Gas price liberalization: Impact assessment with a multi-sector multi-household model of the Russian Federation

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Abstract: In this paper we employ a novel multi-regional, multi-sector and multi-household computable general equilibrium (CGE) model of the Russian Federation to study the effects of gas price liberalization. We find that deregulating natural gas pricing can lead to a significant improvement in energy efficiency, if prices are gradually increased for both consumers and industries alike. Rising consumer prices only will leave economy-wide energy efficiency virtually unchanged in 2015 in comparison to "doing-nothing case". Moreover, the latter is a regressive policy. We conclude that gas price liberalisation can bring Russia on a substantially more sustainable path in terms of improved energy efficiency and reduced CO_2 emissions. This, however, only if industrial producers will advance in terms of energetic modernisation incentivized by proper set price signals.

Keywords: Regional general equilibrium model, sustainable development, natural gas pricing, Russia

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1 Introduction

Beyond the horizon of the current political upheaval, one of the grand challenges which are faced by Russia is to ultimately liberalize its energy markets, in particular the gas market. Today, Russia has the largest gas reserves in the world and currently produces around 550 billion cubic meters of gas each year. Sixty percent of the production is sold domestically at prices below long term marginal cost, for households and for industrial producers. The pricing of natural gas is currently a hot topic in Russia, as the Russian government proposes to liberalize the regulated domestic market price and decrease subsidies for natural gas products. This is claimed to fit in a policy promoting energy efficiency, increasing investments in natural gas production and bringing the natural gas price on the domestic market closer to long term cost recovery. The elimination of "dual-pricing" has also been discussed in the context of Russian accession to WTO. In this paper we study economic and social impacts of an upward correction of the natural gas price in Russian regions, raising the question of its political feasibility and environmental effectiveness. This issue that has not yet attracted much attention in the literature but it is of immense importance for Russia's development in the near- and mid-term perspective.

Underpricing of natural gas at the domestic markets was already an explicit feature of the Soviet era. Low gas prices were motivated from a political and economic perspective, stating that industrial growth could only be sufficiently maintained with cheap prices for natural resources and large state subsidies. In the post-Soviet period, domestic gas prices were kept at relatively low levels, though by 2006 this strategy had become increasingly untenable in the light of Gasprom's investment needs into new extraction fields and a desire to "green-up" the economy. The target of reaching parity with the European export netback price by 2011 for domestic gas prices was set by Putin in November 2006. As a result, prices for gas have been rising gradually over the last five years, but they are not yet recovering long term marginal cost and do not reflect the current international market prices. In fact, the domestic gas prices remained in 2011 as far from netback parity as they have ever been in 2006, an outcome which is largely determined by sharp increase of oil prices to which long-term contract gas prices in Europe are linked (Henderson, 2011). The current legislature calls for a change of strategy with respect of reaching parity and proposes to index the price of all energy sources to the level of inflation, but allow Gazprom to increase domestic gas prices at 10-15% each year (at double of the inflation rate), starting 2011.

Ongoing discussion on gas price liberalisation is closely related to the concern of the poor energy efficiency of the Russian economy. Over the last few years, the issue of energy efficiency improvement increasingly demanded attention. The Russian government started introducing a mix of structural policies to limit the energy consumption and to reduce GHG emissions while favouring longer-term growth of an economy and safeguarding competitiveness in the key industrial sectors. Despite some progress over the last two decades, the country is still among world's most intensive users of energy, while low energy intensity is endemic in every sector of economy. The heavy industry in particular has inherited an energy-inefficient and carbon-intensive production plants from the Soviet time, while the shortage of natural gas and electricity supplies to the industry become an factor determining "the limits of growth" in Russia in the 2000s (Bashmakov et al. 2008). The economic crisis 2007-2009 has even more disclosed the vulnerability of the "low-energy-efficiency" approach in the industrial landscape of both countries.

While the issue of raising gas prices has tangible implications for country's energy efficiency targets, the policy debate misses a comprehensive quantitative analysis of policy proposals. In the assessment of gas market reforms, the bulk of the research is skewed towards an export-driven perspective. Tsygankova M.A (2009) touches on the subject of dual pricing, claiming that equaling the price of gas on the European market and the domestic market, correcting for transportation costs and transfers would be necessary to avoid gas shortages in the future. Stern (2011) argues that Europe could find itself in competition for gas supplies with the Russian domestic and the CIS markets. There is a limited number of publications focusing on the domestic markets implications, most notably on social aspects. Estimating the long run marginal cost (LRMC) of gas production, Rutherford and Tarr (2003) concluded that the price on the Russian domestic market should be increased to full cost recovery, but not higher to avoid social inequality. Dudek et al. (2006) argue that dual pricing of natural gas remains the most efficient environmental policy for Russia as it prevents from an increase of coal combustion in existing facilities.

Neither of these studies investigated all relevant trade-offs pertaining gas price increases at the domestic market, including the social and environmental implications. Our paper provides an impact assessment of gas price increases to illustrate potential pitfalls of alternative policy reforms. Based on quantitative simulations with a computable-general equilibrium model of Russia, we compare several scenarios of differential gas pricing strategies, simulating increases in price for industrial and private consumers at different annual growth rates, with a time horizon from 2012 until 2020. We find that deregulating natural gas pricing can lead to a significant improvement in energy efficiency, if prices are gradually increased for both consumers and industries alike. We show that increasing the consumer price of gas is indeed a regressive policy, but can be compensated for by the government. A policy of deregulation, by allowing Gazprom to act as a real monopoly on the domestic market is both negative for consumer welfare and social equality.

The remainder of the paper is structured as follows. Section 2 describes our model for quantitative assessment, highlighting the model structure and data issues. Section 3 describes policy simulation runs. Section 4 presents our findings. Section 5 concludes.

2 Model for quantitative impact assessment

To quantify the economic, social and environmental implications of gas price increases, we make use of a regional multi-sector, multi-household computable general equilibrium (CGE) model of the Russian Federation. This model belongs to the group of spatial CGE (SCGE) models, applying a mix of conventional modelling techniques used in standard computable general equilibrium models on regional level. SCGE models typically are comparative static equilibrium models of interregional trade and location based in microeconomics, using utility and production functions with substitution between inputs.

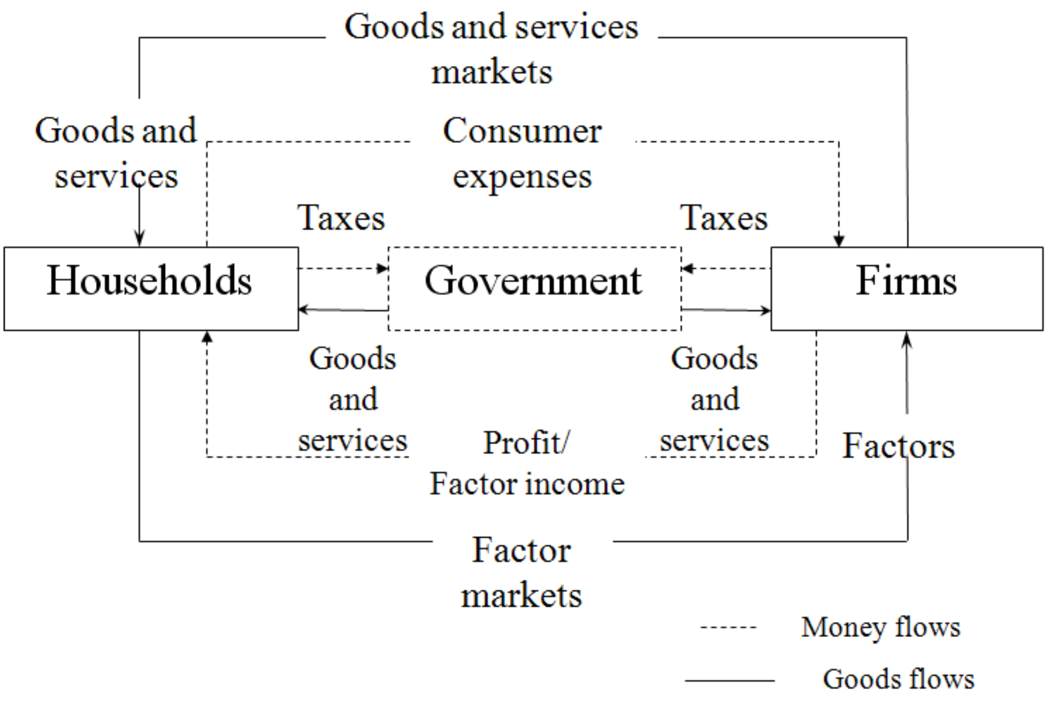
The model dimensions are a prerequisite to track sectoral, distributional, regional and economy-wide implications related to the gas price increases. Russia is represented by 7 federal districts (Central, North Western, South, Volga Basin, Ural, Siberian and Far Eastern) which are linked by interregional trade flows, a federal government level and migration. Beyond an appropriate sectoral disaggregation, a multi-household setting (3 types of households with low, medium and high income) is indispensable for the economic impact analysis of price liberalisation on the gas market.

Section 2.1 provides a non-technical overview of the basic CGE model structure adopted for our impact analysis of gas price increases in Russia, while section 3.2 lays out the data used for empirical parameterisation.

2.1 Model structure

Figure 1 provides a diagrammatic structure of the static multi-sector, multi-region CGE model of the Russian Federation applied for our numerical analysis. Households in each federal district are endowed with four primary factors: tree types of labour – low, medium and high skilled labour – and capital. Labour and capital are assumed to be intersectorally and regionally mobile.

Figure 1: Stylized representation of the model structure



The behaviour of the production sectors is based on the profit-maximization principle and is captured by the behaviour of the representative firm. At each time period, the instantaneous behaviour of the sectors is based on the minimization of the production costs for a given output level under the sector's technological constraint. The production technology of the sector is represented by three-level nested Constant Elasticity of Substitution (CES) functions which allow for the different degree of substitutability between the production inputs. At the top level of the CES function sectors can substitute between intermediate inputs and an aggregate capital-labour-energy bundle. At the second nest firms can substitute between a value-added composite of capital and labour and the energy aggregate. At the lowest nests they substitute between the use of different energy types within the energy composite and between capital and labour within a value-added composite.

Final consumption is determined by regional representative households who maximise the utility level under the budget constraints. It is assumed that the utility of households is separable in consumption and leisure. Total income of representative households consists of net factor income, unemployment benefits and other transfers such as pensions from the federal government. Consumption demand for commodities is captured by Stone-Geary utility function

Bilateral trade of Russian regions with the rest of the world (ROW) is modelled following the Armington approach of product heterogeneity, that is domestic and foreign goods are distinguished by origin (Armington 1969). Domestic production is split between input to the formation of the Armington composite and exports to other regions, thereby we do explicitly account for the existence of trade margins on exports. The model includes the trade balance constraint, according to which the value of the country's exports plus the governmental transfers to the rest of the world are equal to the value of the country's imports. Similar to the international trade part, we assume heterogeneity between the goods and services produced in different federal districts. The substitution possibilities between the commodities produced in different regions are described by the CES production function.

The model incorporates the representation of the federal and regional governments. The governmental sector collects taxes, pays subsidies and makes transfers to households, production sectors and to the rest of the world. Each government gets two types of income: tax revenues from the economic agents within the regions under its jurisdiction and income from inter government transfers. The federal and regional governments consume a number of commodities and services, where the optimal governmental demand is determined according to the maximization of the governmental consumption Cobb-Douglas utility function.

Emissions of CO_2 are linked in fixed proportions to the use of fossil fuels. Carbon coefficients are therefore differentiated by the specific carbon content of fuels. Abatement of CO_2 takes place by inter-fuel switching and energy savings (either by substitution with labour and capital or by a scale reduction of production and final demand activities).

Finally, we do capture the market imperfections in our modelling framework. Firms can operate under economies of scale in markets with monopolistic competition of the Dixit-Stiglitz (1977) which gives individual firms a certain monopolistic power over the consumers. Moreover, there is unemployment which is modeled according to a simplified wage curve, i.e. households reduce or increase their participation on the labour market, depending on the real market wage.

2.2 Data

Our model is based on the most recent consistent accounts of regional and sector-specific production, consumption, interregional and international bilateral trade and energy flows in the Russian Federation for the year 2006. Table 1 in the Appendix summarises the regional, sectoral and factor aggregation of the model.

The core of the model database is the symmetric input-output matrix created from the different sources by means of input-output estimation techniques, entropy minimization technique and the RAS method. Given the spatial nature of our model, the dataset is a multiregional social accounting matrix with regional SAMs representing economy of federal districts in the Russian Federation. All 7 regional SAMs (RSAMs) are interconnected by trade and income flows, while all RSAMs sum up to the country social accounting matrix (Figure 2 in the Appendix).

The social accounting matrix (SAM) for the year 2006 (Rosstat, 2009) builds a backbone of our dataset. But given its low level of sectoral disaggregation we used additionally the 1995 Russian symmetric input-output table (SIOT) and the Russian input-output table for 2003 published by Rosstat (2006) for the sectoral disaggregation purposes. Our database features rudimentarily initial tax levels which were complemented by the Rosstat publication (Rosstat, 2008) to estimate the level of social taxes.

Data on international trade of the Russian regions in 2006 was obtained from CEFIR's international trade database based on the Federal Customs database.

The main data sources for the construction of the social module are the public databases of *Rosstat*, a federal executive body discharging the functions of forming official statistical information, (Rosstat, 2006) and the micro-level household data from the Russia Longitudinal Monitoring Survey (RLMS, 2006). *Rosstat* provides data on population and population growth rates by federal districts which are drawn from the population censuses. *Russian Longitudinal Monitoring Survey* for the base year 2006 contains detailed information on household composition and labour market history of adult household members, as well as on household income and expenditures (RLMS, 2006). Started in 1994, RLMS is a nationally representative panel survey covering approximately 4,000 households (RLMS, 2006). We define skills of labour force on the base of one-digit International Standard Classification of Occupations (ISCO). The detailed description of skill levels is presented in Table 2,3 and 4 (Appendix). The distribution of skill levels across sectors is derived from ILO (2006, 2007). Given the data gap, we assume that the distribution of skill levels within a particular sector is homogenous across the federal districts. We divide households into three types according to their income per capita. To reach interregional comparability income data are corrected by regional subsistence level. Share of wage income by skill type, household type and district are calculated on the base of RLMS data. Level of unemployment by skills is calculated combining the data from Rosstat (2006) and RLMS (2006).

Finally, our database includes fuel consumption in natural terms (toe) for all sectors and regions of the SUST-RUS model. This data comes from Russian industrial fuel consumption database (11-TER). Regional distribution in the SUST-RUS database is done according to each region's production. For each region and sector fuel consumption is differentiated by 4 types of fuel (coal, oil, gas and petrochemicals).

3 Policy implementationon

In this simulation we will mimic the current proposal of the Russian government, to increase prices of natural gas on the domestic market annually with 10%. To simulate the impact of such a change in prices, we assume that the government systematically increases taxes on final and intermediate consumption of natural gas. To illustrate this, we performed a simple static run with the SUSTRUS model, considering three scenarios about how to adjust the price of natural gas.

Scen_H: consumers face annual gas price increase by 10% from 2012 onwards

Scen_F: firms face annual gas price increase by 10% from 2012 onwards

Sce_HF: consumers and firms face annual gas price increase by 10% from 2012 onwards

4 Results

Exploring the implications of gas price increases on sectoral output, emissions levels and households requires numerical analysis. Here we focus on gradual gas price increases in Russia by 10% annually from 2012 onwards, before doubling them compared to the 2006 price levels by the end of the decade. The primary interest of our simulation analysis is to highlight the pending trade-offs between macroeconomic, environmental and distributional implications as a function of preferential treatment of actors subjecting to the gas price increases. We report our results as percentage change of an economic indicator compared to a reference situation – the Business-as-Usual (BaU) – where there is no gas price increases. The subsections 4.1- to 4.3 show how macroeconomic, environmental and distributional measures evolve across the three scenarios considered.

4.1 Macroeconomic implications

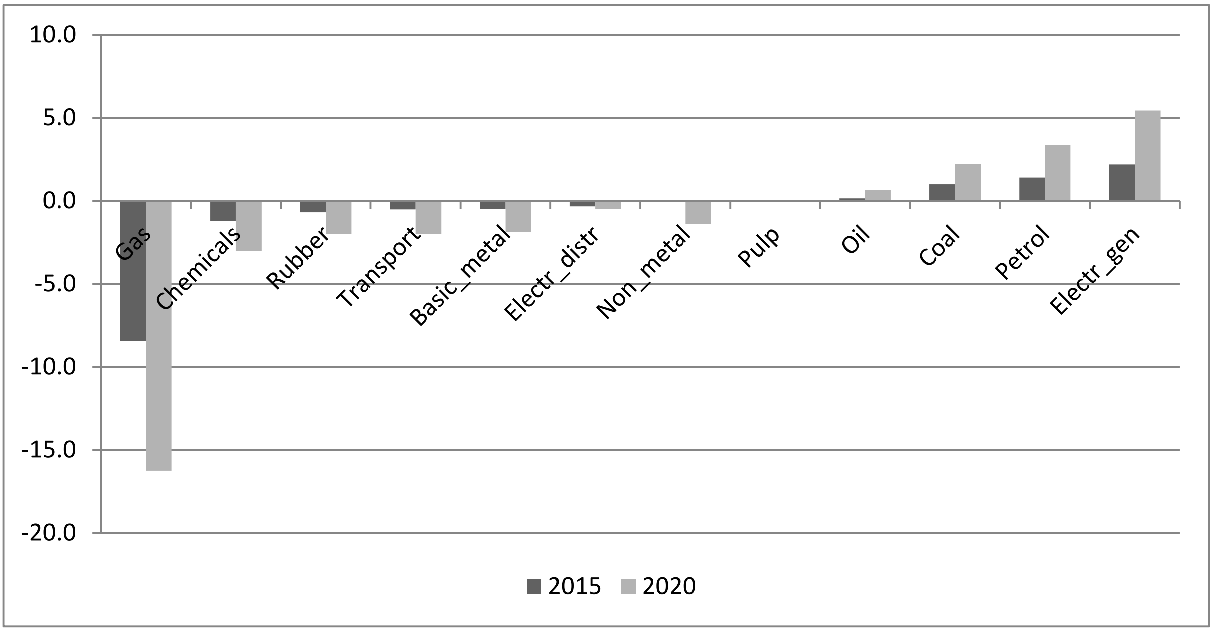
We start the interpretation of our results with macroeconomic implications of gas price increases (Table 5). A policy option aiming at the households' taxation (*Scen_H*) has an overall positive impact at the macroeconomic level according to the key indicators such as real GDP, national savings, tax revenues and total investments. The main argument behind these effects is that large-scale distortions are removed. Albeit these mechanisms drives the results under the alternative scenarios as well (*Scen_F and Scen_HF*), there are substantial adverse sectoral adjustments which let export and GDP level decrease in comparison to the BaU.

Table 5: Main macroeconomic impacts (% change from BaU)

	2015			2020		
	Scen_H	Scen_F	Scen_HF	Scen_H	Scen_F	Scen_HF
GDP real	0.4	-0.6	-0.1	1.7	-1.7	0.3
National savings	1.1	0.5	1.7	4.0	0.5	3.9
Subsidies	0.1	0.8	0.9	0.6	1.4	1.7
Tax revenues	0.8	0.3	1.2	2.7	0.1	2.4
Total exports	0.2	-0.1	0.2	1.1	-0.1	0.8
Total investments	1.8	1.0	3.1	6.5	0.4	6.1
Welfare						

To economize space, Figure 3 depicts sectoral implications for energy producing and selected energy-intensive industries in the year 2020, focusing on the *Scen_F* in which we simulate firm's higher gas prices. Table 5 in the Appendix contains the full details for all model sectors and scenarios. As expected, switching from gas to other energy goods induces rather substantial production losses in the gas sector – up to roughly 15% in 2020 in comparison to the BaU. Coal and petroleum producing industries together with the power generating sector gain, with the latter expanding its production level by impressive 5% in comparison to the "doing nothing case". Energy-intensive industries suffer from a loss in competitiveness if we track the adjustments in output levels but production losses are not likely to be high even for significant gas price increases. If policy discriminates gas pricing in favour of industrial sectors and taxes households instead (*Scen_H*), these losses can be ameliorated and even overcompensated.

Figure 3: Sectoral implications for selected industries (% change from BaU)



At the regional level, we do not observe a significant variation in GDP impacts with an exception of Urals region: The energy-intensive industries, in particular basic metals producers, are located here, while gas price increases will hit these industries most (Table 6). According to the Table 7, the tax revenues are highest in Urals region for *Scen_F*.

Table 6: Regional GDP impacts (% change from BaU)

	2015			2020		
	Scen_H	Scen_F	Scen_HF	Scen_H	Scen_F	Scen_HF
RF	0.4	-0.6	-0.1	1.7	-1.7	0.3
Central	0.4	-0.5	0.0	1.6	-1.5	0.4
North West	0.4	-0.5	0.0	1.6	-1.6	0.2
South	0.3	-0.2	0.2	1.6	-0.8	0.8
Volga	0.5	-0.4	0.2	1.9	-1.3	0.8
Urals	0.4	-1.3	-0.8	1.8	-2.9	-0.7
Siberia	0.5	-0.7	-0.1	1.9	-2.1	0.1
Far East	0.4	-0.3	0.3	1.9	-1.0	1.0

Table 7: Regional tax revenue effects (% change from BaU)

	2015			2020		
	Scen_H	Scen_F	Scen_HF	Scen_H	Scen_F	Scen_HF
RF	0.8	0.3	1.2	2.7	0.1	2.4
Central	0.7	0.3	1.0	2.2	-0.1	1.7
North West	0.5	0.0	0.6	1.8	-0.4	1.2
South	0.4	0.0	0.3	1.6	-0.2	1.1
Volga	0.9	0.3	1.3	2.9	0.3	2.7
Urals	1.7	0.9	2.8	5.6	0.8	5.3
Siberia	1.1	0.7	1.9	3.5	0.8	3.8
Far East	1.1	0.5	1.8	3.4	0.4	3.6

4.2 Environmental effects

Table 8 illustrates changes in energy efficiency (EE) across Russian regions for 2015 and 2020, respectively. The energy efficiency improves as the indicator decreases; the energy efficiency deteriorates as the indicator increases. The magnitude of changes in EE depends on (i) the stringency of gas price increases advancing towards the end of the decade, (ii) the energy intensity of a region in the reference case and (iii) the coverage of economic agents subjecting to the gas price increases.

Table 8: Economy-wide and regional energy efficiency improvements (% change from BaU)

	2015			2020		
	Scen_H	Scen_F	Scen_HF	Scen_H	Scen_F	Scen_HF
RF	0.0	-3.4	-3.8	-0.2	-5.4	-6.3
Central	0.2	-3.0	-3.2	0.1	-4.8	-5.4
North West	0.2	-4.6	-4.8	0.3	-7.9	-8.4
South	0.1	-1.9	-1.9	0.0	-3.0	-3.2
Volga	0.0	-2.5	-2.8	-0.3	-3.8	-4.6
Urals	-0.3	-4.7	-5.7	-0.9	-7.1	-8.9
Siberia	0.1	-3.6	-4.1	-0.2	-5.8	-6.8
Far East	0.0	-4.9	-5.3	-0.3	-8.5	-9.5

Probably one of the most important results of our simulations is that rising household's gas prices will leave economy-wide energy efficiency virtually unchanged in 2015 in comparison to "doing-nothing case". This is due to a rather small fraction of households' gas consumption in total gas consumption in Russia. The table 4 further shows that at the regional scale there are even some adverse implications in terms of decreasing energy efficiency, though they are not likely to be substantial. This result can be mainly explained by indirect effects working through changes in prices on the Russian gas market. The cutback in gas demand by households implies a tiny drop in prices which is, however, of a magnitude sufficient enough to provide incentives to the industrial producers to use a bit more of cheaper energy in the production process. As a result, the regional energy efficiency deteriorates, with only one exception: in Urals region direct effects from households' energy reduction are likely to outweigh the indirect effects from the increasing demand by industrial producers.

Our simulations further highlight that substantial improvements in EE are feasible only if government charges industrial producers with higher gas prices. The regional rate of EE improvement varies then between 1.9% and 4.9% in 2015 and between 3.0% and 8.5% in 2020. The improvement of energy efficiency is highest vis-à-vis the BaU levels when both households and firms face increasing gas prices.

Figure 4: Economy-wide carbon emissions (% change from BaU)

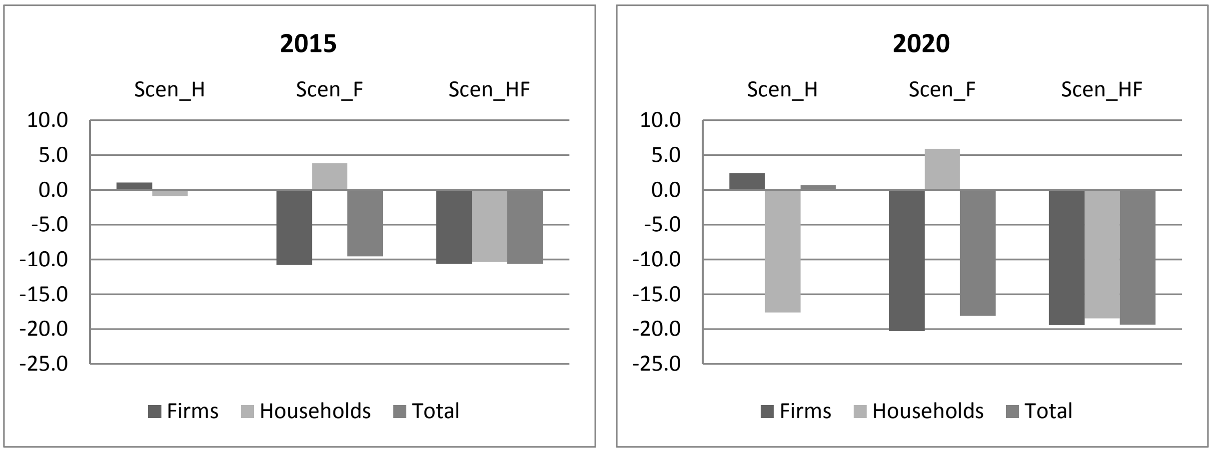
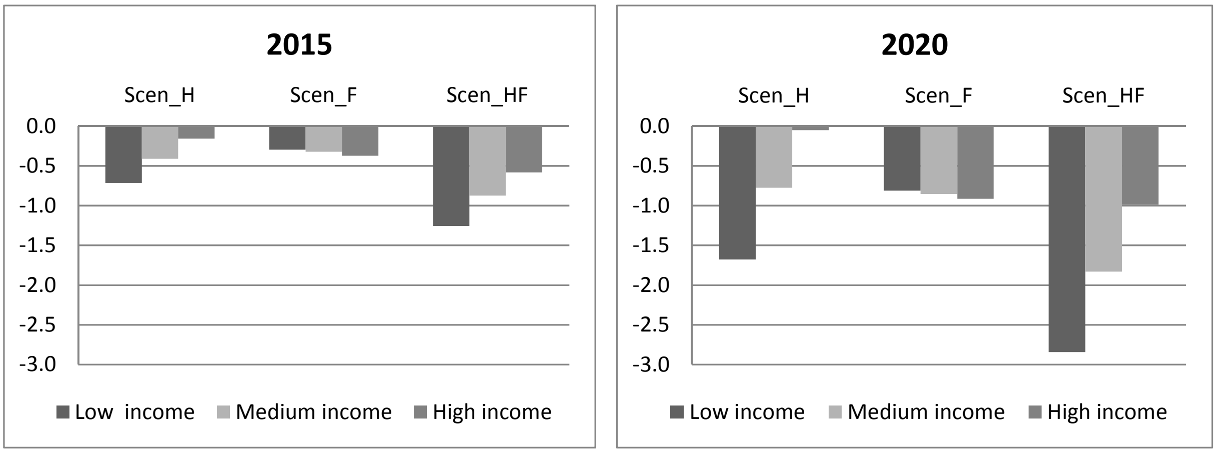


Figure 4 visualizes how the level of CO_2 emissions – from households, firms and totals (economy-wide emissions) – reacts to changes in energy efficiency. Under the most extensive scheme in *Scen_HF*, the large-scale emissions reductions of about 10% (20%) compared to the BaU in 2015 (2020) can be achieved. Thus, the gas price liberalisation will bring Russia on a substantially more sustainable path in terms of CO_2 emissions but only under the prerequisite that industrial producers will advance in terms of the energetic modernisation. Limiting the policy to the household's side will barely cause any measurable improvements in emissions levels.

4.3 Social impacts

Figure 5 provides distributional impact assessment of gas price increases for low-, medium- and high income households. We find that deregulating natural gas pricing is indeed a regressive policy if prices are gradually increased for consumers only. From the distributional point of view, charging firms with higher gas prices might be a superior strategy as it will have a moderate and progressive impact on citizen's welfare in comparison to "doing nothing case".

Figure 5: Welfare impacts for different types of households (% change from BaU)



5 Conclusions

Russia is the biggest consumer of natural gas in the world both in real and in relative terms. 56% of the domestic energy use can be directly attributed to natural gas. In this paper, we approached the issue of gas pricing through taxation of intermediate and final use of natural gas for domestic industries and consumers. We have elaborated on a computable general equilibrium model complemented with selected macroeconomic, environmental and distributional indicators to facilitate the comprehensive impact assessment of gas price increases.

We find that deregulating natural gas pricing can lead to a significant improvement in energy efficiency, if prices are gradually increased for both consumers and industries alike. Rising consumer prices only will leave economy-wide energy efficiency virtually unchanged in 2015 in comparison to "doing-nothing case". Moreover, the latter is a regressive policy. We conclude that gas price liberalisation can bring Russia on a substantially more sustainable path in terms of improved energy efficiency and reduced CO2 emissions. This, however, only if industrial producers will advance in terms of energetic modernisation incentivized by proper set price signals.

6 Appendix

Figure 2: Estimation of the Russian IOT

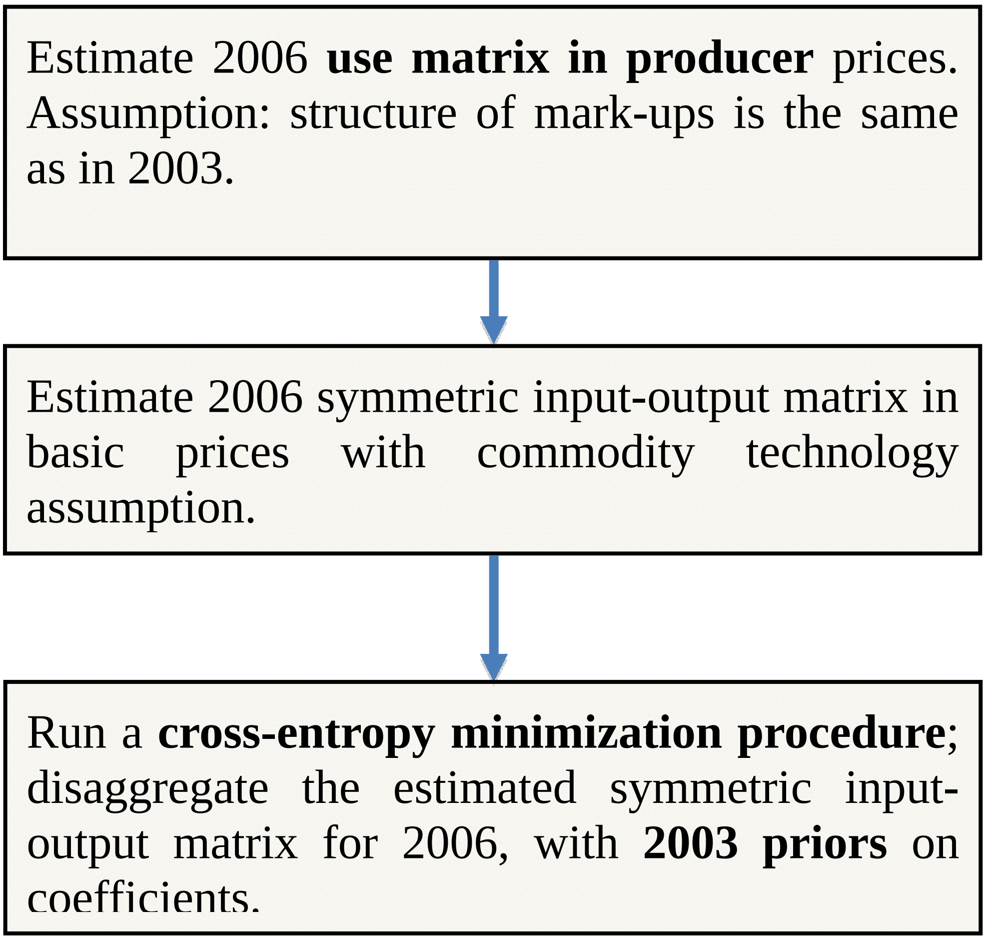


Table 1: Model dimensions

Production sectors	Regions and primary factors
Energy	*Regions*
Coal	Central
Crude oil	North Western
Natural gas	South
Refined oil products	Volga Basin
	Ural
	Siberian
Non-Energy	Far Eastern
Mining and quarrying	
Food products, beverages and tobacco	
Textiles and textile products	*Primary factors*
Leather and leather products	Labour: low, medium, high
Wood and wood products	Capital
Pulp, paper and paper products	Fixed factor resources for coal, oil and gas
Chemicals and chemical products	
Rubber and plastic products	
Non-metallic mineral products	
Basic metals	
Machinery and equipment	
Electrical and optical equipment	
Transport equipment	
Manufacturing n.e.c.	
Electricity distribution	
Electricity generation	
Construction	
Wholesale and retail trade	
Hotels and restaurants	
Transport and communication	
Transport	
Financial intermediation	
Public administration and defence	
Real estate, renting	
Education	
Health and social work	

Table 2: Skills and ISCO codes

Level of skills	ISCO codes	Occupations
Low	9	Elementary (unskilled) occupations
Medium	3-8	Technicians and associate professionals, clerks, service workers and market workers, skilled agricultural and fishery workers, craft and related trades, plant and machine operators and assemblers
High	1-2	Legislators, senior managers, officials and professionals

Table 3: Share of skill use within sector, source: ILO database (average 2006-2007)[1]

	LS	*MS*	*HS*
Total	*0.117*	*0.642*	*0.240*
A Agriculture, Hunting and Forestry	0.184	0.750	0.066
B Fishing	0.169	0.721	0.110
C Mining and Quarrying	0.076	0.751	0.173
D Manufacturing	0.125	0.676	0.199
E Electricity, Gas and Water Supply	0.074	0.727	0.200
F Construction	0.127	0.677	0.197
G Wholesale and Retail Trade	0.089	0.767	0.144
H Hotels and Restaurants	0.134	0.779	0.088
I Transport, Storage and Communications	0.089	0.767	0.144
J Financial Intermediation	0.024	0.426	0.549
K Real Estate, Renting and Business Activities	0.120	0.458	0.421
L Public Administration and Defence	0.121	0.369	0.510
M Education	0.121	0.369	0.510
N Health and Social Work	0.089	0.626	0.285
O Other Community, Social and Personal Service Activities	0.152	0.580	0.268
P Households with Employed Persons	0.525	0.450	0.025
Q Extraterritorial Organizations and Bodies	0.250	0.000	0.750
Unemployed	0.228	0.676	0.095

[1] Own calculations based on the ILO database. High skilled = isco1, isco2, medium skilled=isco3, isco4, isco5, isco6, isco7, low skilled=isco 8 and isco 9. The data is based on the share of employees, not corrected for wages.

Table 4: Average wage by skill level in each region

		HS	MS	LS
Central	reg1	20114.356	13075.75	7436
North Western	reg2	19014.388	14264.29	7494
South	reg3	11670.255	8619.949	4367
Volga Basin	reg4	12922.245	9945.456	4777
Ural	reg5	21737.174	15955.16	7419
Siberian	reg6	15915.056	11911.5	5607
Far Eastern	reg7	21934.625	16106.03	7169

Table: Sectoral effects (% change from BaU)

	2015			2020		
	Scen_H	Scen_F	Scen_HF	Scen_H	Scen_F	Scen_HF
Gas	-0.8	-8.4	-10.8	-1.2	-16.3	-19.9
Chemicals	0.3	-1.2	-1.0	1.2	-3.0	-2.1
Hotels	-0.2	-0.7	-1.0	-0.3	-1.7	-2.0
Communication	-0.1	-0.8	-0.9	0.4	-2.0	-1.5
Leather	-0.1	-0.6	-0.8	-0.2	-1.4	-1.7
Textile	-0.1	-0.5	-0.7	0.0	-1.3	-1.5
Transport	0.0	-0.5	-0.6	0.6	-1.3	-0.9
Rubber	0.3	-0.7	-0.4	1.3	-2.0	-0.9
Health	-0.1	-0.2	-0.3	-0.1	-0.4	-0.6
Electr_distr	0.1	-0.3	-0.3	0.4	-0.9	-0.5
Public	-0.1	-0.3	-0.2	0.0	-1.0	-0.4
Trade	0.1	-0.3	-0.2	0.9	-0.6	0.2
Real_estate	0.0	-0.1	-0.2	0.2	-0.4	-0.2
Food	0.1	-0.2	-0.1	0.4	-0.5	-0.3
Education	0.0	-0.1	-0.1	-0.1	-0.2	-0.3
Agr	0.1	-0.1	0.0	0.9	-0.3	0.2
Basic_metal	0.3	-0.5	0.0	1.6	-1.9	0.0
Finance	0.1	-0.2	0.0	0.6	-0.6	0.3
Other_manufacturing	0.2	-0.3	0.0	1.0	-0.9	0.2
Fishing	0.1	0.0	0.1	0.8	0.1	0.7
Pulp	0.2	0.0	0.2	1.0	0.0	0.9
Oil	0.1	0.1	0.3	1.1	0.7	1.6
Wood	0.5	-0.2	0.3	1.9	-1.2	0.6
Transport_eq	0.5	-0.2	0.4	2.1	-1.3	0.5
Mining	0.3	0.1	0.7	1.4	-0.2	1.9
Machinery	0.7	0.1	0.8	2.5	-0.6	1.6
Electrical_eq	0.7	0.1	1.0	2.5	-0.5	2.0
Non_metal	1.0	0.0	1.3	3.6	-1.4	2.4
Coal	0.2	1.0	1.5	1.1	2.2	3.9
Petrol	0.2	1.4	1.7	1.2	3.3	4.7
Construction	1.0	0.5	1.7	3.9	0.4	3.9
Electr_gen	0.2	2.2	2.4	1.0	5.4	6.5