

**TO WHAT EXTENT DID THE 2022 INFLATION SHOCK
GENERATE HETEROGENEOUS PURCHASING POWER
OUTCOMES ACROSS SELECTED EURO AREA
COUNTRIES, AND WHICH STRUCTURAL FACTORS CAN
ACCOUNT FOR THESE DIFFERENCES?**

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List of Abbreviations

Abbreviation	Full term
CPI	Consumer Price Index
COICOP	Classification of Individual Consumption According to Purpose
COVID-19	Coronavirus Disease 2019
DTW	Dynamic Time Warping
ECB	European Central Bank
EMU	Economic and Monetary Union
EU	European Union
GDP	Gross Domestic Product
HICP	Harmonised Index of Consumer Prices
IV	Instrumental Variable
LCI	Labour Cost Index
NACE	Statistical Classification of Economic Activities in the European Community
NDI	Nominal Disposable Income
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
RDI	Real Disposable Income
SVAR	Structural Vector Autoregression
VAR	Vector Autoregression
VAT	Value Added Tax

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1. Introduction

1.1 Context

For more than a decade following the European sovereign debt crisis, inflation remained relatively subdued across the euro area. The European Central Bank even faced persistent risks of excessively low inflation, prompting the implementation of unconventional monetary policies, including negative interest rates and large-scale asset purchase programmes (European Central Bank, 2021). Consequently, the sharp inflationary acceleration observed in 2022 represented a significant break with the macroeconomic environment that had characterised the previous decade.

Inflation returned to the forefront of economic and political debates in 2022, as consumer prices increased sharply in the aftermath of the COVID-19 pandemic and the energy crisis triggered by Russia's invasion of Ukraine. Rising energy prices, supply chain disruptions and strong post-pandemic demand combined to generate inflation rates unseen since the creation of the euro (Eurostat, 2023; European Commission, 2023).

The inflation surge resulted from the combination of several simultaneous shocks. Following the COVID-19 pandemic, economic activity recovered rapidly while global production networks remained disrupted by shortages of intermediate goods, transportation bottlenecks and persistent supply-chain constraints (OECD, 2023). Shortly afterwards, Russia's invasion of Ukraine generated an unprecedented increase in natural gas and electricity prices across Europe, substantially increasing production costs for firms and living costs for households (European Commission, 2023). The coexistence of demand-side and supply-side pressures contributed to exceptionally high inflation rates across the euro area.

The consequences of this inflationary episode were particularly significant for households. As consumer prices increased faster than wages in many countries, purchasing power deteriorated substantially (OECD, 2023; European Commission, 2023). However, the intensity of this deterioration differed across European economies. While all countries experienced inflationary pressures, the magnitude of inflation and its impact on households varied considerably.

Understanding these developments is particularly relevant in the context of the euro area. Although member states share a common monetary policy conducted by the European Central Bank (ECB), they differ in terms of energy dependence, labour market institutions, wage-setting mechanisms and economic structures. Consequently, a common external shock may generate different inflation trajectories and different effects on real wages and purchasing power.

In response to rapidly increasing inflation, the European Central Bank progressively tightened monetary policy through a series of interest rate increases aimed at restoring price stability and anchoring inflation expectations (European Central Bank, 2023). However, although monetary policy is common to all euro area countries, national economic structures differ substantially, potentially leading to heterogeneous inflation dynamics and purchasing power effects.

The inflation shock rapidly evolved into a purchasing power crisis. In many European countries, nominal wage growth failed to fully compensate for rising consumer prices, leading to a decline in households' real disposable income. The strongest effects were observed for essential expenditures such as food and energy, which represent a larger share of consumption for lower-income households

(OECD, 2023). Consequently, inflation not only generated macroeconomic challenges but also raised important social and distributional concerns across Europe.

Although the inflation shock affected the entire euro area, its magnitude and persistence differed across countries. These differences suggest that national structural characteristics may have influenced both inflation dynamics and households' purchasing power. Understanding these heterogeneous effects constitutes the central motivation of this thesis.

These developments raise important questions for both policymakers and researchers, which constitute the central research problem addressed in this thesis.

1.2 Research Problem

Although the 2022 inflation shock affected all euro area countries, its economic consequences were far from uniform. While inflation increased across the entire monetary union, important differences emerged regarding both the magnitude and the persistence of price increases. Similarly, households did not experience the same evolution of purchasing power, with some countries recording substantially larger declines in real disposable income than others.

These heterogeneous outcomes appear paradoxical given that euro area countries share a common currency and are subject to the same monetary policy implemented by the European Central Bank. In principle, a common external shock would be expected to generate relatively similar macroeconomic effects across member states. However, the 2022 inflation episode revealed significant cross-country differences, suggesting that national structural characteristics may influence the transmission of inflationary shocks.

Existing studies highlight several potential explanatory mechanisms, including differences in energy dependency, labour market institutions, wage indexation systems, fiscal support measures and the overall composition of national economies. Nevertheless, there remains no clear consensus regarding the relative importance of these factors in explaining why purchasing power evolved differently across European countries following the inflation surge.

Understanding these differences represents an important research challenge for both policymakers and researchers. From a policy perspective, identifying the mechanisms that amplify or mitigate inflationary pressures may improve the design of future monetary and fiscal responses to external shocks. From an academic perspective, analysing heterogeneous inflation dynamics contributes to the broader literature on inflation convergence, economic resilience and the transmission of common shocks within a monetary union.

Against this background, this thesis seeks to investigate to what extent the 2022 inflation shock generated heterogeneous purchasing power outcomes across selected euro area countries. To this end, it combines descriptive evidence from Eurostat data with an exploratory empirical analysis examining the role of energy dependency and wage dynamics as structural transmission channels, alongside insights from the existing literature on inflation dynamics, energy shocks and institutional adjustment mechanisms.

1.3 Research Question

The central research question addressed in this thesis is:

To what extent did the 2022 inflation shock generate heterogeneous purchasing power outcomes across selected euro area countries, and which structural factors can account for these differences?

Although the inflationary episode originated from largely common external shocks, including the post-pandemic recovery and the energy crisis triggered by Russia's invasion of Ukraine, its consequences were not identical across euro area countries. Inflation rates followed different trajectories, and households experienced varying degrees of purchasing power deterioration despite sharing a common monetary policy framework.

To address this question, the present study analyses inflation divergence across selected euro area countries and examines whether differences in purchasing power developments can be associated with structural national characteristics. Particular attention is given to energy dependency as measured by the share of energy imports in total energy consumption, and to wage dynamics as captured by the Labour Cost Index. These indicators serve as empirical proxies for the structural mechanisms discussed in the literature.

By combining insights from the existing literature with descriptive and exploratory empirical evidence based on Eurostat data, this thesis seeks to provide a better understanding of why a common inflationary shock generated heterogeneous economic outcomes within the euro area.

1.4 Research Objectives

The main objective of this thesis is to investigate to what extent the 2022 inflation shock generated heterogeneous purchasing power outcomes across selected euro area countries, and to identify which structural factors may account for these differences despite the existence of a common monetary policy framework.

More specifically, the study pursues five complementary objectives.

First, it seeks to analyse the evolution of inflation dynamics across the selected countries in order to identify periods of convergence and divergence before and after the 2022 inflation shock. This analysis relies on the standard deviation of annual HICP inflation rates as a measure of inflation dispersion, which provides a more robust indicator of cross-country heterogeneity than simple range-based measures. In addition, monthly HICP data disaggregated by component (headline, core, energy and food) are examined for the 2020–2023 period in order to assess whether annual averages adequately capture the timing and sequencing of the 2022 inflation shock across countries.

Second, it aims to compare changes in household purchasing power through the analysis of real disposable income developments and to assess whether inflation translated into heterogeneous welfare outcomes across countries. This comparison is complemented by an analysis of nominal disposable income growth, which makes it possible to distinguish the respective contributions of nominal income growth and inflation to real purchasing power outcomes, and to assess the extent to which wage indexation mechanisms translated into effective purchasing power protection.

Third, the study introduces several structural proxy variables, including the share of energy imports in total energy consumption, a household-level measure of energy exposure based on the weight of energy in the HICP consumption basket, and the Labour Cost Index, in order to explore whether differences in energy dependency and wage dynamics are associated with the observed cross-country differences in inflation and purchasing power outcomes.

Fourth, the thesis presents two complementary empirical analyses to examine the structural transmission channels introduced above. On the one hand, an exploratory scatter-plot analysis combined with a simple cross-sectional OLS regression examines whether energy dependency can partially account for cross-country differences in peak inflation following the 2022 shock; given the small sample size of five country-level observations, these results are interpreted with caution and are intended as illustrative rather than conclusive. On the other hand, a quarterly panel regression, based on 120 country-quarter observations between 2019 and 2024, examines the relationship between wage growth and inflation with substantially greater statistical power, allowing a more robust assessment of the extent to which nominal wages responded to the 2022 inflation shock across countries.

Finally, the study seeks to relate the descriptive and exploratory empirical evidence to the broader academic debate on inflation transmission, inflation convergence and purchasing power dynamics within the euro area.

By combining a comparative descriptive analysis with both an exploratory cross-sectional framework and a more robust panel-based empirical analysis, together with insights from the literature, this research aims to contribute to a better understanding of the heterogeneous effects of common inflationary shocks within a monetary union and to provide evidence that may inform future economic policy discussions.

1.5 Structure of the Thesis

This thesis is organised into six chapters.

Following the present introduction, Chapter 2 reviews the existing literature on inflation shocks, inflation convergence within the euro area, purchasing power dynamics and the role of labour market institutions and wage adjustment mechanisms. This review establishes the theoretical framework and identifies the main explanatory factors discussed in the academic literature.

Chapter 3 presents the methodology adopted in this study, including the data sources, variable construction and empirical strategy used to analyse inflation dynamics and purchasing power developments across the selected euro area countries.

Chapter 4 reports the empirical results by examining inflation trends, inflation dispersion, real disposable income developments, and the association between structural variables and purchasing power outcomes. The analysis begins with a detailed examination of inflation dynamics at both the annual and monthly frequency, highlighting the timing and sequencing of the 2022 shock across HICP components. It then presents inflation dispersion and purchasing power developments across the selected countries, followed by a scatter-plot analysis of energy dependency and peak inflation, a household-level measure of energy exposure, and a quarterly panel regression examining the relationship between wage growth and inflation. The chapter highlights similarities and differences in the way countries experienced the 2022 inflation shock.

Chapter 5 discusses these findings in light of the existing literature and explores the potential mechanisms that may explain the heterogeneous purchasing power outcomes observed across countries, with particular attention to energy dependency and institutional characteristics.

Finally, Chapter 6 summarises the main findings of the study, discusses its limitations and outlines potential avenues for future research as well as policy implications arising from the analysis.

2. Literature Review

The purpose of this literature review is to examine the main theoretical and empirical contributions that help explain why a common inflation shock may generate heterogeneous purchasing power outcomes across euro area countries. Existing research suggests that inflation dynamics are influenced by a combination of external shocks, national economic structures and institutional adjustment mechanisms. At the same time, purchasing power developments depend not only on inflation itself but also on wage dynamics, labour market institutions and the broader economic environment.

To provide a structured overview of the existing literature, this chapter is organised around four complementary themes. The first section reviews the relationship between energy shocks and inflation transmission. The second examines inflation convergence and divergence within the euro area. The third focuses on purchasing power and real wage developments, while the final section analyses the role of labour market institutions and wage adjustment mechanisms. Together, these contributions establish the theoretical framework that guides the empirical analysis developed in the following chapters.

2.1 Energy shocks and inflation transmission

Energy shocks are a central mechanism through which external disturbances can affect domestic inflation, particularly through cost-push inflation mechanisms widely discussed in macroeconomic theory (Blanchard, 2021). In open economies, increases in oil, gas or electricity prices directly raise consumer energy prices and indirectly increase production and transportation costs. These cost pressures can then be transmitted to a broader set of goods and services, generating second-round effects on headline inflation.

The 2022 inflation episode in Europe provides a clear example of such a mechanism. The sharp increase in energy prices following the post-pandemic recovery and Russia's invasion of Ukraine affected European economies unevenly, depending on their degree of energy import dependency, energy mix and policy responses. As a result, while the inflation shock was common across Europe, its intensity differed across countries.

This literature is relevant for the present thesis because it provides a theoretical explanation for why a common external shock may generate heterogeneous inflation outcomes. Countries that are more exposed to imported energy or more dependent on volatile energy inputs may experience stronger inflationary pressures than countries with more diversified or protected energy structures.

Beyond their direct impact on household energy bills, energy price shocks can generate broader inflationary pressures through cost pass-through mechanisms. Higher energy prices increase production costs, transportation expenses and distribution costs across many sectors of the economy, leading firms to progressively transfer these additional costs to final consumers. Consequently, inflationary pressures extend beyond the energy sector itself and affect a wide range of goods and services. Moreover, rising energy prices may also influence inflation expectations, encouraging higher wage demands and further reinforcing price increases. Recent evidence for the Euro area suggests that these transmission mechanisms have become particularly important following the post-pandemic recovery and the energy crisis triggered by the Russia–Ukraine conflict (Casoli et al., 2024).

The transmission of energy shocks to inflation is therefore both direct and indirect. Direct effects occur through higher household expenditure on electricity, gas and fuels, while indirect effects arise because energy constitutes an essential input in production, transportation and distribution activities across the economy. Consequently, increases in energy prices gradually spread to manufactured goods, food products and services, amplifying inflationary pressures beyond the energy component itself. This broad cost transmission mechanism partly explains why the inflation shock observed after 2021 rapidly extended to core inflation across many euro area countries.

Banerjee et al. (2026) show that oil price shocks affect inflation through multiple channels. Beyond the direct cost-push effect on production and transportation costs, energy price increases may also operate through exchange rate depreciation, liquidity conditions and central bank responses. Their results suggest that inflation-targeting countries are better able to manage sudden inflationary pressures by adjusting policy rates. This supports the idea that the inflationary impact of energy shocks depends not only on energy exposure itself, but also on monetary and institutional conditions.

Dullien and Tober (2024) analyse Germany's experience after the 2022 energy price shock and show that the inflation surge was largely driven by imported energy and food prices. They describe the episode as a historic terms-of-trade shock, particularly severe for Germany because of its dependence on imported energy and exposure to the Central European gas market. Their analysis also shows that energy and food price increases had strong distributional effects, disproportionately affecting low-income households. This is relevant for the present thesis because it illustrates how a common European energy shock can translate into heterogeneous inflation and purchasing-power effects depending on national energy exposure and policy responses.

Although both Banerjee et al. (2026) and Dullien and Tober (2024) identify energy prices as a major driver of inflation, their perspectives differ. Banerjee et al. (2026) emphasise the macroeconomic transmission channels linking oil price shocks to inflation and monetary policy responses, whereas Dullien and Tober focus more specifically on the role of imported energy dependence and the distributional consequences of the 2022 energy crisis. Together, these studies illustrate that energy shocks affect inflation through both macroeconomic and structural national channels.

According to Casoli et al. (2024), the inflation episode observed after 2021 cannot be explained solely by demand recovery but also reflects exceptionally large natural gas and energy supply shocks that propagated throughout the euro area economy. This illustrates the central role played by energy markets in shaping post-pandemic inflation dynamics.

Coutinho and Licchetta (2025) show that the 2022 increase in euro area inflation was largely driven by a common shock related to energy and food prices, but that the transmission of this shock differed across member states. Their results suggest that the common factor explains around half to two thirds of the increase in headline inflation in 2022, depending on the specification. Countries with higher energy intensity reacted more strongly to the shock, while economies with a larger services share in gross value added were less affected. This provides direct evidence that the 2022 inflation episode was not only a common euro area shock, but also an asymmetric one.

Garzon and Hierro (2024) show that the transmission of electricity price shocks to inflation depends strongly on the retail pricing mechanism. Using the introduction of Real-Time Pricing in Spain, they find that wholesale electricity price shocks were transmitted faster to inflation after the reform, with a maximum impact on HICP around three to four times higher than under the previous fixed-price system. Their results also suggest that stronger electricity pass-through can affect core inflation, particularly services, implying that energy shocks may generate second-round effects beyond the direct energy component.

While Coutinho and Licchetta (2025) emphasise differences in national economic structures and energy intensity, Garzon and Hierro (2024) show that institutional features of electricity markets can also influence the transmission of energy price shocks to consumer inflation. Their results therefore complement each other by highlighting different dimensions of inflation heterogeneity.

These findings further support the hypothesis that cross-country inflation differences following an energy shock may reflect not only energy dependence but also national retail price regulation and the speed of pass-through to consumer prices.

Van den End et al. (2025) provide direct institutional evidence on why a common energy shock can generate heterogeneous inflation outcomes even within the euro area. Analysing the Dutch case, they identify three distinct layers of explanation for the Netherlands' persistently higher inflation relative to the euro area average. At the structural level, the high share of natural gas in the Dutch energy mix, accounting for approximately 34% of energy inflation between 2020 and 2024, compared to 19% in the euro area, combined with exceptional trade openness (a trade-to-GDP ratio of 156% against an euro area average of 89%), made the Dutch economy particularly sensitive to external price shocks. At the cyclical level, excess domestic demand and a persistently tight labour market contributed to strong wage and service price pressures that amplified the common energy shock. Finally, at the policy level, the Netherlands opted for direct household compensation rather than retail price caps, meaning that wholesale energy price increases were more directly transmitted to consumer prices than in countries such as France, where administered price ceilings limited pass-through. These findings reinforce the argument that structural energy exposure, market design and national policy responses jointly shape the transmission of common inflationary shocks, thereby contributing to heterogeneous inflation outcomes across euro area countries.

Taken together, the studies reviewed in this section highlight that energy shocks constitute one of the principal transmission channels through which external disturbances affect inflation. While all authors recognise the central role of energy prices, they emphasise different mechanisms. Banerjee et al. (2026) focus on the interaction between commodity prices and monetary policy, whereas Dullien and Tober (2024) stress the importance of imported energy dependence and distributional consequences. Coutinho and Licchetta (2025) further demonstrate that national economic structures shape the transmission of common shocks, while Garzon and Hierro (2024) show that regulatory frameworks influence the pass-through of electricity prices to consumers.

Overall, this literature suggests that energy shocks constitute a fundamental but not exclusive determinant of inflation dynamics. Their effects depend on the interaction between external price shocks and national structural characteristics, thereby providing a strong theoretical basis for analysing inflation divergence and its implications for purchasing power across euro area countries.

However, understanding energy transmission mechanisms alone is insufficient to explain the heterogeneous inflation outcomes observed across Europe. The literature on inflation convergence and divergence within the euro area therefore provides an additional perspective for interpreting these cross-country differences.

2.2 Inflation convergence and divergence in the Euro Area

A recent contribution by Pereira and Aguiar-Conraria (2025) directly addresses the question of inflation convergence within the Eurozone. Using wavelet-based methods on inflation data for the initial Eurozone member states from 2001 to 2023, they find evidence of increasing synchronisation of

inflation cycles over time. However, their results also show that this apparent convergence becomes much weaker once energy prices are controlled for. This suggests that part of the observed inflation synchronisation after 2022 may reflect a common energy shock rather than genuine structural convergence among Eurozone economies. This distinction is important for the present thesis, which investigates whether the 2022 inflation shock generated temporary divergence across selected European countries and how this divergence affected purchasing power.

Ortmans (2023) also highlights the importance of analysing inflation dispersion within the euro area. Using measures based on the cross-country dispersion of predictive inflation distributions, the study shows that inflation differentials are time-varying and became particularly relevant during the post-COVID inflation episode. This supports the idea that average euro area inflation can hide substantial heterogeneity across member states.

Although Pereira and Aguiar-Conraria (2025) and Ortmans (2023) both analyse inflation convergence within the euro area, they adopt complementary perspectives. Pereira and Aguiar-Conraria focus on the long-term synchronisation of inflation cycles, whereas Ortmans emphasises the time-varying nature of inflation dispersion and the importance of analysing cross-country heterogeneity during periods of major economic shocks. Together, these studies suggest that apparent inflation convergence may conceal significant short-term divergence across member states.

Recent research on euro area convergence further supports the idea that monetary integration does not necessarily eliminate structural asymmetries between member states. Navarro-Ortiz (2026) identifies what he describes as a “convergence paradox” within the euro area. Although aggregate economic indicators may suggest relatively high levels of synchronisation, this apparent convergence can conceal important structural vulnerabilities. In particular, the author argues that the euro area remains exposed to asymmetric shocks because it lacks some of the adjustment mechanisms observed in more integrated monetary unions, such as federal fiscal risk-sharing and strong labour mobility. His analysis also shows that inflation correlations within the euro area became particularly volatile during the sovereign debt crisis and the recent energy shocks. This perspective is relevant for the present thesis because it reinforces the idea that inflation convergence should not be interpreted as a permanent or complete process. Instead, major shocks may reveal underlying structural differences between member states, leading to temporary inflation divergence and potentially heterogeneous purchasing power outcomes.

Borowski, Fidrmuc and Jaworski (2025) show that inflation synchronization within the Eurozone is closely linked to real economic convergence. Using panel data for 24 EU countries over the period 2001–2022, they find that countries with higher GDP per capita relative to the EU average tend to display stronger inflation co-movement with the Eurozone. Their results also indicate that this relationship is non-linear and that lower income inequality is associated with greater inflation synchronization. This suggests that inflation convergence depends not only on the existence of a common monetary policy, but also on structural similarities between economies, including income levels, inequality and trade integration.

While several studies emphasise the increasing synchronisation of inflation within the euro area, Navarro-Ortiz (2026) argues that this convergence should be interpreted with caution. According to the author, periods of apparent macroeconomic convergence may conceal persistent structural asymmetries between member states that become particularly visible during major external shocks. This perspective suggests that inflation convergence should be regarded as a dynamic process rather than as a permanent equilibrium, reinforcing the idea that common monetary institutions cannot fully eliminate national inflation differentials.

These findings further reinforce the argument that inflation heterogeneity across European countries may reflect deeper structural economic differences rather than solely short-term exposure to the 2022 energy shock.

The literature therefore suggests that monetary integration alone does not guarantee inflation convergence across member states. Differences in productive structures, sectoral composition, trade openness and energy dependency may generate asymmetric responses to common shocks. Consequently, inflation convergence should be interpreted as a long-run tendency that remains sensitive to large external disturbances capable of temporarily increasing inflation dispersion within the monetary union.

This observation also implies that common monetary institutions cannot completely eliminate inflation heterogeneity when national economies remain structurally different. Differences in industrial specialisation, energy dependency and fiscal frameworks may continue to generate asymmetric inflation responses despite monetary integration, particularly during periods of exceptional external shocks.

While structural economic characteristics appear to influence inflation synchronisation, other authors argue that national policy choices may also contribute to persistent inflation differentials across euro area countries. Checherita-Westphal, Leiner-Killinger and Schildmann (2025) analyse the determinants of inflation differentials across the 19 euro area countries over the period 1999–2019. Their findings suggest that aggregate fiscal stance or fiscal impulse does not have a robust direct effect on HICP or core HICP inflation differentials. However, fiscal policy may influence inflation differentials indirectly through the output gap. The authors also show that specific fiscal instruments, especially VAT changes and public wage growth, are statistically significant determinants of inflation differentials. This indicates that inflation heterogeneity within the euro area is not only driven by common shocks, but also by national macroeconomic conditions and policy instruments.

The findings of Borowski et al. (2025) and Checherita-Westphal et al. (2025) further complement each other. While Borowski et al. emphasise the role of structural economic convergence and income characteristics in explaining inflation synchronisation, Checherita-Westphal et al. highlight the importance of national fiscal policies and institutional factors. Together, these contributions indicate that inflation convergence depends on a combination of structural and policy-related determinants rather than on monetary integration alone.

Coutinho and Licchetta (2025) reinforce these findings by showing that even when inflation originates from a common external shock, differences in national economic structures may generate heterogeneous inflation outcomes across euro area countries. Their results therefore complement the broader literature on inflation convergence by highlighting the interaction between common shocks and country-specific characteristics.

The issue of inflation divergence within the euro area can also be interpreted through the theory of optimum currency areas. Mundell (1961) argues that monetary unions may generate adjustment costs when member economies are exposed to asymmetric shocks and cannot rely on exchange-rate adjustments. In such a context, alternative adjustment mechanisms, such as labour mobility, wage flexibility and fiscal transfers, become essential for absorbing country-specific disturbances. When these mechanisms are limited, common shocks may produce heterogeneous national outcomes, even within a shared monetary framework.

This perspective is particularly relevant for the euro area, where monetary policy is centralised but fiscal policy, labour markets and institutional structures remain largely national. As emphasised by De Grauwe (2020), the costs of monetary union are more likely to appear when member states experience asymmetric shocks or when common shocks are transmitted differently across national economies. This theoretical framework supports the interpretation developed in this thesis: the 2022 inflation shock occurred within a common monetary area, but its effects on inflation and purchasing power

differed because countries retained distinct structural characteristics, energy exposures and wage-setting institutions.

Taken together, the studies reviewed in this section suggest that inflation convergence within the euro area is neither automatic nor permanent. Although the existence of a common monetary policy has favoured greater synchronisation of inflation over time, important divergence may still emerge following major external shocks such as the 2022 energy crisis. The literature indicates that inflation heterogeneity reflects the interaction between common shocks, structural economic characteristics and national policy responses rather than the absence of monetary integration itself. These findings provide an essential theoretical framework for interpreting the cross-country inflation differences analysed in the present thesis and motivate the subsequent analysis of purchasing power developments across euro area countries. Moreover, if inflation dynamics differ across countries, households are unlikely to experience identical purchasing power developments. The literature on purchasing power and real income adjustment therefore provides a complementary perspective for understanding the welfare consequences of inflation heterogeneity within the euro area.

2.3 Real wages and purchasing power

Purchasing power reflects households' ability to acquire goods and services with their available income and is therefore closely linked to both price developments and income dynamics. During periods of high inflation, purchasing power depends not only on changes in consumer prices but also on wage adjustments, housing costs and broader living expenses. Consequently, understanding purchasing power requires a multidimensional approach that extends beyond conventional inflation indicators. (OECD, 2023)

Israel and Schnabl (2024) highlight that the assessment of real wages and purchasing power depends strongly on how inflation is measured. Focusing on Germany, they argue that official HICP-based inflation may not fully capture broader cost-of-living pressures because it excludes housing prices, asset prices and some public-sector-related costs. When they construct alternative inflation measures including these components, real income and real wage developments appear significantly weaker than under official inflation measures. This suggests that purchasing power losses may be underestimated when relying only on standard consumer price indices, particularly for households mainly dependent on labour income.

Goracy, Maciejewska and Maciuk (2024) extend the analysis of purchasing power to housing affordability across EU countries. Using data on average full-time earnings, housing transaction prices and rental costs, they show that the purchasing potential of wages in the housing market has weakened in many European countries since 2015. Their results indicate that the average European needed around 5.5 to 5.7 years of full gross salary to purchase a 70 m² apartment by 2022, while wage-based housing purchasing power declined in 20 out of 26 countries between 2015 and 2022. This suggests that purchasing power losses cannot be assessed only through consumer prices, since housing costs also shape households' real living standards.

Although Israel and Schnabl (2024) and Goracy et al. (2024) approach purchasing power from different perspectives, their conclusions are complementary. Israel and Schnabl emphasise the importance of accurately measuring inflation in order to assess real income developments, whereas Goracy et al. highlight the role of housing affordability as an additional determinant of households' effective purchasing power. Together, these studies suggest that purchasing power cannot be fully understood through standard inflation indicators alone.

Höpner, Di Carlo and Hassel (2024) show that the 2021–2023 inflation shock generated substantial real wage losses in Germany, as in other eurozone countries. Despite high inflation and tight labour market conditions, German collective bargaining remained relatively moderate. This moderation was achieved through one-off payments, longer collective agreements and “zero-month” clauses, which delayed permanent wage increases. The German case therefore illustrates how inflation can reduce purchasing power even when nominal wages rise, especially when wage policy prioritises competitiveness and avoids full compensation for price increases.

The findings of Höpner et al. (2024) complement this perspective by illustrating how wage-setting institutions influence households’ ability to cope with inflation. Their analysis suggests that even when labour markets remain relatively tight, moderate wage adjustments may result in significant losses in real purchasing power if inflation accelerates more rapidly than nominal income growth.

More generally, the distinction between nominal wages and real wages is essential for understanding purchasing power developments during periods of high inflation. While nominal wages measure the amount of money earned by workers, real wages adjust this income for changes in consumer prices and therefore reflect households’ effective purchasing capacity. Consequently, nominal wage increases do not necessarily translate into improvements in living standards if inflation rises more rapidly than wages. This distinction is particularly relevant for the 2022 inflation episode, during which many European households experienced declining real incomes despite positive nominal wage growth.

Purchasing power is also closely related to income distribution. Households with lower incomes generally devote a larger share of their expenditure to essential goods such as food, heating and electricity, whose prices increased particularly rapidly during the recent inflation episode. Conversely, higher-income households allocate a larger proportion of their expenditure to services and discretionary consumption, which may evolve differently during inflationary periods. Consequently, identical inflation rates may generate heterogeneous welfare effects across income groups, reinforcing existing inequalities and creating differentiated purchasing power losses within the same economy.

Taken together, the studies reviewed in this section indicate that purchasing power is a multidimensional concept shaped by the interaction between inflation, wage dynamics, housing affordability and the measurement of living costs. Inflation alone does not fully determine households’ real economic well-being, as institutional wage-setting mechanisms and structural characteristics of national housing markets also play an important role.

The literature further suggests that countries facing similar inflationary pressures may nevertheless experience different purchasing power trajectories depending on their labour market institutions, income dynamics and cost-of-living structures. Consequently, analysing purchasing power requires a broader perspective that extends beyond conventional inflation indicators and incorporates the broader economic environment affecting households.

These contributions provide an important conceptual framework for the present thesis by supporting the hypothesis that heterogeneous purchasing power developments observed across euro area countries after the 2022 inflation shock reflect the combined influence of inflation dynamics, wage adjustment mechanisms and national structural characteristics rather than price developments alone.

These observations also suggest that institutional arrangements and wage-setting mechanisms may play a crucial role in shaping purchasing power resilience. The following section therefore examines the role of labour market institutions in moderating the effects of inflation across euro area countries.

2.4 Institutional factors and wage adjustment

Institutional arrangements play a central role in determining how inflation shocks affect households and firms. Wage-setting mechanisms, collective bargaining systems, automatic wage indexation and monetary policy frameworks all influence the extent to which external price shocks are transmitted to domestic inflation and purchasing power. Consequently, differences in institutional structures may contribute to heterogeneous inflation dynamics and purchasing power outcomes across euro area countries. (European Central Bank, 2023)

Visco (2023) argues that the euro area energy shock should be interpreted as an external tax on the economy. The resulting loss of purchasing power cannot be fully reversed through generalised wage increases, since backward-looking attempts to recover real income losses may prolong inflation and generate second-round effects. This highlights the importance of wage-setting institutions and inflation expectations in determining whether an external inflation shock remains temporary or becomes persistent.

Peersman (2022) shows that commodity price shocks can generate asymmetric inflation effects across euro-area countries because wage responses differ across national labour-market institutions. Using an SVAR-IV model with global harvest shocks as an external instrument, the paper finds that international food commodity price shocks explain almost 30% of euro-area HICP volatility over the medium term. Importantly, the direct pass-through through food retail prices explains only part of the total effect; the strongest transmission channel comes from second-round effects through rising wages. Countries with stronger wage indexation or wage bargaining mechanisms, including Belgium, tend to experience stronger wage responses and therefore stronger inflationary effects.

Although Visco (2023) and Peersman (2022) examine different aspects of inflation transmission, their conclusions are closely related. Visco emphasises the risks associated with broad wage compensation following external inflation shocks, whereas Peersman provides empirical evidence that wage-setting institutions can amplify inflation persistence through second-round effects. Together, these studies highlight the importance of institutional wage adjustment mechanisms in shaping inflation dynamics within the euro area.

Bijnens, Duprez and Jonckheere (2023) provide direct evidence on the Belgian case during the 2022 inflation shock. Using firm-level data from more than 100,000 Belgian firms, they decompose price increases into input-cost effects, wage effects and markup effects. Their results show that Belgian price increases in 2022 were mainly driven by rising intermediate input costs, while wages also contributed but to a lesser extent. Importantly, they find no evidence that markups or excessive profit-seeking behaviour drove inflation. Even in Belgium, where wages are automatically indexed, the authors do not find evidence of a self-sustaining profit-wage-price spiral in 2022.

The Belgian evidence presented by Bijnens et al. (2023) provides an interesting complement to Peersman's theoretical framework. While Peersman highlights the potential inflationary effects of stronger wage indexation mechanisms, Bijnens et al. show that, during the 2022 inflation episode, Belgian inflation remained primarily driven by imported input costs rather than by an endogenous wage-price spiral. This suggests that institutional mechanisms may increase inflation persistence under certain conditions, but their actual effects depend on the broader economic context.

This finding is particularly relevant for the present thesis because Belgium is often considered more exposed to second-round effects due to automatic wage indexation. The article suggests that wage indexation may increase theoretical concerns about inflation persistence, but that the Belgian inflation

shock in 2022 was primarily imported through input costs rather than generated domestically by wages or profits.

While labour-market institutions play an important role in shaping inflation dynamics, monetary policy also affects how inflation shocks propagate across the euro area. Ribba (2022) argues that euro-area monetary policy should be analysed within an open-economy framework. Using a structural VAR model, he shows that contractionary monetary policy shocks reduce inflation and increase unemployment when US monetary policy and exchange-rate dynamics are taken into account. This suggests that inflation developments within the euro area are influenced not only by domestic conditions but also by broader international monetary interactions.

Institutional arrangements may therefore influence not only inflation persistence but also the resilience of household purchasing power following external shocks. Countries characterised by stronger collective bargaining systems, automatic wage adjustment mechanisms or more generous fiscal compensation policies may be better able to cushion temporary inflationary pressures. By contrast, economies relying primarily on market wage adjustment may experience larger short-term purchasing power losses when inflation accelerates rapidly.

The literature also suggests that institutional mechanisms can have ambiguous effects. On the one hand, wage indexation and collective bargaining may help households absorb part of the purchasing power loss caused by inflation. On the other hand, they may increase concerns about inflation persistence if wage increases generate additional cost pressures. The Belgian case discussed by Bijmens, Duprez and Jonckheere (2023) illustrates this nuance: automatic wage indexation may raise theoretical concerns about second-round effects, but their firm-level evidence does not support the existence of a self-sustaining wage-price spiral in 2022.

Taken together, the literature suggests that institutional arrangements influence not only inflation persistence but also the extent to which households are protected against purchasing power losses. Consequently, understanding cross-country differences in purchasing power requires considering both macroeconomic shocks and the institutional frameworks through which these shocks are transmitted.

2.5 Chapter Summary

The literature reviewed in this chapter highlights that the heterogeneous inflation and purchasing power developments observed across euro area countries cannot be explained by a single factor. Energy shocks trigger inflationary pressures whose intensity depends on national energy dependence and price transmission mechanisms, while inflation convergence within the euro area is neither automatic nor permanent, as common shocks can temporarily increase dispersion depending on structural and policy-related factors. Purchasing power, in turn, depends not only on inflation but also on wage dynamics, housing affordability and institutional arrangements such as wage-setting mechanisms and collective bargaining. Overall, the existing literature suggests that the 2022 inflation shock should be interpreted as the result of these interacting mechanisms rather than a purely common macroeconomic disturbance.

Although previous studies have extensively analysed energy shocks, inflation convergence and wage adjustment mechanisms separately, relatively little attention has been devoted to jointly examining inflation divergence and purchasing power developments across euro area countries following the 2022 inflation shock. Existing contributions generally focus either on inflation dynamics or on labour market adjustment, whereas fewer studies combine these dimensions within a comparative European

framework. The present thesis seeks to address this gap by jointly analysing inflation dispersion and real disposable income developments across selected euro area countries using harmonised Eurostat data.

The following chapter presents the methodological framework adopted to empirically investigate these relationships using harmonised Eurostat data for selected euro area countries.

3. Methodology

This chapter presents the data sources, variables and empirical approach used to analyse inflation differentials and purchasing power developments across euro area countries. The objective is to assess whether the 2022 inflation shock affected member states differently and whether these differences were reflected in household purchasing power outcomes.

3.1 Analytical framework

The empirical analysis developed in this thesis is guided by a three-stage conceptual framework linking the common external shock to heterogeneous household welfare outcomes across euro area countries.

The first stage identifies the common external shock. The 2022 inflation episode originated from largely shared disturbances affecting all euro area member states simultaneously, including the post-pandemic demand recovery, global supply chain disruptions and the sharp increase in energy prices triggered by Russia's invasion of Ukraine. Although the origin of the shock was common, its intensity at the national level was not uniform.

The second stage concerns national transmission channels. The common shock was transmitted to domestic inflation and household incomes through country-specific structural and institutional mechanisms. Three main channels are considered in this study. First, energy dependency determines the degree to which a country is exposed to imported energy price increases. Second, wage adjustment mechanisms, captured through the Labour Cost Index, influence the extent to which rising prices are offset by increases in household nominal income. Third, national fiscal and regulatory responses, including retail energy price caps and household compensation schemes, shaped the degree to which wholesale price increases were passed through to consumers.

The third stage captures the outcome of interest. The interaction between the common shock and these national transmission channels ultimately determined the evolution of household purchasing power, as measured by real disposable income per capita. Countries in which transmission channels amplified the shock experienced stronger inflationary pressures and larger purchasing power losses, while countries with more protective institutional or policy frameworks absorbed part of the shock before it reached households.

This framework organises the empirical analysis developed in Chapters 4 and 5 and provides the conceptual basis for interpreting cross-country differences in inflation dynamics and purchasing power outcomes.

3.2 Data sources

This study relies exclusively on secondary data obtained from Eurostat. Eurostat was selected because it provides harmonised and comparable economic indicators across European countries, allowing a consistent analysis of inflation developments and purchasing power dynamics within the euro area.

The analysis focuses on five countries: Belgium, Germany, France, Italy and the Netherlands. These countries were selected because they are among the largest economies of the euro area and display different economic structures, labour market characteristics and energy dependencies, making them relevant for a comparative analysis of the 2022 inflation shock.

Several Eurostat datasets are used, corresponding to the different dimensions of the analysis developed in Chapter 4.

Annual headline HICP inflation rates, used in Figure 1, Figure 11 and Figure 13, are obtained from Eurostat's annual HICP dataset (`prc_hicp_ainr`). This annual measure provides a long-run perspective on inflation trends across the five selected countries between 2002 and 2025.

Household purchasing power is proxied using two complementary series obtained from Eurostat's key indicators for sector accounts (`nasa_10_ki`). The first is adjusted gross disposable income of households in real terms per capita (2010 = 100), used in Figure 12 and, expressed as an annual percentage change, in Figure 14. The second is adjusted gross disposable income of households in nominal terms per capita, expressed as an annual percentage change, used alongside the real series in Figure 14 and in the Annex (Figures A2–A6) to disentangle the respective contributions of nominal income growth and inflation to real purchasing power outcomes.

Energy dependency ratios are obtained from Eurostat (`nrg_ind_id`), measured as the share of net energy imports in gross inland energy consumption, and are used in the scatter plot analysis presented in Figure 13.

The Labour Cost Index is used at two different frequencies. Annual LCI data (Eurostat, `lc_lci_r2_a`) are used as a general structural proxy for wage dynamics, as described in Section 3.3. Quarterly LCI data (Eurostat, `lc_lci_r2_q`), expressed as a year-on-year percentage change, are used both to examine country-specific wage-inflation dynamics descriptively (Section 4.4, Appendix Figures A8–A12) and to estimate the panel regression presented in Section 4.6.

Beyond these annual and quarterly datasets, monthly HICP data are also used to examine the timing and sequencing of the 2022 inflation shock across its main components. Monthly year-on-year inflation rates are obtained from Eurostat (`prc_hicp_manr`, monthly frequency) for four HICP aggregates: the headline index, the core index (excluding energy and food), the energy component and the food component. These monthly series cover the period from January 2020 to December 2023 for the five selected countries. This higher-frequency, component-level dataset is used specifically to assess whether annual inflation averages adequately reflect the underlying dynamics of the 2022 shock, as discussed in Section 3.4 and presented in Section 4.1.1. The same monthly HICP dataset also provides the energy price variation used to construct the household-level measure of energy exposure presented in Table 2 (Section 4.4).

A further dataset is used to construct this household-level measure of energy exposure. The weight of energy in the HICP consumption basket is obtained from Eurostat's HICP item weights dataset (`prc_hicp_inw`, COICOP division CP045, covering electricity, gas and other fuels for housing). This household-level measure complements the aggregate energy dependency ratio described above by capturing what households directly spend on energy, rather than the country's overall reliance on energy imports.

The observation period from 2002 to 2025 was selected in order to capture both long-term inflation dynamics and the exceptional inflation episode of 2022. Including a sufficiently long pre-crisis period allows the analysis to identify whether the recent inflation surge represented a structural break relative to previous years characterised by relatively low and stable inflation. At the same time,

extending the sample beyond 2022 makes it possible to examine the subsequent adjustment of inflation rates and purchasing power developments across the selected countries.

The use of Eurostat data offers several advantages for the present study. First, Eurostat provides harmonised statistical indicators produced according to common European methodological standards, ensuring a high degree of comparability across member states. This is particularly important when analysing inflation and purchasing power developments within the euro area, where differences in national statistical methodologies could otherwise bias cross-country comparisons.

The selection of Belgium, Germany, France, Italy and the Netherlands reflects a combination of economic importance and structural diversity within the euro area. Although all five countries share the same monetary policy, they differ substantially in terms of industrial composition, energy dependence, labour market institutions and wage-setting mechanisms, while together representing a substantial share of euro area GDP. These structural differences make them particularly relevant for investigating why a common inflation shock may generate heterogeneous purchasing power outcomes.

3.3 Variable construction

Four main variables are used in the analysis, complemented by several higher-frequency or disaggregated indicators used in specific sections of the empirical analysis, as detailed below.

First, inflation is measured using the annual growth rate of the Harmonised Index of Consumer Prices (HICP). This indicator provides a harmonised measure of consumer price inflation across European countries and is therefore suitable for cross-country comparisons.

In addition to the annual headline HICP measure, monthly inflation is examined separately for four HICP components: headline, core, energy and food. This disaggregation allows the analysis to capture differences in the timing and intensity of price increases across components, which annual averages by construction cannot reveal. Each component is expressed as a year-on-year percentage change, consistent with the annual HICP measure described above, in order to ensure comparability between the annual and monthly analyses.

Second, inflation dispersion is measured as the cross-country standard deviation of annual HICP inflation rates across the five selected countries. This measure is preferred over simple range-based indicators as it incorporates all available observations and is less sensitive to extreme values.

Third, household purchasing power is proxied by adjusted gross disposable income of households in real terms per capita (2010 = 100). Because the indicator is expressed in real terms, it accounts for inflation and reflects changes in households' effective purchasing capacity over time.

In addition to the real disposable income measure described above, nominal gross disposable income per capita is also used in Section 4.4 to decompose real purchasing power outcomes into their nominal income and inflation components. While the real series already incorporates the effect of inflation, comparing it directly with the nominal series and with HICP inflation makes it possible to assess whether purchasing power losses stemmed primarily from insufficient nominal income growth or from the intensity of price increases, and to what extent institutional mechanisms such as wage indexation translated into effective real income protection, as discussed in Section 5.4

Fourth, two structural proxy variables are introduced to explore the transmission mechanisms discussed in the literature. Energy dependency is measured as the share of net energy imports in gross inland energy consumption, expressed as a percentage (Eurostat, `nrg_ind_id`). The Labour Cost Index (LCI) measures the annual percentage change in labour costs per hour worked in the total economy, excluding public administration (Eurostat, `lc_lci_r2_a`). These two indicators serve as empirical proxies for energy exposure and wage dynamics respectively.

In addition to the aggregate energy dependency ratio, a complementary household-level indicator of energy exposure is constructed for Section 4.4. This indicator, referred to as the direct effect of the energy shock, is calculated by multiplying the weight of energy in each country's HICP consumption basket (CP045: electricity, gas and other fuels for housing) by the average annual change in energy prices in 2022. This measure estimates how many percentage points of 2022 headline inflation are directly attributable to household energy expenditure, given each country's specific consumption structure, and is expressed both in percentage points and as a share of total headline inflation. It should be noted that the energy price variation used in this measure corresponds to the broader Eurostat 'Energy' aggregate, which includes motor fuels and lubricants in addition to housing-related energy products, while the weighting variable is restricted to housing energy (CP045); the resulting estimate should therefore be interpreted as a slight upper-bound approximation rather than a precise decomposition restricted to housing energy alone.

For the panel regression presented in Section 4.6, wage growth is measured as the quarterly year-on-year percentage change in the Labour Cost Index (LCI%), and inflation is measured as the quarterly year-on-year percentage change in the HICP headline index. Unlike the annual LCI series described above, this quarterly measure allows the analysis to capture short-term co-movements between wages and prices with sufficient statistical power, addressing the limitation of the annual cross-country comparison discussed below.

Rather than combining the Labour Cost Index and consumer price inflation into a single composite indicator (for example, a wage-to-price ratio such as LCI/CPI), this study deliberately retains these two series in their raw, disaggregated form throughout the empirical analysis. This choice reflects a methodological trade-off: while a composite ratio could offer a compact summary measure of relative wage-price developments, it would also obscure the underlying dynamics of each series, particularly their timing. As shown in Section 4.4, wage and price developments do not move synchronously within a given year, and the lag between inflation and wage adjustment carries important information in itself. Preserving the raw series therefore allows the analysis to capture this timing dimension directly, rather than collapsing it into a single, less informative figure.

Although these variables provide useful insights into inflation dynamics and purchasing power developments, they also present certain limitations. In particular, purchasing power is influenced by additional factors such as housing costs, taxation, wealth effects and household consumption patterns, which are not fully captured by the selected indicators. Moreover, the Labour Cost Index for France contains missing values for several years prior to 2009, which limits the comparability of this indicator over the full sample period. Consequently, the results should be interpreted as evidence of broad macroeconomic trends rather than precise measures of individual household welfare.

The third transmission channel identified in the analytical framework, namely national fiscal and regulatory responses, is examined through a descriptive comparison of national energy support measures based on the Bruegel dataset compiled by Sgaravatti, Tagliapietra and Zachmann (2023), which provides information on the scale and design of fiscal interventions across the selected countries.

3.4 Empirical strategy

The empirical strategy is designed to test each stage of the analytical framework presented in Section 3.1.

This study adopts a descriptive and exploratory empirical approach. The analysis focuses on the evolution of inflation rates, inflation dispersion, real disposable income, energy dependency and labour cost developments across Belgium, Germany, France, Italy and the Netherlands.

First, inflation developments are examined to identify differences in the magnitude and persistence of the 2022 inflation shock across countries. This analysis is conducted at both the annual and monthly frequency: while annual data provide a long-run perspective on inflation trends, monthly data by HICP component are used to assess whether annual averages conceal information about the sequencing and desynchronisation of the inflation shock across energy, food and core prices, an aspect that could not be identified using annual data alone. Second, inflation dispersion indicators are analysed to assess whether inflation rates converged or diverged within the sample over time. Finally, changes in real disposable income are compared across countries to evaluate how inflation translated into purchasing power outcomes.

The empirical results are presented through a combination of graphical analyses, cross-country comparisons, scatter plots and an exploratory OLS regression. The graphical analysis first examines annual and monthly inflation dynamics, followed by inflation dispersion, purchasing power developments and the relationship between structural variables and purchasing power outcomes.

The choice of a descriptive and exploratory empirical approach is consistent with the objective of this study, which is not to establish causal relationships but rather to identify patterns and explore potential structural associations between inflation dynamics, energy dependency, labour costs and purchasing power developments across selected euro area countries.

Graphical representations and descriptive statistics constitute the main analytical tools used in this research. They facilitate the visual identification of convergence and divergence patterns and provide an intuitive comparison of inflation trajectories and real disposable income developments across countries. This approach is particularly appropriate given the exploratory nature of the research question and the relatively limited number of countries included in the sample.

Nevertheless, several methodological limitations should be acknowledged. The analysis remains descriptive and therefore does not allow causal inference regarding the determinants of inflation differentials or purchasing power outcomes. Moreover, the selected indicators capture aggregate macroeconomic developments and may not fully reflect the heterogeneous experiences of individual households or socioeconomic groups within each country. Future research could further complement this approach by employing micro-level household data to investigate the distributional and causal mechanisms underlying cross-country differences in purchasing power developments following major inflationary shocks. While the descriptive analysis presented in this thesis does not itself allow causal inference, it is complemented below by a higher-frequency panel regression, which provides a more statistically robust, though still not strictly causal, test of the relationship between inflation and wage growth.

To complement this descriptive approach and to address the statistical limitations of a cross-sectional analysis based on only five country-level observations, a panel regression is estimated using quarterly data for the five selected countries between 2019 Q1 and 2024 Q4 ($N = 120$ country-quarter observations). The model regresses quarterly year-on-year LCI growth on quarterly year-on-year HICP inflation, with country fixed effects (implemented as binary dummy variables, using the Netherlands

as the reference category) to control for time-invariant country-specific differences in wage-setting institutions. Formally, the model is specified as:

$$LCI\%_{it} = \alpha + \beta \cdot HICP\%_{it} + \sum \gamma_j \cdot Country_j + \epsilon_{it}$$

where $LCI\%_{it}$ denotes quarterly wage growth in country i at quarter t , $HICP\%_{it}$ denotes quarterly headline inflation, $Country_j$ are country fixed effects, and ϵ_{it} is the error term. This higher-frequency panel specification substantially increases the number of observations relative to the exploratory annual cross-sectional regression, thereby providing a more statistically robust basis for examining the relationship between inflation and wage growth across the selected countries. The results of this regression are presented and discussed in Section 4.6. The regression was estimated in Excel using ordinary least squares with country dummy variables.

Independently of the quarterly panel regression described above, the descriptive annual analysis focuses on the period 2021–2023 as it encompasses the emergence, peak and initial easing of the recent inflationary episode in Europe. The year 2021 provides a reference period preceding the sharp inflation surge, whereas 2023 allows the observation of the first phase of adjustment following the inflation peak observed during 2022.

4. Results

This chapter presents the empirical results obtained from the comparative analysis of inflation rates, inflation dispersion and real disposable income across the selected euro area countries. The objective is to identify common trends and cross-country differences before and after the 2022 inflation shock and to examine whether heterogeneous inflation dynamics were associated with different purchasing power outcomes.

4.1 Inflation dynamics before and after the 2022 shock

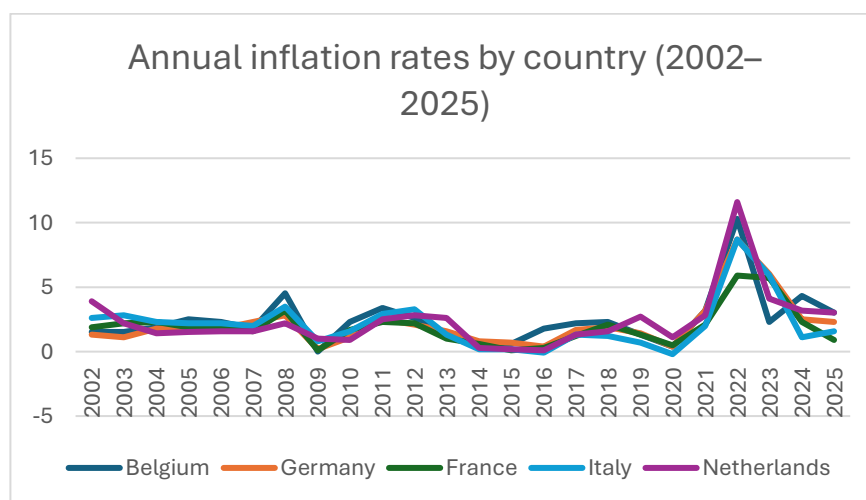


Figure 1: Annual inflation rates by country (2002–2025)

Source: Author's calculations based on Eurostat data

Figure 1 presents annual inflation rates for Belgium, Germany, France, Italy and the Netherlands between 2002 and 2025. Over most of the period preceding the 2022 inflation shock, inflation developments appear relatively similar across the selected countries. Although temporary differences can be observed, inflation rates generally remained within a relatively narrow range, suggesting a certain degree of convergence among neighbouring euro area economies.

As illustrated in Figure 1, several common inflationary episodes can nevertheless be identified throughout the sample period. Inflation increased significantly in 2008, reflecting the global commodity and energy price boom that preceded the financial crisis. This episode affected all selected countries, although the magnitude of the increase differed slightly across national economies. Following the global financial crisis, inflation declined sharply and remained relatively moderate during the following years.

Between 2013 and 2020, inflation rates were generally low across the five countries. In several years, inflation remained close to or below the European Central Bank's medium-term target. This period was characterised by relatively stable price developments and limited differences between countries.

Although occasional divergences emerged, inflation rates largely followed similar trajectories throughout the euro area.

The situation changed substantially in 2021 and especially in 2022. Inflation accelerated sharply in all selected countries, marking the most significant inflationary episode observed during the sample period. However, the magnitude of the shock differed considerably across countries. The Netherlands recorded the highest inflation rate among the selected countries, while France experienced a comparatively lower increase. Belgium, Germany and Italy occupied intermediate positions, although all experienced inflation rates significantly above historical averages.

Following the 2022 peak, inflation gradually declined across all countries. Nevertheless, inflation did not immediately return to pre-shock levels and differences between countries remained visible during the adjustment period. This suggests that while the inflation shock was common across Europe, its intensity and persistence varied across national economies. The observed differences provide preliminary evidence that inflationary pressures were transmitted unevenly across countries despite the existence of a common monetary framework.

These aggregate annual patterns motivate a more detailed monthly analysis of HICP components in order to examine how inflation shocks propagated across countries over time.

4.1.1 Monthly inflation dynamics within each country

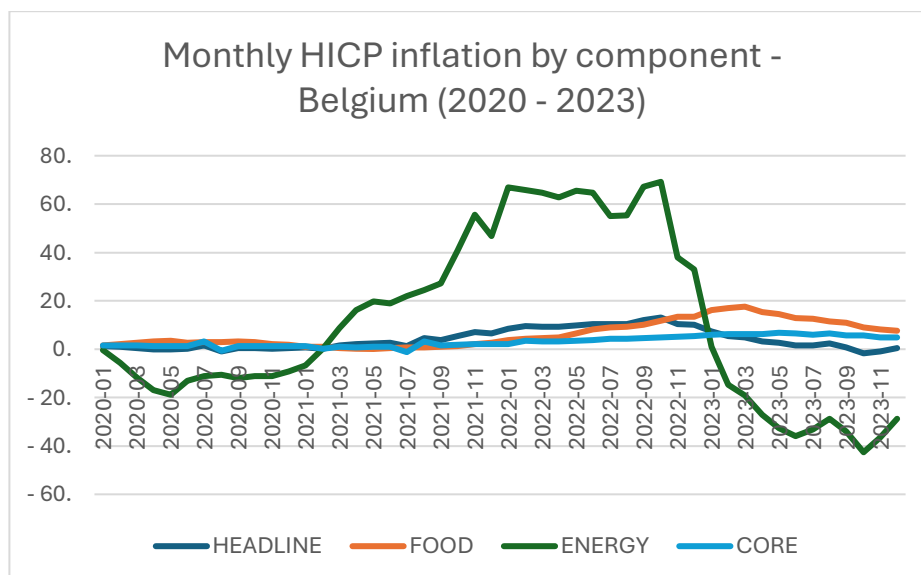


Figure 2: Monthly HICP inflation by component in Belgium (2020 – 2023)

Source: Author's calculations based on Eurostat data

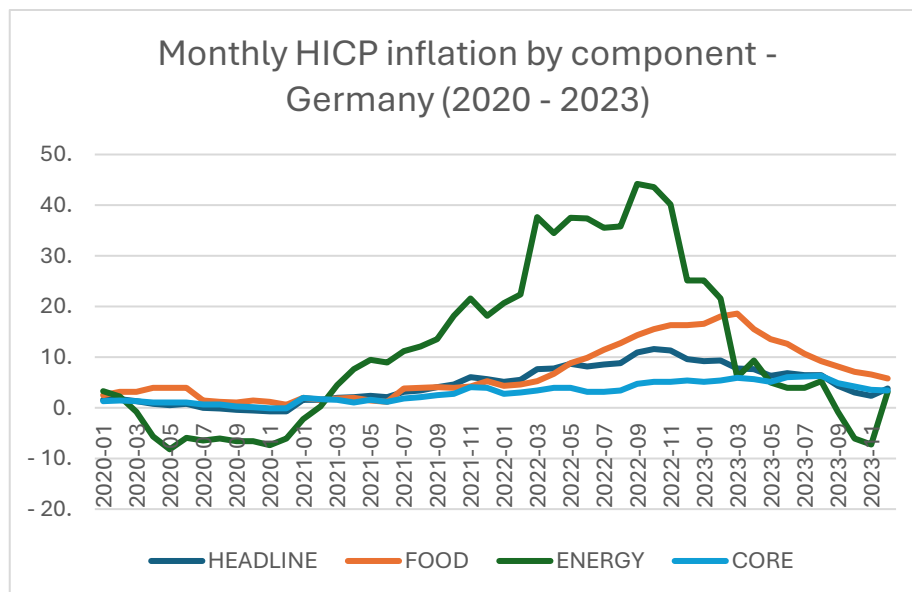


Figure 3: Monthly HICP inflation by component in Germany (2020 – 2023)

Source: Author's calculations based on Eurostat data

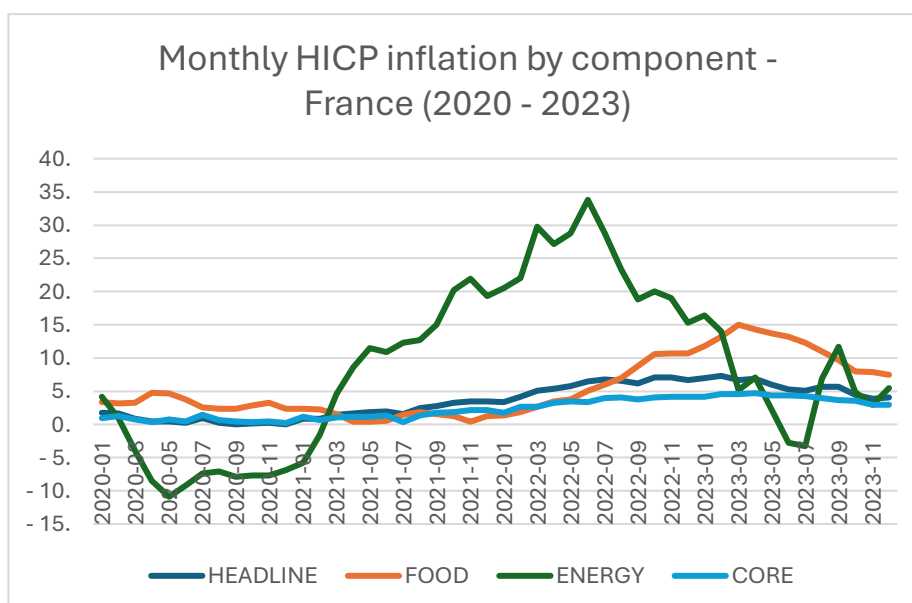


Figure 4: Monthly HICP inflation by component in France (2020 – 2023)

Source: Author's calculations based on Eurostat data

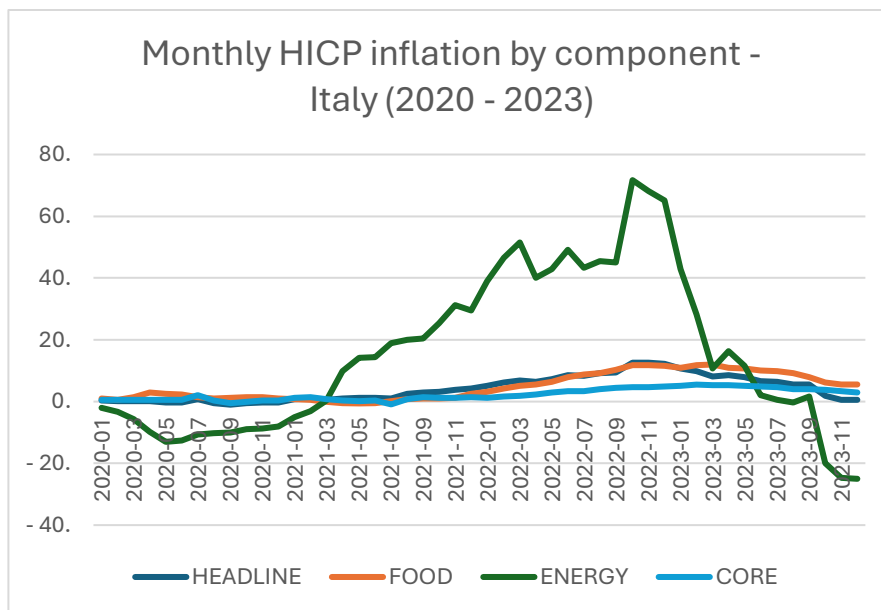


Figure 5: Monthly HICP inflation by component in Italy (2020 – 2023)

Source: Author's calculations based on Eurostat data

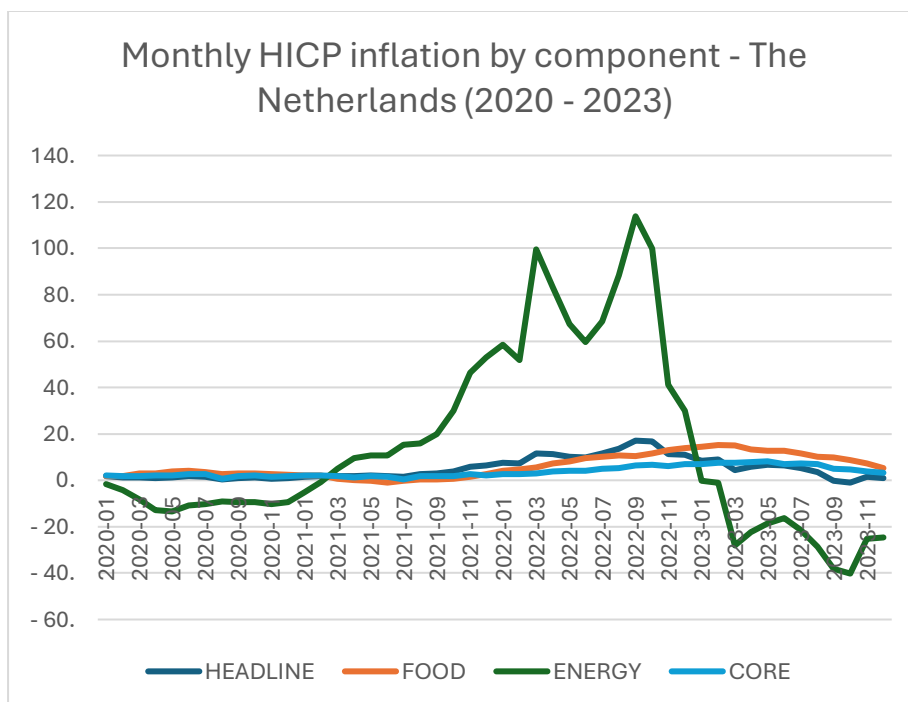


Figure 6: Monthly HICP inflation by component in The Netherlands (2020 – 2023)

Source: Author's calculations based on Eurostat data

Across all five countries, the monthly data reveal a clear sequencing of the inflation shock that cannot be observed using annual averages. Energy inflation rises first and reaches its peak before the other HICP components. Headline inflation follows shortly afterwards, while food inflation increases with a noticeable delay. Core inflation reacts more gradually and remains elevated for a longer period, reflecting the progressive transmission of higher production and distribution costs to the broader economy. This temporal pattern confirms that the 2022 inflation episode unfolded in successive stages rather than simultaneously across all components.

Despite this common sequence, important cross-country differences emerge. France experienced a much more moderate increase in energy inflation than the other countries, consistent with the implementation of the tariff shield. By contrast, the Netherlands recorded the strongest and most abrupt increase in energy inflation. Belgium, Germany and Italy displayed intermediate patterns, although differences can also be observed in the timing and persistence of the inflation shock. These results indicate that while the origin of the shock was common, its transmission differed across national economies.

The monthly data therefore provide information that was not visible in the annual series. In particular, they reveal the desynchronisation between HICP components, showing that energy prices increased first before progressively affecting food prices and core inflation. They also highlight differences in the duration and intensity of the inflation shock across countries, illustrating that annual averages conceal an important part of the underlying inflation dynamics.

4.1.2 Cross-country comparison of HICP components

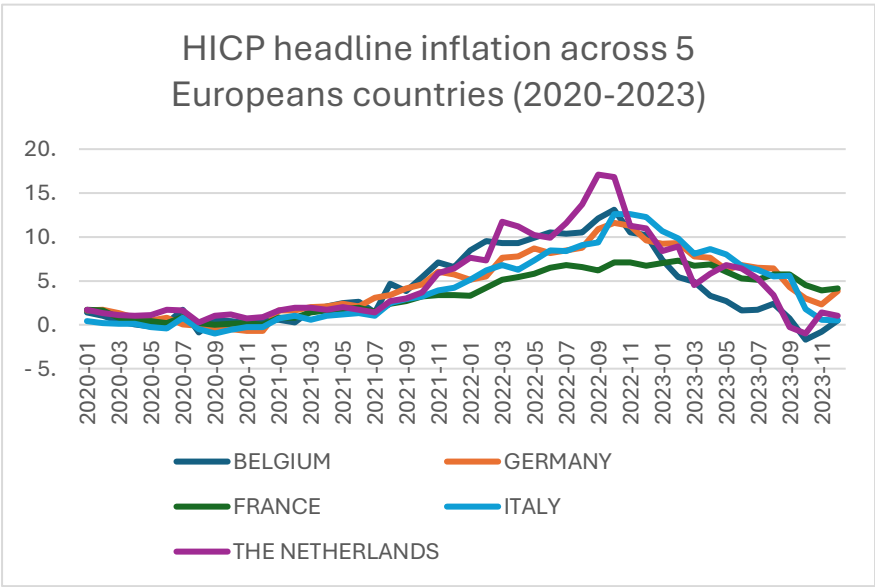


Figure 7: HICP headline inflation across 5 Europeans countries (2020-2023)

Source: Author’s calculations based on Eurostat data

Figure 7 compares the monthly evolution of headline HICP inflation across Belgium, Germany, France, Italy and the Netherlands between 2020 and 2023. Before the inflation shock, headline inflation remained relatively low and followed similar trajectories across all five countries. Inflation began to accelerate during 2021 and reached its highest levels in 2022, confirming the common nature of the inflationary episode across the euro area. However, the magnitude of the shock differed substantially between countries. The Netherlands experienced the highest inflation peak, whereas France recorded the lowest increase. Belgium, Germany and Italy occupied intermediate positions. Although the inflation shock affected all selected countries simultaneously, the observed differences in intensity suggest that common external shocks were transmitted unevenly across national economies despite the existence of a common monetary policy.

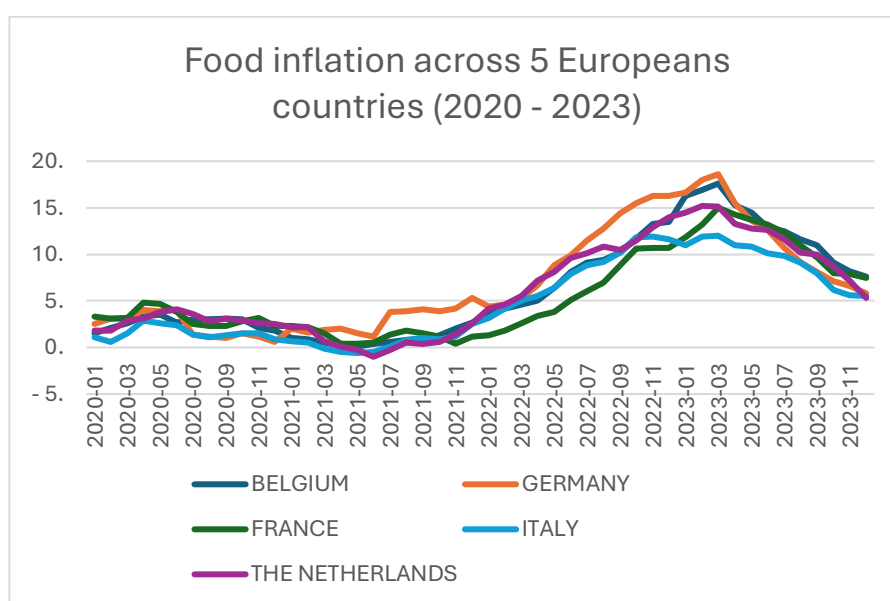


Figure 8: Food inflation across 5 Europeans countries (2020 - 2023)

Source: Author's calculations based on Eurostat data

Figure 8 presents the evolution of food inflation across the five selected countries. Compared with the energy component, food inflation follows a more gradual and more synchronised pattern across countries. Although differences in magnitude remain visible, all countries experienced a progressive increase in food inflation after the initial acceleration of energy prices, with inflation generally peaking later during 2022 and early 2023. Germany and Italy recorded the highest food inflation rates, whereas France remained comparatively less affected. The delayed increase in food prices suggests that higher energy and production costs were progressively transmitted through supply chains before being reflected in final consumer prices. Overall, food inflation appears considerably less volatile than energy inflation, indicating a second stage in the transmission of the inflationary shock.

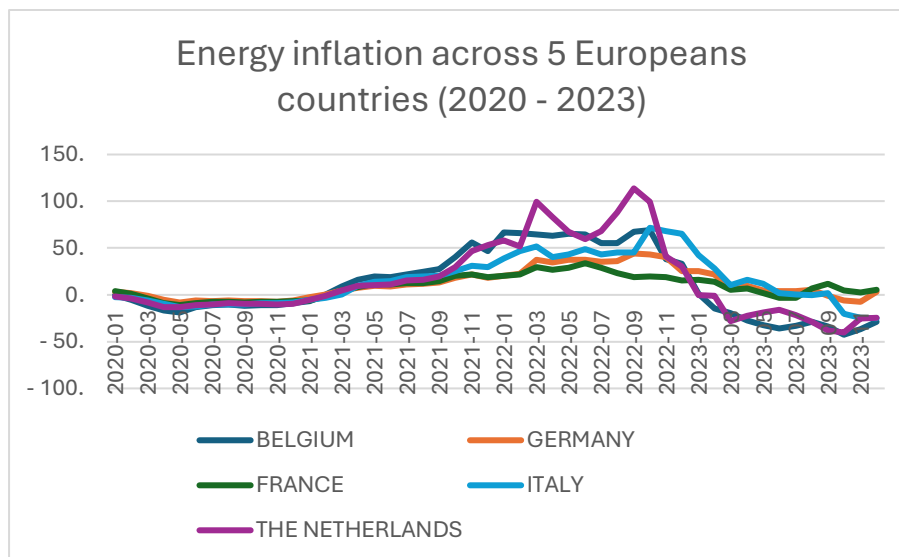


Figure 9: Energy inflation across 5 europeans countries (2020 - 2023)

Source: Author's calculations based on Eurostat data

Figure 9 compares the evolution of energy inflation across the five selected countries. Compared with the other HICP components, energy inflation displays by far the greatest cross-country heterogeneity, both in terms of magnitude and persistence. Although all countries experienced a sharp increase in energy inflation during 2021 and 2022, the intensity of the shock varied substantially. The Netherlands recorded the highest peak, followed by Belgium and Italy, whereas France experienced a much more moderate increase. Germany followed an intermediate trajectory. Energy inflation also rose earlier than the other HICP components and declined rapidly after reaching its peak, suggesting that the inflationary episode initially originated in energy markets before gradually spreading to the rest of the economy. These differences are consistent with the idea that national energy mixes, energy dependency and policy responses influenced the transmission of the common energy shock across euro area countries.

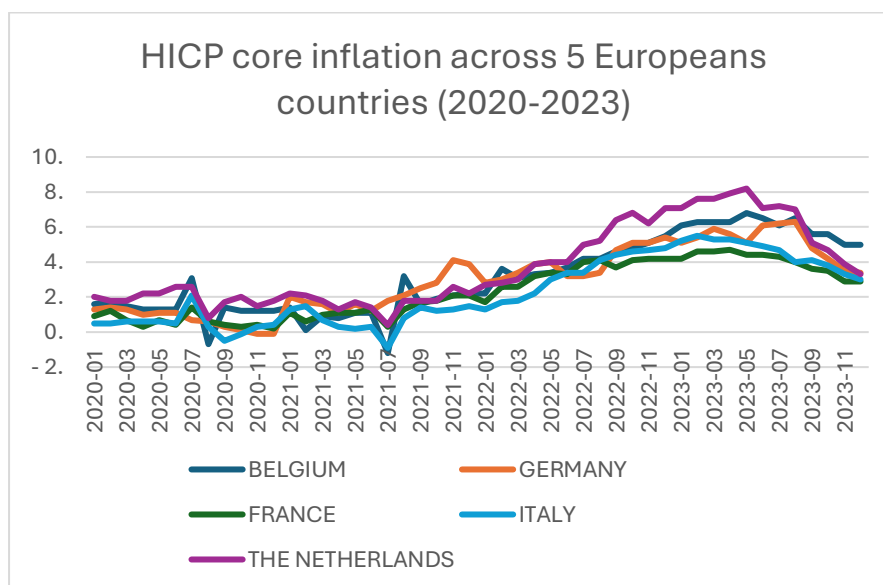


Figure 10: HICP core inflation across 5 Europeans countries (2020-2023)

Source: Author's calculations based on Eurostat data

Figure 10 presents the evolution of core HICP inflation, which excludes the more volatile energy and food components. Compared with the previous figures, core inflation displays the greatest degree of synchronisation across the five countries. Inflation increased more gradually and reached its peak later than both energy and food inflation, suggesting that underlying price pressures emerged only after the initial energy shock had progressively spread throughout the economy. Although some differences in magnitude remain observable, the trajectories are considerably more similar than those observed for energy inflation. This pattern supports the hypothesis that the 2022 inflation episode initially originated in external energy markets before progressively affecting a broader range of goods and services through second-round effects.

Taken together, Figures 7 to 10 provide additional evidence that the 2022 inflation episode followed a common transmission pattern across the selected countries. Energy inflation was the first component to accelerate and exhibited the greatest cross-country heterogeneity, while food and core inflation increased more gradually and displayed greater synchronisation. These findings suggest that the differences observed in headline inflation were driven primarily by the transmission of energy price shocks rather than by fundamentally different underlying inflation dynamics. The monthly analysis therefore complements the annual results presented in Section 4.1 by highlighting the timing and sequence of inflation transmission that cannot be observed using annual data alone.

4.2 Inflation dispersion across countries

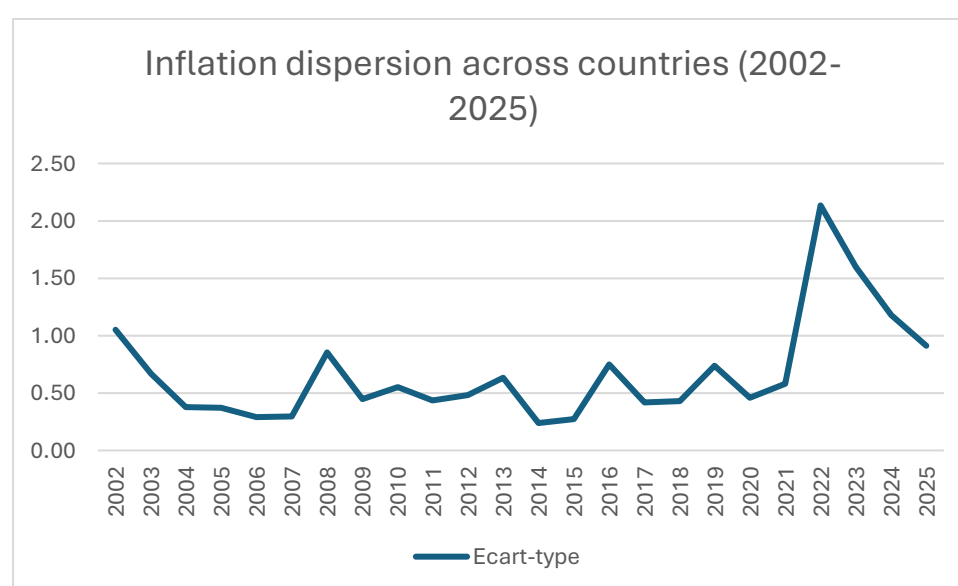


Figure 11: Cross-country standard deviation of HICP inflation rates (2002–2025)

Source: Author's calculations based on Eurostat data

To investigate whether inflation rates converged or diverged across countries, a dispersion indicator was constructed. For each year, inflation dispersion is measured as the cross-country standard deviation of annual HICP inflation rates across the five selected countries. This measure is preferred over simple range-based indicators as it incorporates all available observations and is less sensitive to extreme values.

Figure 11 shows that inflation dispersion remained relatively limited throughout most of the period between 2002 and 2021. The standard deviation of inflation rates generally remained below 1.0 percentage point during this period, with a mean of approximately 0.50 percentage points between 2002 and 2021. This suggests that inflation developments across the selected countries followed relatively similar patterns during most of the sample period, consistent with the broader literature on inflation convergence within the euro area.

Several temporary increases in dispersion can nevertheless be identified. In particular, the years surrounding the global financial crisis display moderate increases in inflation heterogeneity. However, these episodes remained limited compared with the developments observed after 2021.

A significant break occurs in 2022, when the standard deviation of inflation rates increases sharply to approximately 2.13 percentage points, its highest level over the entire sample period. This represents more than four times the average dispersion observed during the pre-shock period, indicating that the inflation shock affected countries unevenly despite the existence of a common monetary policy framework.

The peak observed in 2022 is followed by a gradual decline in dispersion, falling to approximately 1.60 in 2023 and 1.18 in 2024. This suggests that inflation developments became more similar again as inflationary pressures eased across Europe. Nevertheless, dispersion remained above pre-2022 levels during the adjustment period, indicating that the effects of the shock did not disappear immediately.

Overall, Figure 11 highlights that inflation convergence within the selected euro area countries was temporarily disrupted by the 2022 inflation episode. The sharp increase in the standard deviation of inflation rates observed in 2022 provides clear descriptive evidence that the relatively stable convergence pattern characterising the previous two decades was temporarily interrupted by the energy shock.

4.3 Real disposable income and purchasing power developments

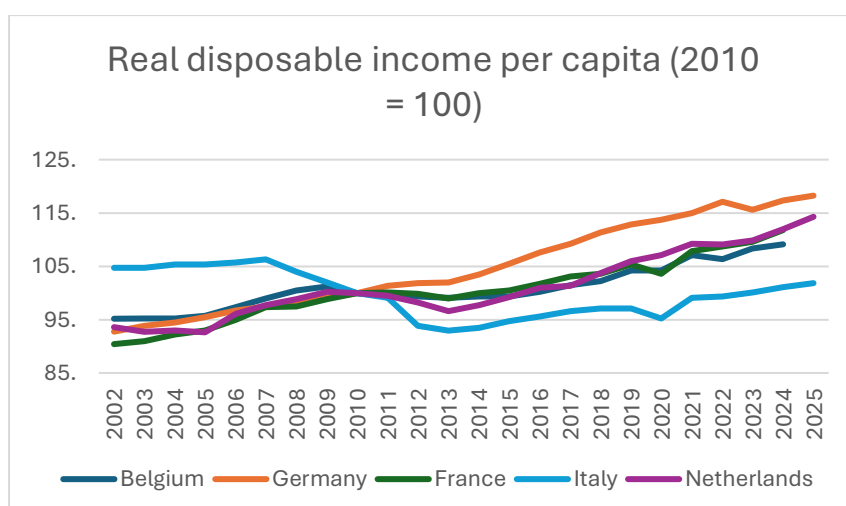


Figure 12: Real disposable income per capita (2010 = 100)

Source: Author's calculations based on Eurostat data

Figure 12 presents the evolution of real disposable income per capita in Belgium, Germany, France, Italy and the Netherlands between 2002 and 2025. While all countries are indexed to 2010 = 100, their trajectories differ substantially over time, suggesting that households experienced different long-term purchasing power developments despite operating within the same monetary union.

Before 2010, variations in real disposable income remained relatively moderate across the selected countries. Most countries followed similar trends, although some differences were already visible. Following the global financial crisis, purchasing power developments became more heterogeneous, reflecting differences in national economic performance and household income growth.

From 2010 onwards, the trajectories of the selected countries gradually diverged. Germany experienced the strongest increase in real disposable income, showing sustained growth throughout most of the post-2010 period and reaching the highest level among the selected countries by the end of the sample. The Netherlands also recorded a generally positive trend, particularly after 2015, although its evolution was less pronounced than that of Germany.

Belgium and France followed more moderate growth paths. While both countries recorded improvements in real disposable income over time, the increase remained relatively limited compared with Germany. Their trajectories appear more stable, with fewer pronounced fluctuations over the period.

Italy displays a markedly different pattern. Real disposable income remained below its 2010 level for several years and recovered only gradually. Compared with the other selected countries, Italy experienced the weakest long-term performance in terms of household purchasing power. This divergence becomes particularly visible after the sovereign debt crisis period and remains evident throughout much of the sample. This long-term divergence suggests that purchasing power developments reflect broader structural economic conditions rather than inflationary episodes alone.

Taken together, these contrasting trajectories indicate that purchasing power developments cannot be explained by inflation rates alone. Differences in wage adjustment mechanisms, labour market performance and broader national economic structures may also have influenced households' ability to maintain real disposable income over time.

The period surrounding the 2022 inflation shock also reveals notable differences. Although all countries were exposed to rising inflationary pressures, the evolution of real disposable income was not identical. Some countries were able to maintain or recover purchasing power more rapidly, while others experienced more persistent difficulties. This suggests that a common inflation shock does not necessarily translate into uniform household outcomes across countries.

4.4 Structural factors: energy dependency and labour costs

To explore potential structural explanations for the observed inflation and purchasing power differences, this section combines a scatter-plot analysis, a comparison of nominal and real income growth, a household-level measure of energy exposure, a comparison of national fiscal responses, and a quarterly analysis of wage-inflation dynamics. Figure 13 examines the relationship between energy dependency in 2021 and average annual HICP inflation in 2022 across the five selected countries. Figure 14 compares nominal disposable income growth, HICP inflation and real disposable income growth across the five countries in 2022.

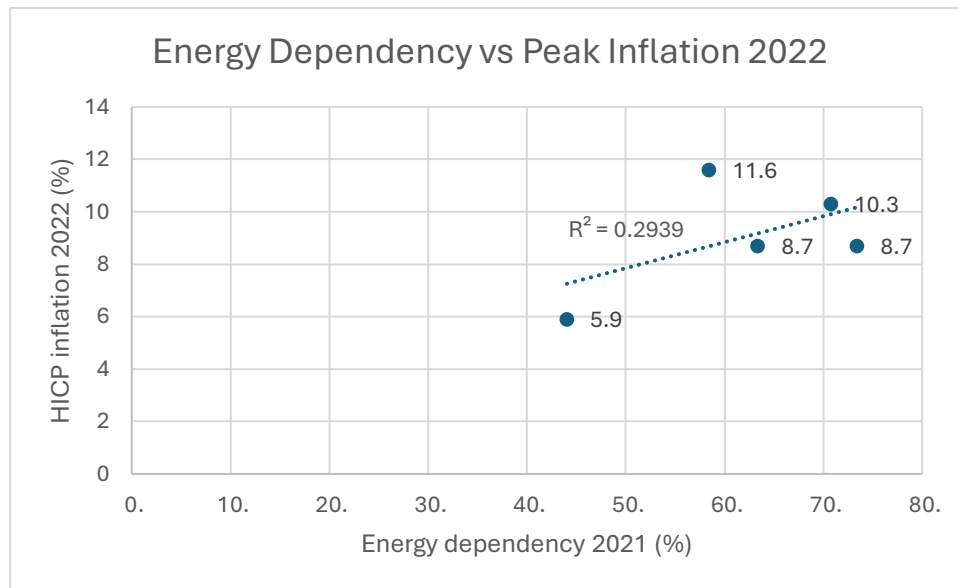


Figure 13: Scatter plot Energy vs Inflation

Source: Author's calculations based on Eurostat data

Figure 13: Energy dependency (2021) and peak HICP inflation (2022). Note: points represent Belgium (70.8%, 10.3%), Germany (63.4%, 8.7%), France (44.0%, 5.9%), Italy (73.4%, 8.7%) and the Netherlands (58.5%, 11.6%). Source: Eurostat.

Figure 13 suggests a positive association between energy dependency and peak inflation in 2022. France, which recorded the lowest energy dependency ratio among the selected countries (44.0%), also experienced the lowest inflation rate (5.9%). By contrast, countries with higher energy dependency such as Belgium (70.8%) and Italy (73.4%) recorded comparatively higher inflation rates.

The trendline yields an R^2 of 0.29, indicating that energy dependency accounts for approximately 29% of the cross-country variation in peak inflation. This result is consistent with the literature reviewed in Chapter 2, which emphasises the role of energy exposure in amplifying inflationary pressures.

However, the Netherlands represents a notable exception: despite a relatively moderate energy dependency ratio (58.5%), it recorded the highest inflation rate among the selected countries (11.6%). This apparent paradox can be explained by several country-specific structural characteristics identified by Van den End et al. (2025). First, gas represents a disproportionately high share of the Dutch energy mix relative to the euro area average, making Dutch inflation particularly sensitive to gas price volatility regardless of aggregate energy import dependency ratios. Second, the exceptional openness of the Dutch economy to world trade amplified the transmission of global demand and supply shocks. Third, unlike France, which implemented retail energy price caps that artificially limited consumer price increases, the Netherlands relied primarily on direct household compensation without capping retail energy prices, resulting in a fuller pass-through of wholesale price increases to consumers. These factors collectively explain why the Netherlands diverged from the pattern suggested by energy dependency ratios alone and illustrate more broadly that a single structural proxy cannot fully capture the heterogeneity of inflation transmission mechanisms across euro area countries.

This interpretation is further supported by a closer examination of electricity prices specifically. In 2022, France recorded by far the most contained increase in electricity prices among the five selected

countries (+7.4%; see Appendix, Figure A13), compared to +20.0% in Germany, +57.7% in Belgium, +106.7% in Italy and +124.2% in the Netherlands. Beyond the tariff shield discussed above, this exceptionally moderate increase is also consistent with France's largely decarbonised electricity mix, dominated by nuclear generation, which limits the direct exposure of household electricity bills to fossil fuel price volatility. This finding illustrates that the composition of a country's electricity mix, not only its aggregate energy dependency ratio, constitutes an additional structural factor shaping the transmission of a common energy shock to household inflation.

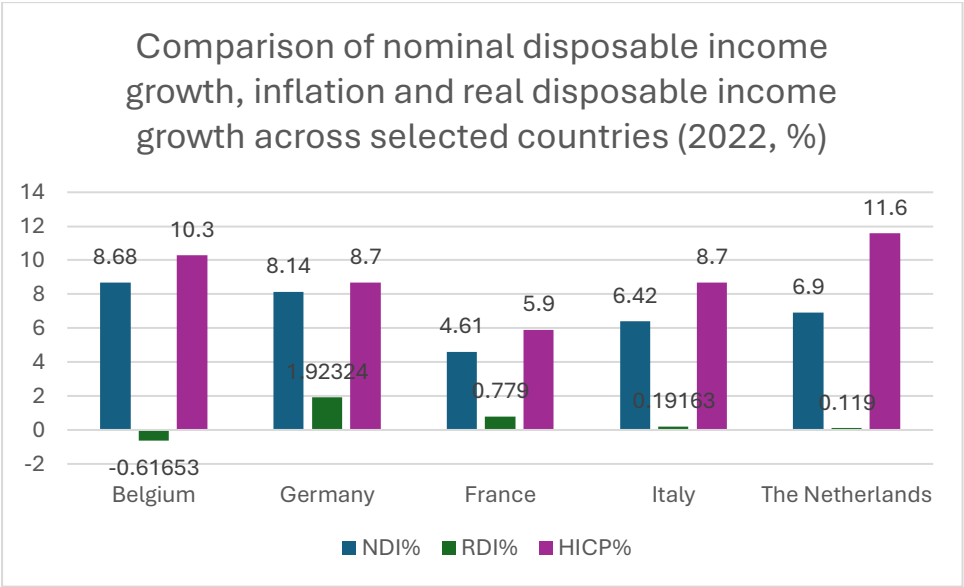


Figure 14: NDI vs RDI vs HICP

Source: Author's calculations based on Eurostat data

Figure 14 compares nominal disposable income growth (NDI), HICP inflation and real disposable income growth (RDI) across the five selected countries in 2022. The comparison illustrates that although nominal disposable income increased in all countries during the inflation shock, this increase was not sufficient to preserve purchasing power everywhere. In Belgium and the Netherlands, nominal disposable income growth remained below the inflation rate, resulting in limited real disposable income growth despite substantial nominal income increases. Germany and Italy display a similar pattern, with inflation largely offsetting gains in nominal income. By contrast, France experienced both the lowest inflation rate and a relatively balanced evolution of nominal income, contributing to a comparatively more favourable real disposable income outcome. Overall, Figure 14 suggests that purchasing power developments cannot be explained solely by nominal income growth. Rather, they depend on the interaction between income dynamics and inflation, reinforcing the argument that differences in purchasing power outcomes across countries were driven by both price developments and national economic adjustment mechanisms.

Table 1: National fiscal support measures in response to the 2022 energy crisis

Country	Total allocated (HH + firms)	Main measure type	Retail price cap
Belgium	€9.4 bn	VAT cuts + social tariff + income bonuses	Partial
Germany	€157.7 bn	Gas / electricity price brake + income transfers	Yes
France	€92.1 bn	Prices caps + fuel discount	Yes (extensive)
Italy	€92.7 bn	VAT cuts + tax credits + income transfers	No
Netherlands	€39.2 bn	Price cap agreement + direct compensation	No retail cap

Source: Bruegel dataset, Sgaravatti, Tagliapietra and Zachmann (2023)

Table 1 illustrates that fiscal support varied considerably across the selected countries in both scale and design. France and Germany implemented extensive retail price caps that directly limited the pass-through of wholesale energy prices to consumers, whereas the Netherlands and Italy relied more on income transfers and tax credits without capping retail prices. This difference in policy design provides an additional explanation for the inflation heterogeneity observed in Figure 13 and reinforces the argument that a common energy shock was transmitted differently depending on both structural exposure and national policy choices.

In addition to the aggregate energy dependency measure presented in Figure 13, a household-level indicator of energy exposure is calculated in Table 2. For each country, the direct effect of the 2022 energy shock is obtained by multiplying the weight of energy in the HICP consumption basket (Eurostat, `prc_hicp_inw`, COICOP division CP045) by the average annual increase in energy prices in 2022 (Eurostat, `prc_hicp_manr`). This measure estimates how many percentage points of the 2022 average headline inflation rate are directly attributable to energy, given each country's specific consumption structure.

Table 2: Direct effect of the energy shock on headline inflation, by country (2022)

Country	Energy weight 2022 (%)	Energy price change 2022 (%)	Direct effect (pp)	Average headline HICP 2022 (%)	Share of total inflation (%)
Belgium	7.56	59	4.46	10.32	43.21
Germany	7.98	34.5	2.75	8.63	31.90
France	6.34	23.9	1.51	5.9	25.67
Italy	4.96	50.7	2.51	8.72	28.83
Netherlands	7.10	71.8	5.10	11.62	43.90

Source: Author's calculations based on Eurostat data

The estimated direct effect ranges from 1.51 percentage points in France to 5.10 percentage points in the Netherlands. Expressed as a share of total headline inflation, energy alone accounts for close to or above 40% of the overall 2022 inflation rate in Belgium (43.2%) and the Netherlands (43.9%), compared with roughly a quarter in France (25.7%) and Italy (28.8%), and around a third in Germany (31.9%).

Comparing Table 2 with the energy dependency measure used in Figure 13 reveals an important nuance. Italy has the highest energy import dependency ratio among the five countries (73.4%), yet its estimated direct effect on the household consumption basket is comparatively modest, both in absolute terms (2.51 percentage points) and as a share of total inflation (28.8%). This apparent inconsistency is explained by Italy's relatively low weight of energy in the HICP basket (4.96%), the lowest of the five countries. In other words, Italy imports a large share of the energy it consumes, but energy represents a comparatively smaller part of what households directly purchase, so aggregate import dependency does not translate one-to-one into household-level price exposure. This distinction illustrates why import-based dependency ratios and consumption-based weights capture two different, complementary dimensions of energy vulnerability.

By contrast, the Netherlands combines a relatively high energy weight in the consumption basket (7.10%) with the largest energy price increase in the sample (71.8%), which jointly explain why Dutch households experienced both the highest headline inflation rate and the largest direct energy contribution among the five countries. This result reinforces the interpretation proposed earlier in this section (Van den End et al., 2025), according to which the specific structure of the Dutch energy mix, rather than aggregate import dependency alone, was central to explaining the country's exceptional inflation experience in 2022.

As noted in Section 3.3, this estimate should be interpreted as a slight upper-bound approximation rather than a precise decomposition restricted to housing energy alone.

Overall, this household-level measure of energy exposure complements the aggregate dependency ratio presented in Figure 13 and provides a more direct explanation of why the 2022 energy shock translated into markedly different inflation outcomes across the five selected countries.

To complement the annual comparison presented above, Figures A8 to A12 (Appendix) present the quarterly evolution of the Labour Cost Index (LCI) and HICP inflation for each of the five selected countries between 2019 and 2024. This quarterly perspective reveals timing patterns in the wage-price relationship that annual data conceal.

In Belgium, the LCI and HICP track closely until late 2021, after which HICP rises sharply ahead of the LCI, peaking near 11% in late 2022. The LCI subsequently peaks roughly one to two quarters later, around 9.5% in early 2023, before both series decline. This lagged but substantial catch-up is consistent with the automatic wage indexation mechanism discussed in Section 4.4, whereby nominal wages adjust to past inflation with a structural delay rather than in real time.

Germany displays a markedly more volatile LCI, with sharp quarter-to-quarter swings that do not track HICP closely at any point. This volatility likely reflects the timing of one-off inflation compensation payments and staggered collective bargaining rounds rather than a smooth indexation process. Unlike Belgium, wage growth in Germany never closes the gap with peak inflation (around 10.8% in late 2022); a partial catch-up only becomes visible from 2023 onwards, well after the inflation peak.

France exhibits the smallest gap between the two series throughout the period, with HICP peaking at only around 7%, substantially lower than in the other four countries. This is consistent with the moderating effect of the tariff shield discussed in Section 4.4: by containing headline inflation itself,

French fiscal policy limited the wage-price gap without relying on a strong automatic indexation mechanism.

Italy shows the most persistent divergence in the sample. The LCI remains close to flat, around 1–2%, throughout the entire 2022 inflation peak, even as HICP reaches approximately 12.5%. Wage growth only begins to accelerate from 2023 onwards, long after inflation has already receded, implying that Italian households absorbed the purchasing power shock through the labour cost channel with a considerably longer delay than in Belgium or Germany.

The Netherlands combines the high inflation peak observed in Belgium (HICP reaching approximately 14% in 2022) with the LCI volatility observed in Germany. As in Belgium, wage growth accelerates as inflation falls rather than during the peak itself, but this catch-up appears to result from delayed collective bargaining renegotiation rather than an automatic indexation rule.

Taken together, these quarterly patterns confirm that the timing, not only the magnitude, of wage adjustment differed substantially across the selected countries. Belgium's automatic indexation produced the most visible and mechanical lagged catch-up; France's contained inflation reduced the need for a large wage response; Germany and the Netherlands relied on more irregular, negotiation-driven adjustments; and Italy exhibited the slowest and most incomplete wage response among the five countries. These findings reinforce the argument, developed in Chapter 5, that institutional wage-setting mechanisms shaped the transmission of the inflation shock to household purchasing power independently of the shock's initial magnitude.

4.5 Comparing inflation and purchasing power outcomes

The previous sections examined inflation developments, inflation dispersion and real disposable income separately. Taken together, these results provide additional insights into how the 2022 inflation shock affected households across the selected countries.

The analysis reveals that countries exposed to the same inflationary episode did not experience identical purchasing power outcomes. Although inflation increased sharply across all countries in 2022, the evolution of real disposable income differed substantially. This suggests that the relationship between inflation and purchasing power is not uniform across countries and may depend on broader economic conditions.

Germany and the Netherlands illustrate this pattern particularly well. Despite experiencing significant inflationary pressures during the inflation shock, both countries maintained relatively strong long-term growth in real disposable income. By contrast, Italy recorded weaker purchasing power performance over the sample period, despite facing inflation developments that were not systematically higher than those observed in the other selected countries.

Belgium and France occupied intermediate positions. Both countries experienced the common inflation shock and recorded increases in inflation during 2022. However, their purchasing power trajectories remained relatively stable compared with some of the other countries in the sample.

These observations constitute the central empirical finding of the present study and provide the basis for the discussion developed in the following chapter.

4.6 Panel regression: wage response to inflation across countries and time

Table 3: Panel regression results - quarterly wage growth (LCI) and inflation (HICP), 2019 Q1–2024 Q4

Variable	Coefficient	Std. error	t-stat	p-value
Constant (Netherlands baseline)	3.515	0.563	6.249	0.000
HICP% (headline inflation)	0.185	0.066	2.806	0.006
Belgium	-0.633	0.689	-0.918	0.360
Germany	-0.533	0.689	-0.773	0.441
France	-1.578	0.693	-2.277	0.025
Italy	-2.083	0.693	-3.008	0.003

N = 120 (5 countries × 24 quarters, 2019 Q1–2024 Q4). $R^2 = 0.167$; Adjusted $R^2 = 0.130$; $F(5,114) = 4.562$, $p = 0.0008$. Netherlands is the reference category. Source: Author's calculations based on Eurostat data (prc_hicp_manr, lc_lci_r2_q).

To formally test the wage-inflation relationship discussed qualitatively in Section 4.4, a panel regression is estimated using quarterly data for the five selected countries between 2019 Q1 and 2024 Q4 (120 country-quarter observations), addressing the statistical limitation of the exploratory cross-sectional regressions used in earlier drafts of this thesis, which relied on only five country-level observations and lacked statistical power. The dependent variable is the quarterly year-on-year growth rate of the Labour Cost Index (LCI%), and the main explanatory variable is the quarterly year-on-year HICP headline inflation rate. Country fixed effects, implemented as binary dummy variables (with the Netherlands as the reference category), are included to control for time-invariant country-specific differences in wage-setting institutions.

Table 3 reports the results. The coefficient on HICP inflation is positive and statistically significant ($\beta = 0.185$, $p = 0.006$), indicating that, on average across the panel, a one percentage point increase in quarterly inflation is associated with a 0.185 percentage point increase in wage growth. This confirms the presence of a wage response to inflation, though the magnitude well below one suggests that, on average, nominal wage growth only partially offsets price increases within the same quarter, consistent with the lagged catch-up patterns documented in Section 4.4 for most countries other than Belgium.

The country fixed effects reveal significant cross-country heterogeneity in average wage growth, conditional on the inflation level. France ($\beta = -1.578$, $p = 0.025$) and Italy ($\beta = -2.083$, $p = 0.003$) exhibit significantly lower average wage growth than the Netherlands, consistent with the muted wage response identified in the country-level analysis. Belgium and Germany are not statistically distinguishable from the Netherlands in this specification, which does not capture timing effects; as discussed in Section 4.4, Belgium's automatic indexation mechanism is primarily reflected in the *timing* of wage adjustment rather than its long-run average level.

The overall model is statistically significant ($F(5,114) = 4.562$, $p = 0.0008$), and explains approximately 13% of the variation in quarterly wage growth (adjusted $R^2 = 0.130$). This modest explanatory power is consistent with the considerable quarter-to-quarter volatility observed in several countries' LCI series (notably Germany and the Netherlands, see Section 4.4), which likely reflects institutional factors such as one-off compensation payments and the timing of collective bargaining rounds that are not captured by this specification. Consistent with the exploratory approach outlined in Section 3.4, these results should be interpreted as evidence of a statistically robust association between inflation and wage growth across the panel, rather than as a strictly causal estimate.

5. Discussion

5.1 Energy shocks as a driver of inflation divergence

The empirical results presented in Chapter 4 show that the 2022 inflation shock affected the selected euro area countries with different levels of intensity. Although inflation increased sharply across all countries, the magnitude of the increase varied substantially, with the Netherlands experiencing the highest inflation rates while France recorded a comparatively lower increase. The simultaneous rise in inflation combined with the observed increase in inflation dispersion suggests that the common external shock was transmitted unevenly across national economies.

One possible interpretation of these findings is that differences in national energy exposure and economic structures influenced the transmission of the shock. Although euro area countries share the same monetary policy, they differ considerably in terms of energy dependency, industrial composition and reliance on imported fossil fuels. Consequently, a common increase in international energy prices may generate heterogeneous inflation dynamics depending on national structural characteristics.

This interpretation receives partial empirical support from the scatter plot analysis presented in Section 4.4. Figure 13 shows a positive association between energy dependency in 2021 and peak HICP inflation in 2022, with an R^2 of 0.29. France, the least energy-dependent country in the sample (44.0%), recorded the lowest inflation rate (5.9%), while more energy-dependent economies such as Belgium (70.8%) and Italy (73.4%) experienced higher inflationary pressures. However, the Netherlands represents a notable exception, recording the highest inflation rate (11.6%) despite a moderate energy dependency ratio (58.5%), suggesting that additional country-specific factors contributed to its inflation trajectory.

The Dutch case also illustrates the importance of national policy choices in shaping the transmission of energy shocks to consumer prices. Van den End et al. (2025) show that the Netherlands, unlike several other euro area countries, did not implement retail energy price caps during the 2022 crisis. Instead, the Dutch government provided broad compensation to households without limiting the pass-through of wholesale price increases. This policy choice, combined with the high share of gas in the Dutch energy mix and the economy's exceptional openness to world trade, contributed to a fuller transmission of the energy shock to consumer inflation than suggested by aggregate energy dependency ratios. This finding reinforces the argument that the structural proxy used in the present study, the share of net energy imports in total energy consumption, captures only part of the relevant heterogeneity, as institutional features of energy markets and national policy responses constitute additional transmission channels that differ across countries.

This heterogeneity in inflation transmission is further confirmed by Vasylieva et al. (2025), who apply dynamic clustering methods to 26 European countries and identify six distinct inflation regimes following the Russia-Ukraine war, finding that Belgium and France experienced comparatively contained inflation responses partly attributable to fiscal support measures and regulated retail tariffs, while Germany and the Netherlands belong to a regime characterised by more persistent but diffuse inflationary pressures.

This interpretation is consistent with the literature reviewed in Chapter 2. Dullien and Tober (2024) argue that the 2022 inflation surge was primarily driven by imported energy and food prices and that countries with greater dependence on imported energy were more severely affected. Similarly, Coutinho and Licchetta (2025) show that economies characterised by higher energy intensity

experienced stronger inflationary pressures following the common energy shock, while differences in national economic structures contributed to heterogeneous inflation outcomes across the euro area.

The results obtained in the present study are also consistent with the transmission mechanisms described by Casoli et al. (2024). Their analysis suggests that energy shocks propagate throughout the economy via production costs and inflation expectations, implying that differences in national energy exposure may generate heterogeneous inflation outcomes even under a common monetary policy framework. This mechanism provides an additional explanation for the inflation divergence observed across the selected countries in 2022.

The empirical results of the present study therefore support the idea that the inflation episode of 2022 cannot be interpreted as a perfectly homogeneous euro area phenomenon. Instead, the evidence suggests that a common external energy shock interacted with country-specific structural characteristics, producing different inflation trajectories despite the existence of a common monetary policy framework. These findings reinforce the importance of considering national structural vulnerabilities when analysing inflation dynamics within a monetary union.

National policy responses may also have contributed to the heterogeneous inflation outcomes observed across countries. Although energy dependency represents an important structural factor, governments adopted different fiscal and regulatory measures to mitigate the impact of rising energy prices on households and firms. According to the European Commission (2023), several euro area countries implemented energy support schemes, tax reductions and price controls during the energy crisis. In particular, France introduced extensive tariff-shield measures that limited the pass-through of energy price increases to consumers. Consequently, differences in national policy responses may partly explain why countries with comparable levels of energy exposure experienced different inflation outcomes. This also suggests that the relationship between energy dependency and inflation should not be interpreted as purely mechanical, as public intervention can significantly influence the transmission of external energy shocks.

According to Sgaravatti, Tagliapietra and Zachmann (2023), France allocated approximately €92.1 billion to energy support measures, of which the large majority consisted of untargeted price measures including retail energy caps, representing one of the most extensive price-based fiscal responses among the selected countries.

Beyond explaining the inflation episode itself, these findings also have important implications for understanding purchasing power differences across euro area countries. If common external shocks interact with heterogeneous national structures, households are unlikely to experience identical economic consequences despite sharing the same monetary policy environment. The results therefore suggest that structural characteristics, such as energy dependence and productive composition, represent important transmission channels through which external inflation shocks ultimately affect household welfare within the monetary union.

5.2 Inflation convergence and temporary divergence after 2022

The empirical results presented in Chapter 4 indicate that inflation rates remained relatively close across the selected euro area countries for most of the period between 2002 and 2021. Although temporary fluctuations occurred, inflation dispersion generally remained limited, suggesting a relatively high degree of inflation convergence within the sample. A clear break emerged in 2022, when

inflation dispersion increased sharply and reached its highest level over the entire observation period before gradually declining in the following years.

These findings suggest that inflation convergence within the euro area was temporarily disrupted by the 2022 inflation shock. While the existence of a common monetary policy appears to have contributed to relatively coordinated inflation dynamics over the long run, the exceptional external shock generated heterogeneous inflation trajectories across countries. This indicates that common monetary institutions alone are not sufficient to ensure identical inflation outcomes when countries differ in terms of their economic structures and exposure to external disturbances.

The dispersion analysis presented in Section 4.2 provides direct empirical evidence for this interpretation. The cross-country standard deviation of HICP inflation rates remained below 1.0 percentage point on average between 2002 and 2021, before rising sharply to 2.13 percentage points in 2022, more than four times the pre-shock average. This sharp increase confirms that the 2022 inflation episode generated an exceptional degree of inflation heterogeneity across the selected countries, consistent with the view that common monetary institutions cannot fully prevent asymmetric transmission of large external shocks.

This interpretation is consistent with the literature reviewed in Chapter 2. Pereira and Aguiar-Conraria (2025) argue that inflation cycles have become increasingly synchronised across euro area countries over time, reflecting the effects of monetary integration and stronger economic linkages. However, they also show that this apparent synchronisation becomes considerably weaker once energy prices are controlled for, suggesting that common external shocks may temporarily mask underlying structural differences between countries. Similarly, Ortman (2023) emphasises that aggregate euro area inflation may conceal substantial heterogeneity across member states, particularly during periods of major economic turbulence.

This interpretation is also consistent with Navarro-Ortiz (2026), who argues that apparent macroeconomic convergence within the euro area may conceal persistent structural asymmetries. According to this perspective, common monetary institutions promote convergence over the long run but cannot fully eliminate heterogeneous national responses to major external shocks. The temporary inflation divergence observed in 2022 therefore appears compatible with the existence of underlying structural differences between euro area economies.

The gradual decline in inflation dispersion observed after 2022 further supports this interpretation. The empirical evidence suggests that the divergence generated by the inflation shock was largely temporary rather than permanent, as inflation rates progressively converged once energy prices stabilised and inflationary pressures eased. This adjustment process is consistent with the broader literature, which argues that periods of inflation divergence may emerge following large external shocks but tend to diminish over time as economies gradually adapt.

Overall, the findings of the present study support the view that inflation convergence within the euro area is a dynamic rather than a permanent phenomenon. While the common monetary framework promotes long-term convergence, major external shocks may temporarily generate significant cross-country divergence, with important implications for household purchasing power and macroeconomic adjustment within the monetary union.

These findings also have important implications for the analysis of purchasing power within the euro area. If inflation convergence can be temporarily disrupted by major external shocks, households are unlikely to experience identical welfare outcomes despite sharing a common monetary policy environment. Consequently, understanding inflation divergence is essential for explaining why purchasing power evolved differently across euro area countries following the 2022 inflation shock.

5.3 Why purchasing power evolved differently

The empirical results presented in Chapter 4 suggest that differences in purchasing power outcomes cannot be explained by inflation rates alone. Although all selected countries experienced a sharp increase in inflation during the 2022 inflation episode, the evolution of real disposable income differed substantially across countries. Germany and the Netherlands maintained relatively strong long-term growth in real disposable income, whereas Italy recorded considerably weaker purchasing power performance. Belgium and France occupied intermediate positions, displaying more moderate but relatively stable purchasing power developments.

These findings indicate that the effects of inflation on households depend not only on the evolution of consumer prices but also on the capacity of incomes to adjust over time. Consequently, countries facing similar inflationary pressures may nevertheless experience different purchasing power trajectories depending on wage developments, labour market conditions and broader economic characteristics. The empirical evidence therefore suggests that purchasing power reflects the interaction between price dynamics and income adjustment mechanisms rather than inflation alone.

The quarterly analysis presented in Section 4.4 (Appendix Figures A8–A12) further illustrates this point. Wage growth did not automatically translate into purchasing power protection: Belgium's automatic indexation produced a substantial but lagged catch-up, with the LCI peaking one to two quarters after HICP, while Italy's wage growth remained essentially flat throughout the 2022 inflation peak and only began to accelerate in 2023, long after inflation had already receded. These contrasting timing patterns, examined further in Section 5.4, suggest that wage increases did not guarantee purchasing power protection, reinforcing the view that broader structural and institutional factors shaped household welfare outcomes.

This interpretation is consistent with the literature reviewed in Chapter 2. Höpner, Di Carlo and Hassel (2024) show that, during the recent inflation episode, nominal wages often failed to fully compensate for rising prices, resulting in substantial real wage losses despite continued wage growth. Their findings illustrate that purchasing power depends on the ability of household incomes to keep pace with inflation rather than on inflation rates alone. Similarly, Israel and Schnabl (2024) argue that purchasing power losses may be underestimated when inflation is measured exclusively through conventional consumer price indices, as broader cost-of-living pressures such as housing costs may further reduce households' effective purchasing capacity.

The empirical results of the present study therefore support the view that purchasing power divergence emerged through the combined effects of inflation dynamics and income adjustment mechanisms. Countries characterised by stronger income growth or more favourable labour market conditions appear to have been better able to absorb the inflation shock, whereas weaker income dynamics were associated with more persistent purchasing power losses. These findings suggest that understanding the welfare consequences of inflation requires considering both price developments and the institutional and economic factors influencing household income adjustment.

These findings also suggest that the relationship between inflation and purchasing power is more complex than a simple mechanical transmission from prices to household welfare. The capacity of national economies to adjust wages and incomes appears to play a crucial role in mitigating the effects of inflation on households. Consequently, cross-country differences in purchasing power following the 2022 inflation shock should be interpreted as the result of interactions between inflation dynamics,

labour market adjustment and broader structural characteristics rather than as the direct consequence of price developments alone.

From a broader perspective, these results illustrate that the social consequences of inflation may differ substantially even within a monetary union characterised by a common currency and a common monetary policy. This highlights the importance of considering national structural and institutional characteristics when assessing the welfare effects of future inflationary shocks across euro area countries.

Although inflation represents an important determinant of purchasing power, the results of the present study suggest that inflation alone provides an incomplete explanation of cross-country welfare differences, thereby extending the interpretation proposed by Höpner et al. (2024).

5.4 The role of institutions and wage adjustment

The panel regression presented in Section 4.6 provides direct empirical support for this interpretation. The positive and statistically significant coefficient on inflation ($\beta = 0.185$, $p = 0.006$) confirms that nominal wages responded systematically to price increases across the panel, though the magnitude well below one indicates that this response was only partial within the same quarter. More importantly for the present discussion, the country fixed effects reveal that this wage response was far from uniform: France and Italy exhibited significantly lower average wage growth than the Netherlands ($p = 0.025$ and $p = 0.003$ respectively), even after controlling for the inflation level, while Belgium and Germany were not statistically distinguishable from the Netherlands. This heterogeneity is consistent with the view that institutional wage-setting mechanisms shaped the extent to which rising prices translated into income losses for households. Unlike the exploratory cross-sectional regressions used in earlier stages of this research, which relied on only five country-level observations and lacked statistical power, this quarterly panel specification ($N = 120$) provides a statistically robust basis for this association ($F(5,114) = 4.562$, $p = 0.0008$).

The empirical results presented in Chapter 4 suggest that countries exposed to the same inflationary environment did not experience identical purchasing power outcomes. Although inflation increased across all selected euro area countries, differences in real disposable income trajectories indicate that households' ability to absorb the inflation shock varied substantially across national economies. These findings suggest that institutional factors may have influenced the transmission of inflation to household purchasing power.

One possible explanation relates to differences in labour market institutions and wage adjustment mechanisms. Countries differ considerably in terms of wage bargaining systems, indexation mechanisms and income adjustment policies, which may influence the extent to which rising prices are offset by increases in household income. Consequently, similar inflation rates may generate different purchasing power outcomes depending on the institutional environment in which households operate.

This interpretation is consistent with the literature reviewed in Chapter 2. Peersman (2022) argues that commodity price shocks generate heterogeneous inflation outcomes because wage responses differ across national labour market institutions. Countries characterised by stronger wage indexation mechanisms tend to experience more pronounced wage adjustments following external price shocks, potentially influencing both inflation dynamics and households' purchasing power.

The Belgian case illustrates the complexity of these mechanisms. Belgium's automatic wage indexation system may help households preserve part of their purchasing power by adjusting wages to inflation. However, Bijmens, Duprez and Jonckheere (2023) show that the Belgian inflation episode of 2022 was primarily driven by rising input costs rather than by wages or excessive profit margins, providing little evidence of a self-sustaining wage-price spiral. Their findings suggest that wage adjustment mechanisms can support household incomes without necessarily becoming the principal source of inflation persistence.

Beyond this qualitative evidence, the Belgian data also reveal a more specific paradox regarding the effectiveness of automatic wage indexation in protecting purchasing power. Figure 14 shows that Belgium recorded the highest nominal disposable income growth among the five selected countries in 2022 (NDI = 8.68%), directly reflecting the mechanical effect of automatic indexation on nominal wages. It should be noted that this NDI measure captures total household income from all sources, including wages, transfers and capital income, over a single year (2022), and is therefore conceptually distinct from the LCI used in the panel regression of Section 4.6, which isolates labour cost growth specifically and is averaged over the full 2019–2024 period. Yet this strong nominal adjustment did not translate into a correspondingly favourable outcome in real terms: Belgian real disposable income actually contracted slightly in 2022 (RDI = -0.62%). By contrast, France combined a substantially lower nominal income growth (NDI = 4.61%) with a positive real disposable income outcome (RDI = 0.78%), despite lacking any equivalent automatic indexation mechanism. In other words, the country with the strongest institutional wage-protection mechanism recorded a worse real outcome in 2022 than the country largely relying on price containment through fiscal policy. This apparent paradox is consistent with the quarterly evidence presented in Section 4.4: because Belgian wage indexation operates with a structural lag of one to two quarters relative to inflation, the strong nominal catch-up visible in the LCI mainly occurred after inflation had already eroded households' purchasing power within the year, rather than compensating for it in real time. This timing mismatch suggests that automatic indexation, at least over the year in which the shock peaked, may generate a nominal illusion of income protection without preventing an equivalent real-terms loss, whereas France's comparatively lower and more contained inflation trajectory, itself a product of the tariff-shield policy discussed in Section 5.1, achieved a more favourable real outcome through a different channel altogether. This result nuances the conventional view that wage indexation systematically shields households from inflation shocks, and instead points to the timing of adjustment, not merely its existence, as a key determinant of its short-term effectiveness.

The results of the present study are also consistent with the argument developed by Visco (2023), who emphasises that external energy shocks represent a real loss of income for the economy that cannot be fully compensated through wage increases alone. Attempting to completely offset inflation through wage adjustments may generate additional inflationary pressures and complicate the adjustment process. Consequently, institutional arrangements may influence not only the distribution of purchasing power losses but also the broader macroeconomic response to inflation shocks.

Overall, the empirical findings suggest that differences in purchasing power developments across euro area countries cannot be explained solely by inflation rates or energy exposure. National labour market institutions and wage adjustment mechanisms appear to have influenced households' capacity to absorb rising prices, thereby contributing to the heterogeneous purchasing power trajectories observed following the 2022 inflation shock. Institutional arrangements should therefore not be viewed merely as background characteristics but as active transmission mechanisms shaping the economic consequences of external inflation shocks through their influence on wage adjustment and income protection.

More broadly, these results illustrate that the effectiveness of a common monetary policy may partly depend on national institutional arrangements that remain outside the direct control of the European

Central Bank. The 2022 inflation episode therefore highlights the importance of considering institutional heterogeneity when assessing the distributional consequences of external shocks across euro area countries.

5.5 Synthesis of findings and implications

Taken together, the discussion developed throughout this chapter provides a comprehensive answer to the central research question of the present study. Although the 2022 inflation episode originated from a common external shock affecting the entire euro area, its consequences differed substantially across countries in terms of both inflation dynamics and household purchasing power. The empirical evidence therefore suggests that a common monetary environment does not necessarily generate homogeneous economic outcomes when national structural characteristics remain heterogeneous.

The three-stage analytical framework introduced in Chapter 3 provides a useful organising structure for interpreting these findings. The common external shock was transmitted differently across countries depending on their energy exposure, wage adjustment mechanisms and national fiscal responses, ultimately generating heterogeneous purchasing power outcomes.

The analysis indicates that inflation divergence resulted from the interaction between the common energy shock and country-specific structural characteristics, including differences in energy dependence and economic composition. The scatter plot and panel regression analyses presented in Chapter 4 provide empirical support for this interpretation, showing that energy dependency is positively associated with average annual HICP inflation ($R^2 = 0.29$), while the panel regression shows that wage growth responded only partially, and unevenly across countries, to rising prices. Taken together, these results indicate that neither energy exposure nor wage dynamics alone can fully account for the observed purchasing power differences across countries.

While inflation convergence had characterised most of the period preceding 2022, the sharp increase in inflation dispersion observed during the energy crisis illustrates that external shocks may temporarily disrupt this long-run tendency and reveal underlying structural asymmetries within the monetary union.

Beyond inflation itself, the findings also show that differences in purchasing power cannot be explained solely by consumer price developments. The evolution of real disposable income differed considerably across countries, suggesting that labour market conditions, income adjustment mechanisms and institutional arrangements influenced households' ability to cope with rising prices. Consequently, the welfare effects of inflation appear to depend on the interaction between inflation dynamics and the capacity of national economies to protect household incomes.

In this respect, the present study extends the existing literature by jointly analysing inflation divergence and purchasing power developments across selected euro area countries following the 2022 inflation shock. While many studies focus either on inflation dynamics or on income developments separately, the combined analysis developed in this research provides a broader perspective on how common external shocks translate into heterogeneous household welfare outcomes within a monetary union.

From a policy perspective, these findings suggest that a common monetary policy alone cannot fully offset the consequences of structural differences between member states. Policymakers should therefore recognise that future inflationary episodes may require complementary national fiscal

measures, income-support policies or labour market adjustments to mitigate unequal purchasing power losses across countries. More generally, the findings highlight that preserving purchasing power within a monetary union requires not only effective monetary policy but also national institutional and fiscal mechanisms capable of mitigating the unequal distributional consequences of common external shocks across member states.

6. Conclusion

6.1 Main findings

The objective of this thesis was to examine why the impact of the 2022 inflation shock on purchasing power differed across selected European countries. The analysis focused on Belgium, Germany, France, Italy and the Netherlands and combined a review of the existing literature with a descriptive comparative analysis of Eurostat data on inflation, inflation dispersion and real disposable income.

The first main finding is that the 2022 inflation shock was common to all selected countries, but its intensity was not uniform. Inflation increased sharply across the entire sample, confirming the exceptional nature of the shock. However, the magnitude of the increase differed substantially across countries. The Netherlands recorded the highest inflation rate among the selected countries, while France experienced a comparatively lower increase. Belgium, Germany and Italy occupied intermediate positions. This confirms that the 2022 inflation episode cannot be interpreted as a fully homogeneous euro area phenomenon.

The second finding concerns inflation convergence and divergence. Before the 2022 shock, inflation rates generally evolved within a relatively narrow range, suggesting a certain degree of convergence among the selected euro area countries. However, inflation dispersion increased sharply in 2022 and reached its highest level over the period analysed. This indicates that the inflation shock temporarily disrupted the previous convergence pattern. Although dispersion declined after the peak, the 2022 episode shows that inflation convergence within the euro area remains vulnerable to large external shocks.

The third main finding is that purchasing power developments also differed substantially across countries. Real disposable income per capita followed divergent trajectories over the period analysed. Germany and the Netherlands recorded relatively stronger long-term improvements, while Belgium and France followed more moderate but stable paths. Italy displayed the weakest performance, remaining below or close to its 2010 level for several years. These differences indicate that households did not experience the inflation shock in the same way across countries.

The results therefore suggest that inflation alone cannot fully explain differences in purchasing power outcomes. Although rising consumer prices are a central determinant of purchasing power, the evolution of real disposable income also depends on income dynamics, labour market performance, wage adjustment mechanisms and broader national economic structures. Countries with stronger income growth or more favourable adjustment mechanisms appear to have been better able to absorb the effects of rising prices.

A fourth finding relates to the role of structural and institutional factors. Beyond the descriptive analysis, the exploratory empirical framework introduced in this study provides illustrative quantitative evidence on these mechanisms. The scatter plot analysis shows a positive association between energy dependency in 2021 and average annual HICP inflation in 2022 ($R^2 = 0.29$), suggesting that energy exposure partially accounts for cross-country inflation differences. However, as detailed below, wage dynamics alone cannot explain differences in household welfare outcomes.

The panel regression developed in Section 4.6 further confirms that nominal wages responded significantly, but only partially, to inflation across the panel ($\beta = 0.185$, $p = 0.006$, $N = 120$), and that this wage response differed significantly by country, with France and Italy exhibiting significantly

weaker wage growth than the Netherlands even after controlling for inflation. This finding, based on a statistically robust quarterly panel rather than the five-observation cross-sectional regressions used in earlier drafts of this thesis, reinforces the view that purchasing power outcomes reflect the interaction between the common inflation shock and country-specific institutional wage-setting mechanisms.

Taken together, these findings answer the central research question by showing that the 2022 inflation shock affected purchasing power differently across European countries because a common external shock interacted with heterogeneous national structures. The impact on households depended not only on the level of inflation, but also on the way each economy absorbed the shock through its energy structure, income dynamics and institutional adjustment mechanisms. The results therefore highlight that monetary integration does not necessarily imply identical welfare outcomes across member states.

6.2 Contributions

This thesis contributes to the existing literature in several ways. First, it provides a comparative analysis of the 2022 inflation shock across selected euro area countries by focusing not only on inflation dynamics but also on their consequences for household purchasing power. While much of the existing literature examines inflation shocks, energy prices, monetary policy or wage adjustment mechanisms separately, this study combines these dimensions in order to analyse how a common external shock translated into heterogeneous welfare outcomes across countries.

A second contribution lies in the joint analysis of inflation dispersion and real disposable income developments. By comparing inflation rates, inflation dispersion and real disposable income per capita, the study shows that inflation divergence and purchasing power divergence are related but not identical phenomena. This is important because it demonstrates that high inflation does not automatically translate into the same degree of purchasing power loss in every country. Instead, the effects of inflation depend on how household incomes, labour market conditions and institutional adjustment mechanisms evolve over time.

Third, the thesis contributes to the literature on inflation convergence within the euro area. The results show that inflation rates among the selected countries were relatively close for most of the period preceding 2022, but that this convergence pattern was temporarily disrupted by the inflation shock. This finding supports the view that inflation convergence within a monetary union should be understood as a dynamic process rather than a permanent state. The analysis therefore reinforces the idea that a common monetary policy framework may promote long-run convergence while still allowing temporary divergence when member states are exposed differently to large external shocks.

Fourth, the study adds to the literature on purchasing power by highlighting the importance of structural and institutional factors. The analysis suggests that purchasing power outcomes depend not only on consumer price inflation but also on income dynamics, wage adjustment mechanisms and broader national economic structures. This contribution is particularly relevant because it connects macroeconomic inflation indicators with household welfare outcomes, thereby offering a broader interpretation of the social consequences of the 2022 inflation episode.

Finally, this thesis provides an empirical contribution that goes beyond purely descriptive analysis. By introducing energy dependency and the Labour Cost Index as structural proxy variables, and by presenting scatter plots and an exploratory OLS regression, the study offers an illustrative quantitative

dimension that complements the descriptive findings. While the small sample size limits the statistical power of these analyses, they provide a transparent and reproducible empirical framework for examining structural transmission channels within a monetary union. The use of harmonised Eurostat data ensures cross-country comparability and supports a clearer understanding of how national structural differences shaped the transmission of the 2022 inflation shock.

6.3 Policy implications

The findings of this thesis also have several policy implications. The first implication is that a common monetary policy, although essential for maintaining price stability within the euro area, may not be sufficient to produce homogeneous economic outcomes across member states. The 2022 inflation shock showed that countries sharing the same currency and the same central bank can nevertheless experience different inflation trajectories and different purchasing power outcomes. This suggests that national structural characteristics remain highly relevant in shaping the transmission of common external shocks.

From the perspective of the European Central Bank, these findings highlight the difficulty of designing a single monetary policy response to an inflationary shock that affects member states unevenly. While the ECB can act on aggregate euro area inflation by tightening monetary policy and anchoring inflation expectations, it cannot directly address differences in energy dependence, wage-setting systems, fiscal capacity or household income structures across countries. Therefore, the effectiveness of monetary policy may partly depend on national adjustment mechanisms that remain outside the direct control of the ECB.

A second implication concerns national fiscal policy. Since the inflation shock had unequal effects on households, especially through energy and food prices, national governments may need to complement monetary policy with targeted support measures. Broad and untargeted compensation policies may reduce immediate purchasing power losses, but they can also be costly and may weaken incentives to adjust consumption or reduce energy dependence. By contrast, targeted fiscal measures aimed at vulnerable households may help limit the social consequences of inflation while reducing the risk of adding excessive demand-side pressure to the economy.

A third implication relates to energy policy. The results and the literature reviewed in this thesis suggest that energy dependence played an important role in the transmission of the 2022 inflation shock. Countries more exposed to imported or volatile energy sources may experience stronger inflationary pressures when global energy prices increase. This reinforces the importance of reducing energy vulnerability through diversification of energy sources, investment in renewable energy, improved energy efficiency and stronger resilience of energy markets. In the long run, reducing energy dependence may contribute not only to climate and security objectives but also to greater macroeconomic stability.

A fourth implication concerns wage-setting institutions and income adjustment mechanisms. The analysis suggests that countries differ in their ability to protect households from purchasing power losses. Wage indexation, collective bargaining systems and social transfers may help households absorb inflationary pressures, but they must be designed carefully in order to avoid reinforcing inflation persistence. The Belgian case discussed in the literature illustrates this balance: automatic wage indexation may protect income, but it also raises concerns about second-round effects. Policymakers therefore need to consider both purchasing power protection and price stability when designing wage and income policies.

More broadly, the results suggest that preserving purchasing power during inflationary episodes requires coordination between monetary policy, fiscal policy, energy policy and labour market institutions. A purely monetary response may reduce inflation over time, but it does not automatically prevent unequal welfare effects across countries or social groups. Future inflationary shocks may therefore require policy responses that are both macroeconomically credible and socially targeted.

Overall, the main policy implication of this thesis is that monetary integration does not eliminate the need for national economic resilience. Within the euro area, common shocks can have asymmetric consequences when countries differ in their productive structures, energy exposure and institutional arrangements. Policymakers should therefore pay closer attention to the national transmission channels through which inflation affects households. Strengthening these channels may help reduce unequal purchasing power losses and improve the resilience of euro area economies in future crises.

6.4 Limitations and future research

Although this thesis provides useful insights into the heterogeneous effects of the 2022 inflation shock on purchasing power across selected euro area countries, several limitations should be acknowledged. These limitations do not invalidate the findings, but they define the scope within which the results should be interpreted.

The first limitation concerns the descriptive nature of the empirical analysis. This study identifies patterns of inflation divergence and purchasing power developments across countries, but it does not establish causal relationships between inflation, energy dependence, labour market institutions and real disposable income. The analysis therefore shows that these factors are likely to be associated with heterogeneous outcomes, but it cannot precisely quantify the causal contribution of each mechanism. Future research could address this limitation by using econometric models, such as panel regressions, structural decomposition methods or causal identification strategies, to test more directly the determinants of purchasing power divergence after inflation shocks. More sophisticated methodological approaches, such as the dynamic time warping clustering employed by Vasylieva et al. (2025), demonstrate that accounting for heterogeneous timing in inflation responses can reveal additional structural patterns that a purely descriptive cross-country comparison cannot capture.

A second limitation relates to the limited country sample. The study focuses on Belgium, Germany, France, Italy and the Netherlands. These countries were selected because they are large euro area economies and display different structural characteristics, making them relevant for comparative analysis. However, the sample does not cover the entire euro area. As a result, the findings should not be interpreted as fully representative of all member states. Future research could expand the analysis to a larger panel of euro area countries, including smaller economies and countries with different levels of energy dependence, fiscal capacity and labour market institutions.

A third limitation concerns the use of aggregate macroeconomic indicators. Purchasing power is proxied by adjusted gross disposable income of households in real terms per capita. This indicator is useful for cross-country comparison because it is harmonised and expressed in real terms. However, it does not capture differences between households within the same country. Individual purchasing power may vary depending on income level, household composition, region, employment status, housing tenure and consumption structure. Consequently, the analysis cannot fully capture the distributional effects of inflation across social groups. Future research could use household-level data

to examine how inflation affected different income groups, age groups or household types within each country.

A fourth limitation concerns the scope of the exploratory empirical framework. Although energy dependency and the Labour Cost Index were introduced as structural proxy variables, other potentially important factors, including fiscal support measures, taxation, housing costs, social transfers and wage indexation rules, were not directly measured in the empirical analysis. Moreover, the OLS regression relies on only five observations, which severely limits its statistical power and prevents robust causal inference. Consequently, the empirical results should be interpreted as illustrative indicators of potential structural associations rather than as definitive evidence of causal relationships. Future studies could include a broader set of structural variables and employ more sophisticated econometric methods to formally test the relative importance of each transmission mechanism. The Dutch case further illustrates this limitation: as documented by Van den End et al. (2025), the Netherlands' exceptionally high inflation in 2022 reflected the interaction of gas market exposure, trade openness and the absence of retail price caps, factors that are not captured by aggregate energy dependency ratios and that caused this country to deviate substantially from the cross-country pattern observed in Figure 13.

Finally, the period covered by the study includes the immediate inflation shock and the first adjustment years following 2022, but the longer-term consequences of the episode remain uncertain. Inflation declined after its 2022 peak, but the effects on real income, wage bargaining, public finances and household welfare may continue to unfold over a longer period. Future research could therefore extend the observation period as new data become available in order to assess whether the purchasing power differences observed in this thesis were temporary or whether they reflect more persistent structural divergences between euro area countries.

Overall, future research would benefit from combining the comparative approach adopted in this thesis with more detailed econometric and micro-level analyses. A broader dataset including more euro area countries, additional explanatory variables and household-level information would make it possible to better identify the causal mechanisms through which common inflation shocks generate heterogeneous purchasing power outcomes. Such research would further improve the understanding of how monetary unions can respond to external shocks while limiting unequal welfare effects across countries and households.

7. Appendix

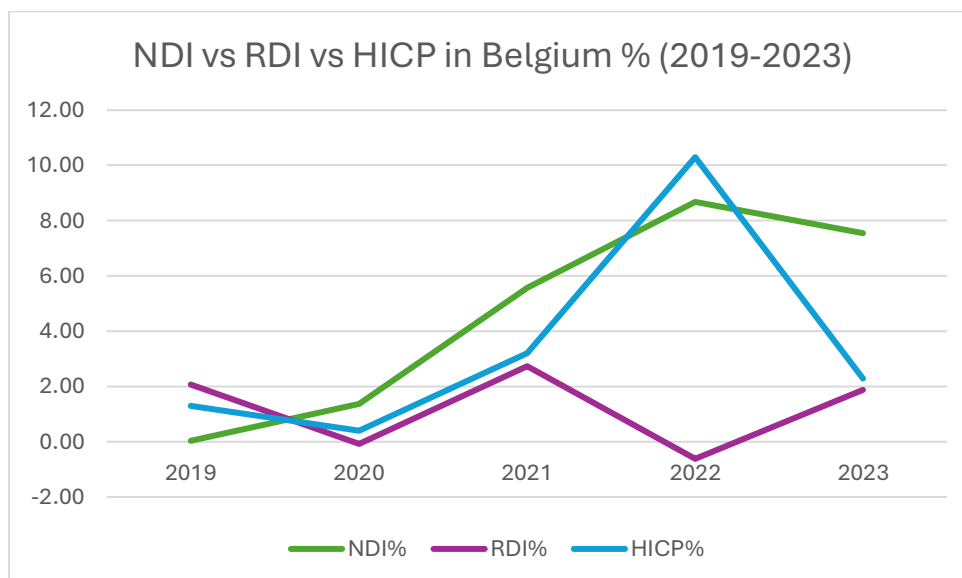


Figure A2: NDI vs RDI vs HICP in Belgium % (2019-2023)

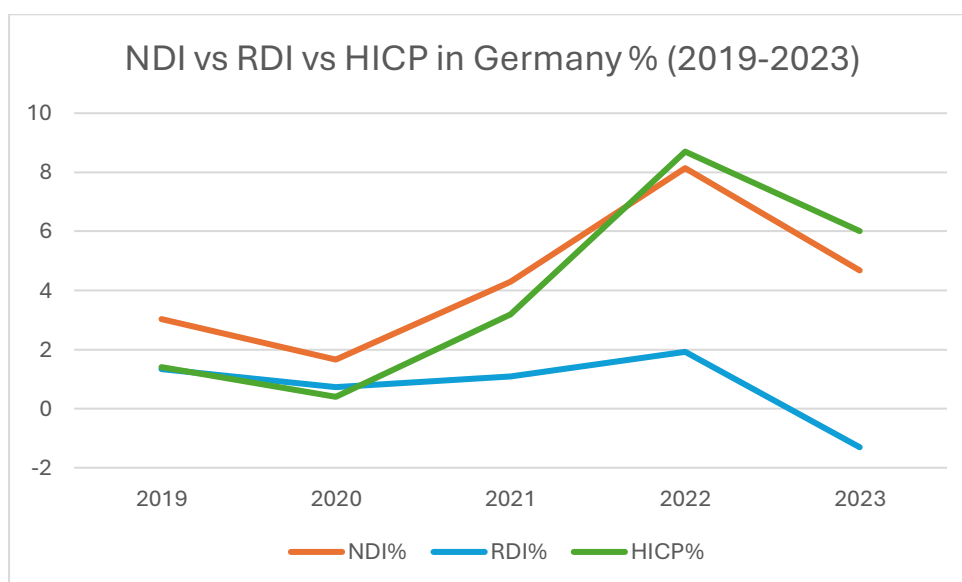


Figure A3: NDI vs RDI vs HICP in Germany (2019-2023)

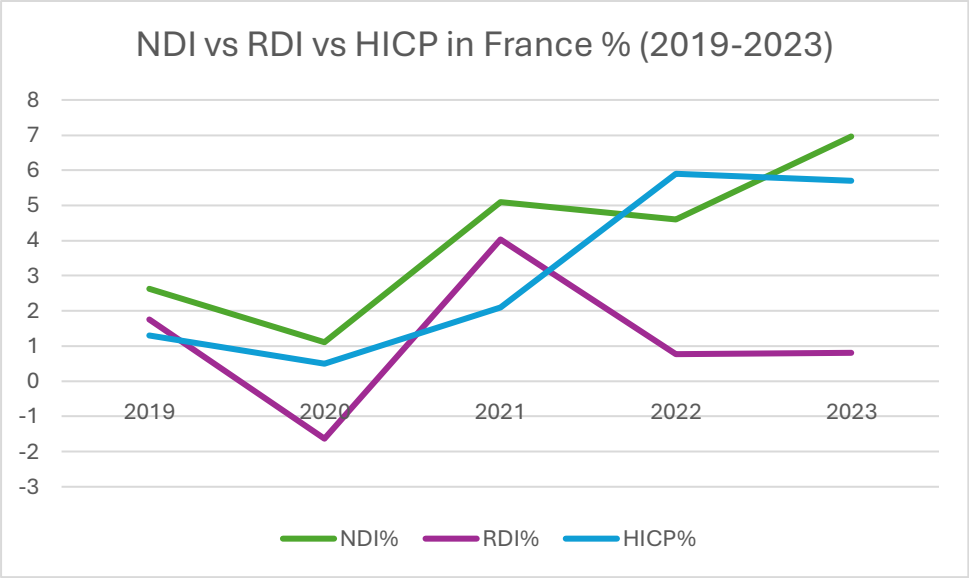


Figure A4: NDI vs RDI vs HICP in France % (2019-2023)

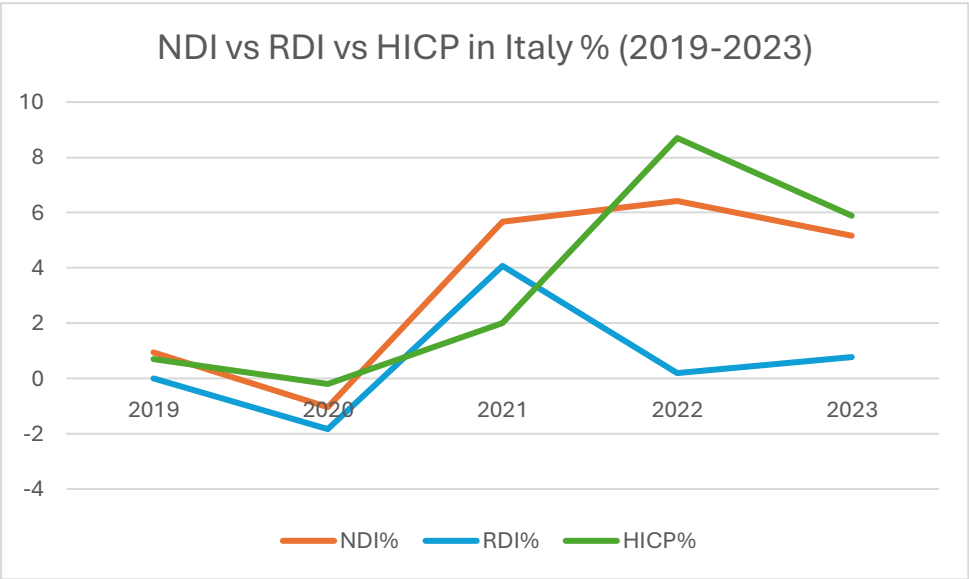


Figure A5: NDI vs RDI vs HICP in Italy % (2019-2023)

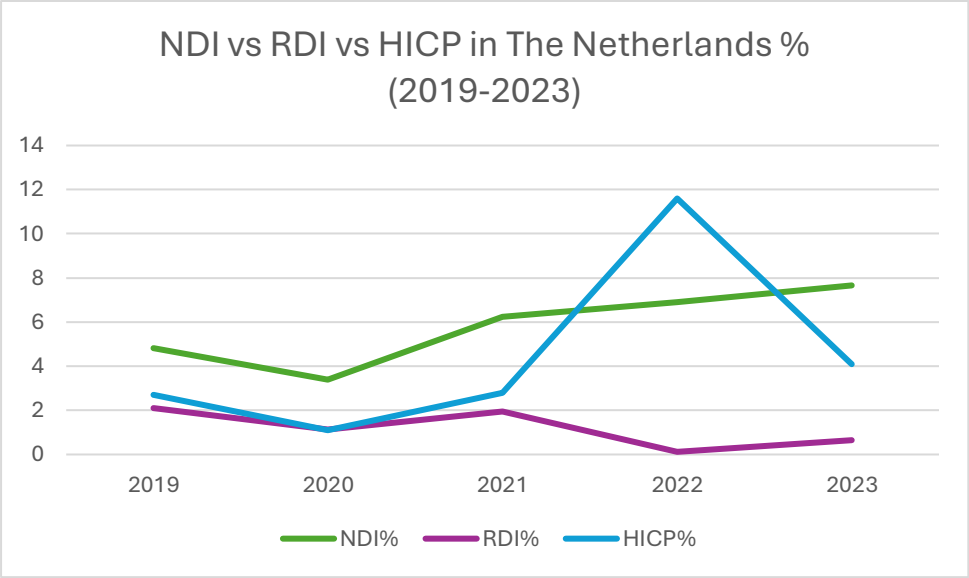


Figure A6: NDI vs RDI vs HICP in The Netherlands % (2019-2023)

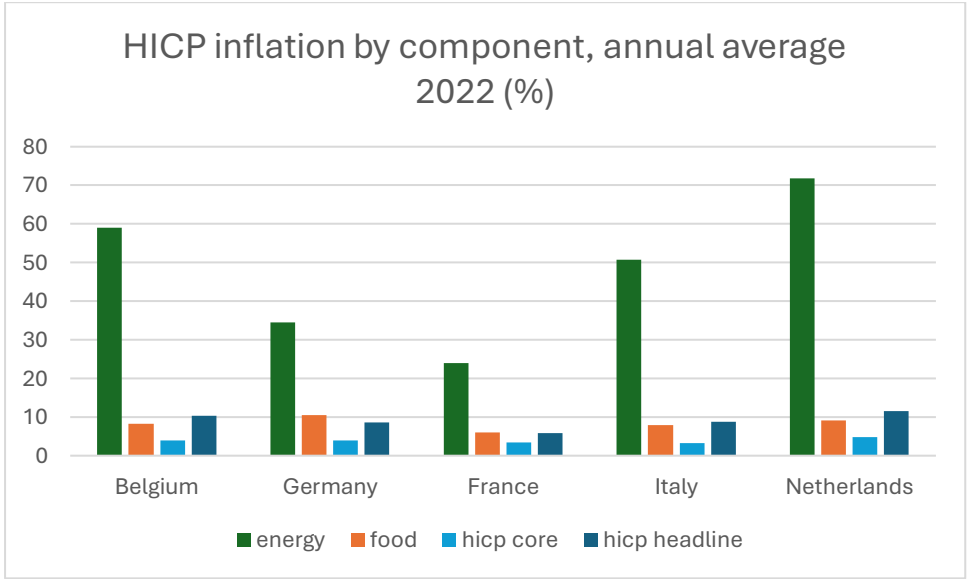


Figure A7: HICP inflation by component, annual average 2022 (%)

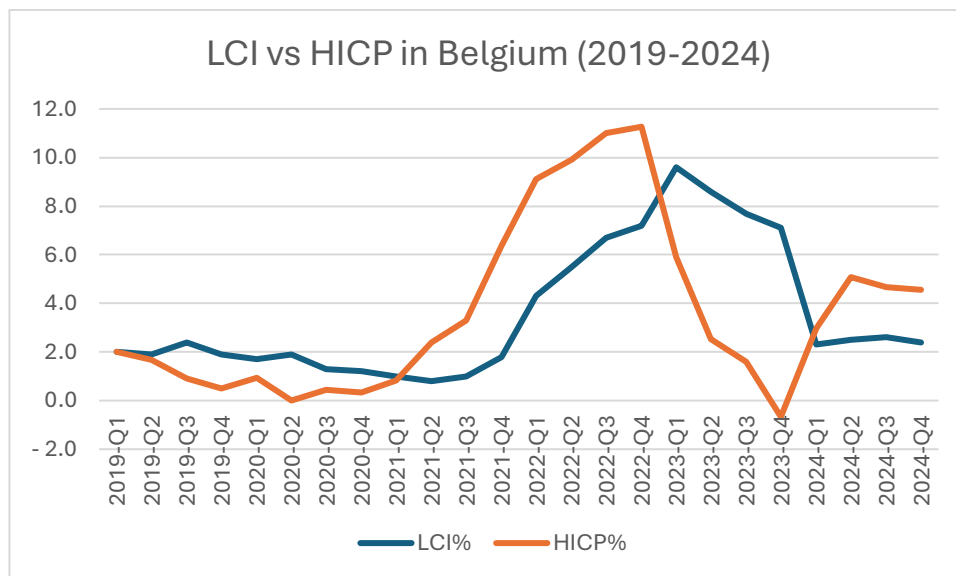


Figure A8: LCI vs HICP in Belgium (2019-2024)

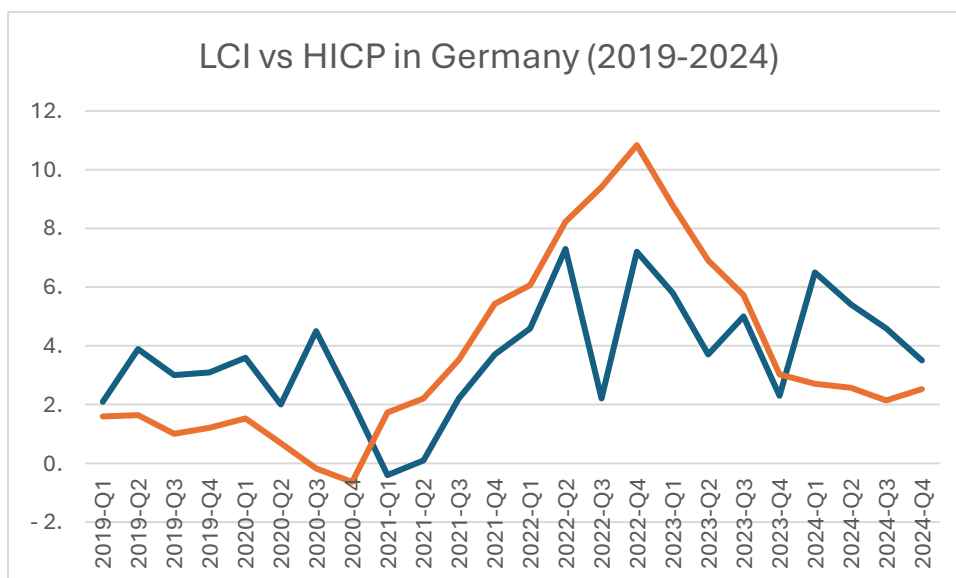


Figure A9: LCI vs HICP in Germany (2019-2024)

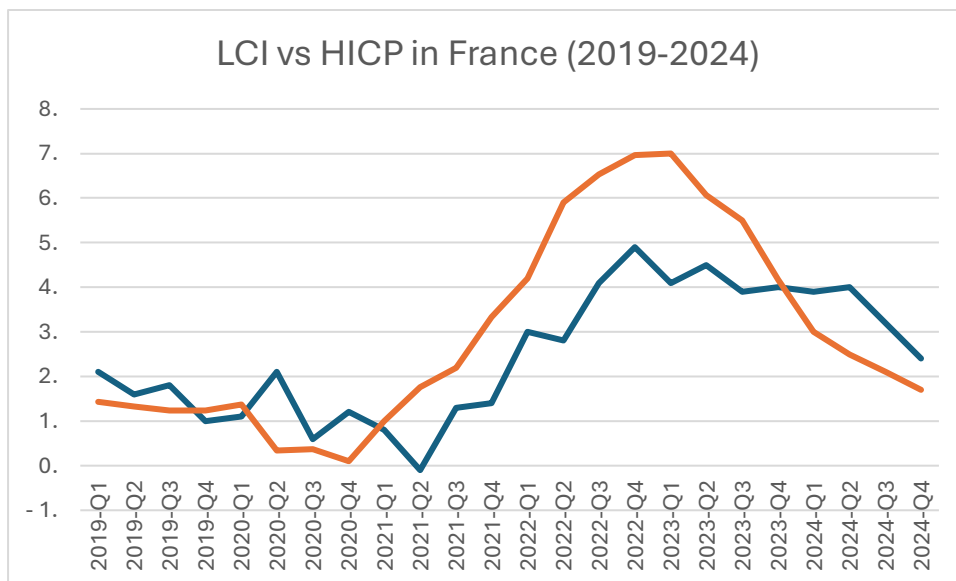


Figure A10: LCI vs HICP in France (2019-2024)

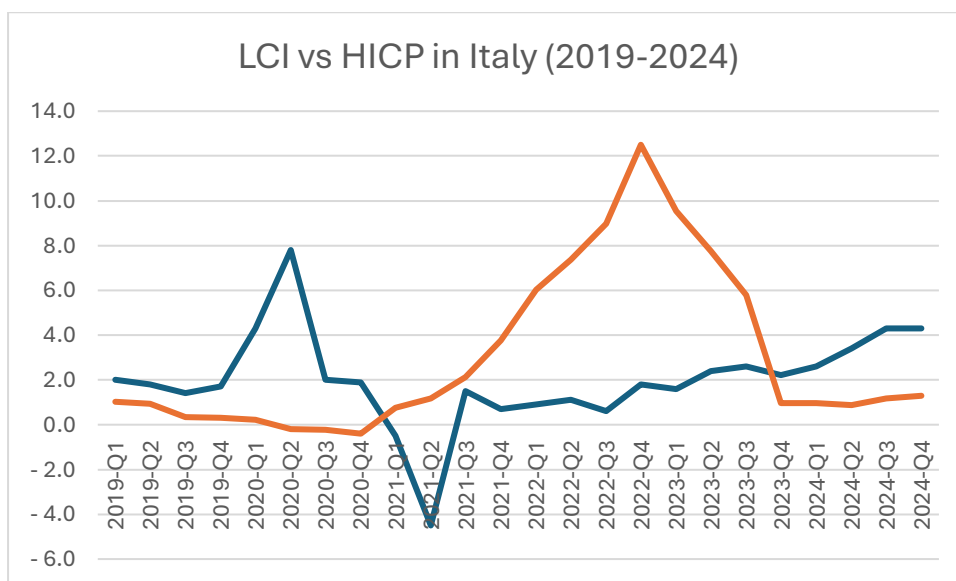


Figure A11: LCI vs HICP in Italy (2019-2024)

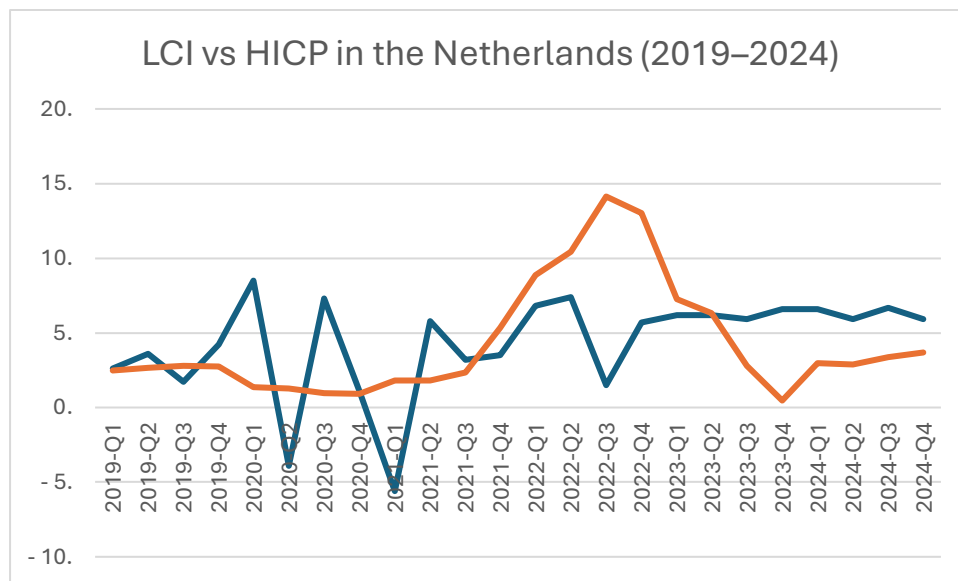


Figure A12: LCI vs HICP in The Netherlands (2019 – 2024)

Country	Electricity price change 2022 (%)
Belgium	57.7
Germany	20.0
France	7.4
Italy	106.7
Netherlands	124.2

Table A1: Electricity price inflation by country (2022)

Source: Author's calculations based on Eurostat data (prc_hicp_manr, COICOP CP0451, monthly year-on-year rate of change, averaged over 2022).

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9. Use of IA

The AI tools ChatGPT and Claude were used to support this work throughout its preparation. One of their first applications was in the literature review process, where they helped propose relevant keywords aligned with the structure previously established for the research. These proposed terms were then used to guide searches conducted through online academic databases, primarily the University library, in order to locate pertinent scientific articles.

The principal use of these tools related to strengthening the academic writing of the thesis, in particular by assisting with the rewording of certain sentences to improve the readability and flow of the text, while also helping to identify and correct grammatical, spelling and language errors.

These tools were further used as a translation aid for certain passages between French and English, and to support comprehension of more technical or complex sections found in English-language scientific articles.

They also contributed to a better understanding of certain academic writing norms, such as the appropriate way to introduce an author or a scientific reference within the body of the text. All outputs and suggestions generated by these tools were nonetheless systematically checked before being integrated into the thesis, and were critically evaluated for their accuracy and relevance.

This approach is consistent with HEC Liège's guidelines on the use of AI: artificial intelligence tools served exclusively as auxiliary resources to enhance the quality of the writing and to assist with certain comprehension- or wording-related tasks. They were not, at any stage, a substitute for the reflection, judgment, data analysis, interpretation of results, conclusions or reasoning underpinning this research. All intellectual contributions within this thesis remain solely the work of the author.

10. Executive Summary

The 2022 inflation shock, triggered by the post-pandemic recovery and the energy crisis following Russia's invasion of Ukraine, affected the entire euro area. Yet its consequences were far from uniform: inflation rates and purchasing power outcomes varied substantially across member states despite a common monetary policy. This thesis investigates why a common external shock generated heterogeneous economic outcomes within the euro area, focusing on five countries: Belgium, Germany, France, Italy and the Netherlands.

The analysis combines a review of the literature on energy shocks, inflation convergence and labour market institutions with a descriptive and exploratory empirical investigation based on harmonised Eurostat data (2002–2025). Monthly HICP data show that the 2022 shock unfolded in successive stages, with energy inflation rising first, followed by food and core inflation. Inflation dispersion across countries, stable for two decades, increased sharply in 2022 before gradually re-converging. Real disposable income per capita also followed markedly different trajectories, with Germany and the Netherlands outperforming Italy, indicating that inflation alone cannot explain purchasing power outcomes.

Two complementary empirical analyses examine possible transmission channels: an exploratory cross-sectional regression suggests a positive association between energy dependency and peak inflation ($R^2 = 0.29$), while a more robust quarterly panel regression ($N = 120$) shows that nominal wages responded only partially to inflation, with this response differing significantly across countries.

These findings suggest that the 2022 inflation episode resulted from the interaction between a common shock and heterogeneous national structures, including energy dependency, wage-setting institutions and fiscal policy responses. They confirm that monetary integration does not eliminate the need for national economic resilience, and that policymakers should consider complementary fiscal, energy and labour market measures to mitigate unequal purchasing power losses in future inflationary episodes.

KEYWORDS: Inflation divergence; Purchasing power; Euro area; Energy dependency; Wage adjustment; Monetary union; HICP; Eurostat

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