Correlation between Wages and House Prices: an Analysis of Regional Differences in the Czech Republic

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Abstract

Background: The real estate market in the Czech Republic exhibits significant differences among regions, especially in terms of the influence of economic factors such as wages on property prices. Wages are one of the key determinants of house prices, but their influence may vary across regions and over time. It is important to further understand the dynamics between wages and house prices at the regional level.

Objective: This study seeks to investigate whether and how the impact of wages on house prices varies among regions and how it changes over time.

Methods: The fixed effects panel regression with interaction terms was used to account for regional and time effects. The model includes lagged house price values to better capture market dynamics over time. Interaction terms between wages and regions allow for the detection of region-specific effects. The Newey-West correction was used to control for heteroskedasticity and autocorrelation.

Results: In some regions, such as Prague, factors other than wages (e.g. lack of supply and high demand) may play a more significant role. The analysis also confirmed that house prices exhibit time inertia, which means that past price developments have an impact on the current market.

Recommendation: It is recommended to focus on promoting affordable housing in regions with high prices and on investment opportunities in emerging regions where wages and house prices are growing more steadily.

Practical relevance: This study provides insights into regional differences in the Czech Republic's housing market. These insights are valuable for regional housing and economic development strategies Policymakers can use this knowledge to better respond to affordable housing challenges.

Originality/value: This study provides an original analysis of the impact of wages on house prices, with an emphasis on regional specificities and time trends, allowing for a deeper understanding of regional dynamics in the housing market in the Czech Republic. This analysis provides useful insights for future research and for practical applications in real estate market and regional policy decision-making.

Keywords
house prices, wages, regional differences, panel regression, Czech Republic, affordable housing

JEL Codes
L33, H59, Q15

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Introduction

Real estate prices in the Czech Republic have shown significant regional differences in recent decades, which are due to a number of economic factors. One of the key determinants, often discussed in connection with trends on the real estate market, are the average wages of the inhabitants of the individual regions. This article addresses the correlation between average wages and property prices across different regions of the Czech Republic, in the context of examining, analyzing, and synthesizing regional differences and their causes.

Property prices are influenced by a wide range of factors. Among the most important price drivers are macroeconomic indicators such as gross domestic product (GDP), unemployment rate, inflation, and especially wages (Ting, 2017). Wages, as one of the main economic indicators, have a direct impact on the purchasing power of the population and the demand for real estate. It can be assumed that these factors are subsequently reflected in market prices. Therefore, regional differences in wage levels can play a crucial role in creating price differentiation in the real estate market.

Regional differences in property prices can also be a signal to investors interested in the profitability of property investments in different locations. They provide useful information for individuals who are considering buying a property to own. Thus, this research provides new empirical evidence on the link between wage trends and property prices in the Czech Republic, while contributing to the understanding of property market dynamics.

The paper aims to explore wage-property price correlations and regional variations within the Czech Republic. For the purposes of this research, the following hypotheses were formulated:

H1: There is a positive correlation between average wages and real estate prices in the individual regions of the Czech Republic.

H2: There is a positive correlation between average wages and property prices depending on the location and level of economic development of the region.

H3: The correlation between wages and house prices is stronger in highly urbanized regions, such as the capital city of Prague, than it is in less developed regions.

This paper focuses on testing these hypotheses and formulating recommendations for policymakers and investors who want to better understand the regional dynamics of the Czech real estate market.

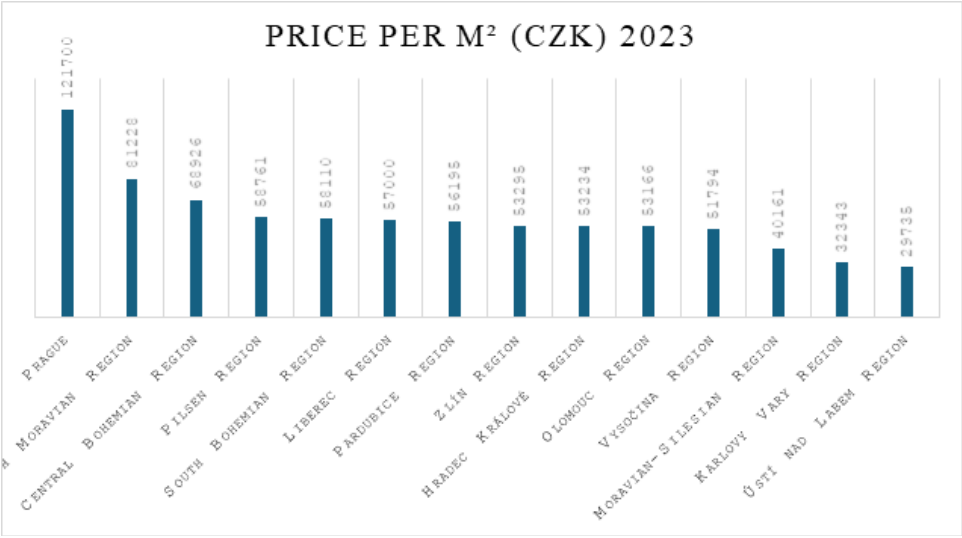
The paper addresses price-setting factors affecting real estate prices through a systematic literature review and is structured as follows: the Introduction provides an introductory view of the issue and justifies the importance of examining the relationship between wages and real estate prices, with a focus on regional differences in the Czech Republic. The Literature Review presents the views and attitudes of world authors on the topic of pricing factors in the real estate market and focuses on identifying the main determinants influencing real estate prices and wage levels in the different regions. The Data and Methodology section presents a methodological approach to the research, including the chronology, analytical methods used, and models applied for investigating the relationship between wages and property prices. It presents the steps and techniques that were used in the processing of the data. The Research findings and discussion section presents the main findings of the research performed, including the correlations found between wages and property prices, and discusses how this relationship varies among the different regions of the Czech Republic. The Conclusion summarizes the key findings and offers an interpretation of the results in a broader context, including possible implications for market participants and policymakers. The author's intention is to present deeper insights into the relationship between wages and property prices and to provide valuable insights into regional market dynamics. These may be useful for future research and practical applications.

1. Literature review

Location is one of the strongest factors influencing property prices. The quality and attractiveness of a location play a major role in determining the type of buyers or tenants a property attracts, which is then reflected in the resulting market value. Location can influence property prices through proximity to the city center, accessibility of transportation, or access to key services and amenities. Amenities, including access to schools, health facilities, or shops, for example, are closely linked to location. Location is considered to be one of the most important factors in determining the price of real estate (Kaynak & Stevenson, 1982; Yusuf & Resosudarmo, 2009; Zabel & Kiel, 2000; Opoku & Abdul-Muhmin, 2010). Moreover, research shows that most buyers consider location a key factor in deciding the price of a home (Raden et al., 2015).

In the Czech Republic, house prices vary significantly by region. Traditionally, prices are highest in Prague, whereas they are almost half as high in most other regions (see Figure 1).

Figure 1: Average prices per m² for flats in the individual regions in 2023



Source: Deloitte Real Index Q4 2023

The differences in average price per square meter among regions in the Czech Republic are obvious at first glance. The highest average price per square meter is found in the Capital City of Prague, while the lowest prices are seen in the Ústí nad Labem Region. This regional variation shows the significant influence of location on the market value of real estate.

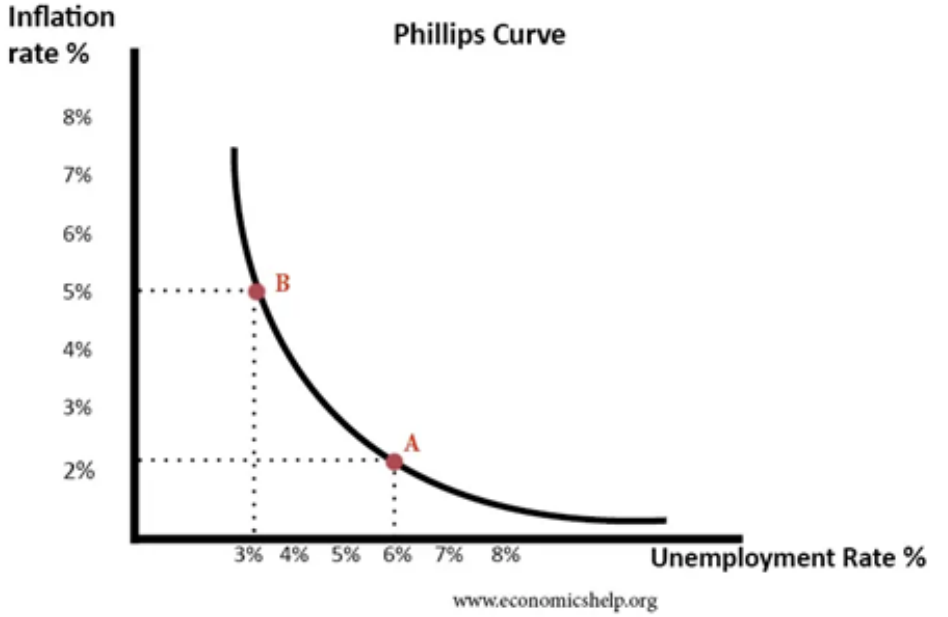
In addition to the attractiveness of the location and the amenities, the quality of public services also plays an important role and can significantly increase the value of residential property and contribute to its price growth. Public services in the context of property prices include a wide range of services provided by the state, municipalities, or other public institutions. These services provide added value to local residents and their availability is a key factor in determining property prices. The main types of public services that affect residential property prices include:

- Transportation infrastructure: includes access to roads, public transportation, and the rail network, facilitating mobility and increasing accessibility.
- Educational facilities: nurseries, primary schools, secondary schools, and universities that attract families and support stable housing demand.
- Healthcare facilities: hospitals, clinics, and pharmacies providing easy access to healthcare. These are seen as a key factor in the quality of life in the area.
- Security services: include local police and fire stations, which increase the sense of security and ensure the protection of residents.
- Social and cultural facilities: parks, libraries, community centers, and other public spaces that contribute to community life and enhance the environment.
- Technical infrastructure: water supply, sewerage, electricity, and high-speed internet access – all essential for comfortable living and a modern lifestyle.

Martz et al. (2006) found that the extent of available public services significantly influences the decision to purchase a property. Following this, a study by Liu et al. (2022) analyzed the effects of public services on property prices using a large sample of 155,845 residential sales transactions in Beijing over the period 2012-2019. The results showed that higher service quality indeed creates a premium in property value. The higher the quality of services, the higher this premium in house price, whereas this premium continuously increased over the reference period. This study also shows that the contribution of the quality of public services to property value is greater for higher-priced or larger houses, relatively newer buildings, or properties farther away from the city center. Amenities include other elements such as cultural attractions, sports centers, shopping facilities, or hospitals, which also contribute to the attractiveness of a location (Huang et al., 2020; Jang & Kang, 2015). The availability of employment opportunities is also an important factor influencing the price of real estate. For example, a study by Vágó et al. (2024) showed that after the opening of a Mercedes factory, property prices in an area increased by 39 percentage points between 2010 and 2017 compared to a hypothetical scenario without this investment. These studies confirm the importance of public services and employment as key factors that significantly affect property values and contribute to their market attractiveness.

House prices are closely linked to the overall state of the economy, so it is important to mention the Phillips curve (Phillips, 1958), which shows a significant negative relationship between wage inflation and the unemployment rate, while also tracking the rate of change in unemployment. This relationship illustrates that with lower unemployment comes higher wage inflation (see Figure 2).

Figure 2: Phillips curve



Source: Phillips Curve Explained - Economics Help

This phenomenon significantly impacts the real estate market through two main mechanisms. The first mechanism is the influence of overall inflation, which raises not only wage costs but also the prices of construction materials. Higher construction costs for new properties consequently drive price growth in the real estate market. The second mechanism involves the effect of rising employment and wage growth, which increases the purchasing power of the population, thereby boosting demand for real estate. This increase in demand leads to further price growth in the real estate market (Baptista et al.,2023). Together, these two mechanisms amplify the impact of wage and price inflation on the real estate market, resulting in further price increases in this sector.

Examining the relationship between regional unemployment rates and housing affordability, measured by the ratio of property prices to average wages, provides an interesting approach to analyzing the economic potential of regions. Unemployment is a key indicator, reflecting not only the economic capabilities of a region but also its potential for future development. In practice, it has been observed that higher unemployment rates are often associated with lower core property prices, as noted by Dráha (2014). Authors Marinković et al. (2024) found that average wages and unemployment rates in Serbia are among the significant determinants of property prices. Similarly, Laurinavičius et al. (2022) conducted research on the impact of macroeconomic factors on property prices in Vilnius from 2006 to 2019. Their findings suggest that rental housing prices, among other factors, are influenced by average wage levels. These studies confirm the importance of employment and wage levels as crucial economic variables affecting the market value of real estate in a regional context.

2. Data and methodology

This study utilized quarterly panel data covering information on property prices (residential units) and wages across regions of the Czech Republic for the period 2015 to 2023. The objective of this analysis was to examine how wage growth affects housing prices in different regions. The time series were normalized with a base index of 2015=100, allowing for relative changes over the reference period to be observed. The data was sourced from the database of the Czech Statistical Office (ČSÚ, 2024), which provides a detailed overview of developments at the regional level. This approach enables a comparative analysis between regions.

To test the relationship between wages and property prices, a panel regression model with fixed effects (Fixed Effects Model) was employed, specifically a fixed effects panel regression with interaction terms between the wage index and regional variables. This model accounts for fixed effects by region and time effects, controlling for unobserved heterogeneity across regions and years. The interaction terms between the wage index (Log_Wage_Index) and regional dummy variables reveal how the relationship between wages and property prices varies across regions. econometric models were created in Gretl software.

Additionally, lagged values of property prices were included in the model to control

for time effects and real estate market dynamics. A robust model with the Newey-West estimator was used, which effectively controls for heteroskedasticity and autocorrelation while retaining the interaction terms. This robust model demonstrates a high R-squared value (0.994), indicating that the model explains a substantial portion of the variability in the data while accounting for both time and regional variability.

The results show that the lagged value of Log_Price_Index has a strong positive and statistically significant association, suggesting the presence of temporal inertia in housing prices. This dynamic is more accurately captured in the model with robust standard errors, providing more stable estimates by accounting for potential temporal and regional influences on the real estate market.

2.1 Model development

A model development approach was selected for analyzing the relationship between the wage index and the price index across different regions, taking into account temporal trends and regional specifics. Below is a detailed description of the methodology. The study utilizes panel data and applies fixed effects for regions and time periods (years, quarters), enabling the model to control for inter-regional variability and temporal factors. The autoregressive component of the model includes the dependency of current values of the price index (Log_Price_Index) on values from previous periods, which better captures the dynamics of price trends. The interaction terms between the wage index and regional variables allow the model to account for varying effects of wages on housing prices across regions, contributing to a more detailed understanding of regional differences. The model uses Newey-West robust standard errors, which are essential for controlling for autocorrelation and heteroskedasticity in residuals, ensuring more accurate and stable estimates.

The model was tested for the presence of autocorrelation, heteroskedasticity, and multicollinearity, yielding the following important findings:

- The Durbin-Watson statistic demonstrated that the model's autoregressive component effectively removed autocorrelation, contributing to the stability and reliability of the results.

- The Breusch-Pagan test confirmed the presence of heteroskedasticity; however, the use of Newey-West standard errors effectively addressed this issue, ensuring the accuracy of estimates.

The proposed model was designed to reflect regional differences in housing price dynamics and to account for temporal inertia in property prices. These adjustments to the model allow for robust and reliable estimates, even in the presence of heteroskedasticity and autocorrelation. Based on these parameters, the model can be considered a valuable tool for analyzing the impact of wages on housing prices across regions, allowing for a deeper understanding of the price dynamics in the real estate market.

$$Log\_Price\_Index_{it} = \alpha + \sum_r \beta r \cdot C(Region)_r + \sum_t yt \cdot C(Year)_r + \delta \cdot Log\_Wage\_Index_{it} + \sum_r \theta r \cdot (Log\_Wage\_Index_{it} \, x \, C(Region)_r) + \lambda \cdot Lag\_Log\_Price\_Index_{it} + \epsilon it$$

Where the following applies:

- Log_Price_Index: Dependent variable representing a logarithm of property prices.
- C(Region): Regional fixed effects for each region (region-specific categories).
- C(Year): Temporal fixed effects for each year.
- Log_Wage_Index: Logarithmic wage index, the main independent variable.
- Log_Wage_Index × C(Region): Interaction terms between the wage index and regions, indicating how wage effects vary across regions.
- Lag_Log_Price_Index: Lagged property price value from the previous period to account for autocorrelation.
- ε_{it}: Model error for individual regions and years.

The above equation describes the relationship between property prices (in logarithmic form) and wages, accounting for regional differences, temporal trends, and lagged effects.

2.2 Research findings and discussion

The following model represents the result of the calculation.

Model 1: Fixed Effects Model

OLS Regression Results						
Dep. Variable:	Log_Price_Index				R-squared:	0.994
Model:	OLS Adj.				R-squared:	0.994
Method:	Least Squares				F-Method	3789.
Prob (F-statistic):	0.00					
Log-Likelihood:	1093.9					
No. Observations:	490					
Df Residuals:	453					
Df Model:	36					
Covariance Type:	HAC					
Durbin-Watson:	2.072	coef	std	err	t P>|t| [0.025	0.975]

Variable	Coefficient	Std. Error	t-Statistic	P-Value
Intercept	0,7666	0,182	4,223	0
C(Region)[T.Hradec Králové Region]	-0,0357	0,165	-0,216	0,829
C(Region)[T.Karlovy Vary Region]	-0,0059	0,239	-0,025	0,98
C(Region)[T.Liberec Region]	-0,2252	0,201	-1,12	0,263
C(Region)[T.Moravian-Silesian Region]	-0,0618	0,211	-0,293	0,77
C(Region)[T.Olomouc Region]	0,3082	0,174	1,771	0,077
C(Region)[T.Pardubický Region]	0,2104	0,159	1,327	0,185
C(Region)[T.Pilsen Region]	0,409	0,155	2,636	0,009
C(Region)[T.Prague]	0,4479	0,17	2,632	0,009

Variable	Coefficient	Std. Error	t-Statistic	P-Value
C(Region)[T.South Bohemia Region]	-0,1686	0,183	-0,922	0,357
C(Region)[T.South Moravian Region]	0,2781	0,172	1,615	0,107
C(Region)[T.Vysočina Region]	-0,0943	0,165	-0,571	0,568
C(Region)[T.Zlín Region]	0,225	0,191	1,181	0,238
C(Region)[T.Ústí nad Labem Region]	-0,8454	0,202	-4,184	0
C(Year)[T.2016]	0,0441	0,005	9,355	0
C(Year)[T.2017]	0,0687	0,007	10,474	0
C(Year)[T.2018]	0,09	0,009	9,991	0
C(Year)[T.2019]	0,1065	0,011	9,64	0
C(Year)[T.2020]	0,1451	0,014	10,56	0
C(Year)[T.2021]	0,2257	0,017	12,988	0
C(Year)[T.2022]	0,2303	0,023	10,195	0
C(Year)[T.2023]	0,1868	0,022	8,56	0
Log_Wage_Index	0,1026	0,04	2,562	0,011
Log_Wage_Index:C(Region)[T.Hradec Králové Region]	0,0086	0,034	0,257	0,797
Log_Wage_Index:C(Region) [T.Karlovy Vary Region]	-0,0028	0,048	-0,058	0,954
Log_Wage_Index:C(Region) [T.Liberec Region]	0,05	0,041	1,212	0,226
Log_Wage_Index:C(Region) [T.Moravian-Silesian Region]	0,0143	0,043	0,33	0,741
Log_Wage_Index:C(Region) [T.Olomouc Region]	-0,0623	0,036	-1,739	0,083
Log_Wage_Index:C(Region) [T.Pardubický Region]	-0,0436	0,032	-1,345	0,179
Log_Wage_Index:C(Region)[T.Pilsen Region]	-0,0832	0,032	-2,615	0,009
Log_Wage_Index:C(Region) [T.Prague]	-0,0898	0,035	-2,552	0,011
Log_Wage_Index:C(Region)[T.South Bohemia Region]	0,0367	0,038	0,978	0,329
Log_Wage_Index:C(Region)[T.South Moravian Region]	-0,0561	0,036	-1,577	0,115
Log_Wage_Index:C(Region) [T.Vysočina Region]	0,022	0,034	0,644	0,52
Log_Wage_Index:C(Region)[T.Zlín Region]	-0,0441	0,039	-1,127	0,26
Log_Wage_Index:C(Region)[T.Ústí nad Labem Region]	0,1803	0,042	4,322	0
Lag_Log_Price_Index	0,7297	0,027	27,24	0

Source: compiled by the author, Gretl

An R-squared value of 0.994 indicates that the model explains approximately 99.4% of the variability in the house price index (dependent variable). This result indicates a very good fit of the model to the data, which is indicative of how well it is able to describe the relationship between wages and house prices. The adjusted R-squared of 0.994 is very similar to the R-squared value, confirming that the model is well suited to the data, even when taking into account the number of predictors. The Durbin-Watson statistic of 2.072 is close to the value of 2. This indicates that there is no significant autocorrelation of residuals in the model. This value means that the model does not have a problem with autocorrelation between errors, which strengthens the credibility of the results. Most of the coefficients are statistically significant with p-values less than 0.05. This result suggests that we can say with high confidence that these variables have a real relationship with housing prices.

3. Interpretation of the results

Table 1 presents the interaction terms of the logarithmic wage index (Log_Wage_Index) with detailed descriptions. It provides an overview of the interaction effects between the wage index and each regional variable, showing how the impact of wages on house prices varies across regions.

Table 1: Log_Wage_Index interaction terms with detailed descriptions

Region	Log_Wage_ Index interaction coefficients	Description	Detailed description
Hradec Králové Region	0.0086	Very small positive effect: wages slightly influence prices in this region.	For every 1% increase in wages, housing prices increase by 0.0086% more than in the baseline region.
Karlovy Vary Region	-0.0028	Very small negative effect; wages have almost no influence on prices.	For every 1% increase in wages, housing prices increase by 0.0028% less than in the baseline region.
Liberec Region	0.0500	Small positive effect; wages slightly influence prices in this region.	For every 1% increase in wages, housing prices increase by 0.0500% more than in the baseline region.
Moravian-Silesian Region	0.0143	Very small positive effect; weak influence of wages on housing prices.	For every 1% increase in wages, housing prices increase by 0.0143% more than in the baseline region.
Olomouc Region	-0.0623	Negative effect; higher wages lead to lower prices in this region.	Housing prices in this region decrease by 0.0623% for every 1% increase in wages.

Pardubice Region	-0.0436	Small negative effect; wages decrease housing prices slightly.	Housing prices in this region decrease by 0.0436% for every 1% increase in wages.
Pilsen Region	-0.0832	Moderate negative effect; wages reduce housing prices in this region.	Housing prices in this region decrease by 0.0832% for every 1% increase in wages.
Prague	-0.0898	Negative effect; wages decrease housing prices in Prague.	For every 1% increase in wages, housing prices decrease by 0.0898% in Prague compared to the baseline region.
South Bohemia Region	0.0367	Small positive effect; weak influence of wages on prices.	For every 1% increase in wages, housing prices increase by 0.0367% more than in the baseline region.
South Moravia Region	-0.0561	Negative effect; wages slightly reduce housing prices.	Housing prices in this region decrease by 0.0561% for every 1% increase in wages.
Vysočina Region	0,0220	Very small positive effect, wages have a weak effect on prices.	For every 1% increase in wages, housing prices increase by 0.0220% more than in the baseline region.
Zlín Region	-0,0441	Moderate negative effect, wages have a small negative impact on prices.	Housing prices in this region decrease by 0.0441% for every 1% increase in wages.
Ústí nad Labem Region	0,1803	Large positive effect, higher wages lead to higher prices in this region.	For every 1% increase in wages, housing prices increase by 0.1803% more than in the baseline region.

Source: compiled by the author, Gretl

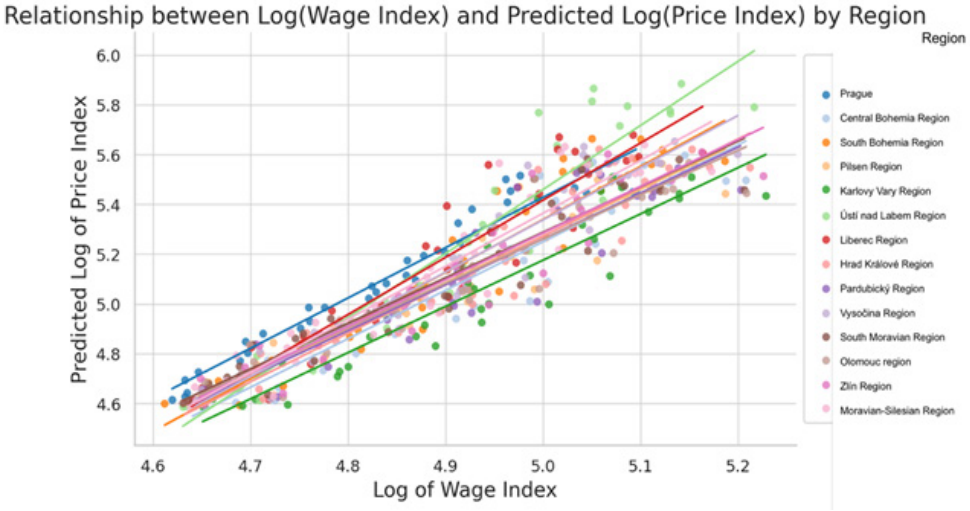
The model suggests that wages generally have a positive impact on housing prices but that this effect varies significantly across regions. For instance, a negative relationship between wages and housing prices appears in some regions, such as Prague. This indicates that other factors, such as limited housing supply, high demand, high cost of living, or specific regional economic conditions, may exert a stronger influence on housing prices in these areas than wages do. These factors may overshadow wage influences, driving up prices independently of local wage levels.

Coefficients for individual years: C(Year) [T.2016] to C(Year) [T.2023]. The coefficients for the C(Year) variables indicate the effect of each year compared to the reference year 2015 (which is not explicitly shown in the model). Each coefficient represents the difference in price index relative to 2015. For example, the coefficient value for C(Year) [T.2020] is 0.1451, meaning that the price index in 2020 was 0.1451 higher than it was in the reference year

2015. Positive coefficient values for the individual years indicate an overall upward trend in housing prices over time. This trend signifies that the housing prices exhibited annual growth. However, this growth may likely be driven by increasing demand, inflation, rising construction costs, or other economic factors over the period. This price increase may also be influenced by specific macroeconomic conditions, such as interest rates or changes in mortgage availability. The trend confirms that housing prices tend to rise each year. The model effectively captures the price dynamics in the Czech Republic's real estate market between 2015 and 2023.

In addition to the main model, a simple linear relationship between wages and property prices was analyzed to identify the direct correlation between these two variables, without accounting for additional factors such as regional specifics or temporal trends. The results of this linear analysis provided insight into the basic relationship between wage growth and changes in property prices. This approach helped confirm the general positive impact of wages on property prices – higher wages often correlate with higher housing prices, suggesting that wage growth contributes to increased housing demand and, consequently, to rising prices in the real estate market. **Thus, the linear relationship provided a simplified view of the issue that supports the initial hypothesis of a positive correlation between wages and property prices.**

Figure 3: Relationship between Log_Wage_Index and Predicted Log_Price_Index by region



Source: Author analysis, Gretl

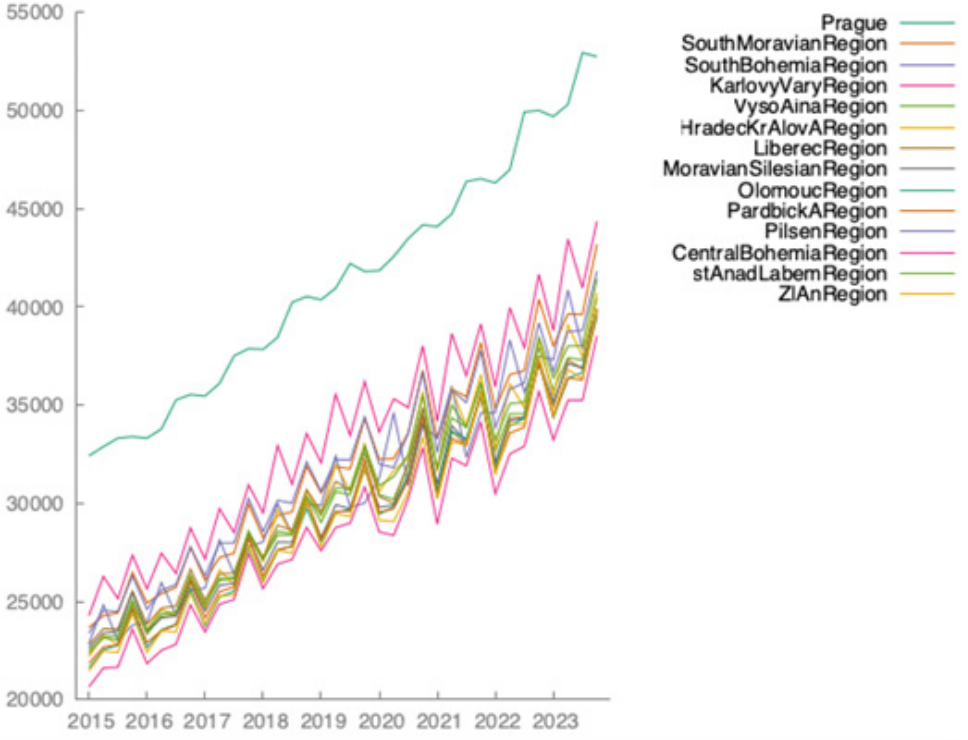
The graph indicates a positive relationship between the logarithmic wage index and the predicted logarithmic price index across different regions. This suggests that higher wages are associated with higher housing prices in all regions. However, this relationship represents only a basic view of the association between wages and property prices, without considering other key factors.

Limitations of the graph: The graph only displays a simple linear relationship between wages and property prices without accounting for regional differences, time effects, or lagged price values. In other words, it shows only the current relationship between wages and prices without incorporating historical trends or time dynamics that could significantly influence the results. Additionally, the graph does not include interaction terms that would help reveal how the relationship between wages and prices varies by specific region or over time.

Difference between Model 1 and Figure 3: Model 1 incorporates regional fixed effects, time effects, and lagged variables, taking into account specific factors for each region and time period. Thus, Model 1 provides a more in-depth analysis that includes historical price changes and the impact of previous periods, while Figure 3 shows only the current relationship between wages and prices, offering a static view. Moreover, Model 1 includes interaction terms between wages and regions, allowing for an analysis of how the impact of wages on property prices varies between regions. Figure 3, however, shows only the average relationship, potentially concealing specific regional differences essential to understanding the full dynamics of the real estate market. In summary, Figure 3 provides a general view of the relationship between wages and property prices, albeit limited to a simplified and static perspective that does not account for the complex dynamics of regional and temporal factors. In contrast, Model 1 offers a more detailed analysis, taking time trends and regional specifics into consideration, which allows for a deeper understanding of the factors influencing the real estate market.

An interesting perspective on wage growth across regions is shown in Figure 4, which highlights a nearly identical trend across all regions except Prague. In Prague, a distinct trend can be observed, suggesting that wages in the capital city have grown at a different rate than in the rest of the country. This specific trend may result from a higher concentration of economic opportunities, above-average demand for jobs, and generally higher living costs, which are common in Prague compared to other regions.

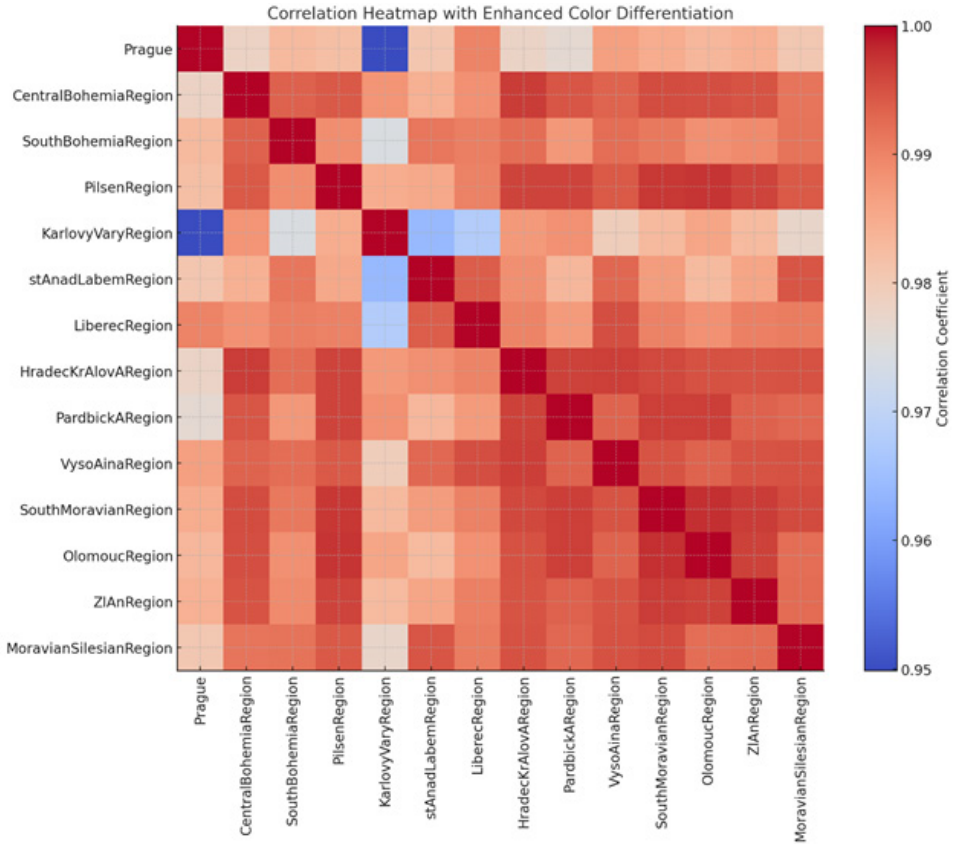
Figure 4: Wage trends by region



Source: Author analysis, Gretl

The unique trend in Prague underscores regional wage differences that may be important when examining the influence of wages on property prices. As the economic and administrative center of the country, Prague exhibits characteristics that may significantly impact wage growth and, in turn, the dynamics of housing prices. This is followed by a correlation matrix.

Figure 5: Correlation matrix between regions



Source: Author analysis, Gretl

The values between regions show very strong positive correlations, depicted in dark red. Most values reach levels close to 1, indicating that the regions display nearly identical behavior in the observed factor, with minimal variability between them. Exceptions include certain values around 0.9, suggesting a slightly lower correlation between certain regions. Still, the relationship remains strong. For this reason, the model could be adjusted to better account for this regional homogeneity and adapt to the small differences that may be relevant to regional analysis. This adjustment would allow for a more accurate interpretation of regional variations, thereby providing a more detailed view of the dynamics of property prices across regions.

Based on the above findings, the following comments can made regarding the hypotheses:

H1: There is a positive correlation between average wages and property prices in various regions of the Czech Republic. The results of the model confirm a strong positive correlation between average wages and property prices. Higher wages are associated with higher property prices, suggesting that wage growth supports housing demand and the ensuing price increases. This hypothesis is supported by the results of the analysis.

H2: The relationship between wages and property prices varies depending on the economic development and location of the region. The interaction terms between the wage index and regional variables indicate that the impact of wages on property prices is not uniform across all regions. For example, a different relationship was found in Prague, where other factors besides wages (e.g., limited supply and high demand) could affect housing prices. This hypothesis is also supported, as the results suggest regional differences in this relationship.

H3: In highly urbanized regions, such as the capital city of Prague, the correlation between wages and property prices is stronger than in less developed regions. Conversely, the results suggest that in Prague, the relationship between wages and property prices is not as pronounced as in other regions. In Prague, other dominant factors may have a greater impact on housing prices than wages. This hypothesis was not validated. The analysis suggests that the wage impact on property prices may be stronger in less urbanized areas than in the capital.

In summary, the analysis supports two of the proposed hypotheses, emphasizing that the impact of wages on property prices is highly region-specific and that additional factors may influence the market in certain areas.

4. Discussion of results

The discussion of the results confirms that the impact of wages on property prices is significant, consistent with numerous prior studies. Similar conclusions are noted by Laurinavičius et al. (2022), who found that an increase of one euro in net monthly wages in Vilnius leads to an increase in rental prices of 0.56 euro cents per square meter per month. This finding supports the notion that wages play a fundamental role in property prices. Other research, such as that by Malpezzi (1999), Capozza et al. (2002), and Meen (2002), also highlights the significant relationship between wages and property prices. Conversely, Gallina's study (2006), which employed a bootstrap method to test this relationship, concluded that a statistically significant relationship between wages and property prices could not be demonstrated. The findings of this study suggest that this relationship may not be universally applicable.

It is essential to consider the model's limitations in order for the results to be interpreted correctly. The model simplifies the relationship between wages and property prices by assuming a linear relationship between these variables. However, nonlinear relationships or complex interactions may exist that the model does not capture. Although the model considers regional and temporal effects, there remains the possibility that other significant factors – such as macroeconomic and microeconomic determinants, demographic changes, or specific housing policies – are not being taken into account. These factors may limit its accuracy.

Despite using the Newey-West correction for standard errors to address heteroskedasticity and autocorrelation, some forms of these problems may not have been fully accounted for. Thus, while this model is a valuable tool for examining the relationship between wages and property prices, the results should be interpreted with an awareness of its limitations and simplifications. Further research could explore nonlinear and more complex models that

might better reflect the intricacies of real estate market relationships. This model focuses exclusively on quantitative factors, such as wages and property prices, and does not include qualitative aspects like buyer preferences, lifestyle changes, or technological innovations, which can also influence property prices. However, this approach was chosen for several critical reasons.

Panel regression with fixed effects allows us to account for temporal and regional heterogeneity, which is essential for this research. This modeling approach enables the impacts of wage on property prices to be identified while controlling for differences across regions and individual years. Interaction terms also play a vital role, offering a deeper understanding of how different regions respond to wage changes. Without these interactions, regional specifics could be overlooked, leading to less accurate results. The inclusion of lagged property price values also ensures that the model accounts for market dynamics, which is essential for properly interpreting long-term trends. Without these temporal effects, conclusions about the influence of wages on property prices could be inaccurate.

While the model has its limitations, its flexibility and robustness in analyzing panel data and regional differences make it a suitable tool for examining the impact of wages on property prices. This approach provides a comprehensive quantitative perspective that, while not incorporating qualitative factors, offers valuable insights into the relationship between wages and prices within the context of the regional real estate market.

Conclusion

This study has focused on analyzing the relationship between wages and property prices in the Czech Republic, with an emphasis on regional differences and temporal trends. Using a panel econometric model with fixed effects and interaction variables, we found that the impact of wages on property prices varies significantly across regions and depends on specific time periods. This suggests that economic factors, such as wages, are not the sole determinants of property prices and that a broader context must be considered.

This research emphasized regional differences, examining how wages affect property prices across various Czech regions. Employing interaction effects allowed us to understand how this relationship varies by region, while the temporal effects in the model captured changes in property prices and wages over the years, bringing us closer to the dynamics of the real estate market. Including lagged property price values helped explain how historical price trends influence the current market state.

The use of panel regression with fixed effects and interaction terms enabled us to account for the specifics of individual regions and periods, contributing to a deeper understanding of the complex relationship between wages and property prices. An interesting finding of this study is that the influence of wages on property prices differs across regions – while in some areas this impact is positive, in others it may be negative.

In conclusion, the relationship between wages and property prices is complex and depends on a range of factors, including not only economic but also regional and temporal

variables. This study provides new insights into the dynamics of property prices in the Czech Republic and highlights the importance of considering regional specifics when analyzing the real estate market.

The objective of this study can be considered achieved. The study successfully analyzed the relationship between wages and property prices in the Czech Republic, with a focus on regional differences and temporal trends. The results of the analysis provide valuable insights into how wages influence property prices across different regions and how this impact changes over time. This research not only confirms hypotheses about the influence of wages on property prices but also provides new insights into regional differences. These findings may serve as a basis for further research or the development of regional strategies in housing and economic development.

Based on the findings of this study, several recommendations can be formulated for policymakers and investors who are interested in better understanding the regional dynamics of the real estate market in the Czech Republic:

- Focus on regional specifics – policymakers and investors are advised to approach the real estate market from a regional perspective, recognizing that the impact of wages on property prices varies across regions. For example, in Prague, factors other than wages – such as limited supply or high demand – may have a significant effect on property prices.

- Support affordable housing in low-wage regions – initiatives aimed at improving housing affordability in regions with lower wage levels could address regional housing disparities and help stabilize local markets.

- Offer investment opportunities in emerging regions with rising wages – investment in regions with rising wages and economic activity may have long-term growth potential, particularly as purchasing power and economic activity in these areas increase.

- Regularly monitor economic indicators – tracking economic indicators, such as wages, unemployment, and other macroeconomic factors, can help anticipate shifts in housing demand. This approach aids with predicting potential changes in property prices across different regions.

- Promote development of transportation infrastructure and services in regions – to support balanced development of the real estate market across the Czech Republic, regional policies could include investments in transportation infrastructure and public amenities in less developed regions. This would enhance the appeal of these areas to new residents and investors alike.

These recommendations can help policymakers and investors better navigate the complex dynamics of the real estate market and respond to regional specifics, with the goal of promoting the development of a sustainable and equitable housing market in the Czech Republic.

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