2. Wage Growth and Inflation in Europe: A Puzzle?

Wages have been rising faster than productivity in many European countries, yet signs of underlying consumer price pressures remain limited. To shed light on this puzzle, this chapter examines the link between wage growth and inflation in Europe and the factors that influence the strength of the passthrough from labor costs to consumer prices. The chapter finds that, historically, wage growth leads to higher inflation, but the impact has weakened since 2009. The passthrough is significantly lower in periods of subdued inflation expectations, greater competitive pressures, and robust corporate profitability. These findings suggest that the recent pickup in wage growth is likely to have a more muted impact on inflation than in the past.

Labor market conditions have been improving in Europe since 2013, with strong job growth and unemployment falling to lower-than-precrisis levels in most economies. Yet, as discussed in Chapter 2 of the May 2018 *Regional Economic Outlook—Europe,* nominal wage growth remained subdued for many years (Figure 2.1, panels 1 and 2). This trend has recently started to reverse, especially in the *European Union's* newer member states (NMS).[1] Spurred by strong labor markets and accompanied by public sector and minimum wage increases in some countries, nominal wage

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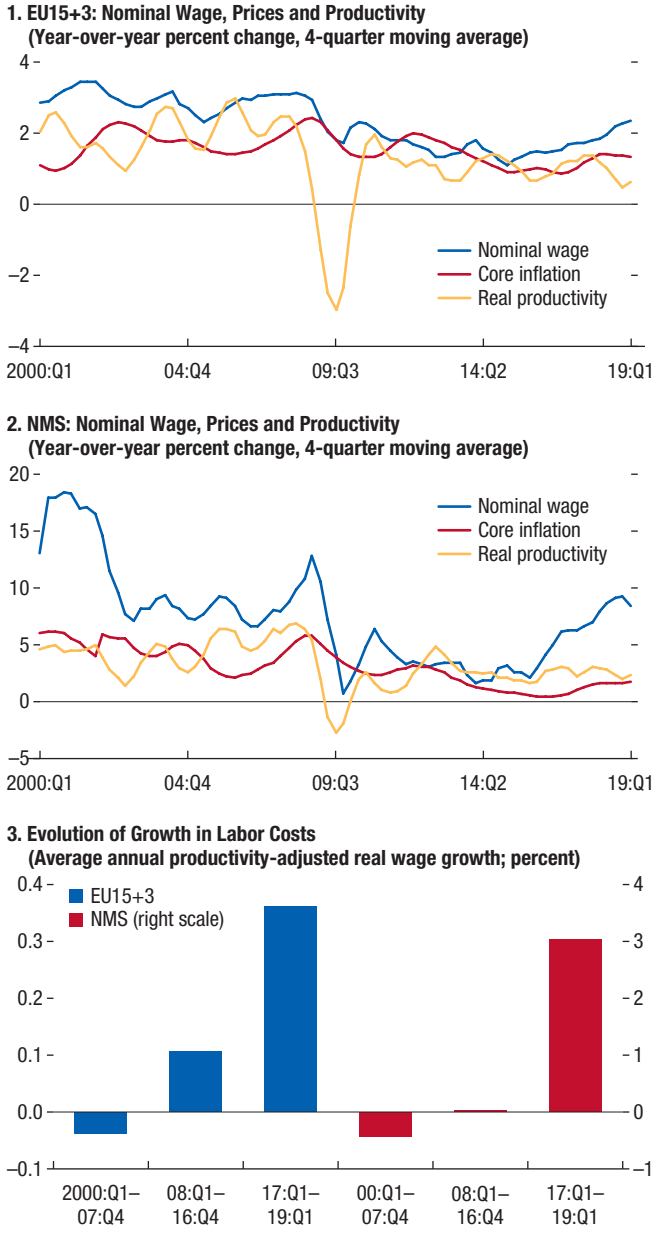
[1]This chapter makes a distinction between long-standing and newer EU member states, rather than between "advanced" and "emerging" European economies, to better capture the disparate wage developments in these two sets of countries. Newer EU members (NMS) include Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, the Slovak Republic, and Slovenia. The long-standing EU members are the countries that joined the European Union before May 1, 2004: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom (EU15). Cyprus, Ireland, Luxembourg, and Malta are not included in the analysis because their GDP data distort labor productivity numbers. Israel, Norway, and Switzerland are added to this group, hence the acronym EU15+3.

Figure 2.1. Wage Growth, Productivity, and Inflation



Sources: Eurostat; Haver Analytics; IMF, *World Economic Outlook Database*; and IMF staff calculations.
Note: NMS are newer EU members. EU15+3 are the long-standing EU members plus Israel, Norway, and Switzerland. Quarterly seasonally adjusted data are used and weighted by purchasing-power-parity GDP to aggregate across the two country groups. Real wage growth is measured as nominal wage growth minus the GDP deflator growth.

growth averaged nearly 8 percent in NMS since the first quarter of 2017, and 2 percent in other European countries (EU15+3). As discussed in Chapter 1 of this *Regional Economic Outlook,* the strengthening of wage growth has supported domestic demand, namely consumption, and has cushioned the drag from slowing global trade on aggregate activity in the region.[2] In contrast, core inflation remained, on average, below 2 percent in both groups of countries. In addition to rising faster than prices of goods and services, compensation costs have outpaced improvements in labor productivity, especially in NMS (Figure 2.1, panel 3). Productivity-adjusted wage growth in NMS has exceeded inflation by about 3 percentage points on average since early 2017, with even stronger growth in the *Czech Republic* and *Hungary*. In EU15+3, the gap between productivity-adjusted wage growth and inflation is smaller, at about 0.4 percentage point, but still sizeable compared to 2000–16. In several of these countries (for example, *Germany*, *Israel*, *Portugal*), annual real wage growth exceeded productivity gains by more than 1 percentage point since the beginning of 2017.

The apparent disconnect between wage and price developments in Europe in the last few years is puzzling. Economic theory suggests that if real wage growth exceeds productivity gains, the higher labor costs faced by businesses should eventually raise the prices of the products and services they provide. Labor costs constitute a large share of business expenses in Europe: almost 50 percent in NMS and 53 percent in EU15+3 countries. And yet, inflation has remained stubbornly below target in many countries, despite closing output gaps and rapid gains in productivity-adjusted wages in the past three years. A variety of factors may explain this puzzle. The lack of inflationary pressures may simply reflect delays in the transmission of wage developments to prices, suggesting a pickup in inflation may be imminent. However, there might have been structural changes to the way firms incorporate costs into their pricing decisions that has affected the relationship between wage growth and inflation. If firms and workers expect low inflation going forward, for example due to the improved credibility of the central bank, firms may be reluctant to raise their prices even when faced with higher wage costs as they expect increases in costs to be only temporary. In such a situation, the passthrough of higher wages to prices would be muted due to lower expected persistence of cost and price changes. Alternatively, the rise in competition, either domestically or from abroad, may have limited the ability of firms to pass cost increases to consumers for fear of losing market share. Another important consideration of a more cyclical nature is firms' profitability, which determines how much and how fast wage growth feeds into prices. To the extent that firms have buffers—comfortable profit margins—they may be able to absorb higher wage costs without increasing prices.

Understanding the extent to which these potential explanations are behind the recent disconnect between inflation and wage growth has important implications for the inflation outlook in Europe and the appropriate policy response.

With this backdrop in mind, this chapter examines the following key questions:

- How large is the passthrough of labor costs to inflation in Europe, and how long does it take for wage growth to feed into prices?
- Have there been notable changes in the extent of passthrough over time?
- What factors influence the extent of passthrough? How is the passthrough shaped by various country and sectoral characteristics?

Analytical Approach

This chapter examines the dynamic wage-price linkages while controlling for endogenous

[2]In NMS, in particular, labor shortages have significantly increased. In 2019, more than 40 percent of firms in NMS cited labor shortages as a major factor limiting production, up from only 10 percent in 2013. Estimated unemployment gaps also suggest that labor markets are notably tight in NMS. For previous analyses of drivers of wage growth, see Bonam and others (2019), Chapter 2 of the May 2018 *Regional Economic Outlook—Europe,* and Chapter 2 of the October 2017 *World Economic Outlook*, among others.

feedback effects of import prices and labor market slack to quantify the extent of passthrough from wages to prices. The historical empirical relationship between year-over-year nominal wage growth adjusted for trend productivity growth and core consumer price inflation is examined for a sample of 27 European countries since 1995 within a panel vector auto regression (PVAR) framework. The analysis estimates a four variable PVAR, comprising import price inflation, nominal wage growth adjusted for trend productivity growth, core consumer price inflation, and unemployment gap.[3] Overall, this empirical approach sheds light on the dynamic nature of the passthrough from wages to inflation, while embedding the traditional Philips curve dynamics between wage growth, inflation, and labor market slack; and capturing firms' labor and imported input costs (see also Peneva and Rudd 2017; Chapter 2 of the May 2018 *Regional Economic Outlook—Europe*; and Bobeica and others 2019). The baseline measure of wages is compensation per employee. Conceptually, compensation per hour worked may be more relevant for firms' pricing decisions if companies rely on temporary workers or are able to reduce hours and then pay only for hours worked. However, hours worked tend to be measured with more noise, and compensation per hours worked data are not available for all countries in the sample (OECD 2009).

To examine the role of various factors in shaping the extent of passthrough, the chapter uses an extension of the PVAR model known as the interacted-PVAR (IPVAR) model. The IPVAR specification allows the response of the variables of interest to shocks—that is, response of inflation to a wage shock—to vary depending on observable state variables (Towbin and Weber 2013). By using the full sample of countries and periods, the IPVAR approach has greater statistical power to detect differences in the degree of passthrough when country characteristics change over time. It is worth noting that the analysis examines the role of each factor separately. Quantifying the relative importance of different factors is difficult within the IPVAR framework, given the limited country sample and time-period covered, as it requires sufficient heterogeneity across factors. To the extent possible, the chapter attempts to examine whether these state-dependent differences also hold within the NMS subsample, where the disconnect between wage growth and inflation has been most pronounced. The link between wage growth and inflation in selected NMS at the sectoral level is also examined in Box 2.1.

When discussing the findings of the IPVAR analysis, the chapter reports the cumulative response of inflation to a wage growth shock after 12 quarters in the high versus low passthrough regime of the interacting variable, when the latter is a dummy (for example, pre- versus post-global financial crisis, or high versus low inflation environment), or at the 25th and 75th percentile of the interacting variable, when the latter is continuous (for example, inflation expectations anchoring, corporate profitability, labor share, and product market regulation).[4]

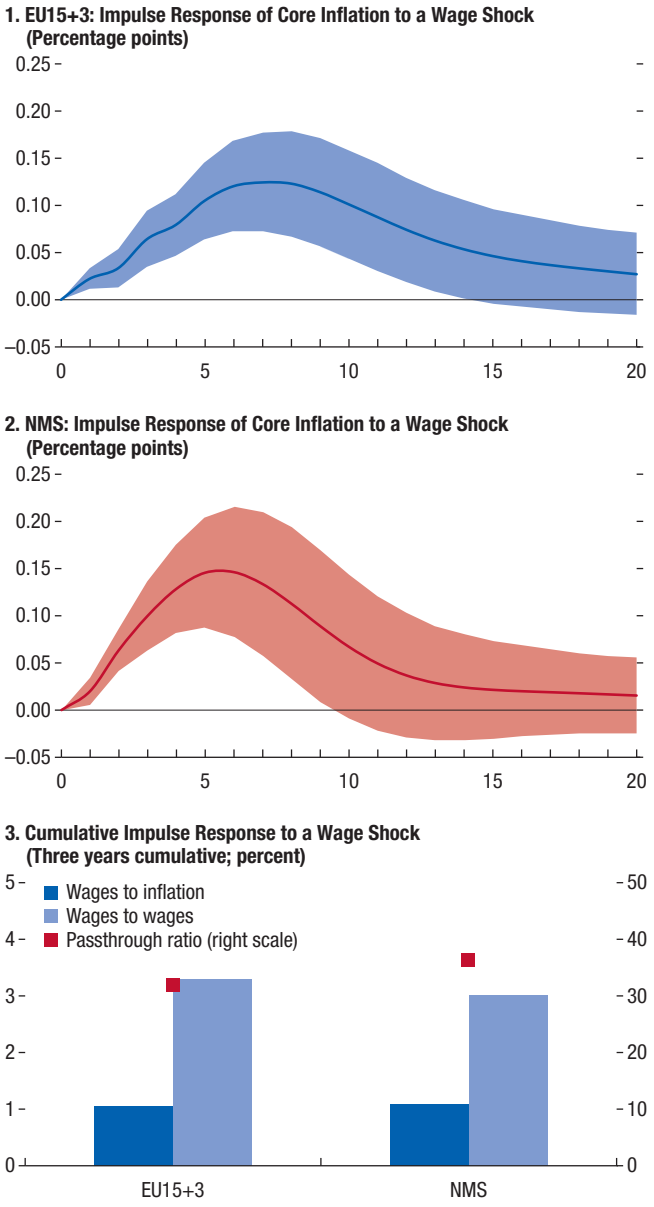
Wage Growth Leads to Higher Core Inflation

The analysis suggests that, historically, in the sample of European countries, wage growth leads to higher core inflation after several quarters. The initial impact of a wage shock on inflation is rather small, but it builds up over time, peaking after about six quarters before slowly dissipating (Figure 2.2, panels 1 and 2). After three years, the cumulative impact of a 1 percentage point increase

[3]The regressions use quarterly data, include four lags of each variable, and utilize Cholesky ordering, meaning that the variables are included in the model in the decreasing order of exogeneity. Import prices are assumed to be the most exogenous and the unemployment gap the most endogenous. Wage growth is assumed to have an immediate impact on inflation, but wages are assumed to take at least a quarter to respond to consumer price movements. The main results presented in this chapter are robust to alternative ordering of the variables within the PVAR and to measuring labor cost as compensation per hour worked instead of compensation per employee. Following Peneva and Rudd (2017), nominal wage growth is adjusted for trend productivity growth to minimize measurement errors associated with the estimation of actual productivity growth. See Online Annex 2.1 for technical details.

[4]Unless otherwise specified, the 25th and 75th percentiles of the interacting variables are taken from an unconditional distribution (that is, from all countries and all time periods).

Figure 2.2. Response of Core Inflation to a Wage Shock
(Quarters on the horizontal axis)



Sources: Eurostat; Haver Analytics; Organisation for Economic Co-operation and Development; IMF, *World Economic Outlook*; and IMF staff calculations.
Note: NMS are newer EU members. EU15+3 are the long-standing EU members plus Israel, Norway, and Switzerland. In panels 1 and 2, $t = 1$ is the quarter of the shock. Shaded areas denote the two standard deviation confidence bands. Shocks represent an exogenous 1 percentage point increase in wages.

in wages is 1.1 percentage point higher inflation in NMS and 1 percentage point higher inflation in other European countries. Taking into account the dynamic response of wages to their own shock over this time period, the impact on inflation is a fraction of the impact on wages (Figure 2.2, panel 3). Overall, the passthrough ratio—defined as the ratio between the cumulative change in prices and the cumulative change in wages—is about a third.

The Passthrough Has Weakened in Recent Years

The passthrough of labor costs into core inflation seems to have weakened after the global financial crisis. The results obtained using the IPVAR framework indicate that after 2009, the cumulative impact of wage growth on European core inflation has decreased, with the passthrough ratio declining to less than 20 percent (Figure 2.3, panels 1 and 2, section A). These results corroborate recent empirical literature findings for the *United States* (Peneva and Rudd 2017) and several *Central, Eastern, and Southeastern European countries* (De Luigi and others 2019), but are in contrast to the results reported for the four largest *euro area* economies by Bobeica and others (2019; see the next section for discussion).

Why would the relationship between labor costs and inflation change over time? The next section examines the role of inflation and inflation expectations; domestic and foreign competition; corporate profitability; and workers' share of the value firms create in determining the size of the wage–inflation passthrough.[5]

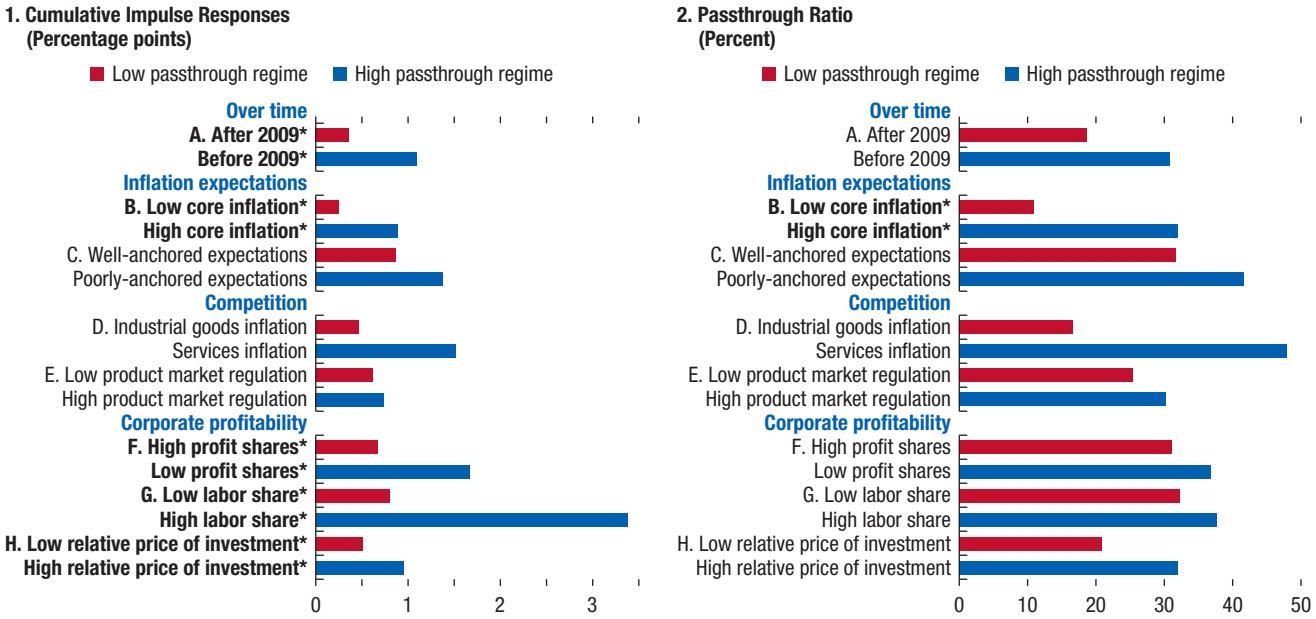
The Role of Various Factors

Inflation and Inflation Expectations[6]

The post-global financial crisis decline in the strength of the passthrough could potentially be due to the subdued inflationary environment that has characterized the last decade. If persistently low inflation since the 2008 global financial crisis

[5]For an alternative explanation of the weaker post-crisis passthrough from wage growth to inflation, which focuses on the role of the cumulative real wage gap, see Voinea (2019).
[6]This section draws on Huidrom and others (forthcoming).

Figure 2.3. Cumulative Response of Core Inflation to a Wage Shock after Three Years



Sources: Bems and others (2018); Eurostat; Haver Analytics; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development, Product Market Regulation Indicators database; Penn World Table 9.1; and IMF staff calculations and estimates.
Note: Panel 1 reports the cumulative impulse responses of inflation to a 1 percent wage shock at the end of three years. Panel 2 reports the passthrough ratios of that shock at the end of three years. Estimates in section D are obtained from panel vector autoregressions (PVAR) that use industrial goods inflation and services inflation instead of core inflation. Other estimates are obtained from interacted PVAR (IPVAR). Statistically significant differences at the 95 percent level are denoted by starred and bolder labels.

reflects persistently lower inflation expectations in the *euro area* and *other advanced economies*, firms may have changed their price-setting behavior.

Intuitively, if firms expect low inflation, they are likely to perceive cost increases as transitory and may be reluctant to pass higher labor costs onto consumers since they expect their competitors to hike their prices only moderately (Taylor 2000). Thus, price stability, for example due to improved inflation expectations anchoring, is likely to reduce the sensitivity of inflation to wage growth.[7] Downward nominal wage rigidities also tend to be more binding in a low-inflation environment (Daly and Hobijn 2014). Conversely, cost increases are likely to be perceived as more persistent in countries with high inflation and higher inflation expectations, in which case wage growth and inflation would be more closely linked.

To shed light on this mechanism, the chapter performs two complementary exercises. First, it examines whether the link between wage growth and inflation depends on the prevailing inflation rate in the economy.[8] It then directly examines the role of inflation expectations anchoring in shaping the responsiveness of core inflation to wage growth.

The first analysis, which relies on the IPVAR empirical framework, uncovers a tight relationship between the prevailing inflation rate and the extent of passthrough from wages to core inflation: the impact of labor cost increases on prices

[7]Similarly, empirical literature has established that lower overall inflation and better-anchored inflation expectations limit the passthrough of currency depreciations to domestic prices. See Chapter 3 of the October 2018 *World Economic Outlook*, and references therein.

[8]Although the prevailing core inflation rate is a crude proxy of inflation expectations anchoring, the analysis allows for the largest possible estimation sample given its limited data requirements. See Chapter 3 of the October 2018 *World Economic Outlook* for a discussion of the role of improvements in inflation expectations anchoring in lowering inflation across emerging markets. The chapter also discusses policies that contributed to improved anchoring.

is systematically lower and slower in periods of below-average inflation. In a low-inflation environment, defined as periods during which core inflation is below the country average, a 1 percentage point wage increase raises inflation by a cumulative 0.3 percentage point over three years, with an estimated passthrough ratio of only 11 percent (Figure 2.3, panels 1 and 2, section B). In a high-inflation environment, defined as periods during which inflation is above the country average, the cumulative impact is three times higher, with a passthrough ratio of about 30 percent.

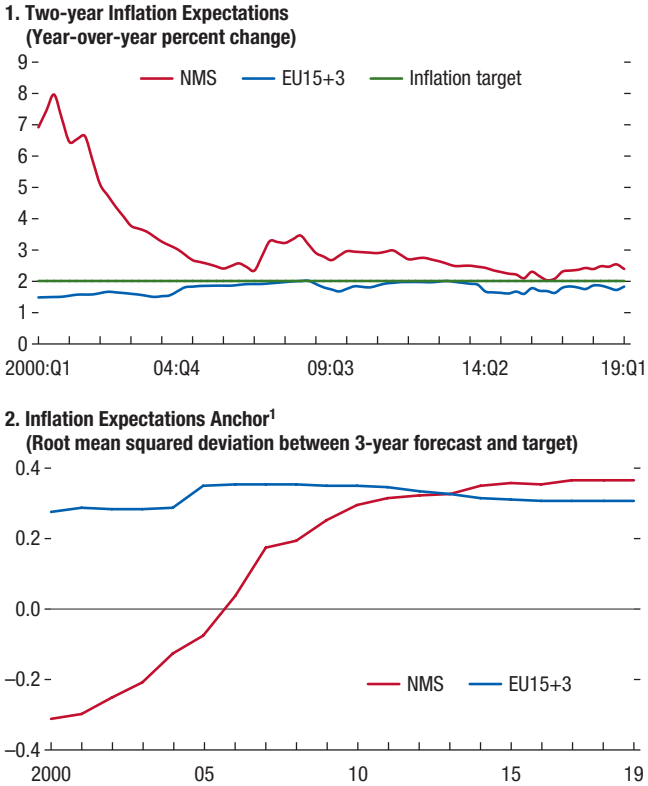
A similar pattern is revealed using a direct measure of the degree of inflation expectations anchoring. The analysis employs a newly constructed index of inflation expectations anchoring developed by Bems and others (2018; see also Chapter 3 of the October 2018 *World Economic Outlook*). The metric employed in this chapter measures the deviation of long-term inflation forecasts produced by professional analysts from the central bank's target.

Intuitively, if inflation expectations are well anchored, predictions of future inflation should be, on average, close to the target pursued by the central bank. According to this metric, long-term inflation expectations are generally well-anchored in Europe. While two-year inflation expectations are somehow higher in NMS than in other European countries (Figure 2.4, panel 1), anchoring has improved significantly during the past two decades, in line with trends observed in other emerging economies. In contrast, inflation expectations have been broadly stable in EU15+3 countries and, in fact, have remained stubbornly low in the *euro area*—below the European Central Bank's target—for several years after the global financial crisis, indicating some de-anchoring of expectations.[9]

The empirical results point to the wage-to-inflation passthrough being dependent on the anchoring of inflation expectations. Across all sample countries, labor cost increases have a more muted impact on inflation when inflation expectations are better anchored, as captured in the metric constructed by Bems and others (2018; see Figure 2.4, panel 2). A 1 percentage point wage increase raises inflation by a cumulative 0.9 percentage point during the three-year period when the impulse response is evaluated at the 75th percentile of the distribution of the measure of inflation expectations anchoring. This impact increases by about a half—to 1.4 percentage point—when inflation expectations are weakly anchored (that is, when the cumulative impulse response is evaluated at the 25th percentile of the distribution of inflation expectations anchoring). The passthrough ratio is also smaller

[9]The inflation anchoring metric treats the positive and negative deviations of inflation expectations from the target in the same way. Lack of sufficient data precludes analyzing the extent of passthrough when inflation expectations remain below the target.

Figure 2.4. Inflation Expectations and Anchoring



Sources: Bems and others (2018); Consensus Forecast; IMF, *World Economic Outlook*; and IMF staff calculations.
Note: NMS are newer EU members. EU15+3 are the long-standing EU members plus Israel, Norway, and Switzerland. Data are weighted by purchasing-power-parity GDP to aggregate across the two country groups.
[1]Normalized indicator such that higher numbers indicate that inflation expectations are better anchored.

when expectations are anchored within a low range (Figure 2.3, panels 1 and 2, section C).

This finding is even stronger in the NMS subsample, where inflation expectations became significantly better anchored in the 2000s. In fact, the improved anchoring of inflation expectations may be an important reason why the passthrough has declined over time in the sample countries analyzed in this chapter, as well as in several *Central, Eastern, and Southeastern European countries* studied by De Luigi and others (2019). In contrast, in the four largest *euro area* countries studied by Bobeica and others (2019), the degree of anchoring of inflation expectations remained relatively unchanged (Figure 2.4, panel 2), with inflation expectations even drifting below target in recent years (Figure 2.4, panel 1).[10]

The Role of Competition

Firms' pricing strategies depend to a significant extent on their exposure to competition, either domestic or from abroad (Lamo and Smets 2009). In a more competitive environment, firms may be reluctant to pass cost increases onto consumers due to fear of losing market share to competitors or being driven out of the market (see, for example, Carney 2015, and Obstfeld 2019).[11] Three pieces of analysis in this chapter suggest the important role of competition in shaping the link between wage growth and inflation.

Europe is one of the world's regions most open to international trade and most deeply integrated in global supply chains (see Huidrom and others 2019). Yet, the numbers hide dramatic differences in exposure to foreign competition across sectors of the economy. Import penetration—measured as the ratio of final imports to sectoral gross value added—is about 60 percent in the manufacturing sector (Figure 2.5, panel 1). In contrast, in the services sector, the import penetration ratio is less than 5 percent. These patterns are consistent with higher barriers to trade in services, relative to the manufacturing sector, as discussed in Boz and others (2019). As a result of higher exposure to foreign competition, non-energy industrial goods prices tend to be closely correlated with producer prices in other countries (Carney 2017, Forbes 2019).[12] One would also expect a lower wage-to-inflation passthrough in this sector relative to services.

Indeed, the analysis confirms that higher economy-wide wage growth is more likely to lead to higher growth in services prices, relative to non-energy industrial goods' prices, which reflect mostly prices of manufactured goods (Figure 2.3, panels 1 and 2, section D; Figure 2.5, panel 2). PVAR regressions suggest that in EU15+3 countries, the extent to which economy-wide wage growth feeds into services inflation is nearly two times stronger than the impact of wage growth on non-energy industrial goods inflation. In NMS, prices of services are about four times more responsive to wage increases compared to manufacturing prices.

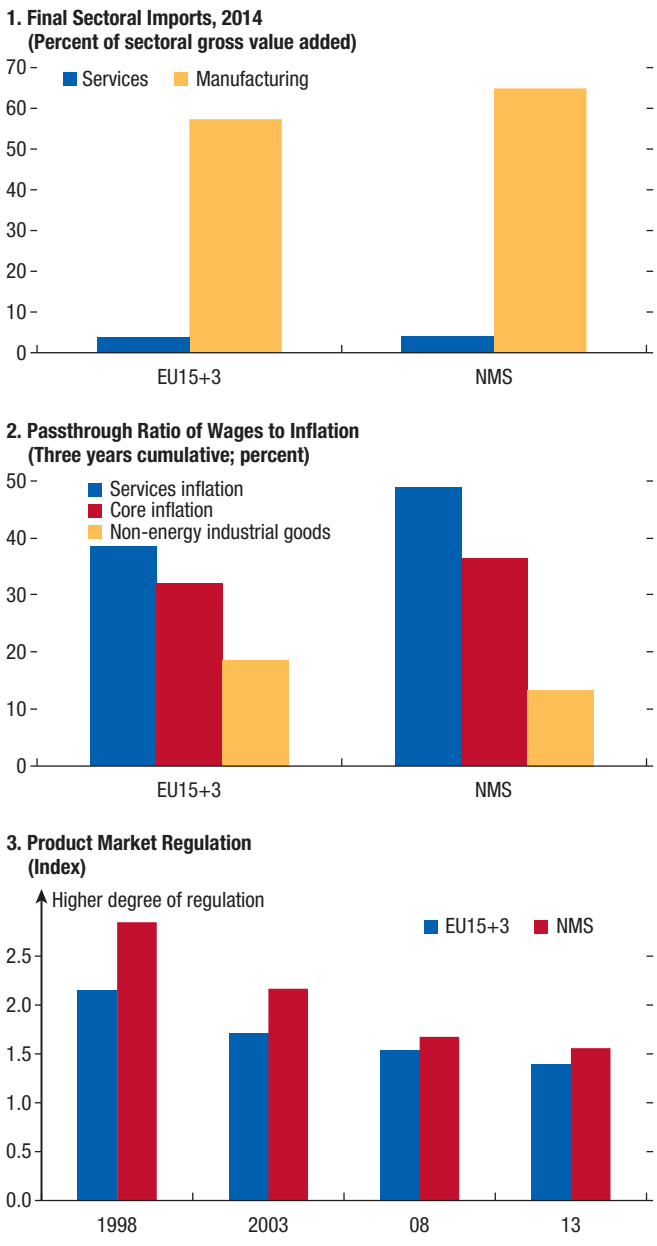
A more granular sectoral analysis confirms the potentially important influence of exposure to competitive pressures for the wage–price link. Using annual data on producer prices, productivity-adjusted wage growth, imports, and output across 55 sectors in 32 European countries during 2000–14 from the World Input Output Database (WIOD) and Johnson and Noguera (2017), panel regressions reveal that the correlation between sectoral wage growth and growth in sectoral value-added deflators is significantly higher in sectors that have lower import

[10]The difference could also be due to a long-term restriction imposed by Bobeica and others (2019) that the gap between productivity-adjusted nominal wage growth and price inflation must disappear in the long-term. The analyses in this chapter do not impose such a restriction.

[11]So far, there are limited signs of loss of competitiveness in the tradeable sector despite the faster growth in wages relative to productivity. In the NMS, still-strong domestic demand generally led to a small deterioration in current account balances, but market shares have generally held up well.

[12]The analysis examines the two key components of core inflation: services and non-energy industrial goods price inflation. The latter captures predominantly products of the manufacturing sector.

Figure 2.5. Foreign and Domestic Competition



Sources: Eurostat; Haver Analytics; Johnson and Noguera (2017) based on World Input-Output Database; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; and IMF staff calculations.
Note: NMS are newer EU members. EU15+3 are the long-standing EU members plus Israel, Norway, and Switzerland. Data are weighted by purchasing-power-parity GDP to aggregate across the two country groups. Higher product market regulation index indicates higher regulatory barriers.

penetration.[13] This pattern holds even when restricting the analysis to the 19 manufacturing sectors included in the WIOD. This finding is in line with Bobeica and others (2019), who examine differences in the passthrough of wage growth to inflation in three broad sectors (namely, construction, manufacturing, and services) in *Germany*, *France*, *Italy*, and *Spain*. Three out of those four economies have somewhat larger passthrough of wage growth to inflation in the less-traded services sectors. Box 2.1 documents a similar pattern for a subsample of NMS, and demonstrates that even within the subsamples of manufacturing and services sectors, higher foreign competition is associated with a lower responsiveness of producer prices to wages.

Finally, the chapter also finds some empirical evidence that more fierce domestic product market competition is associated with a somewhat lower passthrough of wage growth to inflation. Anecdotally, EU firms that participated in the European Central Bank's Wage Dynamics Network Surveys were more likely to indicate their preference to reduce other costs rather than increase prices in response to wage shocks when operating in a more competitive environment (Bertola and others 2012). IPVAR regressions based on OECD's product market regulation (PMR) indices (shown in Figure 2.5, panel 3) also suggest that more vibrant product market competition and fewer barriers to entry mute the sensitivity of consumer prices to wage increases. The passthrough of wage growth to inflation is marginally higher when evaluated at the 75th percentile of a country's PMR score (that is, in countries with higher regulatory barriers in product markets) than at the 25th percentile of the PMR index (Figure 2.3, panels 1 and 2, section E). At a sectoral level, Box 2.1 also finds that stronger domestic competition, as captured by the Lerner

[13]Due to the lower frequency and limited time coverage of the data, the analysis relies on panel regressions, which model growth in sectoral value-added deflators as a function of its lag and growth in productivity adjusted sectoral wage growth, controlling for country–sector and country–year fixed effects. The latter capture the effect of all country-specific time-varying shocks, such as changes in inflation expectations, economic slack, commodity price shocks, and the like. See Online Annex 2.2 for further details.

Index, weakens the link between wage growth and producer prices in the services sector.

The Role of Corporate Profitability

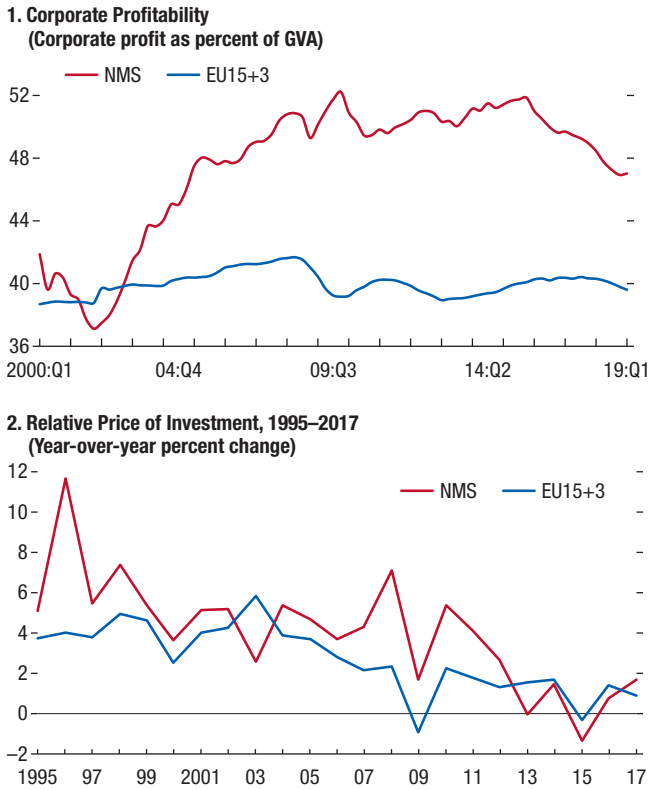
This final section examines the relationship between corporate profitability and the labor cost–inflation passthrough. Firms with higher profit margins have room to absorb a higher wage bill without passing the cost onto consumers, for example, to retain market share. Overall, economy-wide profit shares remain high in Europe, and in NMS in particular (Figure 2.6, panel 1). At the end of 2018, corporate profits amounted to 47 percent of gross value added in NMS and 40 percent in EU15+3 countries.[14] However, the recent increase in productivity-adjusted wages went hand-in-hand with a decline in corporate profit shares. Since the beginning of 2017, corporate profits declined each year by about 1 percent of gross value added in NMS economies and 0.3 percent in other European countries. This pattern suggests that firms are indeed using their profit buffers to absorb the faster wage growth, rather than passing the higher labor costs to their clients.[15]

The IPVAR analysis confirms the inverse association between the corporate profit share and the wage-to-inflation passthrough. In countries and periods when the economy-wide corporate sector profit share is relatively high, a significantly smaller share of wage growth finds its way into consumer price inflation (Figure 2.3, panels 1 and 2, section F). A 1 percentage point increase in labor costs leads to a cumulative increase in inflation of only 0.7 percentage point during the three-year period, when evaluated at the 75th percentile of the distribution of corporate profitability. When corporate profits are relatively thin (when profits are at the 25th percentile of the distribution of corporate profitability), the impact of wage growth on inflation is 2.5 times higher, with a somewhat stronger passthrough.

Rising corporate profit shares mirror the declining share of income that goes to workers. As highlighted in Chapter 3 of the April 2017 *World Economic Outlook*, the labor share of income has been on a downward trend in many countries since the 1990s. A low labor share means that wage developments matter less for inflation. The IPVAR regressions confirm this observation, with the cumulative impact of wage increases on inflation in a low labor share regime very similar to the high corporate profit regime (Figure 2.3, panels 1 and 2, section G).

Finally, enhanced access to relatively cheaper and potentially higher-quality inputs, for example investment goods, allows firms to pay higher

Figure 2.6. Corporate Profitability and Other Costs



Sources: Eurostat; Haver Analytics; IMF, *World Economic Outlook*; Penn World Table 9.1; and IMF staff calculations.
Note: NMS are newer EU members. EU15+3 are the long-standing EU members plus Israel, Norway, and Switzerland. Data are weighted by purchasing-power-parity GDP to aggregate across the two country groups. GVA = gross value added.

[14]In contrast, corporate profits account for only a third of gross value added in the United States.

[15]Admittedly, this pattern is to be expected: higher wages, unless accompanied by employment cuts, will have to translate into lower profits as a matter of accounting, absent any changes to the firm's production technology or other inputs' costs.

wages without raising prices (Andrews and others 2018). The relative prices of machinery and equipment have declined markedly since the 1990s (Figure 2.6, panel 2; and Chapter 3 of the April 2019 *World Economic Outlook*). This is also linked to a more muted wage growth–inflation passthrough (Figure 2.3, panels 1 and 2, section H). More broadly, as the exercise discussed above demonstrates, healthy aggregate corporate profitability and an increase in competition are not necessarily incompatible. Many factors may support corporate profits, even as wages rise, such as access to cheaper intermediate inputs, lower taxation or financing costs, the adoption of new technologies that may reduce the demand for labor, and the like.

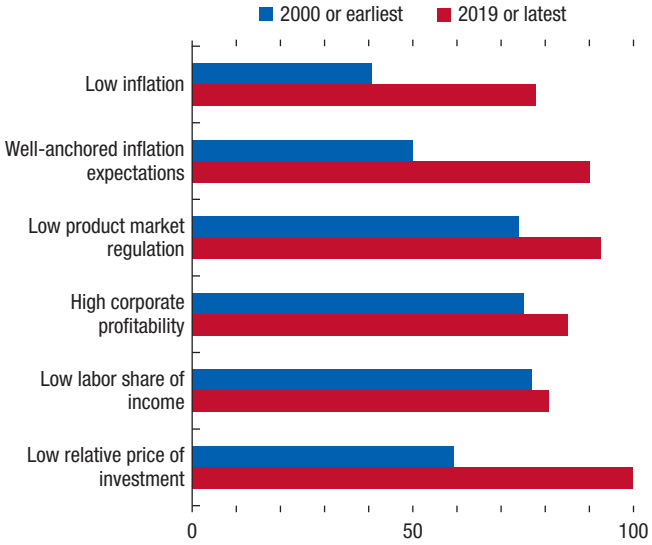
Conclusions and Policy Implications: Inflation to Remain Subdued

Labor markets remain strong in Europe, despite some recent softening discussed in Chapter 1. Wage growth has risen above productivity gains, especially in NMS, yet signs of underlying consumer price pressures remain limited. This chapter explored several factors that influence the strength of the passthrough of wage growth to inflation.

The evidence presented in this chapter suggests that, historically, wage growth has been an important determinant of price developments in Europe. The cumulative impact of a 1 percentage point increase in wages is 1.1 percentage point higher inflation in European countries at the end of three years. The overall passthrough ratio, which takes into account the response of wages to their own increases, is about a third.

However, there are several reasons to expect the recent pickup in wage growth to have a more muted impact on inflation than in the past. The chapter finds that the passthrough of wage growth to inflation is weaker when inflation and inflation expectations are subdued, corporate profitability is higher, and firms are exposed to fiercer competition.

Figure 2.7. Factors Pointing to Low Wage–Inflation Passthrough Ratio
(Percent of total countries)



Sources: Bems and others (2018); Eurostat; Haver Analytics; IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development; Penn World Table 9.1; and IMF staff calculations.
Note: The bars represent the share of European countries in the sample that have core inflation above the long-term country average; the metric of inflation expectations anchoring and corporate profitability in the top 75th percentile; and other variables in the bottom 25th percentile.

What do these findings mean for the inflation outlook and the appropriate policy response? As discussed above, a number of cyclical (for example, inflation, corporate profitability) and structural (such as the degree of competition) factors shape the responsiveness of inflation to wage developments. Currently, inflation and inflation expectations are near historical lows for three quarters of European economies (Figure 2.7). Corporate profitability is still healthy. In NMS, corporate profit shares have started to decline, consistent with firms letting their profit margins absorb the rise in labor costs, rather than passing these costs onto consumers. However, corporate profitability remains high from a historical perspective and significantly above that of EU15+3. Finally, firms continue to report very high levels of competition for their products. Despite the comfortable profit margins at the

aggregate level, more than two-thirds of firms report increased competitive pressures compared to the precrisis era according to the latest Wage Dynamics Network Survey. All of these factors suggest that it is unlikely that the recent increase in wage growth will meaningfully spur inflation in the near term. These findings support the need for monetary policy in many European countries to remain accommodative for longer in order to guard against a downshift in inflation expectations, as discussed in Chapter 1. However, as the prolonged period of accommodative financial conditions may have created an environment conducive to greater risk taking, policy makers need to remain vigilant and guard against further buildup of financial vulnerabilities and other undesirable side effects, as discussed in Chapter 1 of the October 2019 *Global Financial Stability Report*.

Box 2.1. Sectoral Dimension of the Link between Wage Growth and Inflation

Industry-based analysis reveals a strong link between sectoral wage growth and producer prices across 70 industries in eight of the European Union's newer member states (NMS) during 1995–2016.[1,2] This box presents estimates based on the Organisation for Economic Co-operation and Development's Structural Analysis (STAN) Database, which includes 22 industries in the manufacturing sector and 40 industries in the services sector. The impact of wage growth on producer prices at the sectoral level is estimated using error-correction mean-group autoregressive distributed lag regressions since the annual frequency of the available data does not provide sufficient time variation needed for the estimation of a panel vector auto regression (PVAR) model. Overall, a 1 percentage point increase in unit labor costs is found to increase producer prices by 0.9 percentage point after three years. This cumulative increase is the smallest in *Poland* and *Hungary* at about 0.5 percentage point, and the largest in *Latvia* at 1.3 percentage points.[3]

The transmission of wage increases to sectoral prices is stronger in the services sector compared to manufacturing industries, and in times of economy-wide excess demand. On average, the cumulative response of sectoral inflation to wage increases reaches 0.7 percentage point in manufacturing and is close to 1 percentage point in services. The impact of labor compensation on producer prices is much stronger when the economy-wide output gap is positive, and more so in services. When the economy operates above potential, the response of price inflation in the services sector to a 1 percentage point increase in wage growth exceeds 1. In times of excess supply, labor compensation's impact on prices is much more muted (Figure 2.1.1). This result mirrors the economy-wide finding of a significantly higher passthrough of wage growth to inflation in a high-inflation environment (Figure 2.3, panels 1 and 2, section B).

Greater exposure to competition is associated with a weaker link between wage hikes and sectoral inflation. The role of competition is examined in subsamples of country–industry groups exposed to either higher- or lower-than-average intensity of competition within each sector. Firms in the services sector with greater domestic market power, as captured by the Lerner Index, tend to fully pass the cost of higher wages onto their consumers. In contrast, firms with lower market power limit price increases to only two-thirds of wage hikes. In the manufacturing sector, the evidence on the role of domestic market power is less clear-cut. Exposure to foreign competition also affects the responsiveness of producer prices to wage growth. The passthrough appears smaller in sectors that are more exposed to foreign competition, as captured in the ratio of imports of goods or services for final consumption to sectoral gross output.

This box was prepared by Volodymyr Tulin.

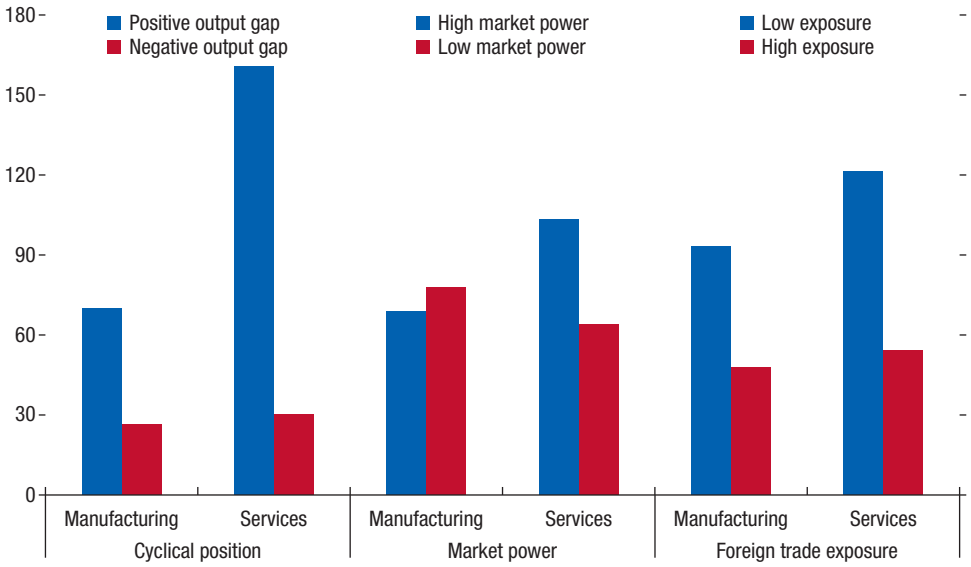
[1]The analysis is based on the following countries: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia. Bulgaria, Croatia, and Romania are excluded due to data limitations.

[2]For the Baltics, output volume is proxied by real value-added.

[3]This result is not fully comparable to the average economy-wide cumulative impact in NMS (Figure 2.2), since the regressions in this box do not account for the dynamic response of wages to either their own shock during the time period or their relationship with prices due to insufficient time variation in the annual data used in this analysis.

Box 2.1 *(continued)*

Figure 2.1.1. Cumulative Response of Producer Prices to Changes in Labor Costs
(Three-year cumulative; percent)



Sources: IMF, *World Economic Outlook*; Organisation for Economic Co-operation and Development, Structural Analysis Database; and IMF staff calculations.
Note: Firms' market power is measured using the Lerner Index, which is constructed as the price–cost margin (Roeger 1995). High market power is an indicator that takes the value of 1 when the Lerner Index exceeds the sectoral average. Firms' exposure to foreign trade is measured as the share of imports of goods and services used for final consumption relative to total gross output of the industry. Subsamples are partitioned into high or low regimes by median values within the two sectors in 2000, except for import of services, where a doubled threshold is chosen since median exposure is low.

References

Andrews, Dan, Peter Gal, and William Witheridge. 2018. "A Genie in a Bottle? Globalisation, Competition and Inflation." OECD Economics Department Working Papers No. 1462, Organisation for Economic Co-operation and Development, Paris.

Bems, Rudolfs, Francesca Caselli, Francesco Grigoli, Bertrand Gruss, and Weicheng Lian. 2018. "Expectations' Anchoring and Inflation Persistence". IMF Working Paper 18/280, International Monetary Fund, Washington, DC.

Bertola, Guiseppe, Aurelijus Dabusinskas, Marco Hoeberichts, Mario Izquierdo, Claudia Kwapil, Jeremi Montornès, and Daniel Radowski. 2012. "Price, Wage and Employment Response to Shocks: Evidence from the WDN Survey." *Labour Economics* 19: 783–791.

Bobeica, Elena, Matteo Ciccarelli, and Isabel Vansteenkiste. 2019. "The Link between Labor Cost and Price Inflation in the Euro Area." ECB Working Paper No. 2235, European Central Bank, Frankfurt am Main.

Bonam, Dennis, Gabriele Galati, Irma Hindrayanto, Marco Hoeberichts, Anna Samarina, and Irina Stanga. 2019. "Inflation in the Euro Area since the Global Financial Crisis." DNB Occasional Studies 17–3, De Nederlandsche Bank, Amsterdam.

Boz, Emine, Nan Li, and Hongrui Zhang. 2019. "Effective Trade Costs and the Current Account: An Empirical Analysis." IMF Working Paper 19/8, International Monetary Fund, Washington, DC.

Carney, Mark. 2015. "Inflation in a Globalised World." Speech at Economic Policy Symposium in Jackson Hole, WY, August 29.

Carney, Mark. 2017. "[De] Globalisation and Inflation." 2017 IMF Michel Camdessus Central Banking Lecture. Washington, DC.

Daly, Mary C., and Bart Hobijn. 2014. "Downward Nominal Wage Rigidities Bend the Phillips Curve." *Journal of Money, Credit and Banking,* Supplement to Vol. 46(2).

De Luigi, Clara, Florian Huber, and Josef Schreiner. 2019. "The Impact of Labor Cost Growth on Inflation in Selected CESEE Countries." *Focus on European Economic Integration* Q4/19, Austrian National Bank, Vienna.

Draghi, Mario. 2019. "Monetary Policy in the Euro Area." Speech at the conference *The ECB and Its Watchers*, Frankfurt am Main, March 27.

Forbes, Kristin. 2019. "Inflation Dynamics: Dead Dormant, or Determined Abroad?" Brookings Papers on Economic Activity, Conference Drafts, September 2019.

Huidrom, Raju, Nemanja Jovanovic, Carlos Mulas-Granados, Laura Papi, Faezeh Raei, Emil Stavrev, and Philippe Wingender. 2019. "Trade Tensions, Global Value Chains, and Spillovers: Insights for Europe." IMF Departmental Paper 19/10, International Monetary Fund, Washington, DC.

Huidrom, Raju, Nemanja Jovanovic, and Emil Stavrev. Forthcoming. "Wage Passthrough to Inflation: The Role of Anchoring of Inflation Expectations." IMF Working Paper, International Monetary Fund, Washington DC.

International Monetary Fund (IMF). 2017a. "Understanding the Downward Trend in Labor Income Shares." Chapter 3 of the *World Economic Outlook*, Washington, DC, April.

_____. 2017b. "Recent Wage Dynamics in Advanced Economies: Drivers and Implications." Chapter 2 of the *World Economic Outlook*, Washington, DC, October.

_____. 2018a. "Challenges for Monetary Policy in Emerging Markets as Global Financial Conditions Normalize." Chapter 3 of the *World Economic Outlook*, Washington, DC, October.

_____. 2018b. "Estonia: Selected Issues." IMF Country Report 18/126. Washington, DC.

_____. 2018c. "European Wage Dynamics and Labor Market Integration." Chapter 2 of *Regional Economic Outlook: Europe*, Washington, DC, May.

_____. 2019a. "Czech Republic: 2019 Article IV Consultation Staff Report" IMF Country Report No. 19/160, Washington, DC.

_____. 2019b. "The Price of Capital Goods: A Driver of Investment Under Threat." Chapter 3 of the *World Economic Outlook*, Washington, DC, April.

Johnson, Robert C. and Guillermo Noguera. 2017. "A Portrait of Trade in Value Added Over Four Decades." *The Review of Economics and Statistics* 99(5): 896–911.

Lamo, Ana, and Frank Smets. 2009. "Wage Dynamics in Europe: Final Report of the Wage Dynamics Network." European Central bank, Frankfurt am Main.

Obstfeld, Maurice. 2019. "Global Dimensions of U.S. Monetary Policy." NBER Working Paper 26039, National Bureau of Economic Research, Cambridge, MA.

Organisation for Economic Co-operation and Development (OECD). 2009. "Productivity Measurement and Analysis." OECD Publishing, Paris.

Peneva, Ekaterina V., and Jeremy B. Rudd. 2017. "The Passthrough of Labour Cost to Price Inflation." *Journal of Money, Credit and Banking*, 49(8), 1777–1802.

Roeger, Werner. 1995. "Can Imperfect Competition Explain the Difference between Primal and Dual Productivity Measures? Estimates for U.S. Manufacturing." *Journal of Political Economy* 103(2): 316–30.

Taylor, John B. 2000. "Low Inflation, Pass-Through, and the Pricing Power of Firms." *European Economic Review*, 44(7), 1389–1408.

Towbin, Pascal, and Sebastian Weber. 2013. "Limits of Floating Exchange Rates: The Role of Foreign Currency Debt and Import Structure." *Journal of Development Economics* 101 (1): 179–94.

Voinea, Liviu. 2019. "The Post-Crisis Phillips Curve and Its Policy Implications: Cumulative Wage Gap Matters for Inflation." SUERF Policy Note 69, May, Vienna.