

## II. Pass-through in EU electricity and gas markets

---

By Helena Hernnäs, Åsa Johannesson-Lindén, Ruben Kasdorp and Magdalena Spooner

**Abstract:** *The sharp increase in electricity and gas prices in 2022 caused concern for households, businesses and policymakers across the EU. As a result of the gas supply constraints stemming from Russia's invasion of Ukraine, wholesale prices of electricity and gas rose sharply in all Member States. On the other hand, the effect on retail prices – the price consumers pay for electricity and gas – differed across Member States. This section presents developments in electricity and gas prices over the past 2 years and examines the pass-through – the effect that changes in wholesale prices have on retail prices – from wholesale to retail prices, and how this has differed across Member States. It also presents some of the factors that could explain the differences in pass-through. The data shows that the peak in wholesale electricity prices was followed by an increase in retail prices equal to, on average, 46% of the increase in wholesale prices, and that retail prices peaked 2 months after the wholesale price peak. This share ranged from 1% to 135% across Member States and occurred with different lags after the wholesale price peak. For gas, the retail price increase corresponded, on average, to 50% of the wholesale price increase, and ranged from 0% to 153% across Member States. There are multiple explanations for the differences. First, consumers in Member States with regulated prices were protected from the increase in wholesale prices. Second, some Member States have adjusted taxes, levies and network charges to limit the pass-through. Third, the level of competition in a market can influence pass-through. And last, fixed-price contracts result in a lag in transmission from wholesale to retail prices. Member States where a high share of consumers had such contracts could therefore have experienced a slower average pass-through.*

### II.1. Introduction

In the past 2 years, high energy prices have raised concerns for households and firms. The price increase started with the recovery after the COVID-19 pandemic and was intensified by gas supply constraints. Russia's invasion of Ukraine caused considerable disruption to the world's energy systems and led to record-high electricity and gas prices in the EU, peaking in August 2022. Demand reduction, diversification of supply and high gas storage levels have set prices on a decreasing trend since then. Although the energy price shock has had a substantial impact across the EU economy, the impact on consumer prices has differed significantly across EU Member States.

Gas supply constraints affect wholesale prices of both gas and electricity<sup>(49)</sup>. The contraction of the gas supply has a direct effect not only on the wholesale price of gas, but also on the wholesale price of electricity, which is determined on the basis of a marginal pricing model. In the current electricity market, with increased reliance on intermittent renewable energy sources and reduced reliance on baseload nuclear and coal plants, natural gas often acts as the marginal unit of electricity production, thereby setting the price.

Changes in wholesale prices do not necessarily translate directly into changes in retail prices, and the extent varies across Member States. The price of gas and electricity paid by households and firms is determined in the retail market, and the pass-through depends on a number of factors that vary between Member States. This chapter presents recent price developments in the retail electricity and gas markets and examines factors that determine the pass-through. These factors are described in qualitative terms, and no attempt is made to quantify their impact or disentangle the different effects from each other.

The analysis shows that on average, pass-through was larger and faster when wholesale prices increased than when they decreased. While wholesale prices have increased sharply in all Member States for both electricity and gas, their effect on retail prices differs. This can be explained by multiple factors: first, a number of Member States have changed the taxes and charges levied on retail prices to lessen the impact of surging wholesale electricity and gas prices on households' bills. Second, Member States with regulated retail prices on electricity or gas tend to have a lower pass-through on the regulated market. Third, the level of competition in the market can have an effect on pass-through, especially when prices are

---

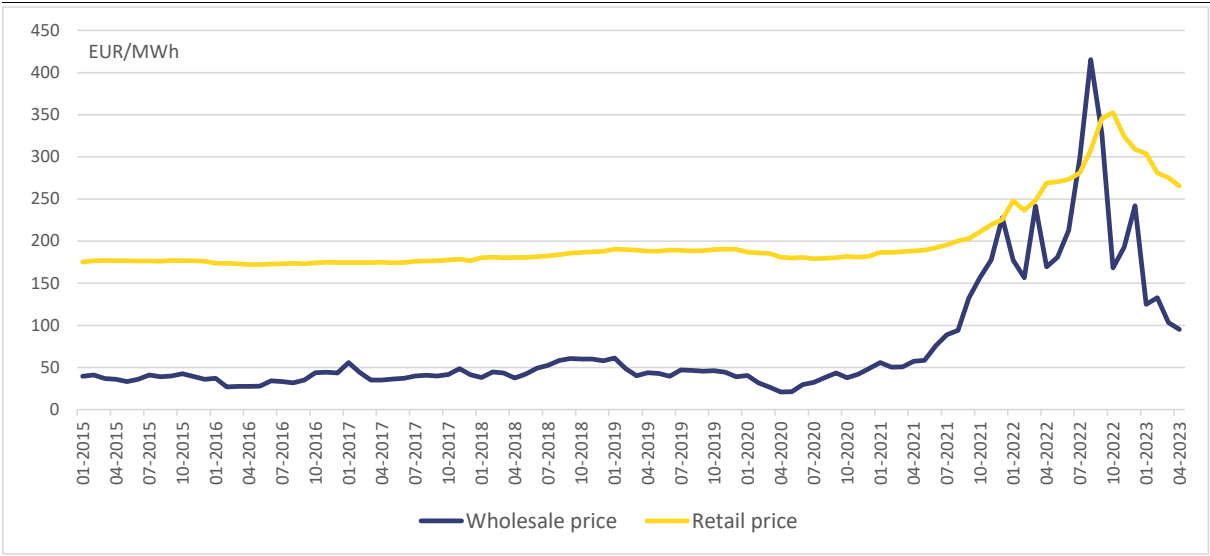
<sup>(49)</sup> Wholesale prices refers to the prices charged for those who purchase electricity or gas with the purpose of reselling it (generally charged by producer to supplier). Retail prices are those charged to the final customer (generally charged by the supplier to the customer).

decreasing. And last, a large share of fixed-price contracts for electricity and gas results in a lagged pass-through.

**II.2. Pass-through in electricity markets**

Electricity price developments are smoother for retail prices <sup>(50)</sup> than for wholesale prices <sup>(51)</sup>. Graph II.1 shows developments in the EU average wholesale and retail prices since January 2015. It shows a relatively steady level of, and relationship between, wholesale and retail prices until around April 2021, when increasing demand in the wake of the COVID-19 pandemic combined with gas supply disruptions led to an increase in wholesale prices. The supply disruptions were aggravated by Russia’s invasion of Ukraine, and prices peaked in August 2022. Demand reduction, including due to high prices and mild weather, increased LNG imports and capacity. High storage levels have also resulted in falling prices since then. The sharp increases in the wholesale price of electricity were not directly and fully passed through to retail prices, which show a more modest increase. The electricity retail price on average less than doubled at its peak compared to April 2021, while the wholesale price increased six-fold over the same period. The price decrease in the post-peak period is also smoother for retail prices. Despite the downward trend since August 2022, retail and wholesale prices are both still significantly higher in April 2023 compared to pre-crisis levels. When gas constraints drove up the wholesale prices of electricity, electricity producers that used inputs other than gas for their production (such as renewables, nuclear or lignite) made large profits. On the other hand, electricity suppliers often saw their profits squeezed <sup>(52)</sup>. Sub-Section II.2.3 discusses the structural consequences of the squeeze in the retail markets.

**Graph II.1: Electricity prices (un-weighted EU averages) (€)**



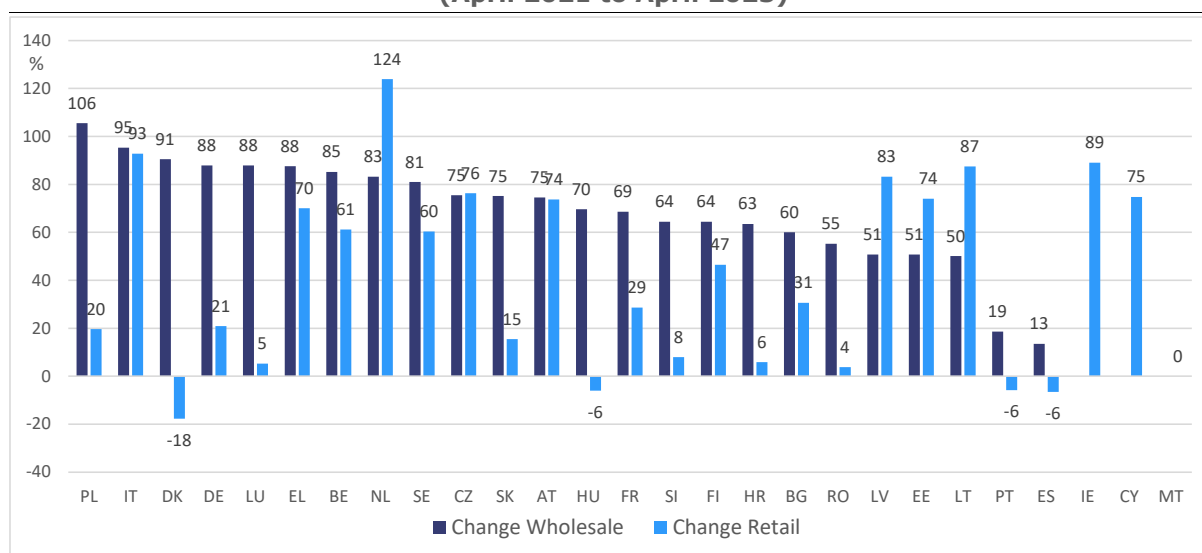
**Source:** VaasaETT (via DG ENER) and Ember.

Price developments during this crisis have varied across Member States. Graph II.2 shows the relative increase in wholesale prices (dark blue) and retail prices (light blue) from April 2021 to April 2023. Wholesale prices were 50% to 100% higher in April 2023 compared to 2 years earlier, in all Member States except in Spain and Portugal <sup>(53)</sup>. The change in retail prices is more varied across Member States. By April 2023, retail prices were below pre-crisis levels in some Member States (DK, HU, PT and ES), while

<sup>(50)</sup> The retail prices as provided by the energy consultancy VaasaETT, i.e. for households in capital cities that are the most representative consumer. The data takes into account both existing and new customers.  
<sup>(51)</sup> We use wholesale electricity prices from the energy think tank Ember ([www.ember-climate.org](http://www.ember-climate.org)): wholesale day-ahead electricity price data for European countries, sourced from the European Network of Transmission System Operators and cleaned; hourly data is then aggregated to produce average monthly values per country, weighted by load.  
<sup>(52)</sup> ‘Supplier’ is understood as the operator that supplies electricity to the consumer on the retail market (also called retailer).  
<sup>(53)</sup> Portugal and Spain implemented a cap on gas-fired power plants in order to lower the electricity bill in 2022.

they were higher than pre-crisis levels or almost double in others (NL, IT, and IE). In most Member States, the change in retail electricity prices between April 2021 and April 2023 was smaller than the change in wholesale prices. Changes in retail prices can also vary within countries – for example, in Sweden, the retail price increase was much bigger in the southern regions compared to the north. The rest of this sub-section analyses the pass-through in the different Member States and also identifies some of the factors that can explain the differences.

Graph II.2: **Percentage change in wholesale and retail prices of electricity (April 2021 to April 2023)**



Data for wholesale prices for Ireland, Cyprus and Malta are missing. Wholesale electricity prices are spot prices traded on the day-ahead market.

Source: VaasaETT (via DG ENER) and Ember.

The ability of suppliers to pass changes in wholesale prices on to final consumers may depend on several factors, and pre-crisis estimates show that pass-through used to be limited. The factors include the degree of regulation and competition in the retail market as well as the use and duration of fixed-price contracts on producer-supplier and supplier-consumer levels respectively. These are elaborated on in the following sub-sections. Earlier studies show limited pass-through: for example, a 2016 study<sup>(54)</sup> found that an increase of 1 cent per kWh in wholesale prices increased the energy component of the electricity retail price<sup>(55)</sup> by only 0.05 cent on average the following month. The study suggests that the small coefficient is explained by market regulation, competition and contract length in the Member States. The Commission’s Winter Economic Forecast from January 2022 found that on average only about 4% of the change in wholesale gas prices is passed on to consumer electricity prices after 12 months<sup>(56)</sup>.

There is sufficient reason to investigate the pass-through in the current energy context, which has been characterised by record-high prices and uncertainty about future market conditions. Graph II.I shows that the historical relationship between wholesale and retail prices no longer holds in the current market situation. Against the backdrop of sharp price increases and high uncertainty, pass-through can be expected to be higher than the empirical results referred to above as suppliers may rapidly need to cover their costs when wholesale prices steadily increase. On the other hand, different factors may be at play during sharp and persistent decreases in wholesale prices, where suppliers could be less eager to adjust retail prices downward, and the pass-through will depend on whether market conditions allow them to

<sup>(54)</sup> Grave et al. (2016), [Prices and costs of EU Energy](#), European Commission.

<sup>(55)</sup> The energy component is one of the multiple components of the electricity retail price – the one that is, in the absence of price regulation, directly linked to the cost of electricity production (as opposed to taxes and levies). Sub-section 0 includes a discussion on the retail price composition and how it affects the pass-through.

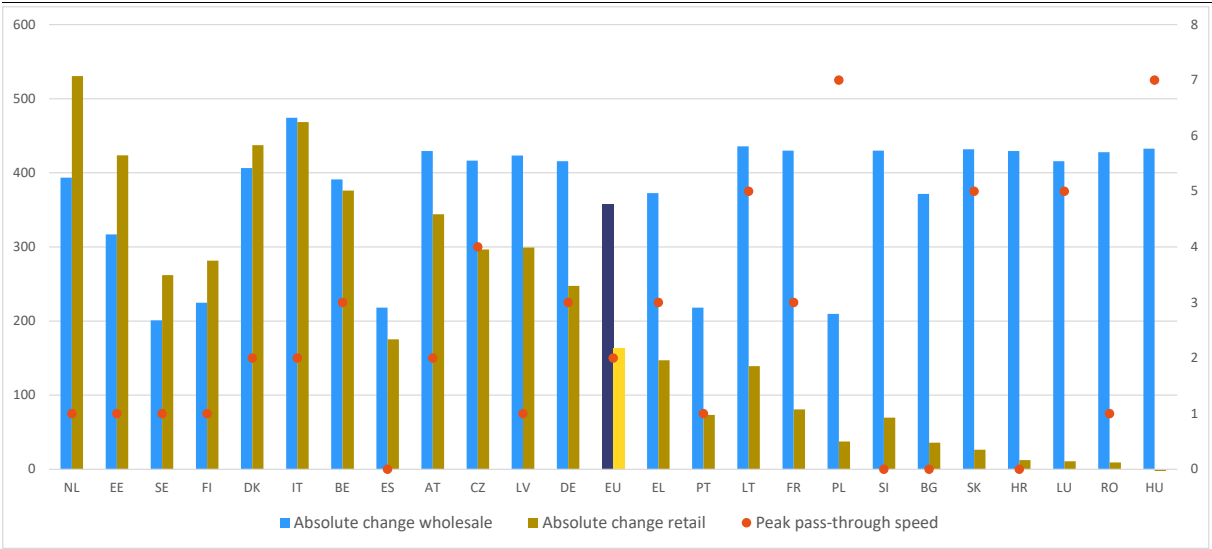
<sup>(56)</sup> European Commission (2022). [European Economic Forecast Winter 2022](#), Box 1.2. This analysis uses the wholesale gas price as the proxy for the wholesale electricity price, which may explain the low coefficient.

delay the adjustment. The rest of this sub-section therefore examines the pass-through in two steps: first, the pass-through of wholesale price increases (until prices peaked), and second, the pass-through in the post-peak period (from August 2022 for most Member States), when prices were on a decreasing path.

### II.2.1. Pass-through of the wholesale price peak

The magnitude and speed of pass-through of the wholesale price peak differs across Member States. For most Member States, the wholesale electricity price peaked in August 2022, after which there has been a sharp decrease<sup>(57)</sup>. On the other hand, subsequent retail price peaks occurred at different points in time across Member States. Graph II.3 shows the absolute increase of prices between April 2021 and the wholesale and retail price peaks respectively, together with the number of months that occurred between those peaks. It shows that the wholesale price peak was followed by an even larger increase in retail prices in some Member States (NL, EE, SE, FI, DK). In Belgium and Italy, retail prices increased in step with wholesale prices.

Graph II.3: Absolute change in wholesale and retail electricity prices (April 2021 to peak)



Absolute difference in wholesale (blue bars) and retail (brown bars) electricity prices between April 2021 and the month of the peak in wholesale and retail prices respectively. Prices in EUR/MWh (left axis). Pass-through speed shows the number of months between the peaks in wholesale and retail prices on the right axis. Data for CY, IE and MT are missing.

Source: Commission staff calculations, data source: VaasaETT (via DG ENER) and Ember.

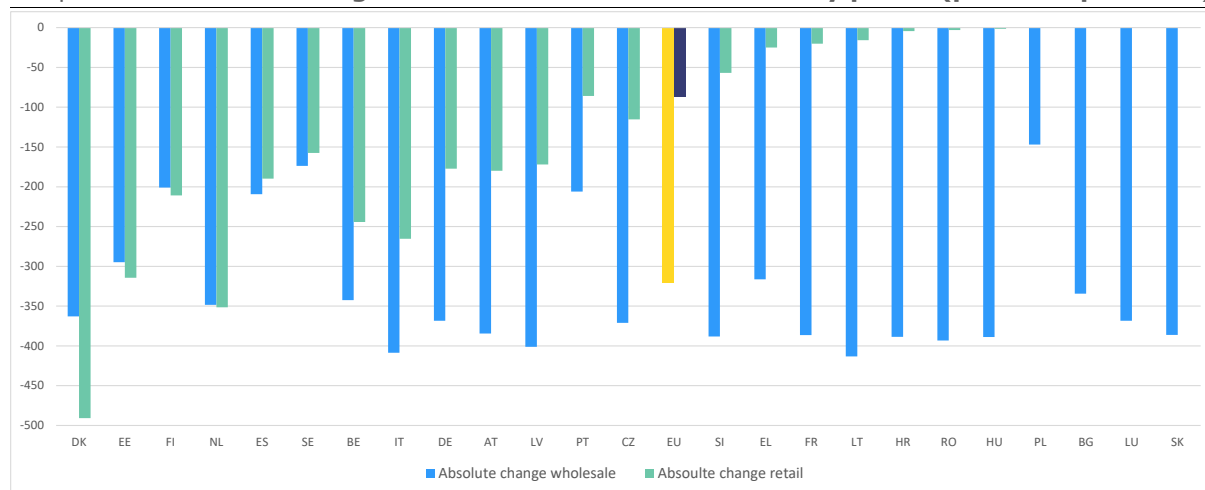
On the other hand, consumers in Hungary, Romania, Luxembourg, Croatia and Slovakia were almost fully protected from the price increases. The speed of pass-through also differs: in Spain, the retail price peak occurred in the same month as the wholesale price peak. In others (NL, EE, SE, FI, LV, PT), it took retail prices 1 month to reach their peak after the wholesale price peak, while it took longer in e.g. Austria, Italy, Denmark, France, Greece, Germany and Belgium<sup>(58)</sup>. No conclusions should be drawn on the number of months between the price peaks in Member States that observed very little or no pass-through (HU, RO, LU, HR, SK). Wholesale electricity prices increased by EUR 358/MWh on average in the EU between April 2021 and their peak. This was followed by an average increase in electricity retail prices of EUR 164/MWh 2 months later. This means that the increase in retail prices corresponded to 46% of the increase of wholesale prices on average, from April 2021 until their peak. This share was highest in the Netherlands, where it reached 135%, while it was -1% in Hungary.

<sup>(57)</sup> The exceptions are Spain, Portugal and Sweden, where the peaks occurred in March (ES & PT) and December (SE) of the same year.  
<sup>(58)</sup> In this section, the changes in wholesale prices are compared with the changes in total retail prices. The pass-through will partly depend on the retail price composition. The effect of the retail price composition on the pass-through is discussed at length in the next sub-section.

## II.2.2. Pass-through in the post-peak period

Member States with a high and speedy pass-through of the wholesale price increase also experienced higher pass-through in the post-peak period. In April 2023, wholesale prices had fallen 77% on average in the EU, compared to their peak. Graph II.4 shows the absolute change in wholesale and retail prices since their peak. In Denmark, Estonia, Finland and the Netherlands, retail prices decreased more than wholesale prices during the period. Member States in which consumers were protected from the wholesale price peak also did not experience retail price changes in the post-peak period. Between their peak and April 2023, electricity retail prices decreased by EUR 87/MWh on average in the EU. This corresponds to 27% of the reduction in wholesale prices, which decreased by EUR 320/MWh during the same period. The EUR 87/MWh reduction in retail prices can be compared to their EUR 164/MWh increase in the preceding period (see above). Considering that full pass-through may not have happened yet and that wholesale prices are still on a declining path, further reductions in retail prices can be expected in the coming months.

Graph II.4: **Absolute change in wholesale and retail electricity prices (peak to April 2023)**



Absolute difference in wholesale (blue bars) and retail (green bars) prices of electricity between the peak of prices until April 2023. Prices in EUR/MWh.

**Source:** Commission staff calculations, data source: VaasaETT (via DG ENER) and Ember.

## II.2.3. Factors influencing pass-through

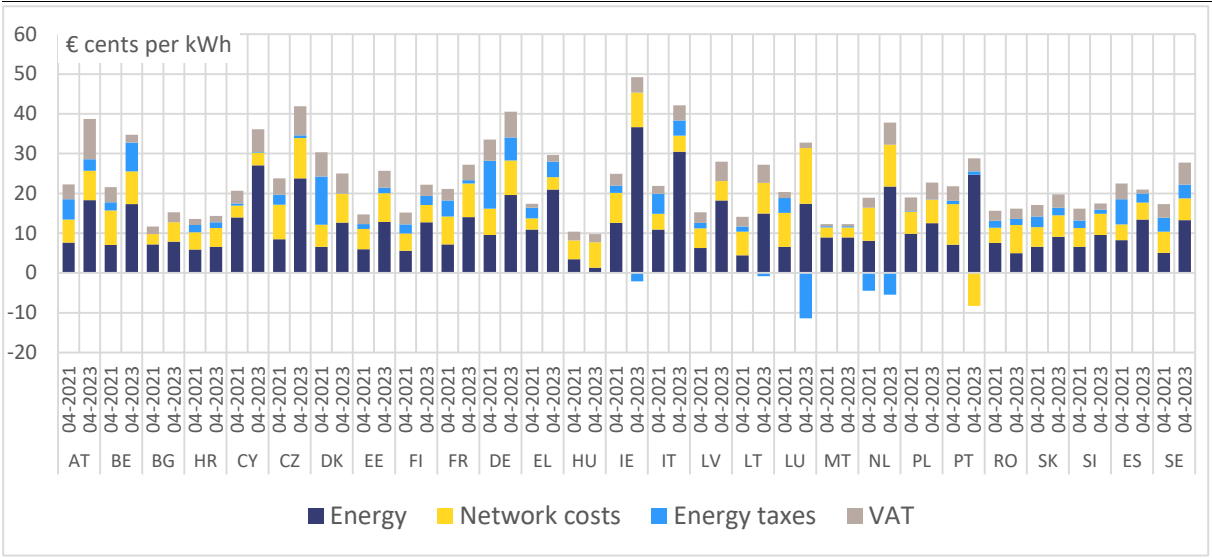
The factors that influence pass-through can be found on both the supply and the demand side. The supply side factors include retail price composition, price regulation, level of competition in the market and the type of contracts offered. The main factors on the demand side include consumer switching and choice of contract. This section describes qualitatively how these factors influence pass-through and how they differ across Member States.

### Electricity retail price composition

The electricity retail price has three main components: energy and supply, network charges, and taxes. First, the energy component is linked to the wholesale market and is therefore dependent on the production cost of electricity. It reflects the functioning of the wholesale market and its price, but can also be influenced by different contracts between the supplier and producer. Its level can also be influenced by price regulation. Second, the network component consists of charges related to investment, management, maintenance and balancing of the grid. These charges are set by the electricity market regulator. The last component consists of VAT, energy taxes and other types of levies and charges, and is determined by the government and/or the regulator.

The wholesale price affects the retail price through the energy component. Graph II.5 compares the composition of electricity retail prices in the Member States in April 2021 and in April 2023. The wholesale price increase led to a significant increase in the energy component of retail prices in most Member States. In others, it remained unchanged or even decreased (e.g. HU, MT, RO), which left households' retail prices unaffected by the wholesale price surge. This was the result of price regulation (see next sub-section).

Graph II.5: **Electricity retail price components per Member State (April 2021 and April 2023)**



Source: VaasaETT (via DG ENER).

The other components also influence the pass-through. The authorities can limit the effective pass-through by adjusting the other two components of the price. This has been done extensively in the past year: by 31 October 2022, 23 Member States <sup>(59)</sup> had reduced indirect taxation (VAT and excise duties) and 25 Member States <sup>(60)</sup> had reduced levies or introduced subsidies on energy products. The overall budgetary cost of support measures was estimated at 1.5% of GDP for 2022 <sup>(61)</sup> with a net cost of 1.2%, taking into account levies on windfall profits. Graph II.5 shows that some Member States (IE, LU, NL, PT) introduced negative taxes or network tariffs to compensate for the high energy prices <sup>(62)</sup>. Without policy intervention, VAT and network costs, which are price based, would mechanically increase together with an increase in the energy component of the retail price. This might explain why a change in wholesale price can lead to an even bigger change in retail prices in absolute terms.

**Price regulation**

Whether an electricity market is regulated or liberalised affects the pass-through. Depending on what price choice the regulator in regulated markets makes, pass-through can happen fast and be high or muted if the regulator opts to keep retail prices decoupled from wholesale prices. The magnitude of the pass-through also depends on whether the regulated prices apply to the whole population or just to a share of it, such as vulnerable households. Indeed, Member States that showed no or very limited pass-through in Graphs II.3 and II.4 have price regulations that decouple retail prices from changes in wholesale prices.

<sup>(59)</sup> Except LU, LV, RO, SK.  
<sup>(60)</sup> Except SE, SK.  
<sup>(61)</sup> Based on Commission estimates.  
<sup>(62)</sup> The Netherlands has electricity taxes as well as a lump-sum tax credit that is deducted from the electricity bill. Its tax credit is larger than the electricity tax for the representative consumer shown in the graph. The tax credits were increased and the energy taxes lowered in 2022 to reduce energy bills for SMEs and households. Source: [Energy tax in the Netherlands | Business.gov.nl](#); [Energy tax | Environmental taxes | Government.nl](#).

Despite the limitations set in the Common Rules for the Internal Market for Electricity Directive <sup>(63)</sup> on the regulation of electricity markets, 18 Member States had some type of electricity price regulation in place for customers in 2021 <sup>(64)</sup>. The Directive allows public interventions in price setting for the supply of electricity to help protect consumers. Such interventions should not override the principle of open markets, should be reserved for defined circumstances and beneficiaries and be limited in duration and proportion <sup>(65)</sup>. However, it might be justified exceptionally, for example where supply is severely constrained. In response to the energy crisis, a number of Member States <sup>(66)</sup> introduced various forms of price caps in their electricity markets as an emergency intervention <sup>(67)</sup>.

Untargeted price measures entail various problems in the long term. Price measures reduce incentives to lower energy consumption. As such, they reinforce the reliance on fossil fuel imports, and work against achieving the climate targets of the European Green Deal. The introduction of price caps can also have a detrimental effect on economic efficiency by hampering competition in the retail market and restricting new players from entering the market. In addition, the overall budgetary costs of these measures, especially when prices are set below cost, can become very high. Lastly, price caps may also be difficult to reverse if energy prices remain elevated for a long period of time. Box II.1 explains how the introduction of a price cap affects price formation in the retail and wholesale markets, as well as its implications on public expenditure.

### The role of competition and active consumers

The degree of competition in the market and consumer responsiveness can also influence the magnitude and speed of pass-through. The theoretical evidence of competition's effect on pass-through when wholesale prices change depends on the characteristics of the market and on the assumptions made <sup>(68)</sup>. Several studies point to pass-through being asymmetric: the speed of pass-through is higher when prices increase than when they decrease <sup>(69)</sup>. This can be explained by the fact that retailers are more eager to pass through cost increases to consumers than cost decreases. However, the possibility for them to maintain retail prices at a high level following a reduction in the wholesale price can be limited by a competitive market with active consumers that face low barriers to switching between suppliers. In that case, consumers can put pressure on retailers to pass through wholesale cost reductions to retail prices <sup>(70)</sup>.

Empirically, some of the Member States that showed the highest pass-through in Graphs II.3 and II.4 are also those with the most competitive markets (DK, SE, FI, NL) <sup>(71)</sup> and active consumers (NL, BE, ES) <sup>(72)</sup>.

The crisis has resulted in structural changes in electricity retail markets, leading to further concentration. Suppliers with insufficient hedging and limited ability to pass on price increases, for example due to a high level of fixed-price contracts, faced difficulties. This led to an increase in the number of bankruptcies and of suppliers exiting the market.

---

<sup>(63)</sup> Electricity Market Directive (Directive (EU) 2019/944).

<sup>(64)</sup> BE, BG, CY, EE, ES, FR, EL, HR, HU, IT, LT, LV, MT, NL, PL, PT, RO, SK. Source: [ACER \(2022\)](#), Figure 48.

<sup>(65)</sup> Member States can apply public interventions in the price setting for the supply of electricity to energy poor or vulnerable household customers, or for a transition period to household customers and to microenterprises. In the latter case, the price must be set above cost.

<sup>(66)</sup> Including AT, CZ, DE, EE, FR, HR, LU, LV, NL, PL, RO, SI.

<sup>(67)</sup> [Council Regulation \(EU\) 2022/1854](#) provides a temporary possibility to set electricity prices below cost to all households as part of a transition period, provided some conditions are fulfilled. Prices regulated below cost should cover only a limited amount of consumption and retain an incentive for demand reduction.

<sup>(68)</sup> Theoretical results of the relationship between competition and pass-through depend on assumptions made, including relating to the shape of the marginal cost curve, convexity of demand, and relative elasticity between supply and demand. For an overview, see [RBB Economics \(2014\)](#), 'Cost pass-through: theory, measurement, and potential policy implications', Section 1.5.1.1.

<sup>(69)</sup> See e.g. [Mirza & Bergland \(2012\)](#), 'Pass-through of wholesale price to the end user retail price in the Norwegian electricity market', *Energy Economics*, Vol 23 (6); [Zachmann & von Hirschhausen \(2008\)](#), 'First evidence of asymmetric cost pass-through of EU emissions allowances: Examining wholesale electricity prices in Germany', *Economic Letters*, Vol 99 (3); and [ACER \(2022\)](#).

<sup>(70)</sup> On the effect of competition and switching costs on pass-through, see e.g. [Duso & Szucs \(2017\)](#), 'Market power and heterogeneous pass-through in German electricity retail', Vol 98.

<sup>(71)</sup> Most competitive meaning least concentrated markets. Market concentration source: [ACER \(2022\)](#).

<sup>(72)</sup> Active consumers measured by their switching between suppliers. Source: [ACER \(2022\)](#).

### Box II.1: The effect of price caps on wholesale and retail prices

This box shows a stylised representation of the impact of a supply shock in the wholesale market on the electricity wholesale and retail market, followed by the introduction of a price cap in the retail market.

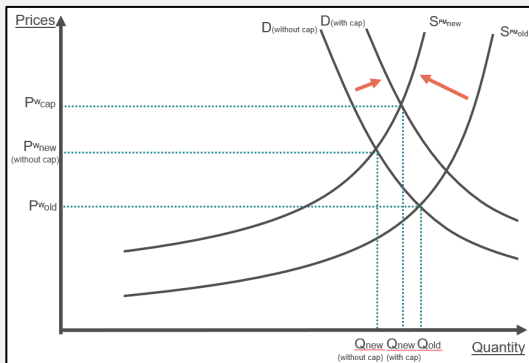
1. **Wholesale market:** The increase in the gas import price ( $P^M$ ) due to lower gas supplies from Russia shifts the supply curve to the left, resulting in a lower  $Q^{\text{new}}$  (without cap) and higher  $P^{\text{Wnew}}$  (without cap).

2. **Retail market:** Those who demand in the wholesale market supply in the retail market. Given the higher wholesale price (cost to retailers), the supply curve shifts to the left, resulting in a lower  $Q^{\text{new}}$  (without cap) and higher  $P^{\text{Rnew}}$  (without cap).

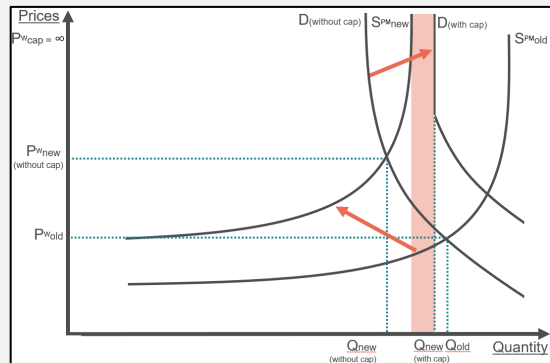
3. **Retail market:** In response, the government introduces a price cap to lower the price in the retail market to  $P^{\text{Rcap}}$  (consumers pay). At this price, consumers demand  $Q^{\text{new}}$  (with cap). To meet the demand, suppliers require a higher price than before  $P^{\text{Rcap}}$  (suppliers receive). To maintain the price cap and the balance in the electricity market, governments must compensate suppliers (shaded area). The more inelastic the supply is, the higher the price and with it the fiscal costs. If the supply is too inelastic, the price cap can result in shortages due to the high demand sustained by the price cap. The price required by suppliers becomes very high, and so does fiscal expenditure. The bottom row figures on the next page show the effect of the price cap on the retail market and how it differs for different elasticities of supply.

4. **Wholesale market:** The higher price that suppliers receive following the price cap means that they can charge a higher price for every unit sold in the retail market. Their demand for electricity in the wholesale market will therefore shift to the right. This will generate higher prices in the wholesale market as well:  $Q^{\text{new}}$  (with cap) at  $P^{\text{Wnew}}$  (with cap). With too inelastic supply and demand, they will never meet and generate a shortage in the wholesale market. The top row figures on the next page show the effect on the wholesale market for different elasticities of supply.

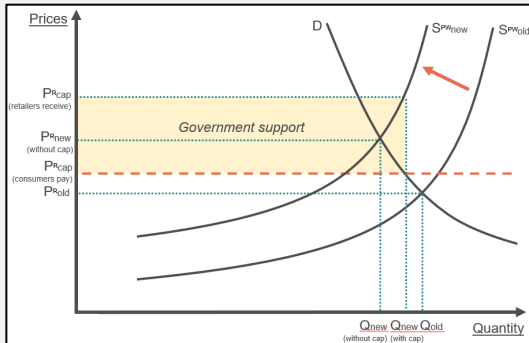
Wholesale market (with more elastic supply)



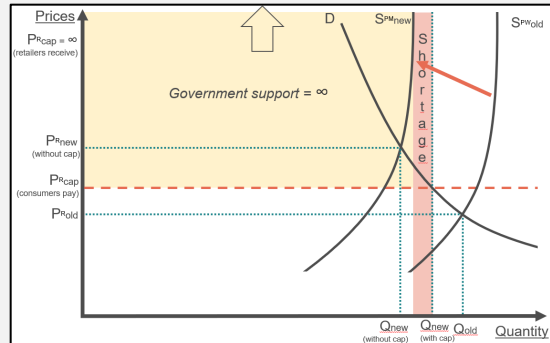
Wholesale market (with more inelastic supply)



Retail market (with more elastic supply)



Retail market (with more inelastic supply)





Nine Czech electricity suppliers went bankrupt between October 2021 and January 2022, resulting in a large share of households being transferred to a supplier of last resort (10% of households for gas and electricity combined). In Germany, 950 000 households had their electricity or gas contracts terminated by suppliers that became insolvent when prices surged, as they were constrained by a large share of fixed-price contracts without sufficient hedging<sup>(73)</sup>. The implications of these changes for the competitive situation in the markets is not yet clear.

### Contract behaviour

Suppliers and electricity producers can hedge against wholesale spot price volatility through future contracts. This makes them less sensitive to spot price fluctuations, limiting an immediate pass-through from wholesale spot prices to retail prices. The non-storability of electricity, combined with varying supply and demand factors such as weather and seasonality, leads to highly volatile spot prices in the wholesale electricity market<sup>(74)</sup>. Electricity suppliers and producers can therefore hedge risks through future contracts that fix the prices ahead of the delivery period. These prices are made up of the expectation of the spot price plus a risk premium, where the risk premium can be seen as part of the wedge between the spot price and retail prices. The differences in risk premiums across countries depend among others on the market power of participants (generators in competitive markets can accept lower risk premiums) and the electricity mix (renewable electricity generation leads to more volatile spot prices, which could imply an upward pressure on risk premiums)<sup>(75)</sup>.

This is also true for consumers: firms and household consumers that have fixed-price electricity contracts will be protected for at least some time against electricity price surges – leading to a lower pass-through in the short term. On the other hand, consumers with variable contracts avoid paying risk premiums and can better exploit price fluctuations – leading to a higher immediate pass-through. The energy crisis has shown the risk that suppliers face when entering into long-term contracts with consumers – leading to higher levels of bankruptcies and market exits. Given the increased risk of major price movements, suppliers are currently turning away from fixed-price contracts, forcing consumers into variable price or short-term contracts<sup>(76)</sup>. This is expected to lead to higher pass-through rates. Lacking comparable data on newly signed contracts across Member States, anecdotal evidence indicates a trend towards an increased use of variable price contracts already before the energy crisis. In Sweden, the share of consumers with variable price contracts increased from 36% in 2013 to 56% in 2022, and another 10% of consumers have one-year contracts<sup>(77)</sup>. In the Flemish region in Belgium, around 40% of contracts are variable, up from 28% last year<sup>(78)</sup>. Also in Spain, most small consumers have variable price contracts<sup>(79)</sup>.

### II.3. Pass-through in gas markets

Graph II.6 shows the average price developments for retail and wholesale gas prices in the EU since 2015. As for electricity, wholesale gas prices started to increase around April 2021, peaked sharply in August 2022, and then decreased but remain well above their pre-crisis levels. Gas retail prices has a more direct link to gas wholesale prices than the corresponding link between wholesale and retail electricity prices. This could be observed as the energy component accounts, on average, for a higher share of the final retail price for gas as compared to electricity (49% compared to 45% of the retail electricity price in 2021)<sup>(80)</sup>. The wholesale price of gas has a strong link to the supply of gas, which reflect a single input. The electricity wholesale prices, on the other hand, reflect the price of the marginal unit of power production, which varies between the different sources and time of production.

---

<sup>(73)</sup> [ACER](#) (2022).

<sup>(74)</sup> [Falbo et al.](#) (2015), 'Electricity futures' in A. G. Malliaris & W. T. Ziemba (ed.) *The World Scientific Handbook of Futures Markets*.

<sup>(75)</sup> [Bonaldo et al.](#) (2021), 'The relationship between day-ahead and futures prices in the electricity markets: an empirical analysis on Italy, France, Germany and Switzerland', Marco Fanno Working Papers No 272.

<sup>(76)</sup> [ACER](#) (2022).

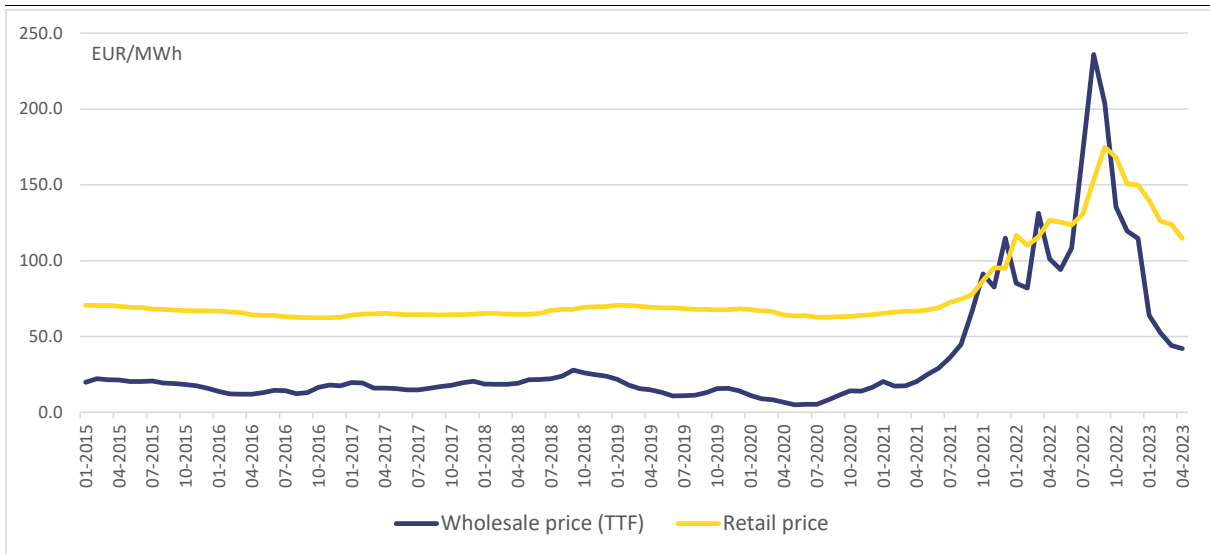
<sup>(77)</sup> Statistics Sweden.

<sup>(78)</sup> [VREG](#) (2023). 'Produktaanbod – elektriciteit'.

<sup>(79)</sup> [CEER](#) (2019). 'Monitoring Report on the Performance of European Retail Markets in 2018'.

<sup>(80)</sup> Data based on VaasaETT and the most representative consumer price band.

Graph II.6: Gas prices (EU unweighted averages)



Wholesale gas price is TTF month-ahead price traded on the futures market.

Source: VaasaETT (via DG ENER) and ICE.

### II.3.1. Pass-through of the wholesale price peak

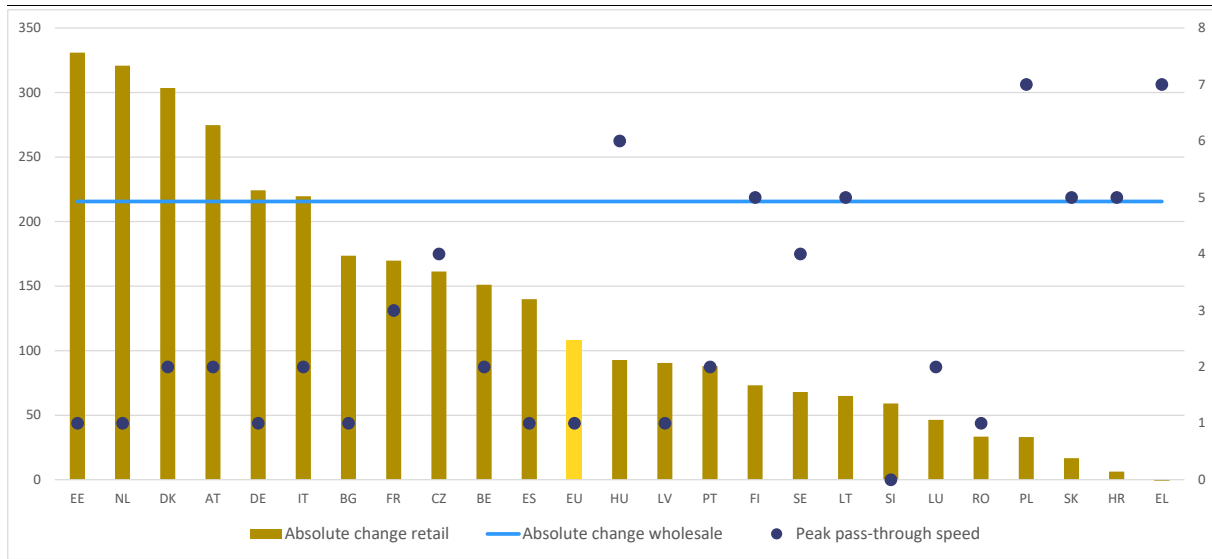
Graph II.7 shows the increase in gas prices across Member States between April 2021 and their peak. The wholesale price of gas <sup>(81)</sup> increased by EUR 216/MWh from April 2021 to its peak in August 2022. This was followed by retail prices increasing by EUR 108/MWh on average, which occurred 1 month later. The retail price increase therefore corresponds to 50% of the increase in wholesale prices. As for electricity prices, some Member States saw their retail prices increase more than the wholesale price (EE, NL, DK, AT), some around the same (DE, IT), while retail prices in other Member States were almost unaffected (EL, HR, SK). The highest pass-through was seen in Estonia, where the retail price increase corresponded to 153% of the wholesale price increase.

### II.3.2. Pass-through in the post-peak period

Graph II.8 shows the change in prices in the post-peak period. From August 2022 until April 2023, the wholesale price of gas decreased by EUR 194/MWh, while retail prices decreased on average by EUR 60/MWh since their peak, ranging from EUR 305/MWh in Estonia to no change in Slovakia, Lithuania, Hungary, Croatia and Poland. The impact of the price changes on total energy prices paid by consumers depends on the energy mix; consumers in Member States with a higher share of gas in the energy mix have been more exposed to energy price fluctuations. The natural gas share of the energy mix ranges from 0% in Cyprus to 41% in Italy. The rest of this section describes some of the factors that determine the pass-through of gas prices to consumers, and how they differ across Member States.

<sup>(81)</sup> The TTF month-ahead price is used as a benchmark for the wholesale price of gas. It is the same across all Member States.

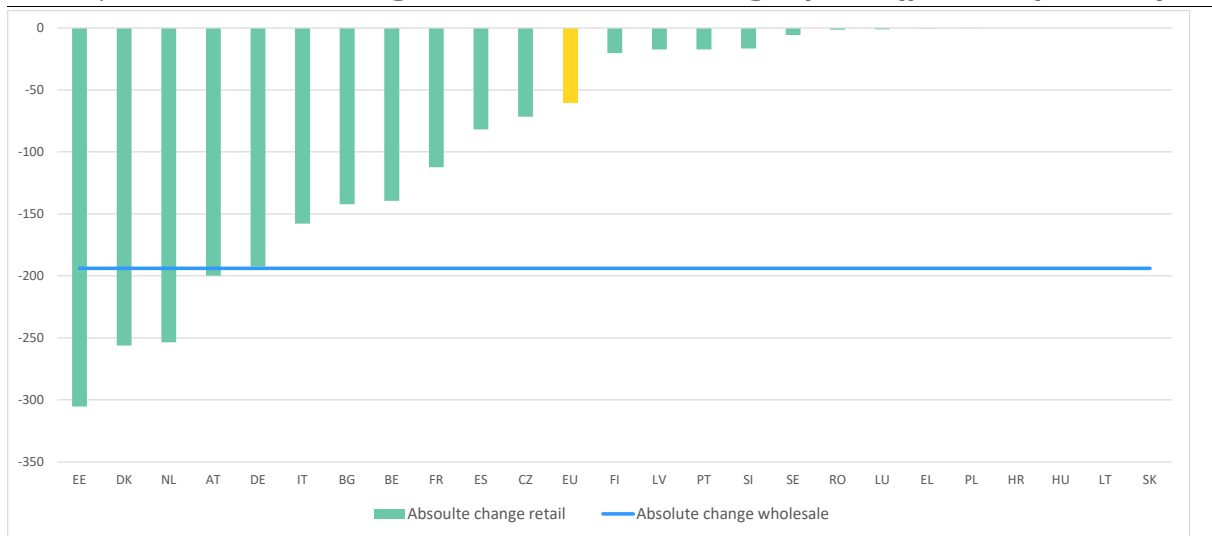
Graph II.7: **Absolute change of wholesale and retail gas prices (April 2021 to peak)**



Absolute change in wholesale (blue line) and retail (brown bars) prices of gas between April 2021 and the peak of wholesale and retail prices, respectively. Wholesale gas prices are TTF month-ahead prices traded on the futures market (EUR/MWh). Pass-through speed shows the number of months between the wholesale price peak in August 2022 and the retail price peak in each Member State.

**Source:** VaasaETT (via DG ENER) and ICE.

Graph II.8: **Absolute change of wholesale and retail gas prices (peak to April 2023)**



Wholesale gas prices are TTF month-ahead prices traded on the futures market.

**Source:** VaasaETT (via DG ENER) and ICE.

### II.3.3. Factors that influence pass-through

As for electricity prices, policy measures, including long-term price regulations as well as temporary emergency measures, counteract the pass-through. In 2021, 14 Member States had some kind of price intervention for household gas prices<sup>(82)</sup> and 6 had specific measures to protect vulnerable

<sup>(82)</sup> BE, BG, EE, FR, EL, HR, HU, IT, LT, LV, NL, PL, RO, SK. Source: [ACER \(2022\)](#), Figure 48.

---

households <sup>(83)</sup>. In response to the energy crisis, several Member States then introduced various forms of price caps in their gas market as an emergency intervention <sup>(84)</sup>.

Retail gas markets are generally more concentrated than electricity markets, and their concentration increased further during the crisis. In 2021, most Member States had highly concentrated retail gas markets <sup>(85)</sup>. As was the case for electricity, the crisis has further increased market concentration due to bankruptcies and market exits – most notably in Czechia, where 15 suppliers exited the market, and the Netherlands, where 6 suppliers left <sup>(86)</sup>. The effect that this will have on pass-through is yet to be seen, but as for electricity, more competitive markets should have relatively faster pass-through when prices fall.

Fixed-price contracts have become less prevalent in most Member States, following the energy price surge. As for electricity, the offer of fixed-price contracts for gas decreased during the crisis. As a result, retail prices will follow wholesale prices more closely: a recent study found that the correlation between retail and wholesale prices was significantly higher in 2020-2022 than in 2016-2019 <sup>(87)</sup>. The move towards more variable contracts will continue to produce retail prices that are more reflective of wholesale price fluctuations.

## II.4. Conclusions

**The energy crisis has affected consumers differently across the EU.** While wholesale electricity and gas prices increased significantly in all Member States over the past 2 years, the effect on retail prices differs. In some Member States, consumers have almost been entirely protected from the wholesale price surge due to price regulation <sup>(88)</sup>, while consumers in other Member States have seen their energy bills soar. Factors that influence this pass-through include the retail price composition, level of regulation and competition in retail markets, as well as different contract offers in each Member State. This section has outlined some of these factors. More detailed country-specific and quantitative analysis is needed to further understand the drivers, speed and magnitude of these effects.

---

<sup>(83)</sup> BE, EE, HU, PT, RO, SK. Source: [ACER \(2022\)](#), Figure 48.

<sup>(84)</sup> Includes AT, CZ, DE, EE, FR, LU, LV, NL, RO, SI.

<sup>(85)</sup> [ACER \(2022\)](#). In 2021, out of 19 EU Member States, all except Italy and Slovenia had highly concentrated markets (highly concentrated being defined in the Herfindahl–Hirschman Index (HHI) as above 2 000). Electricity markets are generally less concentrated, with five Member States (DK, SE, FI, AT and SI) having a HHI score of below 2 000.

<sup>(86)</sup> [ACER \(2022\)](#), paragraph 331.

<sup>(87)</sup> [VaasaETT \(2022\)](#). Provision of Retail Energy Market Data and Analysis for ACER.

<sup>(88)</sup> This implies that others carry the impact of the energy cost increase rather than consumers – normally the government or the supplier, depending on the regulatory framework.