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ABSTRACT

The Green Transformation and the Costs of Market Fundamentalism

The structural theory of green transformation acknowledges the complexity of the transformation process and suggests a state-led approach with green industrial policy at its core. In contrast, the market-fundamentalist approach to the transformation problem relies on carbon pricing and the assumption of smooth adjustment to rising market prices. We argue that the recent energy crisis in Germany provides a test of market fundamentalism. We show that the behavior of key macroeconomic variables contradicts the market-fundamentalist theory of green transformation. We also detail how mainstream economists and the policy establishment held on to their belief in self-regulating markets despite the empirical failure of market fundamentalism, which led to policy mistakes with large economic and political costs. Policy making based on market fundamentalism caused substantial damage to Germany's economy and helped the far-right Alternative for Germany (AfD) double its political support.

JEL Classification: E12, E32, E64, L50, L60, Q43, Q48

Keywords: green transformation, green industrial policy, market fundamentalism, energy crisis, inflation, fiscal austerity, price controls

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1. Introduction

The public debate on green industrial transformation is often dominated by a set of ideas akin to market fundamentalism (Block and Somers, 2016; Oreskes and Conway, 2023; Stiglitz, 2009). It prescribes a market-based approach to the transformation problem of structural change away from fossil-fuel intensive production resting on two pillars. First, carbon pricing or even carbon shock therapy as the central policy instrument to correct a negative climate externality (Gabor and Weber, 2021; Krebs, 2023a).[1] Second, a trust in market forces and price signals (market discipline), and an assumption that individual households and companies can relatively quickly and smoothly adjust to the rising cost of fossil fuels. This market-based approach is deceptively simple. It suggests that the state can take a back seat as long as it gets carbon prices right since the market knows best. In this view, the best industrial policy is no industrial policy at all. We call this perspective the market-fundamentalist theory of green transformation.

There is an alternative approach that emphasizes the need for green industrial policy (Altenburg and Rodrik, 2017; Rodrik, 2014) and has its roots in the development literature on structural change. This literature acknowledges the complexity of transforming an economy and it suggests a state-led approach with a need for government planning and state capacity (Andreoni and Chang, 2019; Chang and Andreoni, 2016; Weber, 2021a). For the purpose of this paper, the state-led approach to transforming an industry can be summarized by two principles. First, an emphasis on green public infrastructure investment and market-shaping subsidies as well as conditionality for green private investments. Second, less trust in market forces and price signals alone, and a skeptical view of the claim that individual households and companies can easily adjust to rising fossil fuel prices. This approach suggests that governments need to have a vision for the future, and that state action is required to manage a complex transformation process. We call this the structural theory of transformation.

The German energy crisis in the wake of the war in Ukraine presented a fast-motion experiment in economic transformation broadly based on a market-fundamentalist theory of transformation. Market prices were seen as the main tool to induce a smooth economic adjustment away from gas. In this paper, we show that the behavior of key macroeconomic variables contradicts the promises of the market-fundamentalist theory. In other words, market fundamentalism as a theory of transformation is an empirical failure. We also document the ideational power of market fundamentalism and show in detail how mainstream economists and the policy establishment held on to their belief in self-regulating markets during the energy crisis. This adherence to an empirically ungrounded “fairy-tale theory” of market economies led to policy mistakes with large economic and political costs.

[1] For example, in January 2019 a large number of economists – among them 28 Nobel Laureate Economists and 15 former chairs of the US Council of Economic Advisers – published a statement that proclaimed a carbon tax to be the best instrument to fight global climate change (Economists’ Statement, 2019).The carbon tax is also the central policy instrument in the highly influential work by William D. Nordhaus, who uses augmented neoclassical growth models (DICE-models) to study climate change and climate policy (Nordhaus, 2007; Barrage and Nordhaus, 2023).

Specifically, policy making based on market fundamentalism caused substantial damage to Germany's economy and helped the far-right Alternative for Germany (AfD) double its political support.

Our analysis proceeds in two steps. In the first part, we provide evidence that far from a smooth market adjustment the economic and political costs of the energy crisis in Germany were large. Specifically, German workers suffered the largest real wage losses since WWII in 2022, the far-right AfD doubled their support during the energy crisis, and the output losses associated with the energy crisis are at least as large as the output losses associated with the financial crisis and the COVID-19 crisis. In addition, there are signs that the crisis had long-term hysteresis effects severely hurting the industrial base of the economy. These developments have eroded public support for the green transformation in Germany threatening to undo all previous successes in the fight against climate change.

In the second part of the paper, we detail how mainstream economists downplayed the cost of crisis because of their belief in market fundamentalism, and how their misdiagnosis of the crisis led to policy mistakes. Specifically, energy price controls were introduced too late in Germany because of the opposition of mainstream economists and the neoliberal Free Democratic Party (FDP) to market interventions that were claimed to "distort" price signals. When the so-called energy-price brake was finally implemented, it provided important relieve to private households suffering under high inflation, but it did not cover the industrial sector of the economy appropriately. In other words, the manufacturing base of the German economy was fully exposed to exploding gas prices, a form of carbon shock therapy. We detail in this paper how these policy failures led to raising support for the far-right AfD (political cost of market fundamentalism) and the loss of industrial production capacity (economic costs of market fundamentalism).

Market fundamentalism also led to fiscal fundamentalism with disastrous consequences. Specifically, based on a naive belief in smooth market adjustment to the energy price shock, the German government declared prematurely an end to the economic crisis in spring 2023 and shifted far too early to a restrictive fiscal policy stance – no crisis policy without a crisis. Thus, the German government decided not to create additional fiscal space for green industrial policy, though the energy crisis provided a perfect opportunity to implement such a policy shift and the German fiscal rules (debt brake) would have allowed for a large, investment-based fiscal package. In sum, it is very likely that the German economy would be in much better shape in 2025, workers would enjoy higher living standards, and the far-right AfD would have much less support, if mainstream economists and the German government had taken more seriously the well-known insights of the structural theory of transformation.

This case study of the German economy during the energy crisis is important for at least two reasons. First, Germany is one of the world's largest industrialized economies and was directly hit by an energy price shock amounting to a large carbon price shock – the cost of using fossil energy increased dramatically during the crisis. In this sense, the experience of the German economy during the energy crisis provides an ideal testing ground for the market-fundamentalist theory of green transformation. Second, the German government consisted of an interesting three-party coalition that illuminates the various political forces

at work: the Social Democratic Party (SPD) with chancellor Olaf Scholz, the Green Party with vice-chancellor and minister for economic affairs and climate action Robert Habeck, and the neoliberal Free Democratic Party (FDP) with its leader and finance minister, Christian Lindner. Our results show that market fundamentalism is so deeply entrenched in economic thinking that even a government led by a social democratic chancellor and a green vice chancellor mainly adhered to the neoliberal playbook in a time of economic crisis – at large costs for society.

This paper relates to three strands of the literature. First, there is the recent scholarship on green industrial policy (Altenburg and Rodrik, 2017; Chang and Andreoni, 2016; Rodrik, 2014). After a long period of stigmatization in economic circles, industrial policy has enjoyed somewhat of a revival in mainstream economics (Hausmann and Rodrik, 2006; Lin, 2012; Wade, 2012), which the editors of this issue have dubbed the "mainstreaming of industrial policy" (Andreoni and Chang, 2019).[2] Our empirical results show that a successful green transformation requires expansionary fiscal policy in support of green industrial policy. The link between macroeconomic policy and industrial policy has so far attracted little attention in the emerging literature on green industrial policy, though there has been extensive work on the question of how economic globalization has constrained the policy space for industrial policy in developing countries (Shadlen 2005; Wade 2003). Our paper provides an important case study of an advanced economy with a large manufacturing sector that demonstrates the importance of an appropriate fiscal policy stance – the best plan for state-led industrial policy will fail if the government pursues a policy of fiscal austerity.

Building on the seminal work by Karl Polanyi (1944), many scholars have argued that market fundamentalism is an empirically discredited yet politically powerful theory that puts human society at risk (Block and Somers, 2016; Oreskes and Conway, 2023; Stiglitz, 2009). Our work provides additional evidence of the empirical failure of market fundamentalism as a theory of modern society under conditions of rapid structural change. Further, we detail how fiscal austerity can be a consequence of the market fundamentalism of the policy establishment and in this sense market fundamentalism explains fiscal fundamentalism.[3] Our paper also demonstrates the danger of pushing the market-fundamentalist agenda too far and trying to disembed the economy from society – the cost of disruption and dislocation to workers and ordinary people will cause a counter-movement in Polanyi's sense. In Germany, the failure of the state to protect its citizen in times of crisis led to a counter-movement that helped the far-right AfD double its political support and gain more votes in the 2025 election than the party of (former) chancellor Olaf Scholz.

Finally, our paper relates to the scholarship on the political power of economic ideas by shaping policy paradigms (Hall, 1993) and serving as an institutional blueprint (Blyth, 2001).

[2] Industrial policy also had a renaissance in the policy arena. In the US, the Biden Administration implemented the CHIPS Act and the Inflation Reduction Act in 2022, and in Europe the EU-Commission passed the Green New Deal in 2021 and the Net-Zero Industry Act in 2023. In addition, China's success in manufacturing based on clean technologies has silenced some mainstream critics of state planning.

[3] Our explanation of fiscal austerity in Germany is in line with the literature that emphasizes the influence of ideas (Blyth, 2013). An alternative approach is developed in Rademacher (2022), who argues that the strategic interaction between the central bank (Bundesbank) and the government laid the path for fiscal austerity in Germany.

We contribute to this literature by showing that policy makers made costly policy mistakes because the ideas of perfect markets and smooth adjustment to price shocks still provide the institutional blueprint for policy making in Germany. Note that the German government had the state-capacity to implement green industrial policy at scale using its development bank KfW (Naqvi, Hennow, and Chang, 2018). In addition, the three-party government coalition began their work in 2021 with the explicit goal to accelerate the green transition based on the expansion of an industrial-policy agenda (Coalition Agreement, 2021) that had already been started by the previous government (Germann, 2023). Germany also had the fiscal space to formulate a forceful fiscal response to the economic crisis focusing on green investment and green industrial policy. However, it never implemented an appropriate investment-led fiscal stimulus package and hesitated to dampen the energy price shock for its large industrial sector. All this happened because mainstream economists and the policy establishment refused to acknowledge the economic crisis based on the mistaken belief that the market-coordinated adjustment to the energy price shock would be smooth and painless.

2. Global Energy Crisis in Germany

In this section, we detail the behavior of key macroeconomic variables during the energy crisis in Germany. We begin with a discussion of the energy price shock hitting the Germany economy in 2022, and then discuss its effect on inflation and real wages. We next compute the loss in aggregate output associated with the energy crisis 2022 and compare it to the output loss associated with the COVID-19 crisis 2020 and the financial crisis 2008. We conclude this section with possible long-run effects (hysteresis) of the energy crisis on aggregate output and industrial production.

2.1 The energy shock and successful energy-supply management

The energy crisis 2022 was mainly driven by a negative shock to the supply of natural gas that Germany and Europe used to import from Russia. This crisis had far-reaching consequences for demand patterns and trading relationships worldwide (IEA, 2023), but the most direct impact of the energy shock was felt in Germany and Europe. In Germany, about half of the natural gas used in 2021 was imported from Russia via pipelines (AGEB, 2023, BDEW, 2023). Further, half of all households use natural gas for heating, energy companies use natural gas to generate electricity and many manufacturing companies use natural gas to generate process heat or as a basic input (AGEB, 2023, BDEW, 2023). In addition, the gas price also affects electricity prices through the merit-order system in European/German electricity markets. This strong reliance on natural gas in Germany and Europe means that we can expect movements in the supply and price of natural gas to have substantial effects on the economy.

The beginning of the global energy crisis 2022 is usually dated February 24, 2022, when the Russian army invaded Ukraine. The war called into question the security of the energy supply in Europe, and most EU countries followed a two-layer strategy of energy supply management to reduce the size of the supply shock hitting the domestic economy. First,

imports of natural gas from Russia were continued (no immediate embargo). Second, governments purchased natural gas on "world markets" to replace the decline in Russian gas imports driving up global energy prices. In the case of Germany, the second leg of the strategy meant that direct imports from Norway were ramped up and imports of liquefied natural gas (LNG) via Belgium and Netherland increased substantially (AGEB, 2023, BDEW, 2023). Thus, the most important player in compensating the supply shortfall was not some abstract market sending price signals, but the German government that pursued a price-inelastic 'whatever it costs' strategy in buying up gas .

The following table summarizes the effect of the energy crisis on the quantity of natural gas imported, exported, and consumed in Germany. It shows that the German government managed to reduce the supply shock quite successful – net imports to Germany in 2022 even increased slightly since imports declined slightly more than exports increased.

Table 1. Imports, exports, and use of natural gas in Germany

	2021	2022	change
Production	45.8	42.7	- 6.6 %
Imports	1,510	1,306.4	- 13.5 %
Exports	693.8	484.1	- 30.2 %
Net imports	816.2	822.3	+ 0.7 %
Total Use	917.4	773.0	- 15.7 %
Industrial Use	331.5	274.2	- 17.3 %

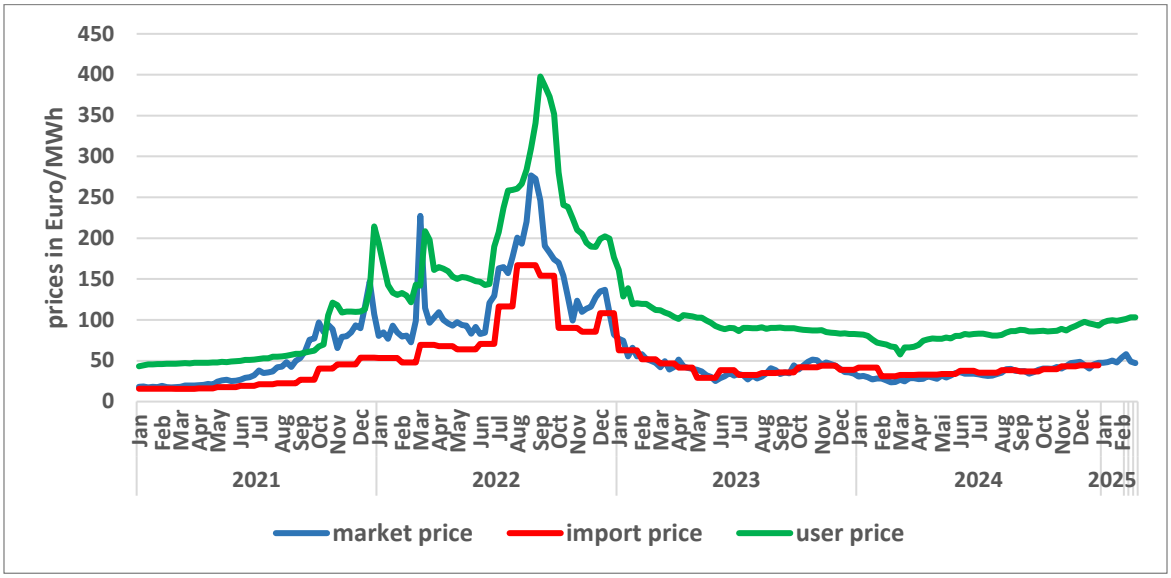
Note: Quantities are expressed in terawatt-hours. *Source:* AGEB (2023).

Table 1 shows that natural gas use decreased by around 16 percent in 2022. Some part of this decline can be attributed to a relatively mild winter, but most of the reduction in natural gas use in 2022 is the response of households and firms to rising energy prices as well as concerted savings efforts on the part of public institutions and a general public alertness.[4] Note that the reduction in gas use in combination with almost unchanged net imports and production means that natural gas storage increased in 2022, which was the desired outcome of the policy of the German government.

The next figure shows the development of three prices for natural gas: The price in the European gas market, the price paid by companies importing gas to Germany, and the price paid by German end users with new contracts.

[4] For example, the German Federal Network Agency reports a reduction of natural gas consumption of 17.6 percent in 2022 relative to 2021, but only a reduction of 14 percent relative the four-year average in 2018-2021 (Federal Network Agency, 2023).

Figure 1: Natural gas prices in Europe/Germany



Note: All prices are monthly averages and expressed in euro per megawatt-hour. Market price is the price for a contract with deliver next month on the Dutch TTF (European market). Import price is the average price German importers have paid for natural gas. User (retail) price is the price end users (households and small businesses) pay for new contracts in Germany. Sources: Statista, Federal Statistical Office (destatis), Verivox.

The figure shows that European natural gas prices increased dramatically in 2022, but also fell very quickly after reaching the peak in August. In addition, market prices were still three times higher in 2024 (on average) than their pre-crisis level at the beginning of 2021. Thus, the energy price shock had a transitory component that was very large but relatively short-lived, and a substantial persistent component.[5] Figure 1 also depicts two turning points of market prices in August 2022 and December 2022. These two turning points are associated with two specific events. First, the price decline starting towards the end of August happened when it became clear that storage tanks for natural gas are filling up quickly and the German government decided to ease up on its strategy of buying natural gas at *any price* via the Trading Hub Europe GmbH (Business Insider, 2022). In addition, after some back and forth, the German government finally announced its decision to implement an energy price brake in September 2022 – see section 3 below for details. This change of mind also paved the way for an EU-level intervention, and in December 2022 EU member countries finally agreed to introduce a common gas price cap at 180 euros per megawatt-hour (European Council, 2022; Guardian, 2022).

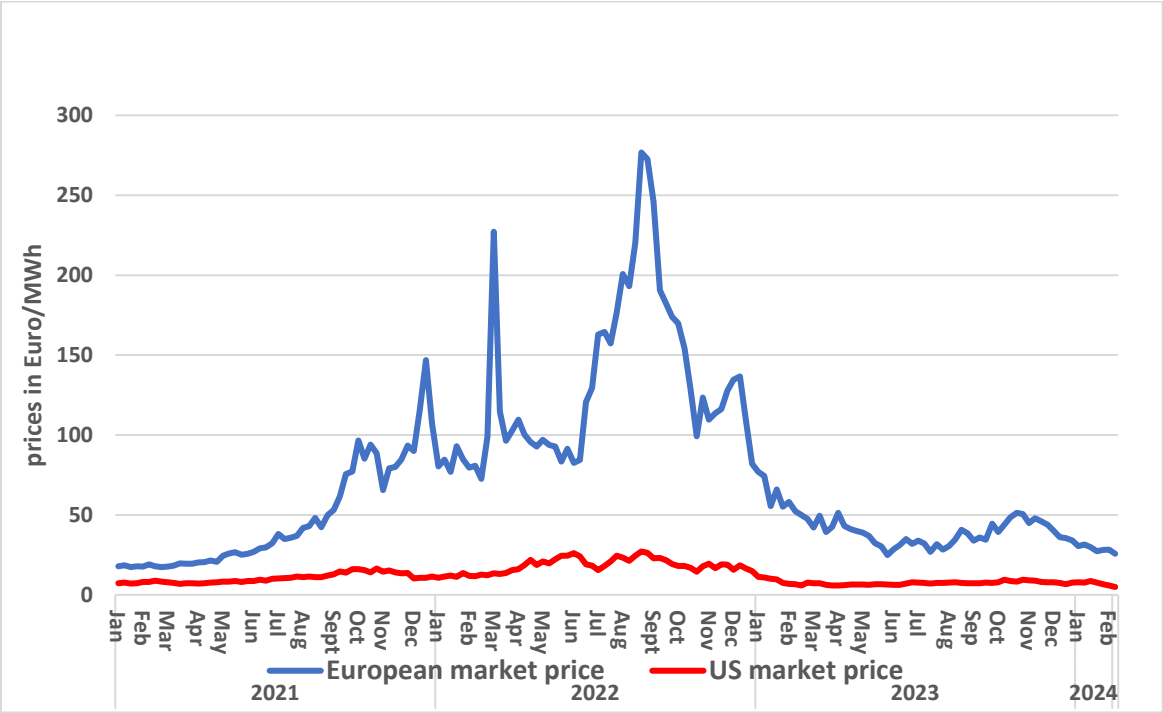
The rise in natural gas prices caused by the energy crisis amounts to a large increase in the price of carbon emission. To see this, note that natural gas prices averaged around 20

[5] Figure 1 illustrates that natural gas prices in Europe increased strongly after the Russian invasion of Ukraine on February 24, 2022, but the figure also shows that natural gas prices already started to rise in the summer of 2021. The price increase in 2021 is to a certain extent also related to the war in Ukraine. Specifically, the threat of a Russian invasion has been debated since the early summer of 2021, which explains part of the increase in gas prices that began in May 2021 – market participants are forward-looking taking into account the possibility of future events. For example, when Russia started amassing troops at the Ukrainian border at a large scale in December 2021, prices in the gas market spiked.

euro/mwh in the years before 2021, and then increased by 150 percent to an annual average of around 50 euro/mwh in 2021. After rising a further 160 percent to an annual average of 130 euro/mwh in 2022, it fell back to 42 euro/mwh in 2023 and 35 euro/mwh in 2024. The years 2023 and 2024, however, were times of economic recession with depressed demand for natural gas, so that the new long-run price can be expected to be around 50 euro/mwh if there is no increase in the supply of "cheap" pipeline gas from Russian in the future. A permanent increase of the price of natural gas by 30 euro/mwh from 20 euro/mwh to 50 euro/mwh is equivalent to an increase in the carbon price by 150 euro per ton of carbon emission for this type of fossil energy. Of course, this rise in the cost of using natural gas (fossil energy) comes on top of the carbon price of 55 euro/tCO2 that Germany already has implemented. In addition, this calculation does not account the high degree of uncertainty that acts like an additional cost component. In comparison: Economists who belief that carbon pricing should be the main instrument to achieve the climate goals recommend that Europe should raise the carbon price to a level ranging from 180 euro/tCO2 up to 250 euro/tCO2 until 2030 (Edenhofer et al., 2019; Kalkuhl et al., 2023; Sachverstaendigenrat, 2019). Thus, the energy price shocks 2022 was akin to fast-motion carbon pricing – a carbon shock therapy in which the market disciplines firms and households to induce the green transformation (Gabor and Braun, 2024; Gabor and Weber, 2021). In this sense, the energy crisis is also a test to what extent a policy that mainly relies on carbon pricing can transform the industrial sector without permanently damaging the economy.

It is worth pointing out that the market for natural gas is partially segmented, and in this sense, there is no integrated "world market". In particular, the US market for natural gas was affected much less than the European gas market since most of the natural gas consumed in the US is domestically produced or imported via pipelines from Canada. Consequently, the global energy crisis 2022 did not affect the US economy to the extent it affected the European economy. The next figure underscores this point. It depicts the development of the price of natural gas in European markets and US markets, and shows that the US only experienced moderate price increases compared to gas importing European countries like Germany.

Figure 2. Natural gas prices in Europe and the US



Note: All prices are monthly averages and expressed in euro per megawatt-hour. European market price is the price for a contract with deliver next month on the Dutch TTF. US market price is the price for a contract with delivery the following month on the Henry Hub; dollar prices are converted at a fixed exchange rate using average rate in January 2021. Sources: Statista, Energy Information Administration.

2.2 Inflation surge and an unprecedented drop in real wages

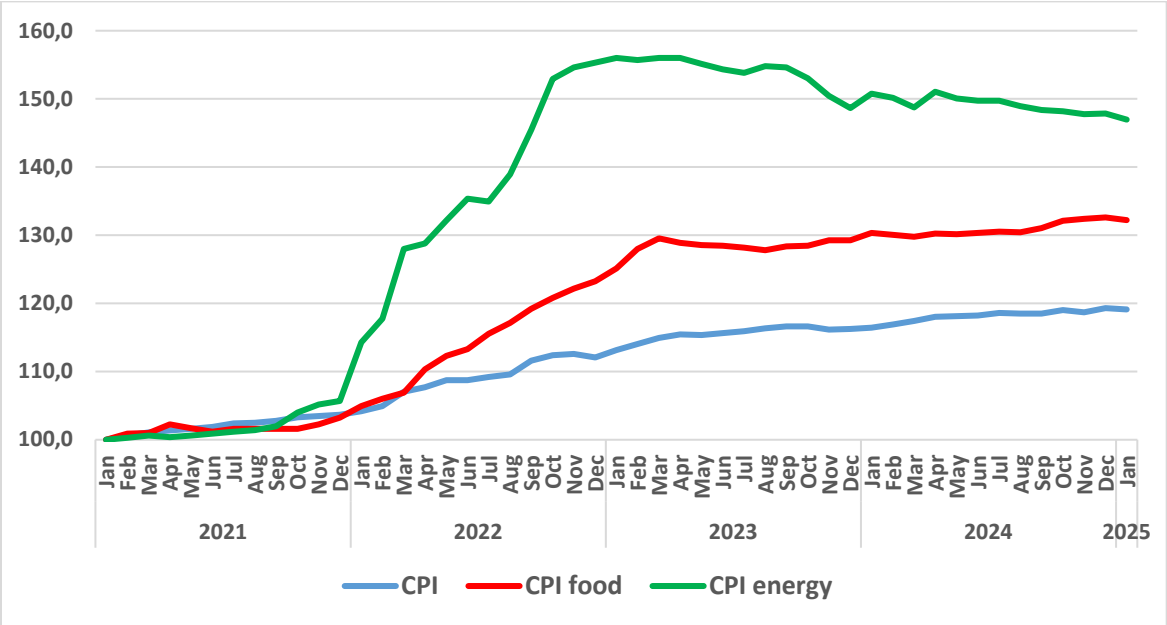
The rise in natural gas prices depicted in figure 1 also led to a large increase in electricity prices in Germany and Europe.[6] Thus, the natural gas price shock generated an energy price shock that went beyond the direct effect of natural gas prices on the energy price index. Rising energy costs in turn led to higher prices for all goods and services. Put differently, the energy shock that hit the European economy in 2022 as a terms of trade shocks was a main driver of inflation in 2022 (Allessandri and Gazzania, 2023; Dao et al., 2023; Pallotti, 2023). Of course, another important driver of inflation was the disruption of global supply chains following the COVID-19 pandemic, but in Germany these effects were mostly felt in 2021 and already waning in 2022. Benefitting from temporarily heightened pricing power, profit margins increased sharply in 2022 for the second year in a row and unit profits accounted for the larger share of inflation in 2021 and 2022 (Bundesbank, 2023; Ragnitz, 2022). In other words, Germany experienced sellers' inflation (Weber and Wasner, 2023) on top of a large terms-of-trade shock.

The next figure shows the development of energy prices, food prices, and a general index of consumer prices in Germany since January 2021. It illustrates the strong rise in energy prices

[6] This is an outcome of market design of the European electricity market, where the price is determined by the so-called merit-order principle. In 2022, this market system often implied that daily electricity prices were driven by the high marginal costs of gas-based power plants.

and the subsequent rise in food prices and prices for all consumption goods. Overall, energy prices rose by about 50 percent and food prices by close to 30 percent in a time span of two years.

Figure 3. Consumer prices in Germany



Note: CPI is the consumer price index; CPI food is the consumer price index for food; CPI energy is the consumer price index for energy. *Source:* Federal Statistical Office (destatis).

In contrast to profits, wages did not increase in lock-step with inflation in 2022. To the contrary, real wages declined dramatically. German consumer price inflation increased from 3 percent in 2021 to 6.9 percent (see figure 3). But nominal wages only increased by around 3 percent so that real wages declined by 4 percent. In other words, workers with little financial wealth experienced a loss of total income of 4 percent and bore the brunt of the cost shock. To put this real wages losses in 2022 into a historical perspective, figure 4 depicts the change in real wages since 1950, which is the first year in post-World-War II history for which data are available. This decline in real wages is the largest on record. There are only a few episodes in recent history in which the annual real-wage decline was substantial in Germany: In 1981 real wages dropped by almost 2 percent and in 1993 and 2020 they declined by somewhat more than 1 percent.

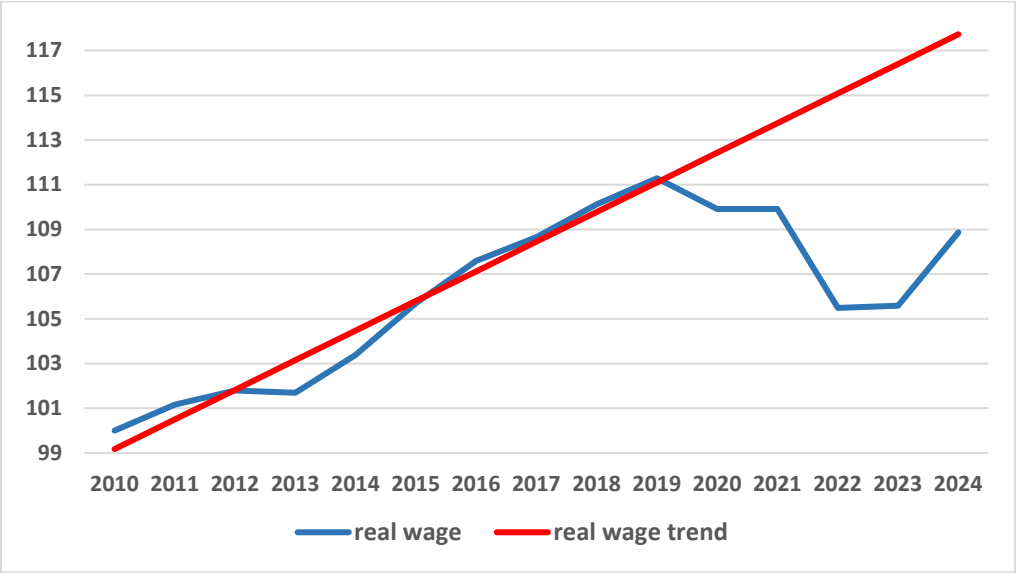
Figure 4. Real Wages since 1950

Note: Annual percentage change of real wages; real wage index is constructed using nominal wage data (index of average gross wage income) and consumer price index from the Federal Statistical Office. Values from 1950 to 1990 refer to West Germany and values from 1992 to 2023 refer to (unified) Germany. Value of real wage change for 1991 is omitted because of the structural data break in the transition from 1990 to 1991.[7]

There are also signs that a substantial part of the short-run real wage losses will be permanent. Specifically, after dropping one percent during the COVID-19 crisis 2020 and four percent during the energy crisis 2022, real wages were basically flat in 2023 – inflation was 5.9 percent and nominal wages increased by 6 percent. This meant that real wages were around 10 percent below their pre-crisis trend in 2023, as shown in figure 5 below. Further, even though reals wages increased by around 3 percent in 2024 due to the decline in inflation and high nominal wage increases, this increase was not sufficient to compensate full for the 4 percent loss during the energy crisis and the one percent loss during the COVID-19 crisis. In addition, real wages they are still around 8 percent below the pre-crisis trend at the end of 2024, and they are not likely to grow substantially in 2025. Thus, the available evidence points towards very large and highly persistence losses in the average real wages of workers. Thus, a look at the real wage data explains why most people in Germany felt that the energy crisis 2022 was a full-blown economic crisis that had large, negative consequences for their standard of living.

[7] The real wage for contracts covered by collective bargaining agreements exhibited a similar pattern in 2022 and 2023. Specifically, it declined by 3.9 percent in 2022 and 0.4 percent in 2023 (WSI, 2023).

Figure 5. Real wages since 2010



Note: Annual real wage index constructed using nominal wage data (average gross wage income) and consumer price index from the Federal Statistical Office. Blue line are actual values and dotted line is the best linear pre-crisis trend.

Across different groups of wage earners the inflation burden has been heterogeneous. Figure 3 shows that energy and food prices rose more quickly than the average price level. In general, this type of inflation hurts low- and middle-income workers disproportionally since they use a larger share of their income for the purchase of energy and food. Pallotti et al. (2023) demonstrate that lower income groups have carried a higher inflation burden, though fixed rent payments served as a hedge and softened this effect. In addition, the regressive effect of inflation was counteracted to some extent by a disproportioned increase of wages in the low-wage sector due to a rise of the federal minimum wage from 10.45 Euro to 12 Euro in 2022. Thus, in Germany we could observe a certain type of wage compression at the lower tail of the distribution, similar to the US (Autor, Dube, McGrew, 2023), but in Germany this occurred behind the backdrop of large average real wage losses.

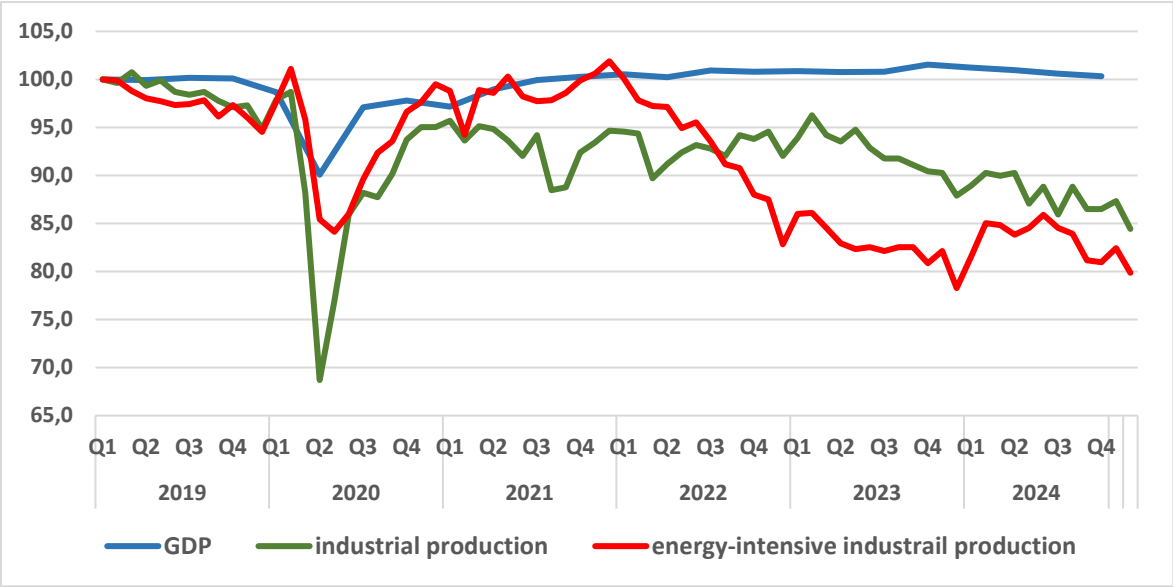
2.3 Large GDP losses

We next analyze the evolution of production and output during the energy crisis. The effect of the energy cost shock on aggregate output depends on the strengths of various adjustment channels and government policy. For example, if companies can easily save energy without reducing production, then we would expect the final output loss to be small. In contrast, the final output loss is large if rising energy costs lead energy-intensive firms to reduce production, and this initial production loss gets amplified via either aggregate demand effects (workers with less income buy fewer goods) or aggregate supply effects (rising prices or availability of energy-intensive products forces other producers along the production network to reduce output).

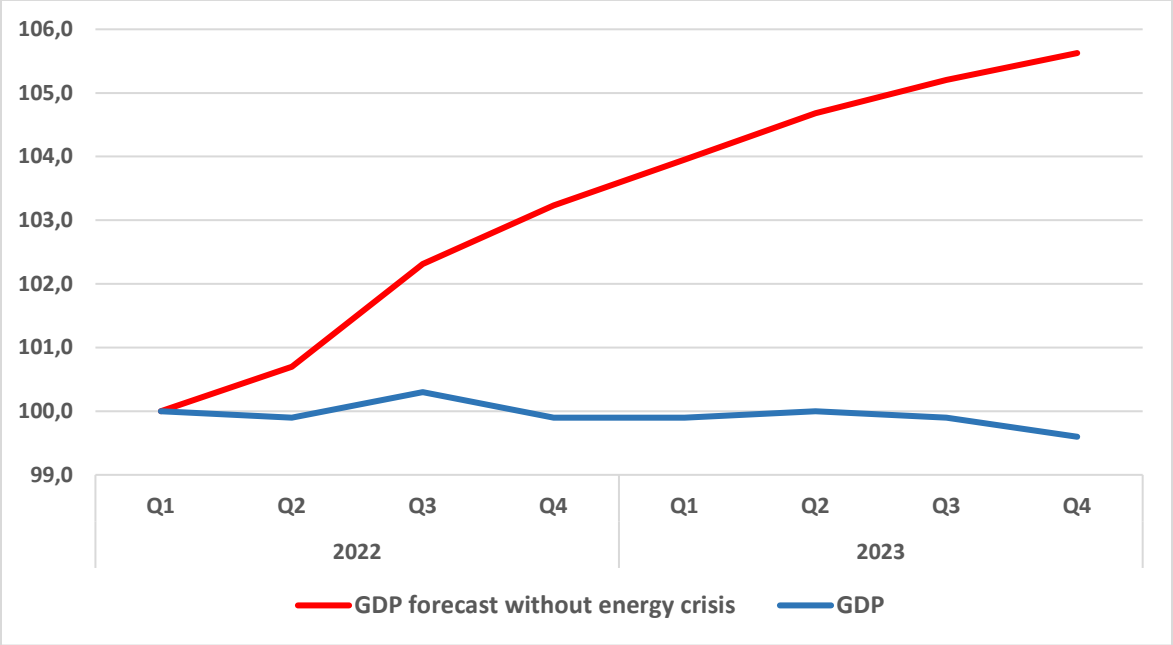
The next figure depicts the time path of aggregate production (real GDP), industrial production, and production of the energy-intensive manufacturing sectors since 2019 – the year before the COVID-19 crisis.

Figure 6: Short-run production losses

a) Aggregate production and industrial production in Germany



b) GDP with and without energy crisis in Germany



Note: a) GDP is the quarterly real gross domestic product. Industrial production is the monthly output of the manufacturing sector and energy-intensive industry is the monthly output of five energy-intensive manufacturing sectors. All variables are normalized to 100 in Q1-2022. b) Quarterly GDP normalized to 100 in Q1-2022. "GDP forecast" is the consensus forecasts of the five economic research institutes in spring 2022 (Joint Economic Forecast, 2022a). *Source:* Federal Statistical Office (destatis).

Figure 6a) shows that production of energy-intensive manufacturing dropped by almost 20 percent in the period March 2022 to December 2022. In other words, the energy-intensive industry fell into a deep recession in 2022. However, real GDP and industrial production barely declined in the year after the energy shock hit the economy – the period Q2-2022

until Q1-2023. In the public debate, this has often been interpreted as proof that the energy crisis had only a moderate effect on the German economy – "not even a recession" (Moll, Schularick, and Zachmann, 2023a,b, Sandbu, 2023; Tabarrok, 2023).[8] Put differently, according to some economic pundits, the energy shock following the Russian invasion of Ukraine in February 2022 barely mattered since households and firms quickly adjusted to rising and uncertain energy prices. If correct, this result could broadly be interpreted as one piece of evidence in favor of the market-fundamentalist theory of green transformation – see section 3 for further details.

However, a simple look at the actual path of GDP might be very misleading since it does not take into account that economic growth would have been possible without the energy crisis. To assess the output cost of the energy crisis, we need to construct a counterfactual, that is, we need to construct the path of GDP in the hypothetical scenario without an energy crisis. Once we have this counterfactual, the aggregate output loss caused by the energy crisis can then be computed as the difference between GDP in the scenario without a crisis (unobserved scenario) and GDP in the scenario with a crisis (observed scenario). Similarly, the loss in manufacturing output should be computed as the difference between production without the energy crisis and with the energy crisis.

We use this approach to compute the short-run output cost of the energy crisis in Germany. We take our estimate of GDP in the hypothetical no-crisis scenario from the pre-crisis forecast of the five economic research institutes that perform business cycle analysis for the German government (Joint Economic Forecast, 2022a).[9] Specifically, the business cycle analysis of these institutes conducted in the spring of 2022 (the so-called spring-forecast, GD, 2022a) provides the "best" estimate of the path of German GDP without an energy crisis given the available information at that time (conditional forecast). These estimates can then be compared with the actual GDP development to compute the economic loss due to the energy crisis. Clearly, this approach captures all direct and indirect effects on the German economy of the Russian war in Ukraine (rise in energy prices, rising uncertainty, reaction of the central bank and fiscal policy), and this should be kept in mind when interpreting the results.

Figure 6b) shows the estimates of the GDP path in the hypothetical case (Joint Economic Forecast, 2022a) as well as the actual path of GDP. From Figure 6b) we can see that the output loss in the one-year period following the Russian war in Ukraine, the period Q2-2022 until Q1-2023, amounted to 4.1 percent according to the five economic institutes.[10] This

[8] Another often-made claim is that annual GDP growth in 2022 was 1.8 percent suggesting that the short-run impact of the energy shock cannot have been substantial. This claim demonstrates the danger of the careless use of statistics. Specifically, annual GDP in 2022 was 1.8 percent higher than annual GDP in 2021 because GDP was growing in 2021 and in Q1-2022, but no growth occurred after Q1-2022.

[9] These are the five Leibniz-Institutes "Deutsches Institut der Wirtschaft (DIW), "Institute for Economic Research at the University of Munich (Ifo)", „Kiel Institute for the World Economy (IfW)", "Halle-Institute for Economic Research (IWH)", and "Ruhr-Institute for Economic Research (RWI)".

[10] As common in the business cycle literature, this paper uses GDP data at a quarterly frequency to analyze the short-run movements in aggregate economy activity. The use of the quarter-to-quarter change ensures that the measure of output loss constructed here is independent of the growth path before the crisis (before the "energy shock" hit the economy). Using this approach, the one-year output cost of the energy recession is

output loss is mainly driven by the fact that German growth was expected to rebound strongly in 2022 after the Covid-19 crisis, which in Germany basically lasted until the spring of 2022 when all Covid-19 restriction were finally lifted. But it should be noted that the GDP forecast of the Joint Economic Forecast (2022a) was published in spring 2022 and already takes into account some of the negative effects of rising energy prices. If anything, it is an under-estimate of GDP in a world without an energy crisis, and therefore results in an under-estimate of the output cost of the energy crisis 2022/23. For example, in December 2021 the German central bank still expected an increase of quarterly GDP in the period from Q2-2022 until Q1-2023 of more than 5 percent (Bundesbank, 2021), in which case the output loss amounts to slightly more than 5 percent. Note further that a similar analysis conducted for the manufacturing sector would yield even larger output losses since industrial production was expected to expand even more than GDP before the crisis. Specifically, using the forecast for the manufacturing sector from Joint Economic Forecast (2022a), we find a production loss of 6 percent for industrial production in the period Q2-2022-Q1-2023.

Using the same method, we can also compute the corresponding economic losses in the Covid-19 crisis 2020 and the financial crisis 2008/09. This allows us to put the results for the energy crisis into perspective. We can further compute the one-year real wage losses in the three crises using the same method. We compute the change of quarterly real wages in the first year following the "beginning" of the crisis, and compare this change with the forecast of the quarterly real wages of the five economic research institutes.[11] The results of the analysis on output losses and wages losses are summarized in the following table: [12]

Table 2. One-year output and wage losses in Germany for three economic crises

	Output loss	Real wage loss
Energy crisis 2022/23	**4.1 %**	**3.4 %**
Covid-19 crisis 2020	**2.5 %**	**0.8 %**
Financial crisis 2008/09	**5.8 %**	**0.4 %**

Note: Output and wage losses are the difference between before-crisis forecasts and actual values of quarterly GDP and quarterly real wages one year after the beginning of crisis. Energy crisis Q2-2022 to Q1-2023, Covid-19 crisis Q1-2020 to Q4-2020 and financial crisis Q4-2008 to Q3-2009. Forecasts are taken from the consensus forecast of the five economic research institutes DIW, Ifo, IfW, IWH, and RWI.

simply the area between the two GDP-time paths in Figure 6 (the sum of the differences for Q2-2022, Q3-2022, Q4-2022, and Q1-2023).

[11] The forecast of real wages is computed as the difference between the forecast of nominal wages and the forecast of consumer prices inflation in fall of the year preceding the crisis. We thank the IWH for providing me we the unpublished data the respective forecasts of quarterly wages.

[12] A further comparison to the oil crisis 1973-75 might also be useful. The oil price shock that hit the German economy in 1973 led to an absolute decline in annual output only in 1975 by 0.9 percent and there was no further year with negative output growth in the 1970s. Using the same method as in table 1 (but with annual data) and the forecast of the economic research institutes taken from (IWH, 2023), we find an annual output loss of 3.4 percent in 1975.

Table 2 shows that the output loss during the energy crisis 2022 was comparable to the output loss during the Covid-19 crisis and somewhat less than the loss during the financial crisis 2009. Table 2 also shows that the loss in real wages during the energy crisis by far exceeds the corresponding losses during the Covid-19 crisis and the financial crisis. In short, the energy crisis was an economic crisis comparable to the Covid-19 and the financial crisis in terms of output losses, but the negative effect on workers' wages has been much stronger.

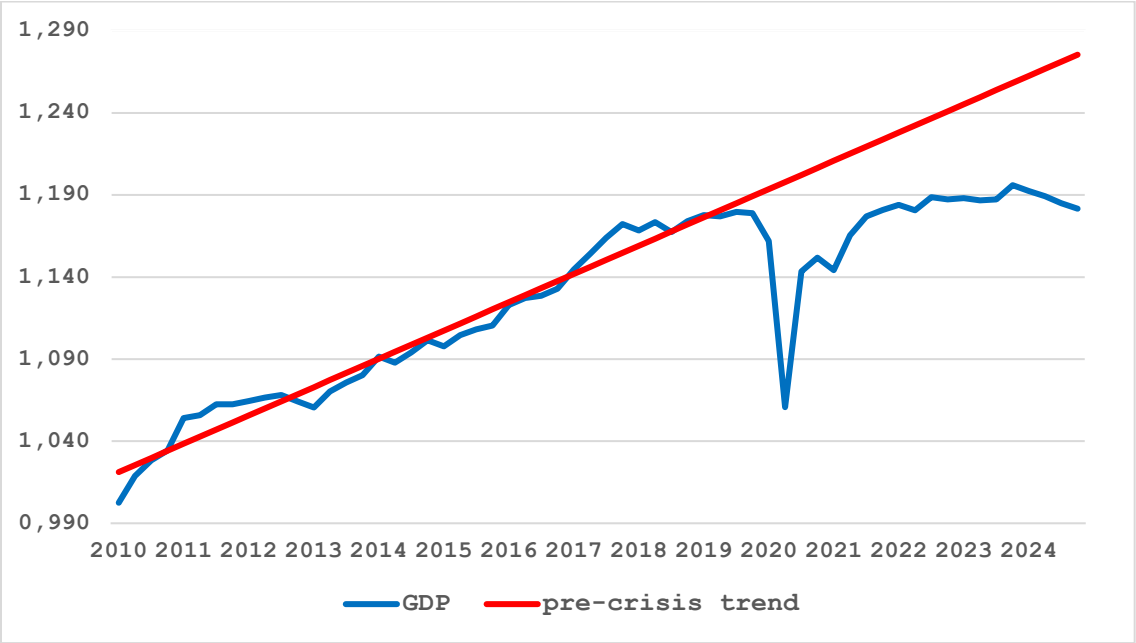
Our finding that a large energy price shock has substantial economic consequences is in line with previous work on the effect of oil price shocks. Simulation results based on macro models calibrated to US data suggest substantial effects of energy shocks due to endogenous mark-ups (Rotemberg and Woodford, 1996) or limited substitution (Atkeson and Kehoe, 1999). In addition, time series evidence indicates that supply-driven energy shocks can have substantial output effects (Baumeister and Hamilton, 2019; Hamilton, 1983; Kilian, 2008). The empirical estimates vary and depend on various factors, but as a rule-of-thumb it is often stated that a 10 percent increase in oil prices reduces GDP by 0.5 percent after one year (Baumeister and Hamilton, 2019; Rotemberg and Woodford, 1996). Given that gas prices increased by 150 percent between 2021 and 2022, this would imply a short-run output loss of 7.5 percent – even more than our estimate of an output loss of 4 percent (table 2). Of course, these results do not directly speak to the energy crisis 2022 in Europe that was mainly driven by a natural gas supply shock, not an oil supply shock, but they clearly provide additional support for our finding.

The above calculations assume that the forecast of the five research institutes provides relatively good estimates of output in the hypothetical scenario without a crisis. This is the case if i) past forecast haven been relatively good in "normal times" (absent a crisis shock) and ii) there has been no major additional, independent macro shock hitting the Germany economy during 2022, respectively 2009 or 2020. The first condition is met in the sense that the forecasting error in normal times is small enough that it would not change the broad conclusion that in all three crises the output losses were of similar magnitude and that in the energy crisis the real wages were much larger than in any other pre-war crisis. In Krebs and Weber (2024) we discuss why the second condition is also met during the energy crisis 2022.

2.4 Long-term economic damage (hysteresis)

Economic crises not only reduce output in the short-run, but they can also affect production in the long-run (potential output) – the so-called hysteresis effect of recessions (Blanchard and Summers, 1987; Blanchard, Cerutti, and Summers, 2015). More precisely, the one-year output loss shown in table 2 might turn into a permanent output loss if there is no strong recovery in the years to come. These long-run output losses represent economic costs of crises that go beyond the short-run costs. The following figure suggests that the economic outlook for the German economy appears bleak, and the danger of significant long-run losses seems real. In fact, the five-year period 2020-2024 is already the longest no-growth period on record since data collection began in 1950, with the period 2001-2004 coming in second – the time when Germany was called the sick man of Europe. In addition, the economic outlook for 2025 is similarly bleak.

Figure 7. Output and trend output in Germany 2010-2024

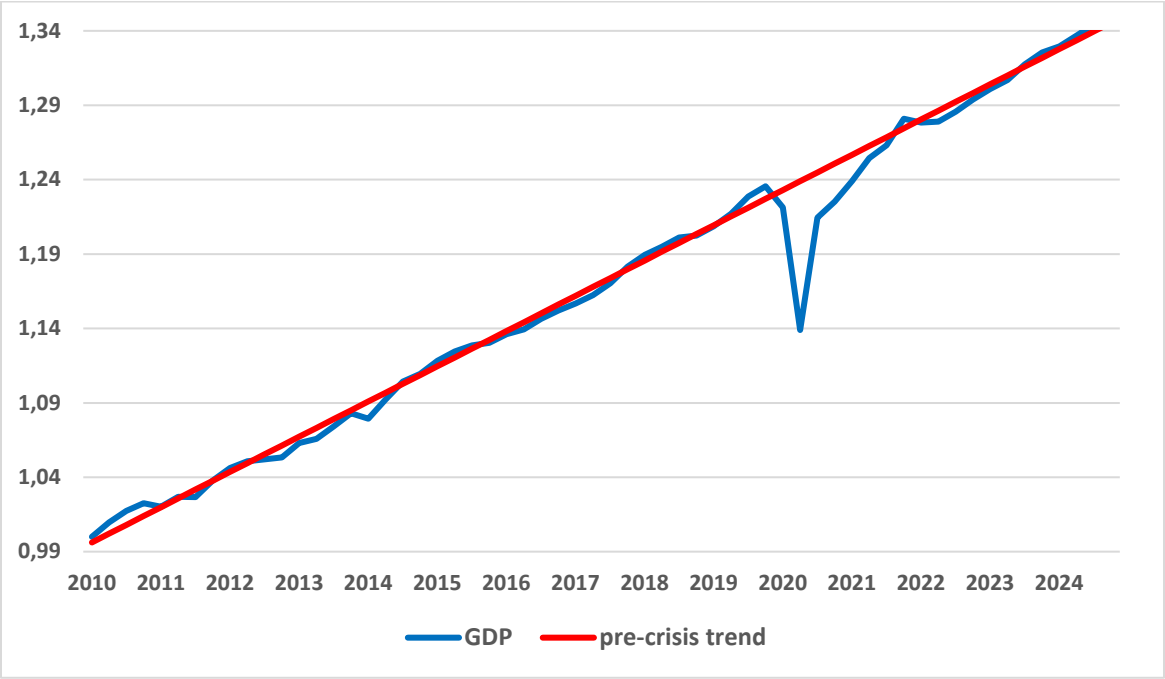


Note: Real quarterly gross domestic product on a logarithmic scale normalized to one in Q1-2010. Blue line are actual values and dotted line is the best linear pre-crisis trend; beginning of crisis Q2-2020.

Figure 7 shows that the German economy is struggling to recover from the twin shock – COVID-19 and energy crisis. Indeed, actual output at the end of 2024 is about 9 percent below the pre-crisis trend. In addition, the IMF (2025) finds that Germany was the only advanced economy with negative GDP growth in 2023 and 2024, and that the projections for 2025 are lower than for any comparable country. In other words, there is preliminary evidence that strong hysteresis effects have set in. Of course, to what extent crisis-induced short-run output loses become permanent heavily depends on policy choices. From this point of view the decision of the German government to start tightening fiscal policy in 2023 (see section 3) and to continue on this path of fiscal restraints in 2024 has made a stagnation scenario with large hysteresis effects much more likely.

A comparison of the recent experiences of Germany and the US underscores this point. In Germany, fiscal policy during the Covid-19 crisis was moderately expansive. Further, Germany is an energy importing country that was directly hit by the energy shock in 2022, and it started to tighten fiscal policy already in 2023 in the middle of the energy crisis. In contrast, US fiscal policy was more expansionary in response to the Covid-19 shock. In 2022, he US has also been the worlds' most important oil producer (IEA, 2023) and has experienced a positive terms of trade shock from the energy crisis. In addition, the Biden administration implemented three ambitious investment programs that are growth enhancing: The Bipartisan Infrastructure Law in 2021, the Chips and Science Act in 2022, and the Inflation Reduction Act in 2022. We would therefore expect a strong recovery of the US economy following the economic downturn in 2020. The next figure confirms that this conjecture is correct. If anything, Germany would have needed an even more ambitious fiscal policy than the US to achieve a similar return to the pre-COVID-19 growth trend.

Figure 8. Output and trend output in the US 2010-2024



Note: Real quarterly gross domestic product on a logarithmic scale normalized to one in Q1-2010. Blue line are actual values and dotted line is the best linear pre-crisis trend; beginning of crisis Q2-2020.

There are several economic channels that can account for persistent output effects of temporary shocks. We only sketch some of the main mechanisms and leave any further analysis for future research. First, the original contribution by Blanchard and Summers (1987) emphasizes long-run effects on unemployment. Second, job loss is often associated with the loss of firm- or sector specific human capital, which explains the empirical finding that recessions often have scarring effects (Schmieder, Wachter und Heining, 2023). Third, physical capital can be destroyed during times of crisis, even though this might also lead to a positive effect on productivity due to a "cleansing effect" (Caballero und Hammour, 1994). Fourth, private investment goes down during crises, which reduces potential output by lowering the physical capital stock and innovation activity (Benigno and Fornaro, 2018). Fifth, if temporary shocks go hand in hand with an increase in endogenous uncertainty, then this can generate persistent output effects (Straub and Ulbrich, 2024). Finally, hysteresis effects of economic crises are general features of Neo-Keynesian models of economic growth (Fazzari und Gonzales, 2023).

3. The Cost of Market Fundamentalism

In this section, we analyze the economic and political costs of market fundamentalism. To this end, we first show that the market-liberal theory of green transformation is inconsistent with the empirical observation that energy price shocks cause large real-wage and output losses. We then detail how market fundamentalism influenced policy making and led to policy mistakes with large economic costs. We further discuss the political costs of these

policy mistakes – the rise of the far-right AfD in Germany. The following table provides a summary of the two main policies choices we analyze.

Table 3. Market fundamentalism and its consequences in Germany

	2022	2023
Market fundamentalism	**Rejection of price controls**	**Crisis denial**
Economic policy adopted	**Late introduction of price controls**	**Fiscal tightening**
Economic consequences	**Unnecessary output and real wage losses**	**No economic recovery and erosion of industrial base**
Political consequences	**Economic insecurity and AfD approval rises**	**Economic insecurity and AfD approval rises**

3.1 The empirical failure of market fundamentalism

We use the term "market fundamentalism" to denote the belief that an economic system of self-regulating markets and well-defined property rights produces by and large socially desirable outcomes (Block and Somers, 2016; Oreskes and Conway, 2023; Stiglitz, 2009). Market fundamentalists analyze the complex transformation process towards climate neutrality based on the assumption that markets work more or less perfectly and the First Welfare Theorem (Invisible Hand Theorem) holds once the negative climate externality has been corrected by carbon pricing (Krebs, 2023a).[13] The market-liberal perspective usually downplays that individual workers and companies bear large costs of adjusting to transformational change (Karl Polanyi). In addition, the possibility that markets generate uncertainty endogenously – very much a Keynesian idea – is ruled out by assumption -- see Krebs and Weber (2024) for details. In short, market fundamentalists believe that deep structural transformations can be achieved in a short amount of time and by pure market coordination. This has been the market-liberal playbook since the late 1970s (Weber, 2021a).

The policy debate surrounding the energy crisis in Germany provides an interesting case study of market fundamentalism. A number of mainstream economists decided early on that the German economy could easily handle the energy shock associated with the Russian war in Ukraine because they assumed that a market economy is an efficient system for handling large shocks (Bachmann et al., 2022; Bayer et al., 2022a; Leopoldina, 2022). In other words, they had unconditional trust in market forces and carbon shock therapy (Gabor and Braun, 2025; Gabor and Weber, 2021). In addition, some of these economists were very explicit about the perfect-market theory of the world they were using to derive their policy recommendations (Bachmann et al., 2022). Specifically, the authors of Bachmann et al.

[13] Krebs (2023a) discusses in more detail how perfect-market (neoclassical) models in the Nordhaus-tradition have shaped the mainstream approach to green transformation and climate policy.

(2022) provide an economic analysis of a worst-case scenario of the German energy crisis in which natural gas prices increase by more than the price hike that actually happened. To this end, they used a static economic model with perfectly competitive markets, no uncertainty, and no cost of adjustment/disruption. Further, the economic model analysis was based on the counterfactual assumption that the market economy always – even in a crisis situation -- produces a socially optimal outcome (First Welfare Theorem). Put differently, these economists used a formal representation of the market-fundamentalist theory of green transformation to analyze the economic consequences of a large energy (carbon) price shock.

The model analysis of Bachmann et al. (2022) is not only built upon counterfactual assumptions, but it also has counterfactual implications – it is inconsistent with the behavior of key macroeconomic variables described in section 2. To see this, recall that the natural gas price rose from 50 euro in 2021 to 130 euro/mwh in 2022, and that this energy price shock is associated with a one-year drop in real wages and aggregate output of around 4 percent. In contrast, the model analysis of Bachmann et al. (2022) implies that an even larger gas price shock – an increase to around 500 euro/mwh – only reduces real wages and aggregate output by a small amount -- between 0.2 and 1.3 percent (Geerof, 2022; Krebs and Weber, 2024). In this sense the prediction of the market-liberal model of transformation is clearly rejected by the empirical evidence. This refutation of the theory should not be surprising: The unrealistic assumptions of no uncertainty and costless adjustment imply the unrealistic result that massive price shocks have very little costs.

Despite its empirical failure, the economic model of smooth transformation and its underlying theory had a large impact on the public debate and policy making in Germany. As we detail below, two major policy mistakes by the German government, the delayed introduction of energy price controls in 2022 and the premature fiscal tightening in 2023, can be traced back to the type of market fundamentalism that was formalized by Bachmann et al. (2022). In addition, the smooth-transition model of the energy crisis had a disproportionate impact on the international debate on the German economy. For example, in spring 2022 economists like Paul Krugman used the results of Bachmann et al. (2022) to argue that the effect of an immediate embargo on Russian gas imports in March 2022 would have had only small effects on the German economy (Krugman, 2022). In addition, the International Monetary Fund based their analysis of the economic effects of an immediate gas embargo on the smooth-adjustment, perfect markets model (IMF, 2023). In May 2023, the economists Moll, Schularick, and Zachmann (2023a) claimed (incorrectly) that Germany did not experience a recession supposedly confirming the analysis in Bachmann et al. (2022), a claim that was eagerly picked up by the international economic press at that time (Sandbu,2023; Tabarrok, 2023). In a follow-up version of the paper written for the Brookings Institute, the authors Moll, Schularick, and Zachmann (2023b) doubled down on their claim that the smooth-transition, perfect-market model provides a good description of the German experience during the energy crisis. They also suggested that their results support the market-fundamentalist approach to the green transformation and state: “Market economies have a tremendous ability to adapt that we should not underestimate again”.

We should point out that the economic debate was hardly monolithic. In particular, the German central bank (Bundesbank, 2022) and five German economic research institutes (Joint Economic Forecast (2022a,b,c) conducted various analyses that suggested very large output losses associated with energy shocks. In contrast to the work by Bachmann et al. (2022), they did not assume perfect markets and smooth adjustment processes, but instead based their analysis on an empirically grounded model that takes into account supply-side as well as demand-side effects. The conclusion of Bundesbank (2022) and Joint Economic Forecast (2022a,b,c) was that in a hypothetical worst-case scenario, which did not occur because of the successful energy-supply management, the output loss would have been one order of magnitude large than predicted by Bachmann et al. (2022). The following table shows the results of papers that have simulated the output losses that could have been caused in a worst-case scenario.[14]

Table 4. Short-run output loss in a worst-case scenario in Germany

Bachmann et al. (2022)	Bundesbank (2022)	Joint Economic Forecast (2022a,b)	Joint Economic Forecast (2022c)
0.2 % - 1.3 %	**9 %**	**8 %**	**10 %**

Note: Joint Economic Forecast (2022a,b) are the difference between before-crisis forecasts and simulated worst-case scenario of quarterly GDP five quarters after beginning of energy crisis (Q2-2022 until Q2-2023). Bundesbank (2022) is the difference between before-crisis forecasts (December 2021) and simulated worst-case scenario of GDP in 2023 -- see the figure on page 36 of Bundesbank (2022). Bachmann et al. (2022) and Joint Economic Forecast (2022c) includes only supply-side effects; all others include demand-side and supply-side effects.

A glance at table 4 begs the question why the debate in economic circles was so much dominated by one paper that found very little economic effects of large energy price shocks. One important reason is that the underlying perfect-market paradigm made the analysis attractive to a large group of mainstream economists and many members of the three-party government coalition. The appeal of this line of reasoning to mainstream economist and the neoliberal FDP is rather obvious, but with respect to the Green party and SPD the case is less clear cut. However, both parties perceive themselves as moderate center-left parties that have uncritically accepted the market-fundamentalist foundation of economic policy making. For example, large parts of the Green party promote an economic approach to the green transformation that amounts to Green Ordo-Liberalism (Bayaz, 2023; Giegold, 2021). Similarly, even though SPD politicians like to remind their voters of the social democratic roots of the party during election season, once they are in power – and that was the case in 21 of the last 25 years – they often tend to follow the neoliberal playbook in economic policy making (Krebs, 2024). We next show how this reliance on market-fundamentalist thinking was responsible for two major policy mistakes during the energy crisis.

[14] Note that table 4 only lists the results of papers that take into account possible supply-side effects in an energy crisis and were tailored towards analyzing large energy price shocks. There were many papers written in 2022 based on economic models that did not capture essential mechanisms and therefore not suitable to investigate the effects of larger energy price shocks. See Krebs (2022a) for a further discussion of the various papers and economic channels.

3.2 Policy mistake I: Crisis denial and fiscal tigthening

In the wake of the energy crisis 2022, the German government made several policy choices that can be summarized as short-run stabilization policy. Besides the management of energy supply already discussed in section 2, the German government used standard fiscal policy measures like transfer payments and temporary tax cuts to provide relieve and stabilize the economy through aggregate demand management. Specifically, it introduced two smaller fiscal packages in the spring of 2022 right after the beginning of the Russian war in Ukraine, and a larger third fiscal package in fall 2022. A core measure were energy price controls, the so-called energy price brake, to tame inflation and to provide relieve for households and firms. It was fully implemented in January 2023, with some early payments being made in December 2022.

The German government acted quickly in spring 2022 adhering to the conventional playbook of crisis policy, but is also made crucial policy mistakes. One was to tighten fiscal policy in the middle of the crisis in 2023. Specifically, the German government decided not to use the exception clause to the balanced-budget rule (German debt brake) in 2023, which prevented the implementation of a fiscal stimulus package with a focus on green public investment and green industrial policy. In other words, the German fiscal stance during the crisis was far too restrictive and prevented a possible economic recovery in 2023 that could have put the German economy on a green growth path. We next trace back this policy failure to the influence of market fundamentalism.

Though the German government was initially very skeptical of shock therapy and the possibility of smooth adjustment (Krebs and Weber, 2024), by the spring of 2023 it was open to the idea that the energy crisis had a relatively mild effect on the German economy since a worst-case scenario (energy shortage) never occurred. For example, in June 2023 the head of the chancellery, Wolfgang Schmidt, hosted a “Zeitenwende-Workshop” in which he invited a number of academic economists to discuss the economic challenges ahead (Bundesregierung, 2023). At this conference, fourteen economists close to the government presented their work on the crisis, and not one of the fourteen talks mentioned that German workers had experienced the largest drop in real wages since World War II. To these economists, the economic hardship of a large fraction of workers apparently did not matter. In addition, there was a clear sense that the German economy had weathered the crisis well. For example, Moritz Schularick (2023) praised the smooth adjustment of the German industry to the energy price shock claiming empirical support for market-fundamentalist model of Bachmann et al. (2022). The sentiment of smooth adjustment with little costs was echoed by several other presentations. Overall, most conference participants downplayed the costs of a large energy price shock and none mentioned the large challenges the German economy was facing due to the long-term effects of the energy crisis.

The crisis denial of many mainstream economists and the German policy establishment in 2023 provided the breeding ground for fiscal fundamentalism: If presumably there is no crisis because market forces worked their magic, then there is also no reason to use expansionary fiscal policy to fight the economic consequences of a crisis. No crisis policy without a crisis. And so it happened that in Germany market fundamentalists provided the

arguments that fiscal fundamentalists needed to rationalize the tightening of fiscal policy in 2023, which was euphemistically called "normalization of financial policy" (Feld, Schmidt, and Wieland, 2022, Lindner, 2023a,b). Specifically, even though the German government used the exemption clause to the balanced-budget rule (the so-called German debt brake) in the COVID-19 years 2020 and 2021 to launch large-scale fiscal packages, its fiscal response to the energy crisis was much more timid: The exemption rule was used in 2022 to launch what became a moderate fiscal package, but for 2023 (or 2024) no exemption rule was used to provide a fiscal stimulus.[15] The restrictive fiscal stance in 2023 and 2024 was a political decision pushed through by a neoliberal finance minister, Christian Lindner, and legitimized by the market fundamentalism of large parts of the German economics community. This also shows that the German debt brake was not the reason for the timid fiscal response in 2023 since German fiscal rules allow unlimited fiscal deficits if the government decides to declare a crisis situation.

In the German policy debate, it is often asserted that fiscal policy was not too tight in 2023. A glance at some fiscal numbers refutes this claim. The stabilization programs implemented in response to the energy crisis amount to an additional fiscal spending of one percent of GDP in each of the years 2022 and 2023 (Krebs and Weber, 2024). [16] In comparison, the additional fiscal spending on programs to combat the COVID-19 crisis were roughly double this amount – two percent of GDP in 2020 and 2021. In addition, the fiscal deficit of the federal government steadily declined from 4.0 percent of GDP in 2021 and 3.0 percent of GDP in 2022 to 1.7 percent of GDP in 2023 and 1 percent in 2024 (BMF, 2022b,2023,2024c,2025). These numbers do not suggest any decisive response of the German government to an economic crisis that started in 2022 and threatens to wipe out large parts of the German manufacturing base.[17] Of course, if one adheres to the by now refuted view that the economic impact of the energy shock was limited, as Bachmann et al. (2022), Bayer et al. (2022), and Moll, Schularick, and Zachmann (2023a,b) would like us to believe, then the actual fiscal stance of the German government would have been about right and fiscal conservatives like finance minister Christian Lindner (2023a,b) and economists like Feld, Schmidt, and Wieland (2022) had a point.

Germany's restrictive fiscal policy not only prevented an economic recovery in 2023, but it also hampered any attempt to give green industrial policy a boost. There was a unique

[15] In the end the German government applied the exemption rule for 2023, but only after the constitutional court ruled in November 2023 that the original fiscal plan of the German government violated the constitutionally enshrined debt brake (Krebs, 2024).

[16] Note that third fiscal package („Doppel-Wumms") was announced to have a volume up to 200 billion euros, but in the end only 70 billion euro of the announced 200 billion euro was spent in 2022 and 2023 (BMF, 2024b). This is the reason why fiscal measures that rely on announced fiscal spending (Dao et al., 2023) provide a biased estimate of the actual fiscal stance of Germany in 2022 and 2023. In addition, the German government has the habit of including old programs into newly announced fiscal packages, which requires caution to avoid double counting when using „announcement data".

[17] A comparison with other advanced economies is also informative. The overall fiscal deficit of the German government (federal, state, local) was 2.6 percent in 2022. Thus, Germany had a much smaller fiscal deficit than the US (5.5 percent) and a substantially smaller deficit than the EU countries on average (3.6 percent), even though it was the country most directly affected by the energy crisis 2022. In 2023 "deficit gap" between Germany and the EU even widened: In 2023, Germany had a fiscal deficit of 2.1 percent of GDP and the EU countries a deficit of 3.2 percent of GDP.

opportunity in 2023 to implement a large credit-financed fiscal package focused on green public investment and green industrial policy (Krebs, 2023b; Weber 2023). This type of policy would have provided a much need fiscal stimulus in the short-run as well as increased economic growth in the long-run. In addition, a large fiscal package implemented in 2023 that focuses on public investment in green infrastructure and green industrial sectors would have been the right reaction to the change in US policy that came with the introduction of the Inflation Reduction Act (IRA). In other words, Germany had the chance to manage successfully the transformation of its large industrial base using expansive green industrial policy. However, the German government decided to squander this opportunity in 2023, and also 2024, based on the false premise that there is no economic crisis: Crisis denial led to policy mistakes with significant economic costs.

The "neoliberal takeover" of Germany's coalition government by Christian Lindner and his neoliberal FDP in 2023 bears some resemblance to the take-over of the Republican Party and the US government first by the Tea Party and then by the MAGA-movements. As in the US case (Hopewell, 2017), the policy debate about industrial policy in Germany was accompanied by a battle between billionaires, who supported the radical market ideology, and bosses (industry representatives), who called for moderation and made some sensible policy proposals. In other words, capitalists are generally united in their support of an ideology that rationalizes lower taxes, wage suppression and union busting, but not all capitalists are willing to accept the destruction of the industrial base of their economy for ideological reasons. We emphasize, however, that in Germany this "take-over" would not have been possible without the ideological foundation provided by market fundamentalism and the explicit agreement of Chancellor Olaf Scholz and vice chancellor Robert Habeck, which was based on false premise that economic effects of the energy crisis were moderate.

3.3 Policy mistake II: Fear of prices controls

The control of market prices to fight inflation has a bad reputation among in mainstream economics – most mainstream economists have the tendency to reject price controls as inefficient and counter-productive. For example, when the Chicago Booth School conducted a survey among prominent economists at the height of the energy crisis in fall 2022, the large majority argued against energy price controls for European countries and almost none made a case in favor of such "unconventional" policy instrument (Chicago Booth, 2022).[18] Similarly, in a survey of German economists conducted by the ifo-institute in October 2022 (Gründler, Potrafke, and Schlepper, 2022), an overwhelming majority of the 178 respondents supported transfer payments, but only 14 percent were in favor of a cap on prices for gas and electricity. And when strategic price controls were first proposed as an emergency tool in the fight against inflation (Weber, 2021b; Galbraith, 2022), the reaction of the economics community was mainly a kneejerk rejection – see Carter (2023) for an account of the negative reaction of the economics profession towards price controls during the energy crisis. Of course, all this is not too surprising in retrospect: If one looks at the world from a perfect-market point of view, as many mainstream economists often do, then

[18] Indeed, there was nobody in the survey who argued that energy price controls could improve aggregate efficiency, as we argue in Krebs and Weber (2024) because energy market overreacted due to market-driven (endogenous) uncertainty.

one is more inclined to conclude that government "distortions" of the price system are never a good idea.

To put this policy debate into perspective, consider the rise in gas prices depicted in figure 1. In the seven-month period from February 2022 until August 2022 the market price more than tripled, and compared to February 2021 the market price increased by a factor fifteen. The majority of economists considered this dramatic rise fully justified resisting any policy that would dampen the price hike and therefore "distort" market signals. Put differently, the market is always right, even in a crisis situation. In contrast, a few economists proposed early on a price cap to dampen the price increase for households and firms. See, for example, Dullien and Weber (2022) for Germany and Stiglitz (2022) in general. As we show in Krebs and Weber (2024), such price controls are optimal and improve aggregate efficiency if energy market overreact to fundamental shocks due to endogenous (market-driven) uncertainty. In other words, the market gets it wrong if animal spirit drives market prices in a crisis situation.

In Germany, the general rejection of price controls by mainstream economists and the policy establishment affected policy making negatively in two way. First, it lent credibility to the political resistance of the neoliberal FDP, which played a large role in the very costly delay of the implementation of the German energy price brake. We discuss the delay and its political consequences in the subsection below. Second, the energy price brake the German government finally implemented has a crucial design flaw that rendered it an ineffective instrument for protecting the German manufacturing sector. We detail this episode next.

After months of hesitation, the German government finally announced the introduction of energy price controls for end users, the so-called energy price brake, on September 29th, 2022 (Bundesregierung, 2022). The design of the energy price brake was delegated to a commission of experts. Even though the explicit request of the German government was to design a price dampening measure, most economists on the commission fiercely opposed anything that would amount to a non-linear pricing scheme that is a defining feature of any proper price-cap as initially proposed by Dullien and Weber (2022) for Germany and Stiglitz (2022) in general. In the end, the proposal of the commission, which was adopted by the German government, was a compromise of the opposing views (Expert Commission, 2022).[19]

The German energy price cap distinguished between private households including very small business and industrial energy users. For private households, the commission's proposal had a non-linear pricing feature, but the subsidy to implement the gas price cap was paid as a rebate on gas bills and the payment was conditioned on past use of energy.[20] Clearly, most people in Germany did not notice the difference between price controls with and without non-linearities, and the German government did not include this nuance explicitly in its

[19] See Krebs and Weber (2024) for an analysis of the different versions of energy price controls that were discussed during the energy crisis in Germany and Europe.

[20] This approach was the only feasible procedure given the constraints in billing systems of German gas companies, but also the preferred option of economists who were primarily concerned with preserving price signals. Note, however, that the German energy price brake still has a non-linear feature since gas bills were not allowed to be negative. See Krebs and Weber (2024) for a detailed discussion of the German energy price brake.

public communication.[21] However, market fundamentalists cared very deeply about the issue, and this by itself is very telling. For example, several economic members of the commission always insisted that the German energy price brake was really nothing else but lump-sum transfer payments (Bayer et al., 2022b, Grimm, 2022a). In addition, prominent German economists publicly lectured anybody -- including Chancellor Olaf Scholz -- who might not share this interpretation of the German energy price brake (Bachmann, 2022; Moll, 2022).

The fiercest battle in the expert commission and public debate was over the design of the energy price brake for industrial users of natural gas. A minority view in the economics community argued that the energy price controls should be designed so that they give firms an incentive to continue producing (Krebs, 2022b; Weber 2022). In contrast, most German economists strongly opposed anything that would go beyond lump-sum transfer payments, including the majority of members of the commission charged with designing the energy price brake (Bayer et al., 2022a; Grimm, 2022b). This "majority view" meant that industrial users of energy would have receive large cash transfers independently of their production decision. More concretely, market fundamentalists proposed a so-called "hibernation premium" that would have the German government write cheques to internationally operating companies like BASF even if they put production at German plants on hold because of exploding energy prices. This scheme was explicitly meant to be applied indiscriminately across all sectors without any consideration for systemically important inputs and products, including for example pharmaceuticals, critical chemicals and basic materials where Germany is a key provider for Europe and the world in many of these sectors.

The hibernation scheme favored by market fundamentalists was seen as politically not palatable, but there was also no consensus for a simple energy subsidy scheme that would give manufacturing companies an incentive to continue producing. The outcome was therefore an unsatisfying compromise that did not correct the initial design flaw, but added several layers of complexity to prevent the worst. Specifically, industrial firms were allowed to sell the price-capped gas on the market at market prices (the "government cheque" turned speculative asset), but unions with the support of the industry association (BDI) added the condition that beneficiaries have to maintain a certain employment level in Germany. This clause was meant to correct the incentives to stop producing that the original scheme sought to achieve in the first place. The EU state-aid rules imposed additional restrictions that drastically reduced the amount of cash transfers an individual company could receive. Furthermore, environmental standards and limits to dividend and bonus-payments were added in the parliamentary process. In the end, the benefits of the program to most companies was too small to make it worthwhile the application. The outcome was a very low take-up rate and a tiny volume of program funding: The gas price brake paid out less than one billion euro (0.025 percent of GDP) to industrial companies, but more than 13

[21] Of course, industrial energy users did understand the difference and adjusted their production decision accordingly.

billion euro to private households and small businesses in 2022 and 2023 (Ifo, 2023; BMF, 2024a).

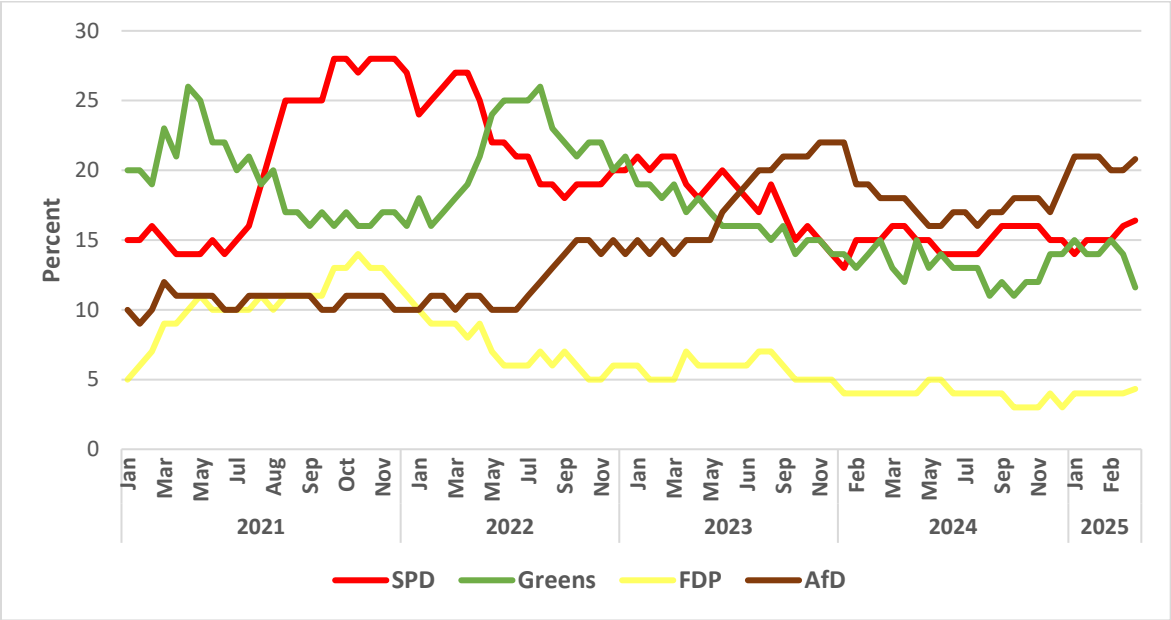
In sum, Germany implemented an effective gas price brake for households and non-industrial businesses, but it failed to protect the industrial core with properly designed energy price controls. By the end of 2023, the production of the energy intensive industry in Germany had decreased by more than 20% compared to 2021, a sharper decline than the one during the COVID-19 recession (Figure 1). While the US is experiencing an unprecedented expansion of the manufacturing industry, Germany's industrial output by the end of 2024 is down by 8 percent compared to 2021. This might well be the exodus and erosion of parts of Germany's industrial base.

Simulation analysis suggests that the economic costs of market fundamentalist are substantial: If Germany had implemented a well-designed energy price brake for its manufacturing sector in 2023, it could have avoided a recession in 2023 and its GDP could have been substantially higher in 2024 (Hinterlang et al., 2024). An effective energy price brake in combination with a large, investment-based fiscal package could have put the German economy on a green growth path in 2023 that would have resulted in a GDP level much higher than its actual value at the end of 2024. In addition, the hysteresis effects of the 2023 recession could have been avoided leading to much higher output in the long-run. These GDP losses, together with the real wages losses, represent the total economic costs of market fundamentalism in Germany.

3.4 The political costs of market fundamentalism: The rise of the AfD

The economic consequences of policy failure in Germany have been immense, but the political consequences are just as worrying. Consistent with the literature that links economic insecurity/uncertainty to the rise of populists' parties, we next argue that the approval rates for the far-right Alternative for Germany (AfD) strongly correlate with two policy decisions of the German government that increased economic uncertainty. The following figure shows the time development of the approval rating of the far-right AfD and the three governing parties, the SPD (Social Democratic Party), the Green Party (Gruene/Buendnis90), and the FDP (Free Democratic Party).

Figure 9. Public support for AfD (brown line) and of the Three-Party Coalition Government



Note. Results of surveys conducted by the social science institute „Forschungsgruppe Wahlen". Survey results are used by the public television channel ZDF in their so-called „Politbarometer". Question asked: „Which party would you vote for if there were an election next Sunday". Data points for February 2025 are the election results.

Figure 9 provides support for the hypothesis that the rise of far-right parties in Europe is tightly linked with increases in economic insecurity combined with a failure of government to provide an adequate policy response due to fiscal restraints.[22] Specifically, there are two episodes in which the AfD's approval rating went up strongly, the period July to October 2022 and the period May 2023 to July 2023, and these two periods coincided with two events in which the German government failed to react decisively to rising economic turmoil.

First, by June 2022 the market price of natural gas had risen more than tenfold compared to spring 2021 (see figure 1) and electricity prices had dramatically increased as well, but the German government hesitated to introduce energy price controls that could provide some sense of security to households and companies.[23] They opted instead for one-off cash transfers and tax breaks, which provided important financial relieve for the majority of households depending on wage incomes (Dullien et al., 2022). But such one-off financial compensation, unlike a price intervention, did not provide insurance against the enormous uncertainty caused by rapidly increasing energy costs. The risk of unprecedented price volatility continued to be borne by households. By the summer of 2022, many families in Germany realized that energy costs could eat up a large fraction of their income during the

[22] See, for example, Fetzer (2019) and Gabriel, Klein, and Pessoa (2023). See also Gold (2022) and Rodrik (2020) for surveys, and Scheiring et al (2024) for a meta-analysis. Our argument is also in line with surveys that show that AfD voters have been much more concerned about indicators of economic insecurity (rising prices, general economic future, own economic future) than voters of other parties (Hövermann, 2023).

[23] In addition, for a long time the German government blocked any European agreement on price caps for natural gas purchases, but it was mainly the lack of decisive national policy that helped the AfD gain support.

upcoming heating season. However, instead of protecting households against energy cost shocks, the German government even contemplated introducing an additional levy on the price of gas following the policy recommendation of mainstream economists (Bachmann et al., 2022).

Towards the end of the summer 2022, discontent with the government's policy on the price front was rising, but no solution was in sight. The main political stumbling block to the introduction of energy price controls at that time was the neoliberal government party, FDP, and their finance minister, Christian Lindner, who objected to such an intervention on grounds of economic principle – the government distortion of price signals is always a bad policy according to market fundamentalism. Indeed, on September 3th, 2022, the German government still proposed a (third) fiscal package that did not contain a cap on energy prices (BMF 2022a). After mounting public pressure, the German government backtracked and finally announced on September 29, 2022, a large fiscal package with an energy price brake (Doppel-Wumms), which was turned into law in December 2022 (Bundesregierung, 2022). This was a 180 degree turnaround from the gas price levy policy that was the focus of the public debate in the summer: The government now pledged to protect all households and citizens against the price shock. Approval ratings for the AfD stopped climbing in October 2022, while the SPD could gain somewhat.

The second surge in AfD approval happened in the period May 2023 to July 2023. It is closely linked to the attempt of the German government to push through its ambitious climate agenda while at the same time tightening fiscal policy. As shown above, fiscal tightening in 2023 was a political decision that pushed through by a neoliberal finance minister, Christian Lindner, who used market fundamentalist arguments to justify fiscal austerity in the middle of a recession. Despite these fiscal restraints, vice chancellor Robert Habeck started his campaign to make the building sector climate neutral by removing oil- and gas-based heating systems in spring 2023 (Krebs, 2024). However, there was no additional funding to support those private households who faced huge financial costs of making their homes climate neutral. In other words, it was the demand for fiscal restraint (Lindner, 2023a,b) in a time of economic turmoil that was feeding popular discontent helping the far-right party AfD. Needless to say, the policy advice given by German mainstream economists at that time was of little help since they mainly suggested to increase the carbon price (Edenhofer, 2023, Grimm, 2022), which would make heating with oil and natural gas even more costly.

Figure 9 also shows that the decline of the Social Democratic Party (SPD) in the approval rating is the mirror image of the rise of the AfD. This does not come as a surprise since Chancellor Olaf Scholz is a member of the SPD and any perceived failure of him to act decisively in a crisis situation leads to a plunge in his party's approval rating. Figure 9 also shows that the Green party experienced a substantial, but short-lived rise in popularity in 2022. This rise and fall was mainly driven by the somewhat bellicose, moral stance of some Green ministers and prominent Green politicians on the war in Ukraine, which initially was highly popular in Germany, but lost its appeal when the realities of the war in Ukraine and the economic consequences for Germany became clear. Finally, we can see from Figure 9 that the FDP steadily lost support until the approval rating hit around 4 to 5 percent and was voted out of parliament with 4.3 percent in the February 2025 election. This is a regular

pattern whenever the neoliberal FDP governs, and it should not be a surprise: Any political party that is based on the principles of market fundamentalism will fail miserably when called to govern since its political platform is an economic fairy-tale that bears little resemblance to economic and social reality.

We stress that we do not claim that economic factors alone can explain the rise of far-right parties in Europe. Clearly, both economic factors and „cultural“ (and social) factors are important determinants, and the two factors often interact. In addition, the public discontent caused by the failure of the government to deal with economic insecurity adequately can strengthen the support for any party that manage to provide a platform for the voter dissatisfaction caused by economic insecurity (not necessarily a right-wing party).

The political development from December 2023 to early summer 2024 is an example of non-economic factors driving major changes. After the ruling of the constitutional court in November 2023, which declared the fiscal plan of the German government to be unconstitutional (i.e. not in line with the constitutionally enshrined debt brake), there was an intensive public debate about further spending cuts and large resistance against these cuts. And while the approval rate for the AfD further increased in December 2023, they took a nose dive in January 2024 and continued to decline until early summer 2024 (figure 9). This loss in public support can be explained by two events that both happened in January 2024. First, Germany witnessed a very public discussion of the racist political agenda of the AfD and its proximity to neo-Nazi groups, which resulted in a large number of public protests against the AfD with millions of participants nationwide. Second, in January 2024 a new, populist party on the left entered the public arena (BSW), which is spearheaded by a charismatic politician (Sarah Wagenknecht), and immediately attracted the support of people that feel disenfranchised and previously voted for the AfD (Seikel and Emmler, 2024).

A further example of non-economic factors driving the support for far-right parties is the strengthening of the AfD approval ratings that started in the summer of 2024 and ended with the election in February 2025. This final surge in AfD approval can be traced back to the fear of voters of far-right parties that mass migration would bring higher crime rates. Specifically, a number of high-profile knife attacks with deadly outcomes by (former) refugees in Mannheim (May 2024), Solingen (August 2024), and Aschaffenburg (January 2025) led to an intensification of the migration debate, which played into the hands of the AfD for two reasons. First, AfD politicians could point to these and other publicly debated cases as proof that they had correctly assessed the risk of migration. Second, in response to the public debate mainstream parties adopted a more rigid stance on migration policy that were almost indistinguishable from previous policy proposals by the AfD, which boosted their political standing. These developments are in line with recent empirical research that shows that such “accommodation” by mainstream parties often help the far-right parties (Krause, Cohen, and Abou-Chadi, 2023).

4. Conclusion

This paper argues that the recent energy crisis in Germany provides a test of the market-fundamentalist theory of green transformation. The theory failed this test since it is inconsistent with the behavior of key macroeconomic variables during the crisis contradicts. The paper also details how mainstream economists and the policy establishment held on to their belief in self-regulating markets despite the empirical failure of market fundamentalism, which led to policy mistakes with large economic and political costs. Policy making based on market fundamentalism caused substantial damage to Germany's economy and helped the far-right Alternative for Germany (AfD) double its political support.

One main insight that follows from our analysis is that a successful green transformation of the economy requires governments to give up market fundamentalism. A successful transformation requires a state-led approach with a new economic policy playbook that includes green industrial policy and unconventional policy instruments like price controls. We leave it to future research to spell out the main components of green transformation policy that avoids the policy mistakes made by the German government.

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