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Migration, Remittances, and Wage-Inflation Spillovers: The Case of Albania

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Abstract:
Motivated by migration phenomena and wage-inflation spillovers, we investigate the relationship between the two and the inflationary remittances built-in pressures. We establish a feedback loop between migration and inflation, and specify a simple dynamic model to identify the pass-through. Our empirical approach focuses on the wage Phillips Curve, price setting under monopolistic competition, and state space model for the natural unemployment rate. Our estimates suggest that overshooting inflation and tight labor market conditions increase wage-inflation sensitivity. A continuous decline of population by 1% leads to 98 basis points (BP) of inflation pressures in the short-run and 23 BP in the long-run. Remittances induce excessive pressures by 18 BP on inflation. Supportive schemes such as an older retirement age and higher labor force participation rate can partially mitigate inflationary.

JEL: J11, J21, J31, E24, E31
Keywords: labor market, demographics, inflation, wage, remittances, feedback-loop

1. Introduction

The surge in global inflation since 2021 has sparked renewed the academic interest in exploring the determinants of price level movements. Inflation has remained low across the world for a considerable period of time (Jorda and Nechio 2020), but has risen in recent years Kamdar (2022). Factors contributing to this trend include supply chain disruptions caused by the COVID-19 pandemic, commodity and input price spikes resulting from the invasion of Ukraine, and tight labor markets pushing higher wages [(Giovanni, et al. 2022), (Maurya, Bansal and Mishra 2023), (European Commission 2022), (OECD 2023) and (Vacas-Soriano and Kostolny 2022)]. In emerging markets, prices might be more reactive to external developments in commodity and food prices, exchange rate volatility and domestic pressures from the labor market compared to advanced economies.

With this in mind, we aim to investigate the link between labor market tightness and inflation in Albania, which is specific case due to high levels of migration and an aging population (ILO 2022). Albania is among top 20% of countries with the largest migration rates and remittances inflows in the World (see Figure A1 and A2 in Appendix). Given the possibility of induced inflation through remittances (Narayan, Narayan and Mishra 2011), we seek to explore whether migration features inflationary pressures. Our paper has three primary objectives: (1) to determine whether wage sensitivity to inflation increases as the labor market overheats; (2) to examine the spillover of inflation into nominal wages and vice versa; and (3) to assess the inflationary costs of demographic shrinkage and remittance externalities, and to determine whether they can be mitigated.

We have implemented a simple dynamic model strategy recently introduced by Bernanke and Blanchard (2023). Our approach consists of combining well-known economic theory and empirical approaches. Specifically, we examine: (i) the labor market cyclical conditions using the reduced form approach described in (Crump, et al. 2019); (ii) the price formation system of monopolistic competitions market, with the price being a function of normal costs with some mark-up and inflation a composite of domestic prices and imported prices; and (iii) the labor supply in the long-run estimated in line with demographic shifts.

To address our first research question, we employ a wage Phillips Curve in 10-year rolling windows, which is a widely used technique for estimating wage elasticity given inflation and labor market conditions, as exemplified by (Carstens 2022). We then, specify the empirical version of the model to allow for spillovers between the labor market and the price formation process in order to answer our second research question. Finally, we simulate a migration shock along with supportive schemes such as raising the retirement age and increasing labor-force participation rate to answer our third research question.

By employing a holistic method, we have found that the COVID-19 pandemic has further tightened the labor market conditions, and the migration of young people may have contributed to the overheated labor market. Our results indicate that the sensitivity of wage elasticity to inflation has increased by 10 basis points on average after 2020. Our analysis supports the presence of spillover effects of inflation into nominal wages and vice versa. Furthermore, we find that on average, a decline in population for years leads to higher inflation. Some long-term inflationary costs of migration could be mitigated by implementing support schemes. However, this finding remains blurred if we simultaneously factor in remittances externalities. Indeed, our data indicates that remittances induce 91 basis points of wage inflation pressures in the short-run and 38 basis points in the long-run. Remittances induce excessive price inflation pressures by 18 basis points.

To our knowledge, this paper is among the first to study the long-lasting inflationary costs of population shrinkage with the feedback loop and remittances effects built in. By going beyond the more-familiar causation demographic contraction-wage-inflation, we materialize the spillovers of remittances inflows in the wage Philips curve setting. Albania provides a unique country case to study the phenomena, as it is facing a second migratory cycle.

The remainder of the paper is organized as follows. Section 2 presents a literature review, Section 3 describes the data and methodology used, Section 4 presents the results, and Section 5 concludes.

2. Literature review

The increase in inflation during 2021 has prompted a surge in research into the drivers of this trend, as well as the potential duration of inflation overshooting. Much of this research started with Phillips Curve (Phillips 1958) slope. The slope of the Phillips curve has been questioned over time [(Coibion and Gorodnichenko 2015), (Blanchard 2016), and (Negro, et al. 2020)], but recent estimates suggest that it has steepened (Ari, Garcia-Macia and Mishra 2023), (Hazell, et al. 2022), and (Hobijn, et al. 2023). A variety of approaches, such as structural or semi-structural models, time-varying parameters, and ad-hoc sub-samples, have been employed to analyze inflation.

Gagliardone and Gertler (2023) utilize a DSGE model that allows for unemployment, real wage rigidity, oil prices and demand shocks. They acknowledge that the model provides a good explanation of unemployment and inflation since 2010, including the recent inflation surge. Furthermore, they explain that this surge was a combination of oil price shocks, “easy” monetary policy, demand shocks and shocks to labor market tightness. The poor elasticity of substitution between oil and labor is significant for the quantitative impact of the oil price shock. Also, Del

Negro, et al (2020) rely on DSGE and SVAR. Both methodologies provide the two same conclusions. First, the slope of the Phillips curve has decreased significantly since 1990, while it has not reached zero. Second, structural changes may have affected inflation's cyclical sensitivity, but this evidence is weaker. A similar conclusion is obtained by Inoue, Rossi, and Wang (2022). They find that the weakening of the cyclical relationship between unemployment and inflation is due to a flattening of the Phillips curve over time. Using local projections and instrumental variables models with time-varying parameters, they find that during the recent pandemic, the flattening has reverted, and the Phillips curve is coming back. This is likely to put pressure on goods prices and wages in the medium and long term.

Bergholt et al. (2022) estimate structural shocks in constant-parameter VARs using sign limitations; next, they study changes in the Phillips curve over time using inflation and unemployment data purged by the relevant shocks in either sub-samples or rolling windows for US economy. Also, Carstens (2022) makes use of the rolling windows technique for the Euro area, concluding that the price spillovers to wages are increasing after the pandemic.

Using sectoral data from 24 advanced economies in Europe, Ari, Garcia-Macia and Mishra (2023) highlight a steeper Phillips curve. Post-pandemic Phillips curve estimates indicate some steepening in the UK, Spain, Italy, and the euro area as a whole, but at magnitudes that are too small to explain the entire surge in inflation in 2021–22. This result for advanced and emerging European nations is supported also by McGregor and Toscani (2022) and Baba et al. (2023). They discover that Phillips curves based on historical data and energy and other commodity prices dynamics can only account for around half of the increase in inflation in 2022.

Ball, Leigh and Mishra (2022) decompose inflation into two components: core inflation (median inflation) and a residual component (the difference between headline inflation and median inflation). They discover that a significant portion of the upsurge in median inflation can be attributed to the tightness observed in the labor market. They estimate that a 1.5 percentage point increase in the unemployment rate will result in a 2.9 percentage point increase in core inflation. Furthermore, they conclude that only under the most optimistic scenario would inflation return to target.

Some studies make use of simple equations model, likewise. Cecchetti, et al. (2023) use datasets from 1950 for Canada, Germany, the United Kingdom, and the United States. Similar to our approach, they construct a simplified model to comprehend the inflation process. Based on a simple three-equation model [see also Carpenter, et al. (2022)], namely IS curve, Taylor rule, and Phillips Curve, they provide estimations for unemployment gap, monetary policy reaction, and inflation trend. The authors conclude that using data starting in the 1960s exhibits a greater persistence of inflation shocks, as well as a greater sensitivity of inflation to slack.

In the same spirit, Bernanke and Blanchard (2023) formulate and estimate a concise dynamic model that encompasses prices, wages, and inflation expectations. Their findings reveal that the predominant cause of the inflationary surge that emerged in 2021 was attributed to shocks pertaining to prices in relation to wages. However, while labor market tightness has not been the primary catalyst for inflation, it is noteworthy that the enduring effects of overheated labor markets on nominal wage growth and inflation surpass the effects of shocks originating from the product market.

Overall, while these papers perform sophisticated measurements of labor market tightness and inflation and underline the role of structural changes, none of these papers allow for migration patterns over time and remittances implications, which is instead the main contribution of our paper. Even though several studies acknowledge the contribution of migration and remittances on labor market and inflation.

Khurshid, et al. (2018) analyze data from 58 economies spanning the years 1988 to 2014. Their findings revealed that the impact of remittances on inflation is contingent upon the specific economic context of each country. In low and lower-middle-income economies, remittances were found to have an inverse and significant effect on inflation, suggesting that they exerted a dampening influence on price levels. In contrast, middle-income economies exhibited a direct and significant impact of remittances on inflation, indicating that remittances contributed to rising prices in these contexts.

Petreski, Oviedo and Cancho (2019) investigate the determinants of reservation wages and the wage gap in North Macedonia. Their results indicate that in cases where the households receive remittances, reservation wages are higher than the market suggests. They find that remittances can raise the reservation wage by 2.1 up to 5.6 percent for the beneficiaries. Also, Narayan, Narayan and Mishra (2011) find evidence that remittances induce inflation in developing countries, suggesting that the effect of remittances on inflation is more pronounced in the long-run.

The opposite effect is found by Kochovska (2020). She estimates that receivers of other sources income have 32.0 per cent lower reservation wage. Rivera and Tullao (2020) find that in the short term, rising inflation in the Philippines prompts higher remittance flows, driven by altruistic motives to support family consumption. The study disproves the idea that remittances directly cause inflation, and shows that inflation encourages more remittances, and these remittances are not necessarily inflationary.

3. A simple model of wage – inflation

To investigate the price formation process without imposing too much structure, we employ a wage-price set-up model. We provide stochastic estimates for nominal wages, domestic prices, and evaluate labor market cyclical conditions in our model. When combined with deterministic estimates of foreign prices, labor supply, and labor demand, determines both short-run and long-run wage-inflation spillovers. Our simple model becomes dynamic by expressing our stochastic estimations in terms of autoregressive components. Furthermore, we add demographic factors and provide measurements of labor market shocks to account for the forces impacting inflation more directly.

3.1 The unemployment gap

We start by estimating the cyclical conditions using the reduced form approach described in Crump, et al. (2019). To estimate the natural rate of unemployment, this approach relies on aggregate inflation and Phillips curve relationships. Inflation Phillips curve links inflation deviation to expectations, deviations of unemployment from its unobserved natural rate, and a set of supply shocks.

Specifically, in state-space form with Kalman Filter technique, the measurement equation represents observed inflation, expressed as a deviation to the official inflation target of 3%, and the transition equations consist of the unemployment gap and the unemployment trend. Inflation expectations are modeled in the Phillips curve by previous inflation differentials - backward looking expectations (eq. 1.1). Along with the unemployment gap, we're considering the unemployment rate differential since rapid unemployment turns can affect inflation regardless to labor market cyclical position. Supply shocks consist of import prices, oil prices and trade openness. The unemployment gap is determined as the difference between natural unemployment rate and the actual rate (eq. 1.2). Here, we differ from how most other literature calculates it as this way helps us capture better the tightness of labor market. Natural unemployment rate is defined as a first order autoregressive process (eq. 1.3).

$$\Delta inf = \delta_1 \Delta inf_{t-n} + \delta_2 (un^* - un)_t + \delta_3 \Delta un_{t-1} + \delta_4 ss_{t-k} + e_{1t} \quad (eq.\ 1.1)$$

$$un\_gap_t = un_t^* - un_t \quad (eq.\ 1.2)$$

$$un_t^* = \delta_5 un_{t-1}^* + e_{2t} \quad (eq.\ 1.3)$$

Where, inf – inflation rate, un* - natural unemployment rate, un - unemployment rate, ss – supply shocks, un_gap – unemployment gap. Because autoregressive terms and supply shocks might affect inflation at different time intervals, we name them 'n' and 'k' lags. On average we provide 4-lags for 'n' and 2-lags for 'k'. Inflation differentials are explained by the variables in the Phillips Curve, with the remainder divided between the unemployment gap and the error term. Put another way, the variance proportions of natural unemployment rate 'un^*' and error terms 'e_1' and 'e_2' determines the unemployment gap and unemployment trend. A low variance value for the unobserved contrasted to the variance of errors leads to less volatile natural unemployment rate and lower errors in the Phillips curve.

3.2 The wage equation

First, we specify the wage equation as a standard one. Nominal wages grow in line with labor productivity developments, labor market cyclical conditions (previously estimated) and past inflation (eq. 2.1). Explanatory variables enter as a 4-quarter moving average for two particular reasons. First, to smooth volatility and to capture the trending behavior [see Raudys, Lenčiauskas and Malčius (2013)]. Similarly, Bernanke and Blanchard (2023) express labor productivity as 8-quarter moving average. Second, we can capture the dynamic relations between time series with a small number of parameters [see, Lutkepohl (2006) and Foroni, Marcellino and Stevanovic (2019)]. The autoregressive term stands for the rigidities in the labor market. The cyclical condition is specified in its first difference in order to capture the so called "speed effect". Inflation is based on the consumer price index.

$$wn = \alpha_1 wn_{t-1} + \alpha_2 lp_{t-1,ma4} + \alpha_3 inf_{t-1,ma4} + \alpha_4 un\_gap_{t-1,ma4} + e_w \quad (eq.\ 2.1)$$

where, wn – monthly nominal wage, lp – labor productivity calculated as gross domestic product divided by number of employees, inf – inflation rate, un_gap – unemployment gap. Nominal wages and labor productivity are expressed in first difference of log-levels. As a result, the differences should be interpreted in terms of percentage points of growth rates. We express unemployment gap as the difference between natural rate of unemployment and unemployment rate, therefore higher unemployment gap corresponds to tighter labor market conditions.

Second, we modify our first specification to answer the question of whether receiving remittances induce inflation. Receiving remittances provides extra income for households, which may lead to a higher reservation wage, resulting in a higher labor market wage. We assume that the nominal wage depends on remittances dynamics. Specifically, we approximate this influence with the ratio of remittances to GDP. Because both past and expected remittances influence workers decision-making today, the remittances variable is specified in both lags and leads, whereby the leads are used as a proxy for expected remittances. Thus, in the nominal wage equation the remittances variable enters a 5-term centered moving average with 2-leads, see equation 2.2 below.

$$wn = \alpha_{r1} wn_{t-1} + \alpha_{r2+} lp_{t-1,ma4} + \alpha_{r3} inf_{t-1,ma4} + \alpha_{r4} un\_gap_{t-1,ma4} + \alpha_{r5} rem_{t+2,cma,5} + e_{wr} \quad (eq.\ 2.2)$$

The first difference of each variable is included in the model as a technique to assure the long-run equilibria of both the labor market and the goods and services market, toward which the nominal wage gradually adjusts. The shock term derived from the stochastic estimation refers to all other unspecified factors that affect wages. This specification also assumes that when the equilibria is met, nominal wage growth will adjust to absorb the shocks.

Examination of these equations in rolling windows helps understanding the changing relative importance of factors over time. The parameter α_3 helps to appreciate the sensitivity of wage toward inflation. A non-zero value close to labor-market tightness verifies the presence of wage Phillips curve, and an increase of α_4 indicates its steeping. When we factorize for remittances indicators, the dynamics of α_{r5} capture the wage behavior over the migration cycle.

Finally, when we estimate our simple dynamic model, we allow nominal wage to fully adjust to past inflation, this assumption follows wage indexation draft law (Kuvendi 2022). In other words, the nominal developments do not affect the labor market fundamentals. Technically, we assume and calibrate the third parameter on the first and second equation to 1, as early explained in literature by Goldstein (1975). For more updated literature on wage indexation in Europe countries see (ECB 2022).

3.3 The price equation and inflation

We assume that inflation is a composed of inflation of domestically produced goods and services (domestic inflation) and inflation of imported goods and services (foreign inflation). The parameter Ω captures the share of domestic inflation in headline inflation.

$$inf_t = \Omega d\_inf_t + (1\text{-}\Omega)f\_inf_t \quad (eq.\ 3.1)$$

where, inf – inflation rate, d_inf – domestic inflation, f_inf – foreign inflation.

Further, we assume that domestic firms operate in monopolistic competitive market. Thus, the domestic price is a function of production costs with some mark-up. We approximate the costs by the unit labor costs and the oil price as an important input in production. While the mark-up is approximated with the cyclical condition. Unit labor costs represent the ratio of compensation of employee to labor productivity.

$$d\_inf_t = \beta_{1d} d\_inf_{t-1} + \beta_2 ulc_{t-1} + \beta_3 o\_inf + \beta_4 y\_gap_{t-1} + e_{di} \quad (eq.\ 3.2)$$

where, d_inf – domestic inflation, ulc – unit labor costs measured as the ratio of compensation of employees to labor productivity, o_inf – oil inflation, y_gap – output gap calculated by the production function approach (Skufi and Geršl 2023). We treat foreign inflation as an exogenous behavior. Putting the two equations above together yields our inflation equation:

$$inf_t = \beta_1 inf_{t-1} + \Omega(\beta_2 ulc_{t-1} + \beta_3 o\_inf + \beta_4 y\_gap_{t-1}) + (1-\Omega) f\_inf_t + e_i \quad (eq.\ 3.3)$$

where, inf – inflation rate, d_inf – domestic inflation, ulc – unit labour costs, o_inf – oil inflation in domestic currency, y_gap – output gap–, f_inf – foreign inflation approximated with import deflator, which reflects both exchange rate effects and foreign prices of trading partners and includes imported goods and services in the CPI basket. In our specification, wages are transmitted to inflation through the costs channel of domestic prices. A high value of omega, indicate a strong influence of domestic developments on inflation and a low influence of foreign pressures. The parameter β_1 affects the degree of persistence of a shock on inflation.

In the long-run both the wage inflation and price inflation deviation are zero, independent from the value of parameters. The higher the persistence and share of domestic inflation, the longer it will take for the economy to absorb the shocks it faces. An episode of continued shock results in new wage growth and inflation rate. Other things equal, constant migration would result in long-term wage inflation pressure. When the population declines, the model estimates the evolution of labor supply, wage, and inflation.

The transmission of population developments is in our simple model achieved through the wage equation. Basically, labor supply is determined as a product of exogenously given population, which is impacted by migration, working age population rate, and participation rate. Labor supply altogether with labor demand determine the unemployment rate which enters the wage equation through the unemployment gap, assuming that the estimated natural unemployment rate remains unchanged, which is a reasonable approximation for simulations with small changes in population and labor market characteristics .[1] A decline in population leads

[1] The identities are as follows:

Labor supply = Population * Working age population rate * Participation rate

We assume that: Labor Supply = Labor force to a similar decline in labor force and labor supply. We acknowledge that migration may affect our exogenously taken indicators, but we keep them unchanged for simplicity. Despite its simplicity, the model displays dynamic properties.

3.4 Empirical implementation of the model

The model is estimated using quarterly data. The data we employ in our analysis is based on data from the Albanian National Institute of Statistics (INSTAT 2023) and from the Bank of Albania (BoA 2023). Moreover, few indicators are calculated. The database consists of quarterly frequency data between 2000 and 2022. Although, we estimate equation parameters over the entire dataset, for our simulations, we use shorter samples.

Our estimation process is a mixed approach. In the spirit of state space models, we estimate the unemployment gap. We impose restrictions over the variance of natural rate of unemployment and let the parameters to be estimated. This way we try to achieve a balance between volatility and precision for natural unemployment rate.

We use the least square method for rolling estimations of the wage equation to explore wage sensitivity to its determinants, particularly inflation. This technique also allows us to analyze the changing relative importance of factors that contribute to wage formation in time.

Finally, we employ the error correction method (*ecm*) to estimate price equation. According to the *ecm* technique, price inflation is co-integrated with its long-term determinants and adjusts to absorb temporal shocks and reassure equilibrium. Apart from endogenous variables, we also include lags of each exogenous variables in equations. Using this holistic method, we get the estimated parameters in hand. Then, we link equations in a system. Wage inflation is achieved by assuming that wage responds to 4-quarters moving average price

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Unemployment rate = 100*(Labor supply – Labor demand)/Labor force

Unemployment gap= natural unemployment rate – unemployment rate inflation. Wage inflation then affects price inflation through the unit labor costs channel. Thus, a feedback loop between the labor market and inflation takes place. As most of indicators have autoregressive terms our model is a dynamic one (Appendix A lists the variables we employ in our empirical model).

We evaluate the inflationary cost of migration using impulse response function (shock analysis). Impulse responses capture the direct effect of migration shock and the effects in all subsequent periods. Starting from equilibrium, we run two alternative simulations. In the first simulation we assume a permanent decline of population. In the second scenario we assume supportive measurement such as increasing the age of retirement and increasing female labor force participation rate. To get a better understanding of the role of migration on inflation we run the same simulations by replacing the wage equation (eq. 2.1) with the remittances wage equation (eq. 2.2) and contemporaneously simulating remittances inflows. Our assumptions are hypothetical, we consider shocks equal to unit measurement such as 1 percent or 1 basis points.

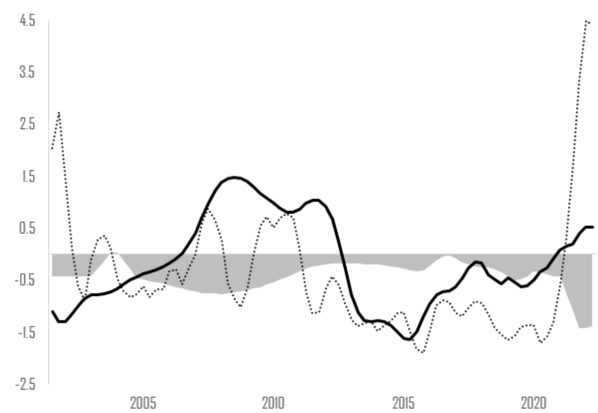
4. Results

In this section we provide our main results.

4.1 The unemployment gap

Following our state space specification, we estimate labor market cyclical conditions as illustrated in Figure 1. The black line represents the unemployment gap, which is calculated as the difference between the natural unemployment rate and the unemployment rate. A positive value of the unemployment gap reveals tight labor market conditions. Following our inflation Phillips curve measurement equation, the labor market cyclical conditions will trace the deviations of inflation from target reflected by the black dotted line, especially during pre-COVID-19 period. During the COVID-19, right after the lockdown, the unemployment rate started to decline gradually. With an estimated natural unemployment rate of 11.5 per cent labor market condition will become tight in 2021 and continue to overheat in 2022.

Figure 1. Labor market cyclical conditions (black line), the deviation of inflation to the official 3% inflation target (black dotted line), and population growth (gray shadow)



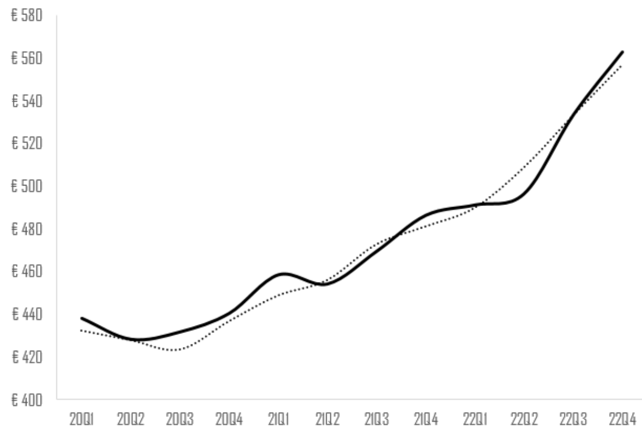
Source: INSTAT and authors' calculations.

Beyond the demand side, on the supply side migration seems to play a fundamental role (see Figure A1 in Appendix for net migration flows). The population has been steadily shrinking. We do not identify labor market cyclical conditions by demographic changes. Still, the positive relationship between the unemployment gap and population growth is obvious. Especially during periods of intense migration, such 2005-2010 and after the COVID-19 pandemic. Thus, we estimate the dynamic effect of migration under the perspective of our simple model in subsection 4.4.

4.2 The wage equation

According to our first specification of wage equation (2.1), nominal wages depend on its lag, labor productivity developments, unemployment gap as estimated in the previous paragraph, and past inflation. Table A1 in Appendix reports the estimated parameters and p-value statistic over the full sample 2002-2022. As a check on our specification, we compare the actual wage with the estimated wage form our equation for 2020-2022. As illustrated in Figure 2, the wage data fits our estimation.

Figure 2. Actual nominal wage (black line) and estimated (black dotted line)

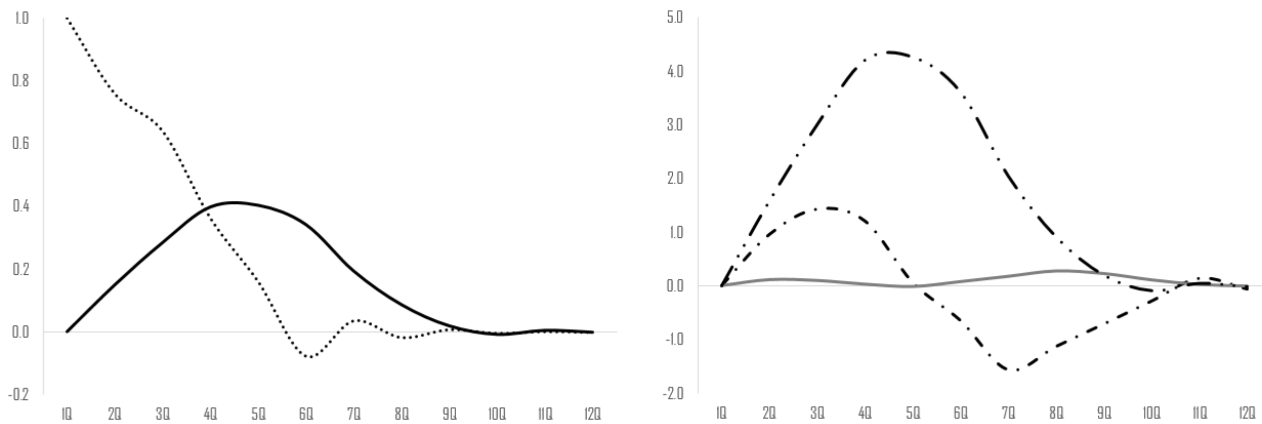


Source: INSTAT and authors' calculations.

Our results indicate that the labor market is rigid. Figure 3 shows the nominal wage's reaction to a one-time shock in the growth of wage and inflation rate, productivity, and labor market tightness, other things equal. A one-time shock to wage growth means a permanent shift of nominal wage level. Similarly, a one-time shock in inflation rate means a permanent shock to price level. As illustrated in Figure 3 it takes almost 6-quarters to absorb the wage shock (black dotted line). While the shock to the price level (black line), is more persistence on wages.

Controversially to other shocks, labor market tightness led to a sharp reaction of wages whether the shock is temporal (black 1-dotted-line) or there is a continuous overheated labor market (black 2-dotted-line). A temporal shock is reversed after one year, this behavior reflects the speed effect of cyclical conditions on the labor market. Productivity growth (gray line) appears to play a minor role on wage dynamics, particularly when faced with tight labor market cyclical conditions.

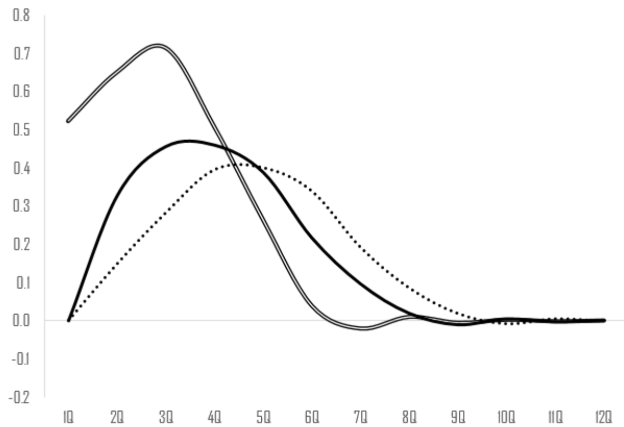
Figure 3. Nominal wage reaction to (i) one-time shock in inflation rate (black line), (ii) nominal wage growth shock (black dotted line), left-hand chart; (iii) productivity growth rate shock (gray line), and (iv) in labor market tightness (black 1-dotted-line temporal and black 2-dotted-line permanent), right-hand chart.



Source: INSTAT and authors' calculations.

Our second wage equation specification (2.2) results indicate that remittances inflows have an effect on wages (see Table A1 in Appendix). Receiving and expecting to receive remittances lead to a higher labor market wage. To answer the question of whether receiving remittances induces inflation, we find statistically significant evidence that it does. This result is also supported by Petreski, Oviedo and Cancho (2019). In addition, to the positive and significant remittances estimated parameter, the inflation estimated parameter has increased. Figure 4 shows that a one-time inflation shock increases wage inflation by 20 basis points when remittances are counted (black line) versus when they are left out (black dotted line). Inflows of remittances raise nominal wage growth by up to 72.5 basis points (black 2-lined). Thus, remittances inflows can generate wage inflationary pressures of up to one percentage point.

Figure 4. Nominal wage reaction to a shock in inflation rate (black line with remittances & black dotted line without remittances), and to a shock to remittances (black 2-lined)

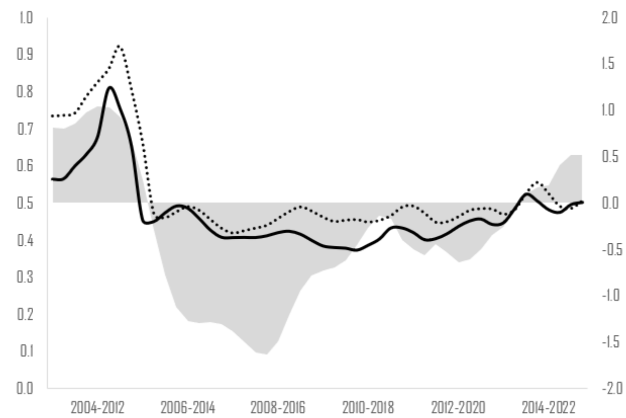


Source: INSTAT and authors' calculations.

The inflationary effect results lower if we specify the remittances inflows only as a lag or as a lead indicator (see equation 2.2 (A) and 2.2 (B) in Table A1 in Appendix). Put in other words, if households have received or expect to receive remittances the wage inflation is less affected compared to ongoing remittances. Furthermore, when the remittances variable is defined as a ratio of future remittance inflows to labor income, its impact is significantly decreased (see equation 2.2 (C) in Table A1 in Appendix). Intuitively, these findings suggest that remittances affect wages through the not-working households rather than employed.

The rolling estimates of our wage equations are illustrated in Figure 5. The black line indicates the sensitivity of wage inflation to price inflation without remittances and the black dotted line with remittances. The gray shadow area shows the labor market cyclical conditions, the positive value stands for overheated labor market. As labor market conditions become tighter and inflation rate accelerates, our results indicate that the spillovers are increasing. Recent research by Carstens (2022) finds similar result. Remittances tend to amplify the effect of price inflation on wage inflation at maximum by 21 basis points and on average by 7 basis points.

Figure 5. Price spillovers on wages (black line without remittances & black dotted line with remittances), and labor market cyclical conditions (gray shadow right axis)



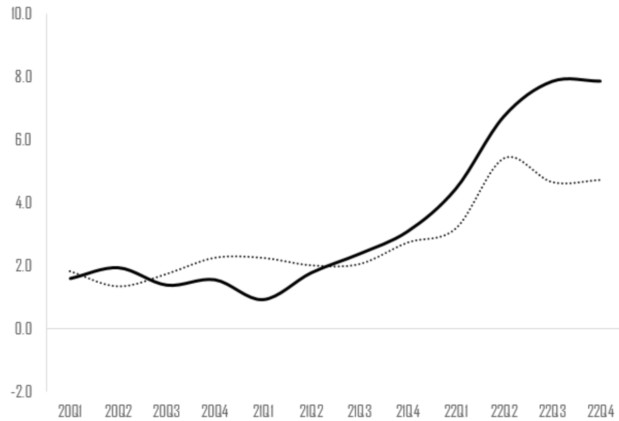
Source: BoA, INSTAT, authors' calculations

This result may be related to the changing relative importance of factors over time. The estimated time-varying parameters for the rest of parameters are illustrated Figure A3 in Appendix. The parameter α_{r4} close to unemployment gap oscillates from 1.3 to 6.5, assuring the presence of the Phillips curve during our period of estimation. Including post 2020 observations lead to a fast steeping of Phillips curve, followed by a decline in the last quarter of 2022. This behavior is related to the speed effect of unemployment gap.

4.3 The price equation

Our price equation is determined by the nominal wage growth via the unit labor cost, its level of persistence, and other factors such as foreign inflation, oil inflation and cyclical conditions. The estimated parameters are reported in Table A2 in Appendix. Figure 6 compares the actual inflation rate with the estimated price inflation from our price equation 3.3 for 2020 -2022. The predicted price inflation is close to the actual inflation rate for almost eight to nine quarters. After the second quarter of 2022 our prediction diverges on average by 2.6 percentage points from the actual rate. In our opinion, this misalignment is related to the fast appreciation of domestic currency, which we believe was not reflected in the final goods.

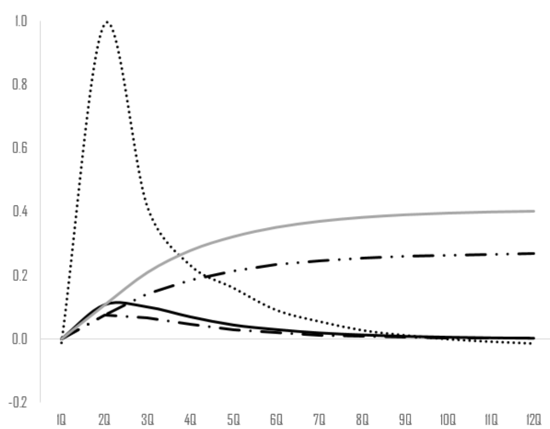
Figure 6. Actual inflation rate (black line) and estimated (black dotted line)



Source: INSTAT and authors' calculations.

The persistence parameter of 0.5 and the omega value of 0.6 indicate a fast transmission of domestic developments on inflation rate. More than 80 per cent of a shock in price inflation is absorbed within a year as shown by the black dotted line in Figure 7.

Figure 7. Price inflation reaction to one-time shock in inflation rate (black dotted line), in foreign inflation (black line temporal and gray line permanent), and in wage inflation (black 1-dotted-line temporal and black 2-dotted-line permanent)



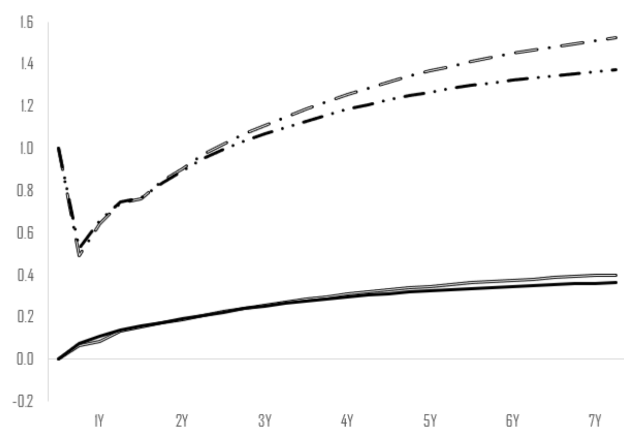
Source: INSTAT and authors' calculations.

The estimated effect of wage inflation results in 27 basis points on inflation rate in the long-run, compared to only 7 basis points in the short-run. The contribution of oil prices estimates results lower than its share on CPI basket. One-time foreign inflation shock induces a light increase on inflation rate, but continuous foreign inflation matches the share of foreign inflation in headline inflation (1-omega), see gray line in Figure 7.

4.4 The wage-inflation model

In this paragraph we present the impulse response function (IRF) that considers the relationships between wage equation, price equation and demographic developments. We use the full model to capture the spillovers between variables. Figure 8 shows the effect of a permanent increase in wages by 1 per cent. First the labor market can absorb about half of the shock, reflecting the rigidities in labor market. After that wage inflation rises steadily by 20 basis points per year. The increased unit labor costs gradually start to be transmitted in prices, which in turn affects wages through the feedback mechanism. The inflation rate stays 40 basis points higher than its pre-shock equilibrium. At the end of simulation wage inflation is 1.4 percentage points higher, which sums up 100 basis points of wage inflation shock and 40 basis points of price inflation transmitted back to wages.

Figure 8. Response of wage (black dotted line) and inflation (black line) to wage shock (2-lined with remittances)



Source: INSTAT and authors' calculations.

Replacing the wage equation (2.1) with the wage equation determined also by remittances (equation 2.2), results in a very similar pattern. Even though we do not shock remittances inflows inhere, there is an induced wage inflation of 14 basis points. In this simulation, the inflationary pressures stem from the higher autoregressive term and higher inflation sensitivity parameter in the second wage equation.

Now, we answer our main question. What are the inflationary costs of demographic shrinkage? Our results are presented in Figure 10. According to our simulations the long-lasting inflationary costs of population shrinkage vary between 14 basis points with supporting schemes to 31 basis points with remittances spillovers. While the short-run inflationary pressures may rise up to 1 percentage point.

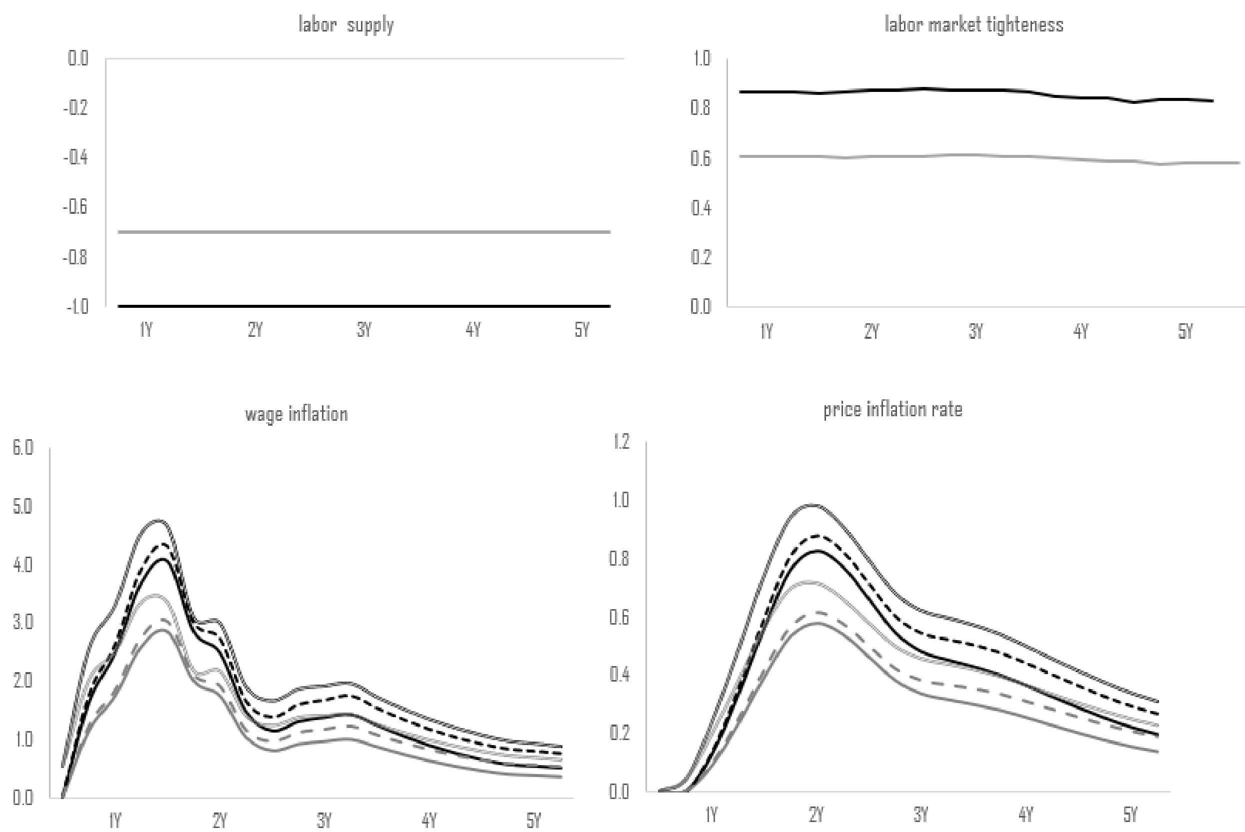
Specifically, in the first simulation, we simulate a decline of population by 1 per cent over 5-years (black line). The labor force shrinks similarly. As labor demand is unchanged, the cyclical conditions in the labor market become tighter. Wages start to increase gradually given the rigidities. Later, the speed effect of unemployment gap takes place. Wage inflation peaks at 4.1 after 6-quarters. Price inflation picks up steadily shooting 83 basis point higher after 2-years. Despite labor market tightness, wages react to absorb price inflation, thus wage path features a wavy trajectory. At the end of simulation wage inflation pressures are 50 basis points and price inflation 20 basis points.

We mimic the same simulation by replacing the wage equation with the remittance wage equation. The IRFs (black dotted line) are shifted up, for the same reasons explained in Figure 8.

Last, we factorize an increase in remittances inflows by 1 percentage points (black 2-lined). Remittances amplify wage inflation and price inflation. Migration wage inflationary pressures are up to 1 percentage point higher contrasted to absent remittances inflows. On average remittances inflows induce 15 basis point price inflation each year (compared to no-inflows).

In the second simulation, we assume an increase in the working age population rate and the participation rate by 1 basis point per year. These supporting assumptions offset labor force decline by 30 basis points. We repeat the same exercise as in the first simulation. The IRFs are shown in Figure 9 by the gray color. A less overheated labor market scale down the inflation tensions. Still, wage inflation pressures remain high, at 2.1 percentage point in the short-run and half percentage point in long-run. While price inflation pressures are moderate in the short-run and marginal in the long-run.

Figure 9. Response to population shrinkage without supportive schemes (black lines), with supportive schemes (gray lines), remittances wage equation (dotted line), remittances inflows shock (2-lined)



Source: BoA, INSTAT and authors' calculations.

In all the simulations the shrinking of population has amplified effect on wage inflation and price inflation due to the feedback mechanism. Our results are biased for several reasons. Beyond the simple model specification, the statistical discrepancy, and the exogenous variables assumption, we assume everything else equal. In and out of our simple model framework, nothing changes or adjusts. Freezing the demand side, the foreign economy, and the monetary policy reaction makes our *ceteris paribus* results the upper inflationary risk.

5. Conclusion

This paper investigates the interplay between labor market tightness, inflation, and migration phenomena. The late is a feature of emerging market countries, and Albania is one of Europe's countries with the most intense migration. We construct a simple dynamic wage-price set-up model with remittances externalities using data for 2000-2022.

First, we evaluate labor market tightness using the state space model. Second, we assess wage inflation under two versions of wage Phillips Curve, with and without remittances. Third, we estimate price inflation (inflation rate). Last, using the estimated model, we assess the long-lasting inflationary costs of population shrinkage estimates under alternative simulations. In the first simulation, we assume a permanent decline of population. In the second simulation, we introduce supportive measurement such as increasing the age of retirement and an increase in female labor force participation rate. To get a better understanding of migration implication, last, we simulate remittances inflow.

Our analysis suggests that lately the labor market conditions are tight. In our view, over heated labor market is affected by both the macroeconomic conditions and the migration wave after pandemic. Rolling estimations of wage equations confirm the presence of the Phillips curve during our period of estimation. Including post 2020 observations lead to a fast steeping of

Phillips curve. The sensitivity of wage elasticity to inflation has increased in recent times, reinforcing the feedback loop between wage growth and inflation. Put in other words, as inflation rises, so does the responsiveness of wages to inflation, indicating that the labor market is becoming increasingly cyclical.

Remittances' wage Phillips curve estimations indicate that remittances inflows influence wages. We find statistically significant evidence that remittances induce inflation and tend to amplify the effect of price inflation on wage inflation.

Our results show that continuous migration generate inflation pressures both, in the short-run and in the long-run. Shock analysis suggests that some long-term inflationary costs of migration could be mitigated by implementing support schemes So, if the decline in population is accompanied by an increase in the retirement age and/or labor participate rate, it could offset some of the tightness in the labor market, reducing the pressure on wage increase and therefore even the inflationary pressures, though still present. However, this finding remains blurred if we simultaneously factor for remittances externalities.

Migration phenomena plays a major role in one's country economy. It may create an inflationary burden that is difficult to get rid of. Unless appropriate policies are implemented to address the root causes of the issue. This paper may provide valuable insights for policymakers in developing strategies to address the challenges posed by demographic changes and migration flows, in Albania or other countries facing similar issues. However, given the entire set of constraints under which we conducted our analysis, these estimates should not be taken as read.

These findings point to avenues for future research. For example, further analyses may explore the impact of demand side, proper government actions, monetary policy reaction and the outer world, in Albania or other countries facing migration.

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Appendix

Below, we list the endogenous and exogenous variables in our empirical model and their source.

Endogenous variables

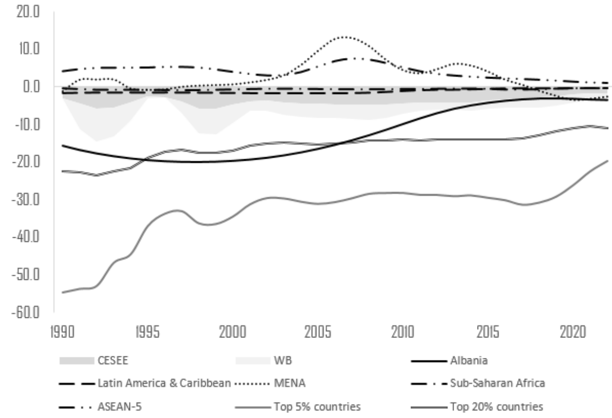
1. L_COMP_PE - Compensation of employees, measured as the sum of 3-month monthly nominal average wage, published by the national Institute of Statistic (INSTAT)
2. L_S - Labor supply, calculated as a product of participation in labor force rate, working age population rate, and population
3. L_UN - Unemployment rate, labor force survey, INSTAT
4. P_CPI - Price inflation as measured by Consumer Price Index, prices, INSTAT
5. P_DSP - Domestic Inflation, calculated from the turnover index statistics of domestic producers, short term statistics, INSTAT
6. P_ULC - Unit labor cost index, measured as the ratio of compensation of employee to labor productivity
7. P_W_N - Monthly nominal average wage, INSTAT
8. GDP - Gross domestic product in current prices, national accounts, INSTAT

Exogenous variables

9. L_D - Labor demand, employment as in labor force survey, INSTAT
10. L_P - Labor productivity, measured as 8-quarters moving average of gross domestic product divided number of employees, both indicators published by INSTAT
11. L_PARTICIP - Participation in labor force rate as in labor force survey, INSTAT
12. L_W_AGE - Working age population rate as in labor force survey, INSTAT
13. P – Population, the data is published by annual frequency by INSAT and is interpolated by statistical method to quarterly frequency

14. P_IMP - Foreign inflation, approximated with the import deflator, INSTAT
15. P_OIL - Oil prices index, as measured in the CPI basket, INSTAT
16. REM - Inflow remittances, as measured in the Balance of Payment (BoP), converted to domestic currency with LEK/EUR exchange rate published by the Bank of Albania (BoA)
17. UN* - Natural unemployment rate, estimated via state space model
18. Y_GAP – Output gap, estimated production function.

Figure A1. Migration flows. Net migration rate per 1000 population.



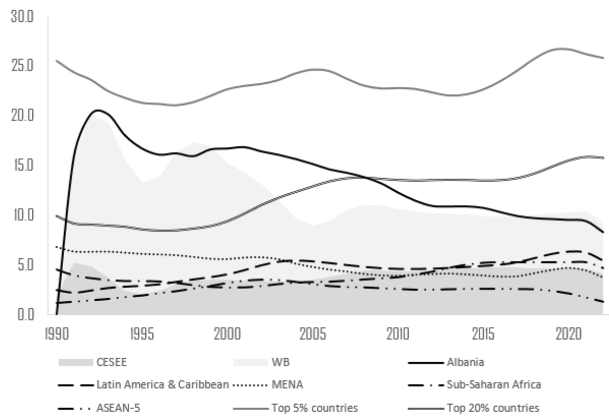
Source: UN (2023) and authors' calculations.

Note 1: The highest migratory 5 per cent and 20 percent countries are calculated on yearly basis given the full sample of 237 nations in the world.[2]

Note 2: Albanian labor market is characterized by significant level of migration flows. The intensity and characteristics of migration have changed every decade, starting with young men moving to Greece and Italy in the 1990s through irregular channels. The second decade was characterized by family reunification and regularization schemes, leading to a rapid process of settlement and integration in other European countries and North America. The third decade saw economic factors driving migration, with a shift towards highly qualified and educated migrants moving to Germany and other advanced Western European countries and North America. This phenomenon is primarily driven by economic factors such as the search for better job opportunities and higher wages, but it can also be the result of political and social factors.

[2] For 2021 top 20% nations in descending order includes the following: Marshall Islands, American Samoa, Saint Martin (French part), Lebanon, Venezuela (Bolivarian Republic of), Central African Republic, Qatar, Cook Islands, Kosovo (under UNSC res. 1244), Montserrat, Tonga, Northern Mariana Islands, Kuwait, Bosnia and Herzegovina, Wallis and Futuna Islands, Fiji, Bahrain, Micronesia (Fed. States of), Guyana, Nauru, Republic of Moldova, Armenia, Afghanistan, Oman, El Salvador, Saudi Arabia, Lithuania, Sri Lanka, Eritrea, Eswatini, New Caledonia, Samoa, Martinique, Albania, Latvia, Saint Vincent and the Grenadines, Sao Tome and Principe, Yemen, South, Sudan, Haiti, Croatia, Kyrgyzstan, State of Palestine, Kiribati, Liberia, Puerto Rico, United States Virgin Islands.

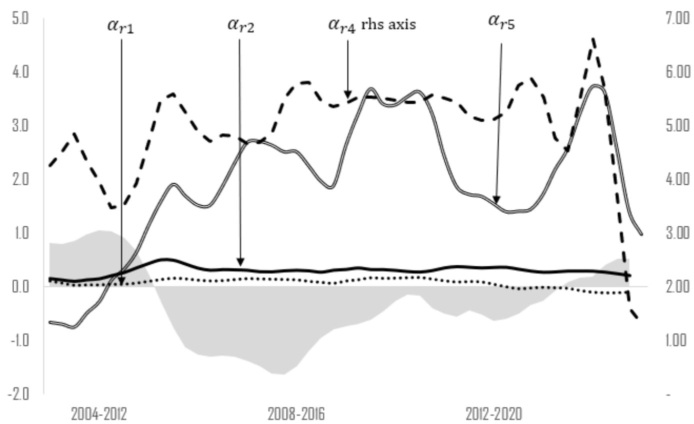
Figure A2. Remittances flows. Net remittances to GDP.



Source: WB (2023) and authors' calculations.

Note: Albania in black line, CESEE countries in dark gray shadow, WB countries in light gray shadow, top 5% highest remittances inflows countries in gray line, MENA countries in black dotted line, Sub-Saharan countries in black line one dotted, ASEAN-5 countries in black line two dotted, Latin America & Caribbean countries black lined

[Figure A3]. Wage equation time varying estimated parameters in lines and the labor market cyclical conditions in gray shadow



Source: BoA, INSTAT and authors' calculations.

Note: The parameter α_{r1} indicate the autoregressive term, α_{r2} stands for labor productivity, α_{r4} approximates labor market cyclical conditions, and α_{r5} shows the influence of remittances inflows.

Table A1. Wage equation: Dependent variable P_W_N

Variable	Equation 2.1		Equation 2.2		Equation 2.2 (A)		Equation 2.2 (B)		Equation 2.2 (C)	
AR	-0.47	(0.00)	-0.51	(0.00)	-0.44	(0.00)	-0.44	(0.00)	-0.44	(0.00)
L_P	0.43	(0.03)	0.49	(0.01)	0.38	(0.04)	0.36	(0.06)	0.39	(0.04)
P_CPI	0.71	(0.00)	0.83	(0.00)	0.79	(0.00)	0.79	(0.00)	0.79	(0.00)
UN*-UN	7.49	(0.00)	8.11	(0.00)	7.88	(0.00)	7.87	(0.00)	7.67	(0.00)
REM			2.09	(0.03)	1.75	(0.00)	1.20	(0.04)	0.41	(0.06)
R-squared	0.31		0.35		0.39		0.34		0.33	
No. Observations	84		84		84		84		84	

Source: BoA, INSTAT and authors' calculations.

Note: P-value statistics are in parenthesis. The remittances variable is specified as remittances inflows to GDP. Equations (A), (B), and (C) represent alternative specification of remittances variable in equation 2.2. In equation 2.2 (A) the remittances variable is specified only in 2-lags. In equation 2.2 (B) the remittances variable is specified only in 2-leads. In equation 2.2 (C) the remittances variable is specified only in 2-leads and as ratio of labor income (not as ratio of GDP).

Table A2. Price equation: Dependent variable P_CPI

Variable	Equation 3.3	
AR - adjustment parameter	-0.50	(0.00)
P_ULC	0.27	(0.00)
P_OIL	0.01	(0.07)
Y_GAP	0.34	(0.02)
P_IMP	0.41	(0.00)
OMEGA	0.60	(0.00)
R-squared	0.43	
No. Observations	84	

Source: BoA, INSTAT and authors' calculations.

Note: Output gap series is estimated according the Cobb-Douglass functions, see (Skufi and Geršl 2023).

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