involved. Additional future research on a larger scale would be needed to draw more definitive findings for the countries involved.

in Morocco, a far greater proportion of men than women are well matched in Serbia. This may reflect gender discrimination in the labour market in Serbia reducing the chances of even the most educated women in the country to find a well-matched job.

The analysis also provides an insight into the impact of qualification mismatch on graduate **wage differentials**. Firstly, in both countries, the average monthly wage is higher for male than for female graduates. Considering the differences between the public and private sectors, female graduates are mostly employed in the lower-paid sector in each country, which underpins the lower average female graduate wage. Furthermore, the findings provide insight into the **wage penalty** associated with qualification mismatch. The wage penalty has a gender dimension: qualification-mismatched female graduates suffer a wage penalty in both countries of around 25% compared to well-matched female graduates which is much higher than for male graduates; this gender wage bias is higher in Serbia than in Morocco. While there is little or no penalty for mismatched qualifications in the public sector, in the private sector the costs of qualification mismatch is a loss of about a third of the wage compared to a well-matched graduate. These different patterns likely reflect widespread practices of patronage, clientelism and credentialism in the super-periphery of the EU.

Turning to skill mismatch, we find evidence of **the persistence of mismatch**, but this is not absolute as there is evidence of the positive role of job mobility and on-the-job learning in reducing underskill mismatch, while overskill mismatch is increasing. Yet, upon leaving university, a relatively high proportion of graduates are found to be under-skilled, despite the relative preponderance of overqualification among them compared to the proportion who are underqualified. This suggests that graduates in both countries, upon leaving university, are *simultaneously overqualified and underskilled for the jobs they first acquire*.

The findings reported above are suggestive of higher education and labour market systems that are quite dysfunctional in both countries. Being in regions neighbouring the EU, they require effective and high-quality skill formation and utilisation systems to improve their competitive position on EU markets. In achieving this, their publicly-funded higher education systems have a major role to play, providing the labour market with graduates with appropriate skills, especially in an era of rapidly changing technologies. However, our findings reveal high levels of qualification and skill mismatch, in particular over-qualification and under-skill mismatch; there are also strong elements of under-qualification in Morocco. All this suggests that fundamental changes to the higher education systems in both countries are needed to provide a more appropriate set of graduate-level skills for their labour markets. In addition, a substantial and persistent misallocation of graduate labour is apparent, especially in relation to the respective needs of the public and private sectors and between genders, suggesting a need for improved methods of graduate job search assistance and career guidance that should be a policy priority in both countries and, by extension, in both of the regions in which they are located.

Disclosure statement
The authors have no conflict of interest to declare.

REFERENCES

1. Acosta-Ballesteros, J., Osorno-del Rosal, M. D. and Rodriguez-Rodriguez, O. M., 2018. Overeducation of young workers in Spain: How much does the first job matter? *Social Indicators Research*, 138(1), pp. 109-139. https://doi.org/10.1007/s11205-017-1643-z
2. Albert, C., Davia, M. A. and Legazpe, N., 2023. Educational mismatch in recent university graduates: The role of labour mobility. *Journal of Youth Studies*, 26(1), pp. 113-135. https://doi.org/10.1080/13676261.2021.1981840
3. Alattas, H., 2023. Overeducation in Arab Labour Markets; Different Measures, Different Outcomes. *European Journal of Sustainable Development*, 12(1), p. 91.
4. Allen, J. and van der Velden, R., 2001. Educational mismatches versus skill mismatches: Effects on wages, job satisfaction, and on-the-job search. *Oxford Economic Papers*, 53(3), pp. 434-452. https://doi.org/10.1093/oep/53.3.434
5. Amachraa, A., 2023. Driving the Dream: Morocco's Rise in the Global Automotive Industry. *Policy Paper*, PP- 09/23.
6. Anić, A. and Krstić, G., 2019. What lies behind the gender wage gap in Serbia? *Economic Annals*, 64(223), pp. 137-169. https://doi.org/10.2298/EKA1923137A
7. Baran, J. A., 2024. Overeducation in the EU: Gender and regional dimension. *Labour Economics*, 90, 102603. https://doi.org/10.1016/j.labeco.2024.102603
8. Bartlett, W. [et al.], 2016. *From University to Employment: Higher Education Provision and Labour Market Needs in The Western Balkans.* Brussels: European Commission, Directorate-General for Education and Culture.
9. Bartlett, W. and Prica, I., 2017. Interdependence between core and peripheries of the European economy: Secular stagnation and growth in the Western Balkans. *European Journal of Comparative Economics*, 14(1), pp. 123-139. https://doi.org/10.2139/ssrn.2729882
10. Bartlett, W. and Uvalić, M., 2019. Higher education and the graduate labour market in the Western Balkans. In: R. Osbild and W. Bartlett, eds. *Western Balkan Economies in Transition: Recent Economic and Social Developments,* pp. 47-59. https://doi.org/10.1007/978-3-319-93665-9_4
11. Bartlett, W., Krasniqi, B. and Ahmetbasić, J., 2019. Attracting FDI to the Western Balkans: Special Economic Zones and Smart Specialisation Strategies. *Croatian Economic Survey*, 21(2), pp. 5-35. https://doi.org/10.15179/ces.21.2.1
12. Bauer, T., 2002. Educational mismatch and wages: a panel analysis. *Economics of Education Review*, 21, pp. 221-229. https://doi.org/10.1016/S0272-7757(01)00004-8
13. Betti, G., D'Agostino, A. and Neri, L., 2011. Educational mismatch of graduates: A multidimensional and fuzzy indicator. *Social Indicators Research*, 103(3), pp. 465-480. https://doi.org/10.1007/s11205-010-9712-6
14. Canuto, O. and Kabbach, H., 2023. Gender Inequality in the Labour Market: The Case of Morocco. *Policy Brief*, 12/23.
15. Chevalier, A. and Lindley, J., 2009. Overeducation and the skills of UK graduates. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 172(2), pp. 307-337. https://doi.org/10.1111/j.1467-985X.2008.00578.x

16. Chuang, Y. C. and Liang, C.-Y., 2022. Overeducation and skill mismatch of university graduates in Taiwan. *Review of Development Economics*, 26(3), pp. 1693-1712. https://doi.org/10.1111/rode.12891
17. Delaney, J. [et al.], 2020. Educational expansion and overeducation of young graduates: A comparative analysis of 30 European countries. *Oxford Review of Education*, 46(1), pp. 10-29. https://doi.org/10.1080/03054985.2019.1687433
18. Dolton, P. and Vignoles, A., 2000. The incidence and effects of overeducation in the UK graduate labour market. *Economics of Education Review*, 19(2), pp. 179-198. https://doi.org/10.1016/S0272-7757(97)00036-8
19. Draissi, Z. and Rong, Y., 2023. Estimating the determinants and extent of Morocco's education and skill mismatch through the STEP Survey. *Sage Open*, 13(2), pp. 1-17. https://doi.org/10.1177/21582440231181325
20. Eguia, B., Gonzalez, C. R. and Serrano, F., 2023. Overeducation and scarring effects on the wages of young graduates. *International Journal of Manpower*, 44(4), pp. 755-771. https://doi.org/10.1108/IJM-02-2022-0075
21. Elamin, O. A., 2023. Overeducation wage penalty for university graduates: Evidence from the MENA region using machine learning techniques. *Middle East Development Journal*, 15(1), pp. 151-188. https://doi.org/10.1080/17938120.2023.2167482
22. Erdsiek, D., 2021. Dynamics of overqualification: Evidence from the early career of graduates. *Education Economics*, 29(3), pp. 312-340. https://doi.org/10.1080/09645292.2021.1882391
23. ETF, 2025. *Bridging the Skills Gap: Embracing Digital Transformation. Key Findings from the European Skills and Jobs Survey in the Western Balkans*. Torino: European Training Foundation.
24. European Union, 2021. *The European Union and Morocco*.
25. Figueiredo, H. [et al.], 2017. Should we start worrying? Mass higher education, skill demand and the increasingly complex landscape of young graduates' employment. *Studies in Higher Education*, 42(8), pp. 1401-1420. https://doi.org/10.1080/03075079.2015.1101754
26. Francisco Castro, J. [et al.], 2024. Overeducation and overskilling in Latin America: evidence from PIAAC. *Comparative Education*, 60(2), pp. 296-314. https://doi.org/10.1080/03050068.2023.2244263
27. Frenette, M., 2004. The overqualified Canadian graduate: The role of the academic program in the incidence, persistence, and economic returns to overqualification. *Economics of Education Review*, 23(1), pp. 29-45. https://doi.org/10.1016/S0272-7757(03)00043-8
28. Gazibara, T. [et al.], 2015. Ready to work or not quite? Self-perception of practical skills among medical students from Serbia ahead of graduation. *Croatian Medical Journal*, 56(4), pp. 375-382. https://doi.org/10.3325/cmj.2015.56.375
29. Green, F. and Henseke, G., 2021. Europe's evolving graduate labour markets: Supply, demand, underemployment and pay. *Journal for Labour Market Research*, 55(1), Article 2. https://doi.org/10.1186/s12651-021-00288-y

30. HCP, 2023. *Note d'information du Haut-Commissariat au Plan relative à la situation du marché du travail en 2023*. Casablanca: High Commission for Planning.
31. Jackson, D. and Li, I., 2022. Transition to work, mismatch and underemployment among graduates: An Australian longitudinal study. *International Journal of Manpower*, 43(7), pp. 1516-1539. https://doi.org/10.1108/IJM-03-2021-0195
32. Kiersztyn, A., 2013. Stuck in a mismatch? The persistence of overeducation during twenty years of the post-communist transition in Poland. *Economics of Education Review*, 32, pp. 78-91. https://doi.org/10.1016/j.econedurev.2012.09.009
33. Léné, A., 2011. Occupational downgrading and bumping down: The combined effects of education and experience. *Labour Economics*, 18(2), pp. 257-269. https://doi.org/10.1016/j.labeco.2010.11.007
34. Marques, P., Suleman, F. and Costa, J. M., 2022. Moving beyond supply-side arguments to explain over-qualification: The ability to absorb graduates in different models of capitalism. *European Journal of Education*, 57(2), pp. 342-360. https://doi.org/10.1111/ejed.12500
35. McGuinness, S. and Sloane, P. J., 2011. Labour market mismatch among UK graduates: An analysis using REFLEX data. *Economics of Education Review*, 30(1), pp. 130-145. https://doi.org/10.1016/j.econedurev.2010.07.006
36. McGuinness, S., 2006. Overeducation in the labour market. *Journal of Economic Surveys*, 20(3), pp. 387-418. https://doi.org/10.1111/j.0950-0804.2006.00284.x
37. McGuinness, S., Pouliakas, K. and Redmond, P., 2018. Skills mismatch: Concepts, measurement and policy approaches. *Journal of Economic Surveys*, 32(4), pp. 985-1015. https://doi.org/10.1111/joes.12254
38. Meroni, E. C. and Vera-Toscano, E., 2017. The persistence of overeducation among recent graduates. *Labour Economics*, 48, pp. 120-143. https://doi.org/10.1016/j.labeco.2017.07.002
39. Nordin, M., Persson, I. and Rooth, D. O., 2010. Education-occupation mismatch: Is there an income penalty? *Economics of Education Review*, 29(6), pp. 1047-1059. https://doi.org/10.1016/j.econedurev.2010.05.005
40. Ognjenović, K., 2021. Gender wage gap in Serbia: Inheritance and sources of the wage gap. *Stanovništvo*, 59(2), pp. 123-141. https://doi.org/10.2298/STNV2102123O
41. Osseiran, G., 2020. Higher education massification and the changing graduate labour market in the Spanish retail banking industry: A case study. *Oxford Review of Education*, 46(1), pp. 63-78. https://doi.org/10.1080/03054985.2019.1687434
42. Pascual-Sáez, M. and Lanza-Leon, P., 2023. The mismatch of over-education and earnings in Spain: how big are differences? *Applied Economics*, 55(46), 5369-5383. https://doi.org/10.1080/00036846.2022.2139807
43. Patrinos, H. A., 1997. Overeducation in Greece. *International Review of Education*, 43(2), pp. 203-223. https://doi.org/10.1023/A:1002981301802

44. Pecoraro, M., 2016. The incidence and wage effects of overeducation using the vertical and horizontal mismatch in skills: Evidence from Switzerland. *International Journal of Manpower*, 37(3), pp. 536-555. https://doi.org/10.1108/IJM-10-2014-0207
45. Quintini, G., 2011. Right for the job: Over-qualified or under-skilled? *OECD Social Employment and Migration Working Papers,* No.120.
46. Ramadi, E., Ramadi, S. and Nasr, K., 2015. Engineering graduates' skill sets in the MENA region: a gap analysis of industry expectations and satisfaction. *European Journal of Engineering Education*, 41(1), pp. 34-52. https://doi.org/10.1080/03043797.2015.1012707
47. Robert, P., 2014. Job mismatch in early career of graduates under post-communism. *International Journal of Manpower*, 35(4), pp. 500-513. https://doi.org/10.1108/IJM-05-2013-0113
48. Santos, M. and Sequeira, T. N., 2013. Skills mismatch and wage inequality: Evidence for different countries in Europe. *Technological and Economic Development of Economy*, 19, S425-S453. https://doi.org/10.3846/20294913.2013.880086
49. Sattinger, M., 1993. Assignment models of the distribution of earnings. *Journal of Economic Literature*, 31(2), pp. 851-880.
50. Schmelzer, P. and Schneider, T., 2020. Consequences of overeducation among career starters in Germany: A trap for the vocationally trained as well as for university graduates? *European Sociological Review*, 36(3), pp. 413-428. https://doi.org/10.1093/esr/jcz061
51. Shin, D. H. and Bills, D., 2021. Trends in educational and skill mismatch in the United States. *Social Sciences-Basel*, 10(10), Article 395. https://doi.org/10.3390/socsci10100395
52. Times Higher Education, 2025. World University Rankings 2025.
53. Tomić, S. and Pavlović, D., 2023. Blatant, not latent: Patronage in top-level appointments in Serbia. *NISPAcee Journal of Public Administration and Policy*, 16(1), pp. 181-209. https://doi.org/10.2478/nispa-2023-0008
54. Tsang, M. C. and Levin, H. M., 1985. The economics of overeducation. *Economics of Education Review*, 4(2), pp. 93-104. https://doi.org/10.1016/0272-7757(85)90051-2
55. Turmo-Garuz, J., Bartual-Figueras, M. T. and Sierra-Martinez, F.-J., 2019. Factors associated with overeducation among recent graduates during labour market integration: The case of Catalonia (Spain). *Social Indicators Research*, 144(3), pp. 1273-1301. https://doi.org/10.1007/s11205-019-02086-z
56. Uvalić, M. and Bartlett, W., 2020. Transition from university to employment of young graduates in Serbia. In: W. Bartlett, V. Monastiriotis and P. Koutroumpis, eds. *Social Exclusion and Labour Market Challenges in the Western Balkans,* pp. 191-217. Newcastle-on-Tyne: Cambridge Scholars.
57. Vecchia, M. [et al.], 2023. Vertical and horizontal mismatch in the UK: are graduates' skills a good fit for their jobs? *NIESR Discussion Paper*, No. 548.

58. Verhaest, D. [et al.], 2018. Do employers prefer overqualified graduates? A field experiment. *Industrial Relations*, 57(3), pp. 361-388. https://doi.org/10.1111/irel.12212

59. Verhaest, D. and Van der Velden, R., 2013. Cross-country differences in graduate overeducation. *European Sociological Review*, 29(3), pp. 642-653. https://doi.org/10.1093/esr/jcs044

60. Veselinović, L., Mangafić, J. and Turulja, L., 2020. The effect of education-job mismatch on net income: Evidence from a developing country. *Economic research-Ekonomska istraživanja*, 33(1), pp. 2648-2669. https://doi.org/10.1080/1331677X.2020.1723427

61. Vladisavljević, M., 2017. The public sector wage premium and fiscal consolidation in Serbia. *Economic Annals*, 62(215), pp. 111-133. https://doi.org/10.2298/EKA1715111V

62. Vuksanović, N. and Aleksić, D., 2022. The assessment of wage penalty for over-and under-education in the case of Serbia. In: L. Lebedinksi, D. Pavlovic and S. Vujic, eds. *Human Capital and Welfare,* pp. 91-111. Antwerp: University of Antwerp.

35 Years of Public Sector Reform in Central Europe

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This book offers an in-depth analysis of the trajectory and outcomes of public sector reforms across post-socialist European countries. The authors combine data-driven analysis with examples from reform practice. The book is clear and engaging, with many insightful observations, making it useful for a broader social sciences audience.

In Chapter 1, the authors present the general political, economic and social achievements of the eleven central and eastern European (CEE) countries studied: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. All CEE countries succeeded in transitioning from centrally planned (or, in the cases of Croatia and Slovenia, labour-managed) to market economies, and in becoming member states of the EU and NATO. Indicators such as life expectancy, expected years of schooling, labour productivity, and GDP per capita have increased significantly. However, in most cases there is still a large measured gap in these indicators with respect to the average of the 15 "old" EU member states, not to mention the most developed ones in western Europe. The achievements are particularly mixed for public sector performance as measured, for example, by governance quality.

In Chapter 2, the authors delve deeper into the analysis of public sector reforms by focusing on Estonia and Bulgaria as examples of the most and least successful transition in the public sector.

In Estonia, public sector reform was largely a depoliticised and technocratic effort. External advice was led by experts from the IMF and the World Bank, who seem to have been given considerable freedom in designing the reforms. Though the authors suggest that there was minimal political interference and that "Estonian political leadership just saw the reforms as something that happened to them" (p. 41), such a claim underplays the role of domestic institutional engagement. While expert advice may have come from international organizations, it was ultimately Estonian public sector employees who implemented the reforms. A key move in the early stage of transition was that authorities replaced much of the old apparatchik cadre with younger technocrats, thereby reducing resistance to reforms.

Bulgaria followed a different path. Although initial conditions in the public sector were not significantly worse than those in Estonia, the Bulgarian government apparatus remained largely under the control of former communist party members. Public sector reforms were highly politicised and were often discontinued when a new government came to power. While authorities were effective in transposing EU legislation and formally adopting hundreds of reform strategies in various policy areas, their implementation lagged significantly behind. As a result, no genuine change occurred. Instead of addressing the underlying problems, the authorities simply produced documents about the public sector that led to little change in practice.

The third Chapter assesses some unanticipated consequences of public sector reforms. This is a particularly valuable part of the book as it highlights the dif-

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ficulty of taking account *ex ante* of the side effects of reforms. One example is the hollowing out of the state, defined by the authors as the reduction of its power through decreased public sector expenditure at national and local levels (p. 54). While the state apparatus had been arguably overextended under central planning, the curtailment of its functions and the downsizing of public employment led to serious coordination problems in the early stages of public sector reforms. This was manifested in the lack of coordination of reform plans among ministries, and dysfunctional relations between central and subnational levels of government. However, the authors' claim that the hollowing out of the state diminished resilience during the 2008 financial crisis and the 2020 Covid-19 crisis appears overstated. For example, by 2008, most CEE countries were already EU members and had functioning public sector institutions. The impact of the financial crisis varied significantly across the region: countries with weak banking supervision were hit the hardest, while others – such as Poland and Croatia – with stronger banking supervision, avoided the financial crisis. Similarly, by arguing that high inflation, declining GDP, large unemployment, and a rise in poverty in the early 1990s were the unanticipated consequences of shock therapy, the authors overlook a large literature that had warned that such outcomes were inevitable.

The fourth Chapter examines the decentralisation processes that took place after the fall of the Berlin Wall. Under the former socialist regimes, almost all political and economic power was concentrated in the hands of the communist party and exercised by the central government. In the public sector, local self-government was limited, even though it may have formally existed in some countries. During the transition, many CEE countries began delegating public revenue and expenditure powers to subnational levels, often in line with the principles of the European Charter of Local Self-Government.[1] What the authors found is that legislation in many countries failed to delegate to local authorities revenue raising powers commensurate with assigned expenditure responsibilities. In Croatia, for instance, local governments have not been able to manage a substantial share of public affairs under their own responsibility either because of the lack of own revenue or because of inadequate competencies and human resources in various expenditure areas. Even more disturbing is the situation in Hungary, where local public finance and expenditure has undergone a process of recentralisation, and the central government retains extensive authority to interfere in local autonomy.

In Chapter 5, the authors evaluate three types of public services across the region: primary education, healthcare, and local communal services. They acknowledge the lack of comparable data and therefore provide only selected comparisons.

[1] The authors do not explain why they use this document as a point of reference for decentralization reform analysis. Adopted by the Council of Europe in 1985, the Charter sets out legal and institutional standards for guaranteeing the political, administrative, and financial autonomy of local authorities. However, it is a non-binding instrument with limited enforcement capacity.

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Responsibility for primary education in most CEE countries is shared: municipalities usually establish and maintain schools, while the central government supervises service delivery and checks educational standards. Most primary schools are public and only Hungary has private primary school enrolment, albeit with an insignificant share of about 15% of all pupils. Estonia, Poland and Slovenia are best-performing in terms of PISA scores, while Bulgaria and Romania rank among the lowest. According to the 2022 PISA results (OECD, 2023), Estonia achieved the highest score in all of Europe. While there is no significant overall difference in performance between eastern and western Europe, countries in southeast Europe tend to perform poorly.

Compulsory health insurance is another legacy of socialism in CEE. Most countries have a single public health insurance fund that covers healthcare costs more or less comprehensively. One exception is Latvia, where healthcare is financed through general taxation rather than earmarked health insurance contributions. Another is Czechia and Slovakia, where health insurance funds (public and quasi-public) compete in providing coverage. Private as a complement to public health insurance in general plays a minor role. Nevertheless, the share of out-of-pocket health expenditure is relatively high. In Bulgaria, for example, it accounts for 37% of total health expenditure compared with the EU average of 14%. Interestingly, among CEE countries this share is lowest in Croatia, at only 10%. Slovenia and Czechia are ranked the highest, Romania and Bulgaria the lowest in terms of various healthcare system performance indicators.

Regarding delivery of local services such as public transportation, maintenance of public spaces, local roads and green areas, etc., one aspect of performance the authors assess is to what extent these services are contracted out in CEE instead of being produced "in-house" by local authorities, as traditionally is the case. For instance, the authors find that highly fragmented municipal structures, as seen in Czechia and Slovakia, do not necessarily lead to inefficient service delivery. Drawing on Soukopová and Klimovský's (2016) analysis of 205 Czech municipalities, they argue that if municipalities use the contracting mode of delivery, they can provide municipal services efficiently from the point of service delivery costs even when they are themselves fragmented.

In the last Chapter, the authors emphasise that after 1989, political institutions, the economy, the legal system, and sociocultural norms in CEE all had to be reinvented. In moments of such profound change, the choices made by decisionmakers in power can become path-dependent. The institutions adopted tend to persist over time and to resist subsequent change. The authors argue that the CEE countries made different institutional choices at the time and eventually followed different transition trajectories, which ultimately led to varying economic, political and social outcomes. Although some readers might find this conclusion somewhat pessimistic – as it suggests that path dependence leaves little room for future improvements in the public sector – I would argue otherwise. It is crucial

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to maintain ongoing reform efforts and be prepared for moments when significant change becomes possible. Moreover, it is important to recognise that democracies provide through regular electoral cycles periodic opportunities to improve public sector performance incrementally.

Overall, this book provides a comprehensive and detailed comparative overview of public sector development in CEE. Although written during a period of significant social change in the region and globally, the book will likely remain highly relevant for scholars and practitioners interested in public sector reforms.

REFERENCES

1. OECD, 2023. *PISA 2022 Results (Volume I)*. Paris: OECD.
2. Soukopová, J. and Klimovský, D., 2016. Local governments and local waste management in the Czech Republic: producers or providers? *NISPAcee Journal of Public Administration and Policy*, 9(2), pp. 217-237.

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