

Germany without Russian Gas

From „What if?“ over „How it can be done.“
to „How it was done!“ with basic economics

Christian Bayer
Universität of Bonn

EEA-ESEM 2023

August 2023

Four policy pieces in 20 minutes



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Policy Brief No. 028

What if? The Economic Effects for Germany of a Stop of Energy Imports from Russia

Rüdiger Bachmann
Moritz Kuhn
Andreas Peichl

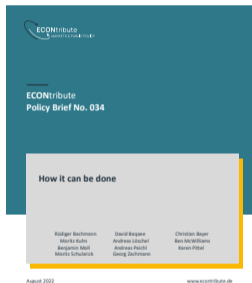
David Baqaee
Andreas Löschel
Karen Pitel

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Benjamin Moll
Moritz Schularick

March 2022 www.econtribute.de



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How it can be done

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ExpertInnen-Kommission Gas und Wärme

Sicher durch den Winter
Zwischenbericht

Berlin, 10.10.2022



DIW Berlin: Politikberatung kompakt

Christian Bager¹, Alexander Kierulch^{2,3}, Fabian Seyrich², und Antonia Vogel³

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makroökonomische Effekte der finanz- und wirtschaftspolitischen Maßnahmen der
Energiepaketts I – II sowie des wirtschaftlichen Abwärtstrends.
12. Mai 2022

Background: huge debate after Russian invasion of Ukraine

manager magazin

Money for Russian gas imports

660 million euros a day – this is how we finance Putin's war



Gas from Russia: For President Putin, gas exports are currently the most important source of foreign exchange Photo: Dmitry Lovetsky / dpa

Bild HOME PAGE NEWS POLITICS REGIONAL ENTERTAINMENT SPORTS FIFA WORLD CUP 2022 STYLE COUNSELOR AUTOMOBILE DIGITAL GAMES DEAL

Putin is swimming in our money

embargo debate

BASF boss warns of destruction of the "entire economy"

Oil and gas are central to the chemical industry. Should their imports from Russia be stopped, BASF boss Martin Brudemüller predicts the "worst crisis since the end of the Second World War".



What things looked like for Germany in March 2022

	Oil	Gas	Coal	Nuclear	Renew.	Rest	Total
TWh	1077	905	606	209	545	45	3387
%	31.8	26.7	17.9	6.2	16.1	1.3	100
of which Russia	34%	55%	26%	0%	0%	0%	30%

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Oil and coal have **global market**

Gas trickier due to pipeline network, limited LNG supplies \Rightarrow **focus on gas**

- our estimate back then: **gas demand needs to drop by 30%** (August update: 25%)

Consumption of gas (also = imports): \approx 1% of GNE

- small number but **energy = critical input** \Rightarrow amplification important

Objectives and results of March 2022 paper

Assess consequences for Germany of cut-off from Russian energy imports

- either embargo by Germany/EU
- or stop of deliveries by Russia

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Get sense of rough magnitudes of losses relative to “do nothing” baseline

1. Small GDP decline, say 0.5-1%, perhaps not even a recession?
2. Like Covid = 4.5% decline in German GDP?
3. Like Spain or Portugal during Euro crisis (5.1% & 7%)?
4. “Mass unemployment and poverty” so perhaps like Great Depression?

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Our assessment back in March: **GDP decline between 0.5% and 3%**

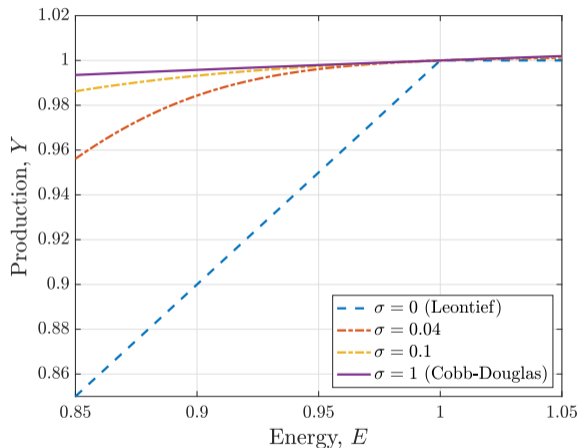
- Import stop likely somewhat less severe than Covid recession
- Key mechanism: **substitution** of gas and gas-intensive inputs

Simplest Model

$$Y = \left[\alpha^{\frac{1}{\sigma}} \text{Gas}^{\frac{\sigma-1}{\sigma}} + (1 - \alpha)^{\frac{1}{\sigma}} (\text{Other Inputs})^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}}$$

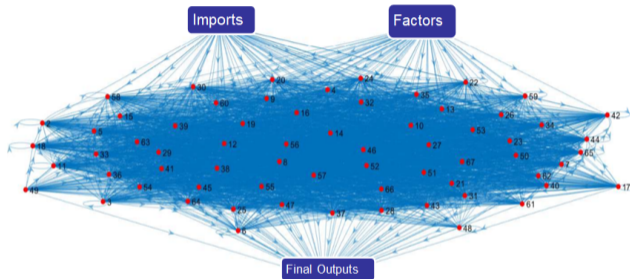
- Gas has small expenditure share, but substitution elasticity might be small

Output losses for different elasticities of substitution



- Leontief \Rightarrow total production drops one-for-one with gas usage
- Even with very low σ output losses potentially far from Leontief

The worry: „cascading effects“ along supply chain



„Engineering view“: The world is Leontieff (in the short run)

Key prediction: Leontief \Rightarrow total production drops one-for-one with gas usage

- if true, should have seen a 20-30% drop in industrial production

Modeling „cascading effects“: Baqaee-Farhi model

- Input-Output linkages allow for spill-overs \Rightarrow larger economic costs
- But: multi country \Rightarrow import energy-intensive products instead of energy
 - ammonia
 - basic chemicals
 - raw metals

What did we predict back in March?

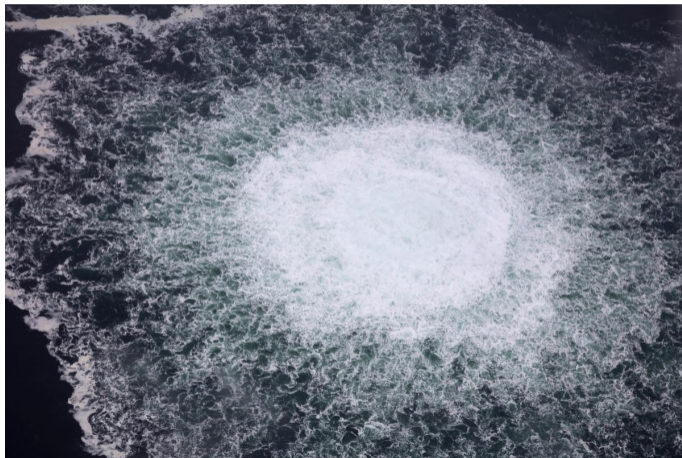
	Baqae-Farhi suff. statistic	Baqae-Farhi simulation	Simplest model 10% energy ↓	Simplest model 30% gas ↓
GNE Loss, in %	< 1	< 0.3	1.5	2.3
As % of GDP	< 1	< 0.3	1.3	2.2

- All models use conservative elasticity estimates
- Simplest model (= production fn) abstracts from trade & network: **larger effect**
- The cost statements are in terms of GNE
- Some mechanisms left out ⇒ round up headline to 3% (“safety margin”)

In the meantime Germany kept importing gas (at low contracted prices)

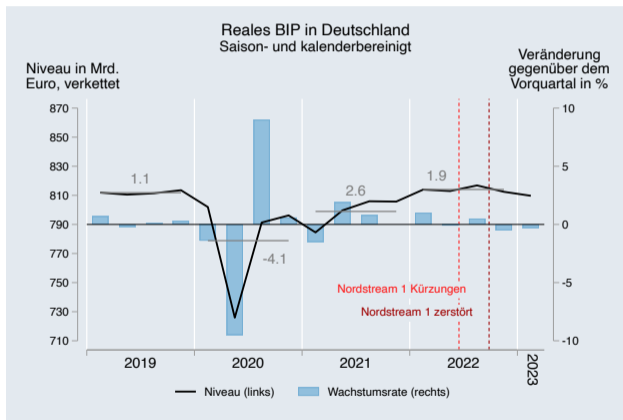
In the meantime Germany kept importing gas (at low contracted prices)

but then ...



and Gas consumption had to go down by 20% (and did).

What happened? Destruction of economy? Worst crisis since end of WWII?

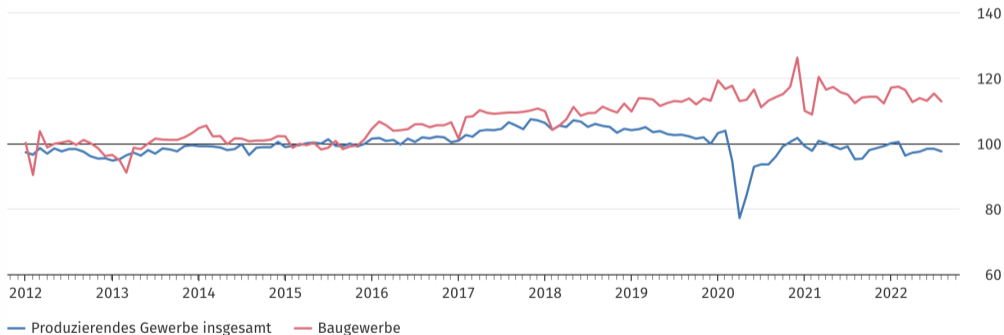


Instead: a **mini recession**. Two last quarters: GDP ↓ by 0.5% and 0.3%.

But is the drop in consumption visible nowhere?

Produktion für das Produzierende Gewerbe

Index 2015 = 100; Kalender- und saisonbereinigt (X13 JDemetra+)

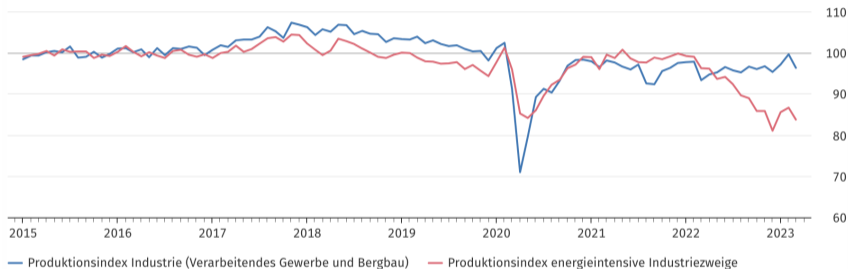


© Statistisches Bundesamt (Destatis), 2022

Cuts in energy-intensive sectors but decoupling from rest

Produktionsentwicklung in energieintensiven Industriezweigen

2015 = 100



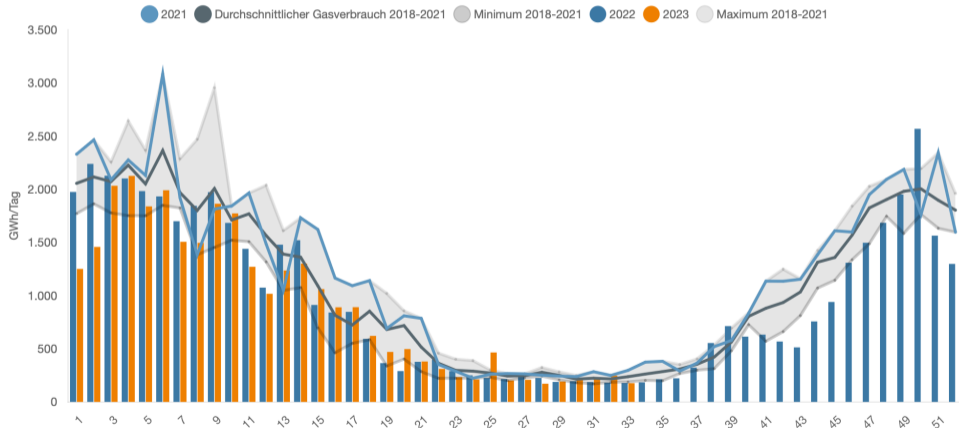
Saisonbereinigt nach dem Verfahren X13JDemetra+.

© Statistisches Bundesamt (Destatis), 2023

Exactly what the model with trade had predicted: The trade linkages worked and imports of energy-intensive goods went up. The economy substituted.

Gas consumption by households: large demand reduction

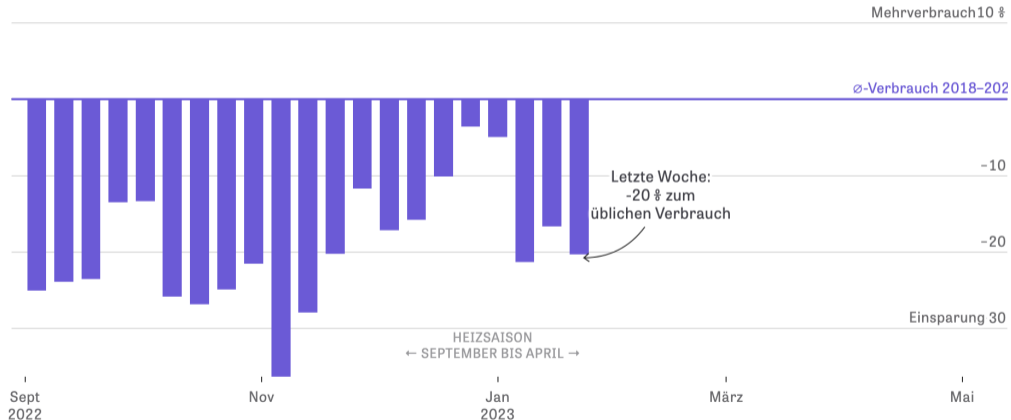
Gasverbrauch Haushalts- und Gewerbekunden, wöchentlicher Mittelwert



... true even when controlling for temperature

So viel Gas sparen die Haushalte

Abweichung vom üblichen Verbrauch bei vergleichbarer Temperatur



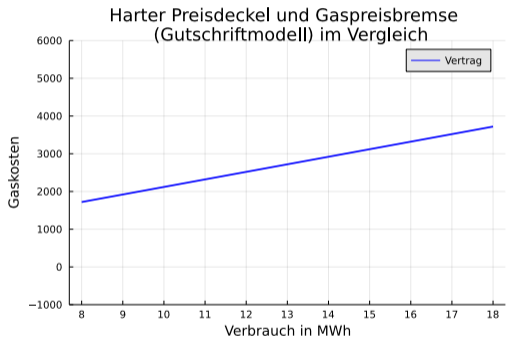
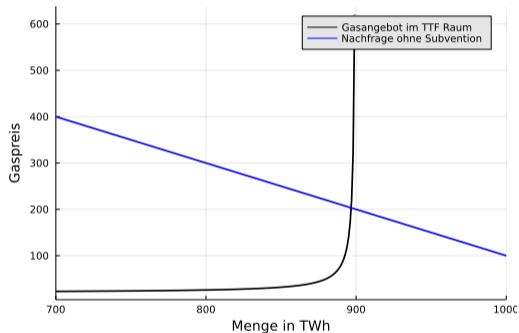
Zuletzt aktualisiert: 27. Januar 2023

Quelle: BNetzA, DWD, BDEW, ZEIT ONLINE

Policies to support households in face of skyrocketing energy prices

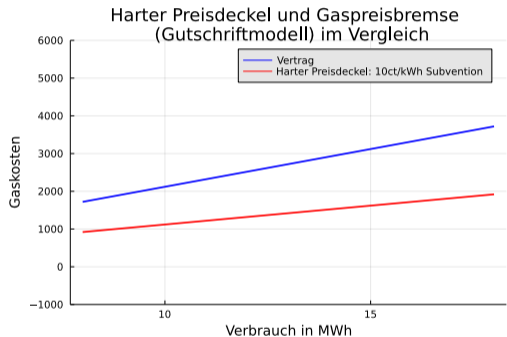
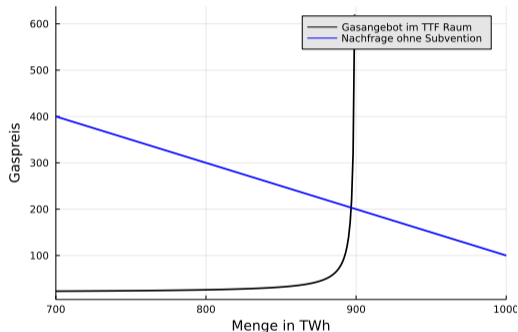
- Crucial to support households, especially economically weaker ones
- Policy: do this by means of transfers that are not directly tied to gas consumption and that preserve incentives for reducing gas demand
- German „gas cost break“
 - importantly, not price subsidy / cap but **lump-sum transfers**
 - compensation based on historical consumption (as suggested in our „what if“ and „how it can be done“ papers)
- Rising gas prices have income and substitution effects
 - income effect is the enemy but substitution effect is our friend
 - German model targets income effect but leaves subst. effect intact

Any attempt to subsidize gas prices will fail (at the EU level)



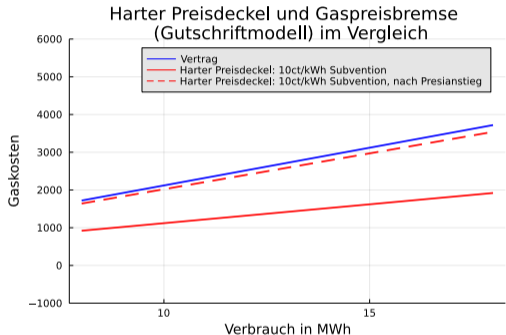
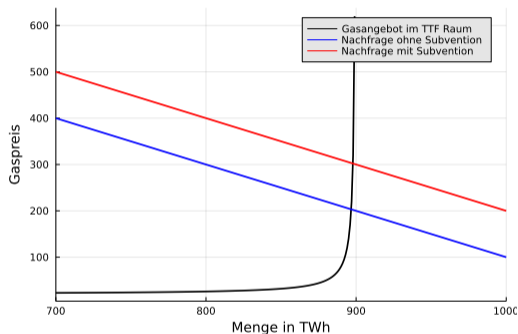
demand meets inelastic supply

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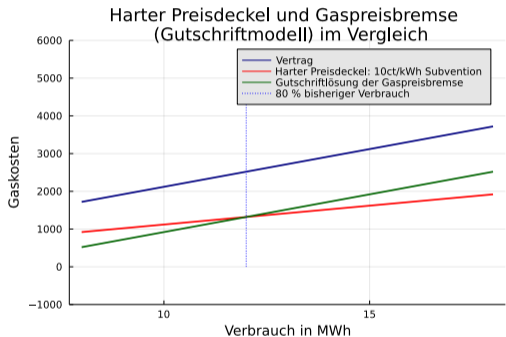
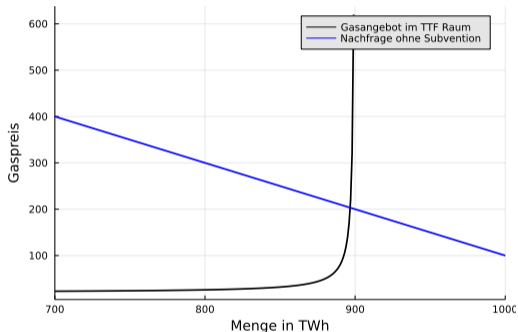
A subsidy of 10 ct/kWh

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**But that increases demand.
Higher prices eat up the subsidy!**

Trying to ease the burdens on households but not



Gas price brake brings costs down — without demand stimulus

Well, this was not the only thing the German government did ...

Well, this was not the only thing the German government did ... I

Measures	2022	2023	2024	2025	2026	sum
I. Relief package („10 relief steps for our country“)	13.0	8.8	10.1	7.8	4.7	44.4
Abolition of the EEG levy as early as July 1, 2022	6,6					6,6
Increase in the employee lump sum for income tax by €200 to €1200	1,7	1,3	1,2	1,2	1,2	6,6
Increase of the basic personal allowance for income tax by €363 to €10,347	2.7	3.1	3.1	3.2	15.2	
Bring forward the increase in the flat rate for long-distance commuters adopted as of January 1, 2024		0.3	0.3	0.1		0.7
One-time payment for recipients of transfer benefits in the amount of 100 €	0.6			0.6		
Immediate supplement for children affected by poverty	0.4	0.8	0.8	0.8	0.8	3.6
Support for low-wage workers through minimum wage increase and changes to marginal employment	-0.1	-0.3	-0.1	-0.1	-0.1	-0.7
Fourth Corona Tax Relief Act	-0.2	-3.6	-4.8	-2.7	-0.4	-10.9
Extension of special regulations on short-time allowance until June 30, 2022	0.5				0.5	
Heating allowance for lower-income households and individuals	0.4				0.4	
II. relief package (“Federal package of measures to deal with high energy costs”)	18.2	0.0	-0.1	0.0	0.0	18.1
One-time payment of flat-rate energy allowance	10.1	0.3			10.4	
One-time bonus on top of child benefit in the amount of 100 €	1.8	-0.3	-0.1		1.4	
One-time payment for recipients of transfer benefits and for recipients of unemployment benefit I in the amount of 100 €	0.6				0.6	
in each case Reduction in energy tax on fuels for three months	3.2				3.2	
Temporary reduced-price ticket for local public transport (€9/month for 90 days of public transport)	2.5				2.5	

Well, this was not the only thing the German government did ... II

III. relief package ("Package of federal measures to secure an affordable energy supply and strengthen incomes").	13,4	49,8	53,5	51,1	48,9	216,7
Relief in the CO2 price (postponement by one year of the €5 per tonne increase in the CO2 price in fuel emissions trading due on January 1, 2023)		1.5	2.9	2.8		7.2
Saving CO2 emissions in the transport sector (Additional funds in the budget of the BMDV)		0.5			0.5	
One-off payment for pensioners (energy price flat rate of €300 as of December 1, 2022)		6.3	0.1		6.4	
Relief for students (one-off payment of €200)		0.7			0.7	
Extension of housing allowance entitlement, introduction of a heating cost and climate component, and increase in the maximum amount of the child allowance to €250 per month from January 1, 2023 (housing allowance reform effective January 1, 2023)		3.1	2.7	3.1	2.7	11.6
Heating cost allowance II to housing benefit recipients	0.6					0.6
Introduction of citizen's allowance as of January 1, 2023 (incl. increase to about €500 and increased allowances)		4.8	5.1	5.4	5.9	21.2
Raising the maximum limit for employment in the transitional sector (midi-job) to €2,000 per month from January 1, 2023		0.8	0.8	0.8	3.2	
Inflation Compensation Act (esp. to reduce cold progression and child benefit increase from January 1, 2023)		18.6	31.8	34.2	35.1	119.7
Concerted action and support for tariff policy (tax and social security contribution exemption of additional payments by companies to employees of up to €3,000)		0.6	0.4	0.2	0.0	1.2
Company aid		3.0	1.0			4.0
Peak compensation of energy-intensive companies (extension by one year)		1.7	0.0	0.0		1.7
Nationwide ticket for local public transport (successor to the €9 ticket)		3.0	3.0	3.0	12.0	
Extension of short-time allowance (beyond September 30, 2022)	0.1	0.0		0.1		
Restaurant sales tax (extending the reduction of the sales tax rate on meals to 7% through the end of 2023)		2.8	0.5		3.3	
Global food security (appropriations from possible budgetary residuals, budget reservation)		1.0				1.0

Well, this was not the only thing the German government did ... III

Abolition of so-called double taxation (full deductibility of pension contributions as of January 1, 2023)		2.9	1.9	0.2	0.0	5.0
Reduce gas sales tax to 7 % (temporary from October 2022 to March 2024)	2.4	7.7	3.3		13.4	
Deferring and improving the home office allowance (income tax deduction of €5 per home office day for up to 120 days per year)		1.1	1.4	1.4	3.9	
Total I. - III. relief package (without electricity and gas price brake)	44,6	58,6	63,5	58,9	53,6	279,2
IV. Economic shield against the consequences of the Russian war of aggression*.	35,1	121,2	25,0	7,0	7,0	195,3
Including:						
Financing of gas price brake	8.9	40.3	16.0		65.2	
Liquidity and subsidies for the electricity price brake		43.0	-2.0		41.0	
Financing of further support measures and compensation payments	1.0	18.3	8.0	1.0		28.3

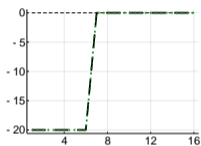
What does a model say?

Bayer, Kriwoluzky, Seyrich, Vogel (2023) - DIW report for the German Ministry of Finance

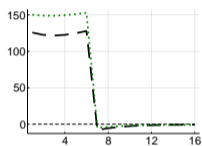
- HANK Model: Incomplete Markets, Income Risk, Two Assets
- Two large open economies in a monetary union (modelled to Germany and Italy) (Bayer, Kriwoluzky, Müller, Seyrich, 2023)
- **New** to the HANK Literature: **heterogeneity in energy intensity**
- Energy in production, treat gas and electricity separately.

Macroeffects

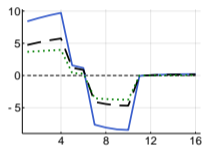
(a) Energy supply



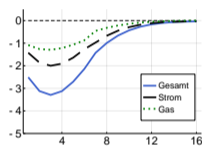
(b) Energy price



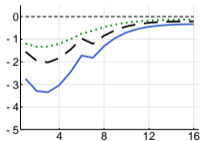
(c) Inflation



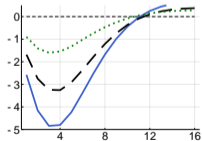
(d) Output



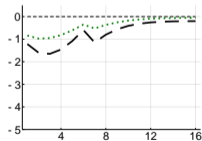
(e) Consumption



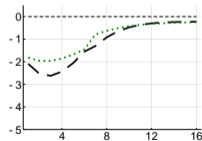
(f) Investment



(g) C of low e-type



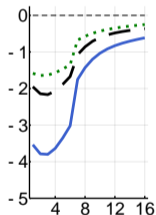
(h) C of high e-type



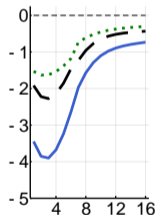
Distributional Effects

Consumption change

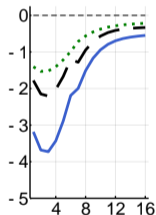
(a) 1st Quintile



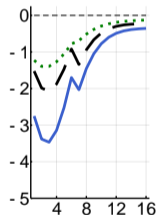
(b) 2nd Quintile



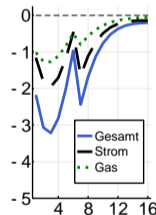
(c) 3rd Quintile



(d) 4th Quintile



(e) 5th Quintile

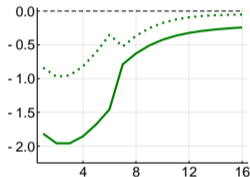


- The energy price hike (without relief) hits poor households the hardest

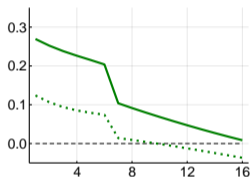
Horizontal equity: Consumption drop by e-type

Abbildung: Effect on consumption by e-type

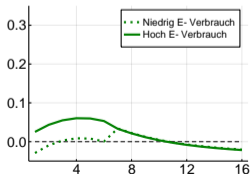
(a) Gas crisis w/o measures



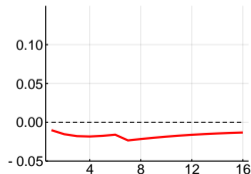
(b) targeted lump-sum transfer



(c) Subsidies (VAT cut)



(d) Effects on Italian Consumption

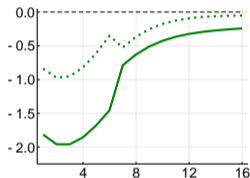


- Energy-intensive households far more affected.
- Since average costs are not reduced to status quo ante:
 - only 1/4 of the difference is closed.
- Little negative spillovers: substitution works.
- Subsidies work worse.

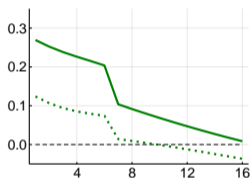
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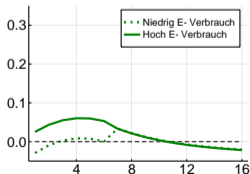
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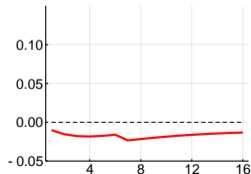
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- **Maybe something to take away for carbon tax-and-rebate policies?**