

The Impact of Worked Hours on Labor Productivity – the Role of Organizational Communication

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Abstract: Labor productivity is a critical determinant of economic growth and societal well-being, reflecting the efficiency with which labor inputs are converted into outputs. This study investigates the impact of key labor market indicators – employment rate, labor participation rate, employee working hours, and total spending on labor market programs – on labor productivity across various countries from 2010 to 2019. Additionally, the research explores the role of organizational communication in shaping productivity outcomes within these contexts. Using panel data analysis, the study offers insights into how effective communication practices can enhance workforce efficiency and economic performance. The findings underscore the complexity and regional variations in the factors influencing labor productivity, providing valuable implications for policymakers and organizational leaders aiming to optimize productivity strategies.

Keywords: Employment Rate, Employee Working Hours, Labor Participation Rate, Organizational Communication, Technology Labor Productivity

I. INTRODUCTION

Labor productivity is a critical determinant of economic growth and living standards, influencing the overall performance of economies and the well-being of societies. As nations strive to enhance their economic output, understanding the factors that drive labor productivity becomes increasingly important. This study seeks to examine the impact of various labor market indicators on labor productivity across different countries from 2010 to 2019. Specifically, the analysis focuses on the employment rate, labor participation rate, employee working hours, and total spending on labor market programs as key determinants of labor productivity.

Effective communication within organizations plays a pivotal role in shaping labor productivity. Communication, both vertical (between management and employees) and horizontal (among employees), facilitates the flow of information, enhances coordination, and fosters a collaborative work environment. In the context of labor productivity, organizational communication can influence various aspects of the workforce, including motivation, engagement, efficiency, and innovation. Consequently, understanding the interplay between organizational communication and labor productivity is essential for devising strategies that promote economic growth and enhance the performance of labor markets.

Labor productivity is a crucial measure of economic performance, reflecting the efficiency of converting labor inputs into outputs. This study aims to examine the impact of various labor market factors on labor productivity across different countries from 2010 to 2019, with a specific focus on the roles of employment rate, labor participation rate, employee working hours, and total spending on labor market programs. The employment rate, defined as the ratio of employed individuals to the working-age population, is a key indicator of labor market performance. High employment rates suggest a robust labor market but may include low-productivity workers, complicating its relationship with overall productivity. Therefore, it is essential to consider both the quality and efficiency of the workforce when analyzing this relationship.

Similarly, the labor participation rate, which measures the proportion of the working-age population that is either employed or actively seeking employment, reflects labor market inclusivity and the effectiveness of labor market policies. The impact of labor participation on productivity depends on the skills and efficiency of the workforce, making it another complex variable to analyze. Employee working hours, representing the average annual hours worked per employee, directly affect labor output. While longer hours can increase output, excessive hours can lead to fatigue and decreased efficiency, highlighting the need to find an optimal balance to ensure sustainable productivity. Total spending on labor market programs, including public employment services, training, hiring subsidies, and unemployment

benefits, is a critical aspect of labor market interventions. Effective spending can enhance workforce skills, reduce unemployment, and support labor market transitions, contributing to a more productive and adaptable workforce. This study will provide a comprehensive analysis of these factors, offering insights into how labor market indicators and policies influence labor productivity in various national contexts.

Organizational Communication and Labor Productivity

The role of organizational communication in influencing labor productivity cannot be overstated. Effective communication channels within organizations facilitate the exchange of ideas, enable efficient decision-making, and foster a culture of collaboration and innovation. When employees are well-informed and engaged, they are more likely to contribute positively to the organization's goals, enhancing overall productivity. Conversely, poor communication can lead to misunderstandings, reduced morale, and inefficiencies, hampering productivity.

Vertical communication, involving interactions between management and employees, is crucial for aligning organizational objectives with individual performance. Clear and transparent communication from management ensures that employees understand their roles, responsibilities, and the broader organizational vision. It also enables managers to provide feedback, recognize achievements, and address concerns, creating a supportive work environment that motivates employees to perform at their best.

Horizontal communication, or communication among peers, is equally important for fostering teamwork and collaboration. Open channels of communication among employees encourage the sharing of knowledge, ideas, and best practices, leading to innovation and problem-solving. In dynamic and complex work environments, effective horizontal communication can enhance coordination, reduce redundancies, and streamline processes, contributing to higher productivity.

This study integrates the examination of labor market indicators with the analysis of organizational communication to provide a holistic understanding of the factors influencing labor productivity. By analyzing data from multiple countries over a decade, the research aims to uncover patterns and relationships that can inform policy decisions and organizational practices. The findings will contribute to the broader discourse on labor productivity, offering evidence-based insights that can guide efforts to enhance economic performance and improve living standards.

The primary objective of this study is to investigate the impact of employment rate, labor participation rate, employee working hours, and total spending on labor market programs on labor productivity across different countries from 2010 to 2019. Additionally, the study aims to explore the role of organizational communication in shaping labor productivity, providing a comprehensive analysis that considers both macroeconomic indicators and micro-level organizational dynamics.

II. LITERATURE REVIEW

The exploration of the relationship between employee/organization communication and labor productivity has garnered significant academic attention over the years. This literature review delves into various studies examining the impact of key labor market factors such as employment rate, labor participation, employee working hours, and total spending on labor market programs on labor productivity. The review highlights the importance of effective communication within organizations and its influence on productivity across different sectors and countries.

Effective communication within an organization is crucial for enhancing labor productivity. Numerous studies have underscored the role of communication in fostering a productive work environment. Clear and consistent communication channels within project teams are essential for successful project outcomes and productivity improvements. Effective communication contributes to better coordination, reduced misunderstandings, and improved employee morale, all of which are vital for high productivity levels.

The employment rate, defined as the ratio of employed individuals to the working-age population, is a fundamental indicator of labor market performance. High employment rates typically signal a robust labor market, but their relationship with labor productivity is multifaceted. On one hand, higher employment can lead to increased output due to more individuals participating in productive activities. On the other hand, an influx of low-productivity workers can dilute overall productivity levels. Studies such as those by Acemoglu and Autor (2011) have explored this complexity, suggesting that the impact of employment rates on productivity depends significantly on the skill levels and efficiency of the workforce.

Labor participation rate, which measures the proportion of the working-age population either employed or actively seeking employment, reflects labor market inclusivity and the effectiveness of labor market policies. A higher labor participation rate often indicates a more dynamic and inclusive labor market, potentially leading to increased

productivity. However, as highlighted by Autor and Dorn (2013), the effect of labor participation on productivity also depends on the skills and productivity levels of the participating workforce. This underscores the need for targeted labor market policies that enhance workforce skills and efficiency.

The relationship between employee working hours and labor productivity is complex and bidirectional. While longer working hours can lead to higher output per worker, excessive hours can result in fatigue, decreased efficiency, and burnout, ultimately impairing productivity. This duality is evident in studies such as that by Golden and Jorgensen (2002), which found that optimal working hours are crucial for maintaining high productivity levels. The study suggests that policies promoting a balance between working hours and employee well-being are essential for sustainable productivity gains.

Investment in labor market programs, including public employment services, training, hiring subsidies, and unemployment benefits, plays a critical role in shaping labor market dynamics and productivity. Effective labor market spending can enhance workforce skills, reduce unemployment, and support labor market transitions, leading to a more productive and adaptable workforce. Research by Card, Kluve, and Weber (2010) indicates that well-designed labor market programs significantly contribute to productivity improvements by enhancing the employability and adaptability of the workforce.

Studies examining the impact of communication and labor market factors on productivity across different countries provide valuable insights. For example, the research on Iraqi construction projects highlights the significant positive effect of internet communication quality on labor productivity (Al-aloozy et al., 2024)¹. This study underscores the importance of effective communication in enhancing productivity, particularly in sectors with complex project management requirements. Another study examines the contribution of information and communications technologies (ICT) to labor productivity across 98 countries, finding that telephone and broadband subscriptions significantly impact labor productivity (Ladha et al., 2022)². This research suggests that investing in ICT is crucial for productivity improvements, emphasizing the role of technological communication in modern labor markets.

Furthermore, a comparative study of Greek and Swiss firms reveals significant positive effects of ICT capital, human capital, and "employee voice"-oriented organizational practices on labor productivity (Arvanitis and Loukis)³. This study highlights the importance of organizational practices that promote effective communication and employee engagement in enhancing productivity. Effective communication, whether facilitated through technological means or organizational practices, plays a pivotal role in enhancing labor productivity. Additionally, labor market factors such as employment rate, labor participation, working hours, and labor market spending significantly influence productivity. This review provides a comprehensive understanding of these relationships, setting the stage for further empirical analysis in this study.

¹ Al-aloozy, Mirvalad, and Shabakhty, "Evaluating the Impact of Internet Communication Quality in Human Resource Management on the Productivity of Construction Projects."

² Laddha et al., "Impact of Information Communication Technology on Labour Productivity."

³ Arvanitis and Loukis, "Information and Communication Technologies, Human Capital, Workplace Organization and Labour Productivity."

III. INDENTATIONS AND EQUATIONS

3.1. Data Sources

The descriptive statistics for the variables in this study provide a comprehensive overview of the dataset, which comprises 80 observations from 8 countries over the period from 2010 to 2019. The variables analyzed include employment rate, labor participation, employee working hours, and total spending on labor market.

This study aims to examine the impact of various factors (X variables) on the labor productivity (Y variable) across different countries from 2010 to 2019. The X variables considered include employment rate, labor participation, employee working hours, and total spending on labor market. For this study, all the data were gathered from multiple reputable sources to ensure the accuracy and reliability of the findings from the OECD (Organisation for Economic Co-operation and Development) and World Bank Statistics.

3.2. Sample Selection

The study examines data from 8 countries over a period spanning from 2010 to 2019. The countries included in the analysis are Australia, Canada, France, Germany, Italy, Japan, Korea, and United States. These countries were chosen based on the availability and completeness of relevant data on labor productivity and related variables across the selected timeframe. Each country is represented by an average of ten annual observations, ensuring a balanced panel dataset. This selection ensures a diverse representation of geographical regions and economic statuses, enhancing the generalizability of the study's findings.

3.3. Variables

3.3.1. Dependent Variable

Labor Productivity measured as GDP per hour worked, this variable reflects the efficiency and output of labor in the economy.

3.3.2. Independent Variables

The study investigates four key independent variables as follows :

- Employment Rate : the ratio of employed individuals to the working-age population (ages 15-64)
- Labor Participation Rate : The ratio of the labor force (employed and actively seeking employment) to the working-age population
- Worked Hours : total number of hours actually worked per year divided by the average number of people in employment per year (average annual hours worked per worker)
- Spending on Labor Markets : Public spending on labor market programs as a percentage of GDP (such as Public Employment Services (PES), training, hiring subsidies and direct job creations in the public sector)

3.3.3. Control Variables

To account for potential confounding factors, the study includes several control variables:

- Country: This categorical variable represents the 8 countries included in the study. It controls for country-specific factors that might influence labor productivity.
- Year: This categorical variable represents each year from 2010 to 2019, controlling for time-specific effects and trends that could impact labor productivity
- Territory : This categorical variable represents Western Countries (Australia, Canada, France, Germany, Italy and United States) and Eastern Countries (Japan and Korea)

By incorporating these control variables, the study aims to isolate the effects of the independent variables on labor productivity, providing a clearer understanding of the factors contributing to labor productivity.

3.4. Model

To examine the effects of the independent variables on labor productivity rates, we employ a fixed-effects panel data regression model. This model is particularly suited for controlling unobserved heterogeneity across countries and over time, ensuring that our estimates are not biased by country-specific or time-specific factors.

The model is as follows:

Labor Productivity_{it} = β_0 + β_1 Employment Rate_{it} + β_2 Labor Participation_{it} + β_3 Worked Hours_{it} + β_4 Spending on Labor Market_{it} + γ_i + δ_t + ϵ_{it}

With detail explanation as follows :

Labor Productivity_{it}: represents the labor productivity rate in country *i* at time *t*

Employment Rate ϵ_{it} : represents the ratio of employed individuals to the working-age population (ages 15-64) for country i at time t .

Labor Participation ϵ_{it} : represents The ratio of the labor force (employed and actively seeking employment) to the working-age population for country i at time t .

Worked Hours ϵ_{it} : represents average annual hours worked per worker) for country i at time t .

Spending on Labor Market ϵ_{it} : Public spending on labor market programs as a percentage of GDP for country i at time t .

γ_i : denotes the country-specific fixed effects, which control for unobserved characteristics that are unique to each country and constant over time.

δ_t : denotes the year-specific fixed effects, which control for unobserved factors that vary over time but are constant across countries in any given year.

ϵ_{it} : is the error term, capturing the random variation not explained by the model.

By incorporating both country-specific and year-specific fixed effects, this model effectively controls for potential confounding factors, allowing us to isolate and quantify the impact of the independent variables on labor productivity. This approach ensures that our findings reflect the true relationship between the variables of interest and labor productivity, accounting for differences across countries and temporal trends.

IV. RESULTS

The descriptive statistics for the variables in this study provide a comprehensive overview of the dataset, which comprises 80 observations from 8 countries over the period from 2010 to 2019. The variables analyzed include employment rate, labor participation, employee working hours, and total spending on labor market.

Labor productivity shows significant variation among observations, with a mean of 1.132 units and a range from -0.53 to 4.47, reflecting diverse productivity levels influenced by various national and economic contexts. The employment rate averages 68.48%, with values ranging from 54.95% to 78.11%, indicating moderate variability and reflecting differing labor market conditions across the countries. In contrast, the labor participation rate is more consistent, averaging 78.556% and ranging from 68.16% to 85.45%, showing less variability compared to the employment rate. Worked hours per year average 1715.667, with a substantial range from 1372.2 to 2163 hours, highlighting different working time norms and labor policies. Spending on labor markets varies significantly, averaging 1.235 units with a range from 0.24 to 3.41 units, suggesting differing levels of government investment in labor market policies and interventions.

TABLE 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
no	80	40.5	23.238	1	80
Country code	80	4.5	2.306	1	8
year	80	2014.5	2.89	2010	2019
Labor productivity	80	1.132	.995	-.53	4.47
Employment rate	80	68.48	5.732	54.95	78.11
Labor participation	80	78.556	3.929	68.16	85.45
Worked hours	80	1715.667	189.286	1372.2	2163
Spending on labor ma-s	80	1.235	.87	.24	3.41
territory	80	.25	.436	0	1

The dataset provides a robust foundation for analyzing the relationships between labor productivity and various labor market variables across eight countries over a decade. The significant variability in labor productivity, worked hours, and spending on labor markets suggests diverse economic and policy environments. This variability, combined with relatively consistent labor participation rates, underscores the importance of examining how effective employee communication and other factors influence productivity across different national contexts. The insights gained from this analysis can inform policymakers and organizations seeking to enhance labor productivity through targeted interventions and improved communication strategies.

4.2 Basic Regression Results

The table below presents the results of three regression models analyzing the impact of various factors on labor productivity. The dependent variable in the models is the labor productivity. The independent variables include employment rate, labor participation, employee working hours, and total spending on labor market. Each model includes 80 observations, and robust standard errors are reported to account for potential heteroscedasticity.

TABLE 2. Basic Regression Results

VARIABLES	(1) Labor productivity	(2) Labor productivity	(3) Labor productivity
Employment rate	0.0134 (0.0196)		-0.0316 (0.0684)
Labor participation			0.132 (0.104)
Worked hours		0.00161*** (0.000567)	0.00324*** (0.000949)
Spending on labor markets			0.213 (0.186)
Constant	0.212 (1.347)	-1.637* (0.978)	-12.92** (5.454)
Observations	80	80	80
R-squared	0.006	0.094	0.159

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model 1:

- Dependent Variable: Labor Productivity
- Independent Variables:
 - Employment Rate: Coefficient = 0.0134 (p = 0.0196)
 - Worked Hours: Coefficient = 0.00161 (p < 0.01)
 - Constant: Coefficient = 0.212 (p > 0.1)

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- R-squared: 0.006
- Interpretation:
 - The employment rate has a positive but statistically insignificant relationship with labor productivity ($p = 0.0196 > 0.01$).
 - Worked hours have a statistically significant positive relationship with labor productivity ($p < 0.01$).
 - The constant term is not statistically significant ($p > 0.1$), indicating that when other variables are zero, labor productivity is expected to be 0.212 units.

In Model 1, the analysis focuses on labor productivity as the dependent variable, assessed against several independent variables. The employment rate shows a positive relationship with labor productivity, albeit not statistically significant ($p = 0.0196$). Conversely, worked hours demonstrate a statistically significant positive association with labor productivity ($p < 0.01$). The constant term, which signifies the baseline level of labor productivity when all other variables are zero, is found to be statistically insignificant ($p > 0.1$), indicating an expected value of 0.212 units. Model 1's explanatory power, as measured by R-squared, is minimal at 0.006.

Model 2:

- Dependent Variable: Labor Productivity
- Independent Variables:
 - Employment Rate: Coefficient = -0.0316 ($p = 0.0684$)
 - Labor Participation: Coefficient = 0.132 ($p = 0.104$)
 - Worked Hours: Coefficient = 0.00324 ($p < 0.01$)
 - Constant: Coefficient = -1.637 ($p < 0.05$)
- R-squared: 0.094
- Interpretation:
 - The employment rate has a negative relationship with labor productivity but is not statistically significant ($p = 0.0684 > 0.05$).
 - Labor participation has a positive relationship with labor productivity but is not statistically significant ($p = 0.104 > 0.05$).
 - Worked hours have a statistically significant positive relationship with labor productivity ($p < 0.01$).
 - The constant term is statistically significant at the 5% level ($p < 0.05$), indicating an intercept of -1.637 units.

Moving to Model 2, the investigation continues with labor productivity as the dependent variable and includes additional independent variables. The employment rate exhibits a negative relationship with labor productivity, though not statistically significant ($p = 0.0684$). Similarly, labor participation shows a positive but statistically insignificant relationship with labor productivity ($p = 0.104$). Worked hours maintain a statistically significant positive correlation with labor productivity ($p < 0.01$). The constant term in this model is statistically significant at the 5% level ($p < 0.05$), suggesting an intercept of -1.637 units. Model 2 achieves a higher R-squared value of 0.094, indicating a stronger explanatory capability compared to Model 1.

Model 3:

- Dependent Variable: Labor Productivity
- Independent Variables:
 - Worked Hours: Coefficient = 0.00324 ($p < 0.01$)
 - Spending on Labor Markets: Coefficient = 0.213 ($p > 0.1$)
 - Constant: Coefficient = -12.92 ($p < 0.01$)
- R-squared: 0.159
- Interpretation:
 - Worked hours have a statistically significant positive relationship with labor productivity ($p < 0.01$).
 - Spending on labor markets does not have a statistically significant relationship with labor productivity ($p > 0.1$).
 - The constant term is statistically significant at the 1% level ($p < 0.01$), indicating an intercept of -12.92 units.

In Model 3, the analysis narrows to focus on the influence of worked hours and spending on labor markets on labor productivity. Worked hours maintain a statistically significant positive association with labor productivity ($p < 0.01$). Conversely, spending on labor markets does not demonstrate a statistically significant relationship with labor productivity ($p > 0.1$). The constant term remains statistically significant at the 1% level ($p < 0.01$), with an intercept estimated at -12.92 units. Model 3 exhibits the highest R-squared value among the models discussed, amounting to 0.159, suggesting a relatively stronger explanatory power.

These findings suggest that while worked hours have a robust positive association with labor productivity, other factors such as employment rate, labor participation, and spending on labor markets do not significantly influence labor productivity in these models. The models also differ in their overall explanatory power (R-squared), with Models 2 and 3 explaining more variability in labor productivity than Model 1.

Table 3. Basic Regression Results Based on Territory

This regression analysis investigates the analysis and interpretation of the regression results from three models examining the relationship between labor productivity and various labor market indicators in Western and Eastern countries, as well as the combined dataset. The results are based on 80 observations collected over the period from 2010 to 2019.

	(1)	(2)	(3)
VARIABLES	Western	Eastern	Combined
Employment rate	0.104 (1.41)	-2.075** (-2.19)	-0.032 (-0.46)
Labor participation	-0.104 (-0.86)	2.608** (2.15)	0.132 (1.27)
Worked hours	-0.001 (-0.41)	-0.001 (-0.34)	0.003*** (3.42)
Spending on labor markets	0.180 (1.03)	5.341** (2.33)	0.213 (1.15)
Constant	2.617 (0.38)	-60.405 (-1.69)	-12.917** (-2.37)
Observations	60	20	80
R-squared	0.089	0.538	0.159

t-statistics in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Column 1: Western Countries

In the context of Western countries, the analysis of the employment rate reveals a coefficient of 0.104 with a t-statistic of 1.41. Although the coefficient is positive, it is not statistically significant, indicating that changes in employment rates do not

have a strong or consistent impact on labor productivity in these countries. This suggests that other factors might be more influential in driving productivity, such as technological advancements or industry-specific dynamics.

For labor participation, the coefficient is -0.104 with a t-statistic of -0.86, indicating a negative relationship, albeit statistically insignificant. This result implies that higher labor participation rates do not necessarily lead to increased labor productivity in Western countries. It could be that the additional labor force participation includes segments of the population with lower productivity levels, thus diluting overall productivity gains.

The variable representing worked hours has a coefficient of -0.001 and a t-statistic of -0.41, showing a negative and statistically insignificant relationship with labor productivity. This finding suggests that simply increasing the number of hours worked does not enhance productivity, potentially due to diminishing returns or fatigue effects among workers. Public spending on labor markets, with a coefficient of 0.180 and a t-statistic of 1.03, indicates a positive but statistically insignificant relationship with labor productivity. While investment in labor market programs is generally thought to enhance skills and employability, this result suggests that such spending has not had a significant immediate impact on productivity in Western countries during the study period.

Column 2: Eastern Countries

In Eastern countries, the employment rate shows a coefficient of -2.075 with a t-statistic of -2.19, which is statistically significant at the 5% level. This indicates a strong negative relationship between employment rates and labor productivity. A possible interpretation is that higher employment rates in these countries may involve the inclusion of a larger number of lower productivity workers, which could reduce overall productivity.

The coefficient for labor participation is 2.608 with a t-statistic of 2.15, also statistically significant at the 5% level. This suggests a positive relationship between labor participation rates and labor productivity, indicating that higher participation rates may bring more skilled and productive workers into the labor force, thereby boosting overall productivity.

For worked hours, the coefficient is -0.001 with a t-statistic of -0.34, showing no significant relationship with labor productivity. This implies that, similar to Western countries, simply increasing the number of hours worked does not significantly affect productivity levels in Eastern countries. The coefficient for public spending on labor markets is 5.341 with a t-statistic of 2.33, indicating a statistically significant positive relationship at the 5% level. This suggests that investment in labor market programs, such as training and employment services, has a substantial positive impact on productivity in Eastern countries, possibly by improving worker skills and matching workers to more productive jobs. The constant term in this model is -60.405 with a t-statistic of -1.69, which is not statistically significant at conventional levels. The R-squared value of 0.538 indicates that the model explains 53.8% of the variability in labor productivity, suggesting a reasonably good fit for the data in Eastern countries.

Column 3: Combined Dataset

In the combined dataset, which includes both Western and Eastern countries, the employment rate has a coefficient of -0.032 with a t-statistic of -0.46, indicating a negative but statistically insignificant relationship with labor productivity. This suggests that the overall impact of employment rates on productivity is mixed when considering both regions together.

The labor participation rate shows a coefficient of 0.132 with a t-statistic of 1.27, which is positive but statistically insignificant. This implies that higher labor participation rates have a generally positive but not robust impact on labor productivity across the combined sample. The worked hours variable is statistically significant with a coefficient of 0.003 and a t-statistic of 3.42, significant at the 1% level. This strong positive relationship indicates that, on average, increasing the number of hours worked per worker is associated with higher labor productivity in the combined dataset, highlighting the importance of work effort in driving productivity. Public spending on labor markets has a coefficient of

0.213 with a t-statistic of 1.15, indicating a positive but statistically insignificant relationship. While this suggests a beneficial impact, the lack of statistical significance means the result should be interpreted with caution.

The analysis reveals significant regional variations in the factors influencing labor productivity. In Western countries, none of the variables show statistically significant relationships with productivity, suggesting that other factors beyond the labor market indicators studied here may be more influential. In contrast, Eastern countries exhibit strong relationships, with employment rates negatively impacting productivity and labor participation rates and public spending on labor markets positively affecting productivity. For the combined dataset, the number of hours worked per worker emerges as a significant positive determinant of labor productivity. These findings underscore the importance of considering regional differences and a broader range of factors when analyzing labor productivity.

4.3 Robustness check

The table presents the results of a multiple regression analysis examining the relationship between labor productivity (dependent variable) and several independent variables. The analysis includes robust standard errors to account for potential heteroskedasticity.

Table 4. Robustness Check Results

VARIABLES	(1) Labor productivity
Employment rate	-0.0316 (0.0658)
Labor participation	0.132 (0.109)
Worked hours	0.00324*** (0.000973)
Spending on labor markets	0.213 (0.142)
Constant	-12.92** (5.901)
Observations	80
R-squared	0.159

Robust standard errors in
parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficient for the employment rate is -0.0316 with a standard error of 0.0658. This negative coefficient suggests that, on average, an increase in the employment rate is associated with a decrease in labor productivity. However, the relationship is not statistically significant, as indicated by the large standard error relative to the coefficient. This insignificance implies that variations in the employment rate do not have a consistent or robust impact on labor productivity across the combined dataset. It is possible that the employment rate's effect on productivity is mediated by other factors not included in this model, such as the quality of employment or the types of jobs being created.

The coefficient for the labor participation rate is 0.132 with a standard error of 0.109. This positive coefficient suggests that higher labor participation rates are associated with increased labor productivity. However, similar to the employment rate, the relationship is not statistically significant. The lack of statistical significance suggests that while there might be a general trend of higher participation correlating with higher productivity, this relationship is not strong enough to be considered reliable across the dataset. This might be due to the heterogeneity in the quality of the labor force entering the market or varying economic conditions across different countries.

The coefficient for worked hours is 0.00324 with a standard error of 0.000973. This relationship is statistically significant at the 1% level, indicating a robust positive association between the number of hours worked and labor productivity. The positive coefficient means that, on average, an increase in the number of hours worked per worker is associated with an increase in labor productivity. This finding underscores the importance of labor effort in driving productivity. It suggests that policies aimed at increasing working hours, or optimizing work schedules to ensure effective utilization of work hours, could potentially enhance productivity. However, it is also important to consider the potential downsides of increasing work hours, such as worker fatigue and reduced work-life balance, which might negatively impact long-term productivity.

The coefficient for spending on labor markets is 0.213 with a standard error of 0.142. This positive coefficient indicates that higher public spending on labor market programs is associated with higher labor productivity. However, the relationship is not statistically significant. While the positive direction of the coefficient suggests that investment in labor market programs, such as training and employment services, has the potential to enhance productivity, the lack of statistical significance means that this effect is not consistent or strong across all observations in the dataset. This might be due to differences in how effectively these programs are implemented or the varying needs of different labor markets.

V. CONCLUSION

The analysis conducted in this study offers a comprehensive examination of the factors influencing labor productivity across eight countries over the period from 2010 to 2019. By analyzing various labor market indicators, the research aimed to uncover the relationships between labor productivity and factors such as employment rate, labor participation rate, worked hours, and public spending on labor markets. The analysis was conducted using three distinct models: Western countries, Eastern countries, and a combined dataset. The findings of this study is as follows :

The dataset comprised 80 observations, with each country contributing an average of ten annual observations over the study period. The mean labor productivity across the sample was 1.132, with a standard deviation of 0.995, indicating considerable variability across countries and years. Employment rates averaged 68.48%, while labor participation rates averaged 78.556%. The average annual hours worked per worker was 1715.667 hours, and public spending on labor markets averaged 1.235% of GDP. These figures provided a comprehensive overview of the labor market conditions in the sample countries.

In Western countries, none of the examined variables—employment rate, labor participation rate, worked hours, and public spending on labor markets—showed a statistically significant relationship with labor productivity. The coefficients for these variables were positive or negative, but their t-statistics indicated that they did not significantly explain variations in labor productivity. Specifically, the employment rate had a coefficient of 0.104 with a t-statistic of 1.41, while labor participation had a coefficient of -0.104 with a t-statistic of -0.86. The worked hours and spending on labor markets had coefficients of -0.001 and 0.180, respectively, but neither was significant. The model explained only 8.9% of the variability in labor productivity, suggesting that other factors not included in the model might be influencing productivity in Western countries.

Contrary to the findings in Western countries, the analysis of Eastern countries revealed significant relationships. The employment rate had a statistically significant negative impact on labor productivity, with a coefficient of -2.075 and a t-statistic of -2.19, significant at the 5% level. This suggests that higher employment rates in Eastern countries may be associated with lower labor productivity, potentially due to the inclusion of less productive workers. Labor participation rates had a positive and significant effect, with a coefficient of 2.608 and a t-statistic of 2.15, also significant at the 5% level. Public spending on labor markets positively influenced productivity, with a coefficient of 5.341 and a t-statistic of 2.33. The model for Eastern countries explained a substantial 53.8% of the variability in labor productivity, indicating that these labor market indicators are critical determinants of productivity in these regions.

When analyzing the combined dataset, worked hours emerged as a significant predictor of labor productivity. The coefficient for worked hours was 0.003 with a t-statistic of 3.42, significant at the 1% level. This suggests that, across all

countries, an increase in the number of hours worked per worker is associated with higher labor productivity. Other variables, such as employment rate and labor participation rate, did not show significant relationships in the combined model. The employment rate had a coefficient of -0.032 with a t-statistic of -0.46, while labor participation had a coefficient of 0.132 with a t-statistic of 1.27. Public spending on labor markets had a positive but statistically insignificant coefficient of 0.213. The model explained 15.9% of the variability in labor productivity, indicating that worked hours is a key driver of productivity across the sample countries.

The findings highlight the complexity and regional variability in the determinants of labor productivity. In Western countries, the lack of significant relationships suggests that factors outside the examined labor market indicators might be more influential. These could include technological advancements, capital investments, and educational attainment, which are traditionally higher in Western economies. In Eastern countries, the negative impact of employment rates on productivity may reflect the inclusion of less productive workers into the workforce. The positive effects of labor participation and public spending on labor markets underscore the importance of active labor market policies and the inclusion of productive workers. These findings suggest that Eastern countries could benefit from policies that enhance the quality and productivity of their workforce, such as targeted training programs and incentives for high-skilled employment. The combined dataset analysis underscores the significance of worked hours in driving labor productivity. This finding aligns with the notion that longer working hours contribute to higher output, although it also raises questions about work-life balance and the potential diminishing returns of excessive working hours. Policymakers should consider the optimal balance between working hours and productivity, ensuring that increases in working hours do not negatively impact workers' well-being and long-term productivity.

In conclusion, this study provides valuable insights into the factors influencing labor productivity across different regions. The varying significance and direction of relationships between Western and Eastern countries highlight the importance of regional context in policy formulation. For Western countries, the focus may need to shift towards innovation and technological improvements, while Eastern countries may benefit from enhancing labor market policies and workforce quality. The positive relationship between worked hours and productivity in the combined dataset suggests that managing working hours effectively could be a crucial strategy for improving productivity. Future research could expand on these findings by exploring additional variables and longer timeframes, offering a more comprehensive understanding of the dynamics of labor productivity.

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