DEREGULATION IN ENERGY PRICES IN CHINA: A CGE ANALYSIS

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Abstract

The central government in China has implemented ambitious energy policy reforms since 1978. An important pillar of these reforms is the deregulation of the prices in the energy market. This paper examines the macroeconomic impact of price deregulation in China using an applied CGE model and a counterfactual policy simulation. The results point to a welfare improvement in the amount of 1.1 % of GDP. Sectoral results point to a reallocation of resources and diversion of economic activities towards domestic services sectors.

1 Introduction

Along with rapid economic growth, China is expected to experience energy shortages in the near future. Since the late 1990s, total energy supply falls short of total energy consumption. Energy imports, especially of oil, increased after 1998 and averaged 3.1 percent of total energy consumption during 1998-2007.

The central government in China has implemented ambitious energy policy reforms since 1978 to tackle the problem of supply shortage and to secure supply of energy to sustain economic growth. A recently important pillar of these reforms is gradual deregulation in the energy sector. The government still enjoys a strong control over the energy sector but the aim of the deregulation process, as elsewhere, is the establishment of a business environment that works on free market principles. One expects deregulation to result in efficiency improvement and elimination of distortions (e.g., large subsidies provided to residential consumers) brought about by the strong regulations prior to the reforms. Efficiency and environment-related issues have only recently been included in the government's energy policies. During the deregulatory process, price deregulation plays a central role.

Ma et al. (2010) provide an extensive review of studies on deregulation in China's energy sector.[1] Among these studies, some have used the CGE modeling approach to investigate the macroeconomic impact of deregulation in the energy market in China. In one of the earliest studies, Zhang (1998) used a general equilibrium model to analyze carbon abatement policy alternatives (carbon emission cuts by 20 percent and 30 percent) for China but this model incorporated important linkages between the energy sector and the economy. Carbon abatement requires carbon taxes and the simulation results showed that larger carbon emission cuts required higher carbon taxes and both GNP and national welfare drop. In another CGE study, Liang et al. (2009) analyzed the macroeconomic impact of energy efficiency improvement and found evidence for the rebound effect, i.e., improvements in energy efficiency bring about increase in energy consumption and CO_2 emissions. Using a CGE model, He et al. (2010) examined the impact of the rising coal prices on the the economy through its impact on electricity prices. They found that the

[1] Ma et al. (2010) show that previous studies focus on (i) causality relationship between energy consumption and GDP, (ii) decomposition of the changes in energy intensity, (iii) substitution between energy and non-energy inputs, (iv) convergence of energy prices, and (v) the reforms in the energy market.

impact of the coal price increase on electricity prices diminishes with the coal price rise and the change in electricity prices impact on the economy negatively. In another CGE study, He et al. (2011) estimated electricity demand price elasticities. Lin and Jiang (2011) estimated energy subsidies using the price-gap approach and analyzed the energy subsidy reforms using the CGE model. They found that a reduction in energy subsidies result in a fall in energy demand and will have negative macroeconomic impacts. Finally, Liu and Li (2011) estimated the impact of the reforms regarding the fossil energy in China and found using the CGE model and price-gap approach that removing oil subsidies have a stronger negative impact on the economy than removing coal subsidies.[2]

Price deregulation is an integral component of the recent energy market reforms in China and plays an important role due to the impact of price signaling in the energy markets on the level of consumption. However, as Ma et al. (2010: 125) argue, "although the existing literature considers all policy reforms, they do little more than describe them." The aim of this paper is to contribute to the literature by providing empirical results from an applied computable general equilibrium (CGE) model. This paper examines the possible effects of the deregulation of prices in the Chinese energy sector from an applied general equilibrium perspective. The impacts of the reforms are examined using an applied computable general equilibrium (CGE) model and policy simulations.

The remainder of the paper is organized as follows. Section 2 reviews the energy policies in China. Price deregulation and related institutional reforms are explained in Section 3. The structure of the CGE model is described in Section 4 and the data used in the benchmark solution are presented in Section 5. Section 6 reports the empirical results obtained from the simulations. Finally, section 7 wraps up and concludes.

2 Energy Policies in China

Early energy policies in China had a supply-side focus because the main issue was supply security. Therefore, the government emphasized the supply

[2] There are quantitative studies using techniques other than the CGE model examining the energy policies in China. For instance, Kahrl and Roland-Holst (2009) used input-output techniques to examine the structural changes in the energy sector and Li (2010) used an econometric model to analyze sustainable energy strategies.

of coal in the 1980s (Wu, 2003). Coal was important because it was the primary source of electricity. At the same time, heavy reliance on coal created a large burden on the transportation system due to uneven geographic distribution of fossil fuel reserves within China.[3] To solve the long-distance transportation issue, four large-scale infrastructure-building projects have been undertaken, namely *Bei Mei Nan Yun* (north-to-south coal transfer), *Bei You Nan Yun* (north-to-south oil transfer), *Xi Qi Dong Shu* (west-to-east natural gas transmission), and *Xi Dian Dong Song* (west-to-east electricity transmission). However, as a result of persisting energy shortages and partially due to environmental concerns,[4] the government turned its attention to energy efficiency and energy conservation during the last decade.

The policies and programs addressing energy efficiency and energy conservation in China can be categorized into three types: laws, comprehensive plans, operational policies (programs and decisions). At the legislation level, the 30th Session of the Standing Committee of the 10th National People's Congress passed the revision of the Energy Conservation Law in October 2007. The general strategy and long-term target of Chinese energy policies were presented in two comprehensive plans, i.e., Medium and Long-term Energy Saving Plan announced in 2004 and 11th Five-Year Plan, promulgated in 2006. In the former plan, the government announced its aim to reduce GDP energy intensity from 26.8 tons of standard coal equivalent (sce) per 1000 yuan (in 1990 prices) in 2002 to 22.5 tons sce per 1000 yuan in 2010 and to 15.4 tons sce per 1000 yuan in 2020 (Yuan et al., 2008). In the latter, the government updated its target of reducing energy intensity to 20 percent between 2005 and 2010. These two comprehensive plans were followed by several implementation programs and decisions for daily operation.

The highlights at the operational level and decisions are 10 Key Energy-saving Program and Top-1000 Energy-consuming Enterprises Program. The 10 Key Energy-saving Program focuses on the energy conservation of in-

[3]There is substantial mismatch between the geographical distribution of fossil fuel reserves and centers of economic activities in China. According to Naughton (2007: 342), northern half of China has about 90 percent of the gas and oil and 80 percent of the coal. Almost half of total coal reserves is particularly concentrated in a three-province region in north China, comprising Shanxi, northern Shaanxi and western Inner Mongolia. Mountainous southwestern and western China are abundant in hydro power resources. Meanwhile, economic activities in China have been located in the southeastern coast.

[4]Shi (2008: 367) reports that 85 percent of the sulfur dioxide, 70 percent of the smoke, and 60 percent of the nitrogen oxides emitted into the atmosphere in China result from the burning of coal.

dustrial sectors, while Top-1000 Energy-consuming Enterprises Program directly targets 1008 highest energy-consuming enterprises[5] in 9 major energy-consuming industries. The contents of 10 Key Energy-saving Program cover coal-fired industrial boiler retrofits, district cogeneration projects, waste heat and pressure utilization projects, petroleum conservation and substitution projects, motors energy conservation projects, energy system optimization projects, building energy conservation projects, green lighting projects, government agency energy conservation projects, and construction projects of energy saving monitoring and testing, and technology service system (NDRC, 2006b). During 2006-2010, the investment from central budget and central fiscal funding designated to energy conservation was around RMB 30 billion yuan, and supported 5200 projects of 10 Key Energy-saving Program (NDRC, 2011a). In the case of the Top-1000 Energy-consuming Enterprises Program, NDRC signed agreements with local governments, while the local governments signed agreements with each of enterprises within its jurisdiction. The agreements include energy-saving targets for each enterprise. The achievement of those targets has been added to the provincial government cadre evaluation system wherein the individuals responsible for implementation will be evaluated each year on whether or not the targets under their jurisdiction have been achieved (Zhang et al., 2010). Recently NDRC announced that, during 2006-2010, the Top-1000 Energy-consuming Enterprises Program saved 150 million tons sce, 50 million tons sce more than its original energy-saving target (NDRC, 2011b). The 12th Five-Year Plan (2011-2015) targets to reduce energy intensity of GDP by 16 percent, and carbon intensity (CO_2 emissions per unit of GDP) by 17 percent (CPC Central Committee, 2011).

3 Deregulation in China: Institutional Reforms

Since the late 1980s, China's energy agencies in the central government have experienced several rounds of restructuring. The main purpose of restructuring was to integrate the separated powers and authority of related regulatory bodies into one regulatory body. The first round of restructuring was the establishment of the Ministry of Energy in 1988; however, the min-

[5] 1008 highest energy-consuming enterprises refer to those enterprises which consumed 180,000 tons sce or higher in 2004 (National Development and Reform Commission, NDRC, 2006a).

istry was dismantled in 1993 due to failure to adjust the vested interests of related regulatory bodies (Tsuchiya, 2011). The second round of restructuring was accompanied by the restructuring of central administration in 1998. The commercial arms of various regulatory bodies were separated and eventually corporatized, while regulatory functions were mainly allocated to the State Development Planning Commission (SDPC), State Economic and Trade Commission (SETC) and Ministry of Land and Natural Resources (MLNR) (Wu, 2003). Among the three, SETC's power and authority was increased and it became the main regulator in the energy sector until 2003 (Wu, 2003). In 2003, accompanied by the establishment of the National Development and Reform Commission (NDRC), China's Energy Bureau was set up under the jurisdiction of NDRC. Since then, the Energy Bureau has been responsible for energy supply while the divisions responsible for energy efficiency have been in different parts of NDRC (Zhou et al., 2010). However, the Energy Bureau was not able to improve the administrative efficiency and integrate the powers from multiple regulatory bodies, because its administrative level was lower or equal to other relevant agencies. As a result, in 2005, the State Council established an Energy Leadership Group, which was later reorganized as State Energy Commission (SEC) in 2008, with Premier Wen Jiabao serving as the head. In addition, the Energy Bureau was reorganized in 2008 as National Energy Administration (NEA), which is still under the jurisdiction of the NDRC but operates rather independently. Though the division of jurisdiction between NEA and SEC remains unclear, it is reported that NEA will be in charge of implementation and SEC on coordination among relevant agencies, and NEA is possibly a transitional institutional towards the establishment of the Ministry of Energy (Xinhua 2010 and Wu 2010).

Deregulations in energy prices is an important pillar of energy sector reforms. At the start of the reform process, strict controls on energy prices by the government were abolished in 1982 and a double-track pricing system was introduced wherein a portion of energy products out of plan allocation could be sold at market prices (Wu 2003, Hang and Tu 2007). In the late 1990s, the dual-track pricing system was abandoned while plan allocation of energy was gradual abolished in the late 1990s.

During the process of price liberalization, an imbalance existed between different energy sectors. Although retail electricity prices remain under government control, coal prices have been fully liberalized since 2002 (Zhao et al.

2009).[6] Consequently, regulated electricity prices do not necessarily reflect the increase in coal prices, leaving many utilities in economic distress (Zhou et al., 2010).[7] Similarly, the regulated price for oil products is low compared to the price of crude oil, which is decided at the international market. The Chinese government consequently pays large subsidies to the upstream oil industry (Zhou et al., 2010). Since 2006, the government has provided large subsidies to energy suppliers in order to address the mismatches between regulated electricity and oil product prices and the costs of raw materials (Zhou et al., 2010).

4 Structure of the CGE Model

We develop a 13-sector CGE model with Walrasian characteristics similar to the CGE model developed for Turkey in Akkemik and Oguz (2011). Sectoral disaggregation emphasizes energy sectors. An important feature of the model is that it allows the producers to substitute among energy sources. Although it is difficult to substitute some energy sources, electricity in particular, the possibility of substitution may still have important policy implications. For instance, energy-saving policies and environmental policies especially address substitution of fossil fuels by other sources of energy.

4.1 Salient Features of the Model

Production and trade: Production technology is represented by a nested production function involving value-added generation at the first level and gross output at the second level. Value-added (VA) is a Cobb-Douglas function of capital (K) and labor (L). Gross output (Q) is a Leontief function of value-added and intermediate (material) inputs (MI). Intermediate inputs

[6] The price for the coal sold to non-electricity generation sector was controlled by the government until 1992, while the price for the coal sold to electricity generation sector was controlled by the government until 2001. Since 2002, the government has only been announcing benchmark prices for coal but there is no direct price control (Zhao et al., 2009).

[7] In 2004, NDRC announced the Notice on Suggestions to Establish Comovement Mechanism between Coal Prices and Electricity Prices. It states that the price adjustment cycle for coal prices and electricity prices is six months. If coal price in the current cycle is 5 percent higher than that of the previous cycle, the price of electricity should be adjusted accordingly. However, the mechanism does not run effectively (Zhao et al., 2009).

include non-energy and energy inputs. We do not allow substitution across energy inputs in the energy-producing sectors. For other sectors, we assume that energy inputs are substitutable with constant elasticity of substitution (CES) aggregation.

As Hosoe (2006) argues, assuming constant returns to scale in the energy sectors is not realistic since these sectors are characterized by scale economies due to high fixed costs. Accordingly, we assume increasing returns to scale in the energy sectors and constant returns to scale in the remaining sectors. Subsequently, the energy sectors earn a markup ( ) over marginal cost which is shown in the equation for the value of capital:

$$_{Kj}K_j = (1 + \quad _j) \quad _{Kj}K_j \tag{1}$$

The superscript 0 denotes the market-clearing level. Since markup enters the value of capital equation, it affects the value-added and output in the energy sectors. Due to lack of reliable estimates, we assume a markup rate of 10 percent.

Constant elasticity of transformation (CET) function with imperfect substitution transforms exports ( ) and domestic sales ( ) into gross output:

$$Q_i = \quad _{Ti}\left[\quad _{Ti} \quad _i^{-\rho_{Ti}} + (1 - \quad _{Ti}) \quad _i^{-\rho_{Ti}}\right]^{\frac{1}{\rho_{Ti}}} \tag{2}$$

Similarly, Armington constant elasticity of substitution (CES) function with imperfect substitution transforms domestic goods and imports (M) into an Armington composite good ( ):

$$_i = \quad _{Ei}\left[\quad _{Ei} \quad _i^{-\rho_{Ei}} + (1 - \quad _{Ei})M_i^{-\rho_{Ei}}\right]^{-\frac{1}{\rho_{Ei}}} \tag{3}$$

First order conditions of the CET and Armington CES functions yield the optimal amounts of domestic supply, exports, and imports as shown below:

$$\frac{M_i}{\quad _i} = \left[\frac{\quad _{Ei}}{1 - \quad _{Ei}} \cdot \frac{\quad _{Di}}{\quad _{Mi}}\right]^{\frac{1}{1+\rho_{Ei}}} \tag{4}$$

$$\frac{\quad _i}{\quad _i} = \left[\frac{\quad _{Ti}}{1 - \quad _{Ti}} \cdot \frac{\quad _{Xi}}{\quad _{Di}}\right]^{\frac{1}{\rho_{Ti}-1}} \tag{5}$$

Institutions: There is a single household account since we are not interested in income distribution. The consumption ( ) of this household is represented by a Cobb-Douglas utility ( ) function:

$$= \quad \underset{i}{} \quad {}_{i}^{\;i} \tag{6}$$

is the consumption share of good .

Households earn factor income from the services of capital and labor they render to enterprises. They then make their decisions on consumption and savings as a fixed proportion of their income.

The government earns direct tax revenues from firms and households in the form of income tax and indirect tax revenues from production activities. The government then makes a decision between the level of public expenditures and transfers.

Equilibrium conditions and macro closure: We specify the Walrasian equilibrium conditions for product market, factor market, and saving-investment account. Excess demand equals zero in both product and factor markets. In the product market, aggregate demand equals aggregate supply in each sector. In the factor market, the sum of sectoral factor demand equals factor supply. We assume that capital is sector-specific (immobile) while labor is mobile. Then, to achieve equilibrium, sectoral labor demands (with inelastic labor supply) and intersectoral profit rate adjust.

As a macroeconomic rule, total investments equal total savings, which comprises of household savings, foreign savings, and public savings. We assume that public, foreign, and aggregate savings are exogenous. The savings rates of economic agents are constant. Therefore, our model is principally a savings-driven model. In the current account, we assume a fixed exchange rate so that the current account surplus/deficit adjusts to achieve the external balance. Due to Walras' Law, one of the equilibrium conditions needs to be dropped to avoid over-determination. Accordingly, we drop the saving-investment equilibrium equation.

Numeraire: The numeraire is supply (gross output) price index.

5 Data

5.1 Benchmark Data

Benchmark data for the analysis are organized into a social accounting matrix (SAM) using data obtained from the Input-Output Tables of China 2007, which is available from China Statistical Yearbook published by the National Bureau of Statistics, 2007 Flow-of-Funds Statistics, which is available from China Statistical Yearbook 2009, and 2007 Balance of Payments statistics, which is available in China Statistical Yearbook 2008. Annual average foreign exchange rate used in constructing the balance of payments data is 7.604 RMB per US dollar. We assume that current transfers from the rest of the world to domestic sectors (except for government) are all destined to the enterprises account.

The sectoral disaggregation in the SAM emphasizes the energy sectors for the purpose of this paper. The SAM is obtained from Akkemik and Li (2011). There are 13 sectors in the production accounts. A list of these sectors is provided in Table 2. In addition, the SAM includes two factors of production accounts (capital and labor), three institutions (households, firms, and government), a capital (saving-investment) account, and a rest of the world account.

The subsidy rates are computed from Lin and Jiang (2011). The subsidy rates for households and industries are shown in Table 3. Half of the subsidies were provided to oil in 2007. Households receive most of the subsidies on electricity while the industry is negatively subsidized for electricity usage. In other words, there is a transfer from industries to households.

5.2 Calibration

Some important parameters (e.g., sectoral distribution parameters in the production function, indirect tax rates, import tariff rates and institutional income tax rates) are calculated using the benchmark data from the SAM. Armington and CET elasticity parameters are determined exogenously. The remaining parameters in the model are calibrated in the standard fashion using SAM data and behavioral equations.

6 Empirical Results

6.1 Policy Experiment

Deregulation in general is expected to establish a competitive market and hence improve efficiency, which in turn should bring production costs down. To analyze the economy-wide impact of the deregulation of prices in the energy sector, we run a policy experiment where all markups in the energy sectors are removed, effectively setting up a competitive market. In this case, the pressure on prices are removed. When the pressure on prices are lifted, energy prices are expected to increase to a certain extent. In fact, the foremost result of deregulation in most ocuntries is an increase in ptices. An increase in energy prices will then influence consumers and energy-intensive activities (heavy industry in particular) directly.

6.2 Simulation Results

The preliminary results from the policy experiments obtained from the model are discussed briefly in this section. The macroeconomic results of the simulation experiment are presented in Table 4. The results reveal that the energy prices for the residential consumers (households) increase, as expected, by 15.7 %. However, this increase in the energy prices leads to a reduction in energy consumption by households by about 14 %. Despite this negative effect on energy consumption, the overall impact on welfare as demonstrated by the Hicksian equivalent variations is positive, accounting for 1.1 % of Chinese GDP.

Sectoral results are presented in Table 5. The disaggregated results imply a reallocation of resources[8] away from mining, energy, and the relatively more energy-intensive manufacturing and transport services sectors towards the domestic services sectors (SERV). As a result, on the supply side, output, domestic supply, and value-added composition in the economy changes in favor of domestic services sector. Energy consumption decreases in the transport services sector, mining sector, and the manufacturing industries. Energy consumption increases in the domestic services sector. On the demand side, households increase their consumption of manufacturing products, construction services, and domestic services. The increase in consumption in these sectors is mainly due to the reduction in supply prices in these sectors. The improvement in welfare results mainly from the increase in household consumption of domestic services.

In terms of foreign trade, transport services sector seems to be affected the most. The increasing domestic energy prices seem to increase imports and reduce exports in this sector. Manufacturing exports are negatively affected by the increase in energy prices. This might pose important challenges for

[8]Note that since capital is fixed in the model, the only resource reallocated is labor.

price competitiveness for Chinese manufactures in the world markets. The overall impact on the real exchange ate is negative, i.e., real depreciation.

While resources are reallocated in the economy, wages for labor and rates of return to capital change. Wages increase in all sectors to varying degrees. Wages rise more in manufacturing industries and less in services sectors. Capital prices, on the other hand, decrease in most sectors and rise in agriculture and light manufactures. These industries are relatively less energy-intensive sectors. Therefore, energy prices lead to reallocation of labor and readjustment of the returns to capital across industries in this manner.

All the abovementioned findings point to the reallocation of available resources in the Chinese economy and a readjustment of returns to these resources in such a way that supply is more leaning towards services sectors. Therefore, an important implication of the results of the analysis is that services sectors may gain importance for output growth in the Chinese economy and more resources would be devoted to services after full accomplishment of energy price deregulation.

7 Conclusion

In this paper we examined the results of the hypothetical removal of the price distortions in the Chinese energy markets using data for the year 2007. The results point to a welfare increase in the amount of about 1.1 % of GDP. The sectoral results point to the possibility of a more domestic demand led economic growth opportunity for the Chinese economy. An important policy implication is then that the reallocation of resources towards services sectors may promote domestic demand led economic growth in China thereby reducing her dependence on foreign trade.

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Table 1: List of sectors in the 42-sector SAM

I-O code	Description
1	Agriculture
2	Coal mining and processing
3	Crude petroleum and natural gas products
4	Metal ore mining
5	Non-metal ore mining
6	Food products and tobacco processing
7	Textile
8	Wearing apparel, leather, furs, down and related goods
9	Wood processing and furniture manufacture
10	Paper, printing, manufacture of cultural, educational and sports products
11	Petroleum processing, coking and nuclear fuel
12	Chemicals
13	Non-metal mineral products
14	Metal smelting and pressing
15	Metal products
16	Machinery and equipment
17	Transport equipment
18	Electric equipment and machinery
19	Telecommunication equipment
20	Instruments-meters-cultural and office machinery
21	Other manufacturing products
22	Scrap and waste
23	Electricity, steam and hot water production and supply
24	Gas production and supply
25	Water production and supply
26	Construction
27	Transport and warehousing services
28	Post services
29	Information communication, computer services and software
30	Wholesale and retail trade
31	Hotel and restaurant businesses
32	Financial services
33	Real estate
34	Leasing and business services
35	R&D
36	Technological services
37	Management of water resources, environment and public utility
38	Civil services and other services
39	Education
40	Sanitation, social security and social welfare
41	Culture, sports and entertainment
42	Public administration and social organizations

Table 2: List of sectors in the 13-sector SAM

Acronym	Description	I-O codes
AGR	Agriculture	1
COAL	Coal mining and processing	2
OIL	Crude petroleum products	3
MIN	Mining	4-5
LIGHT	Light industry (food, beverages, textile, clothing, wood, paper)	6-10
REF	Petroleum processing, coking and nuclear fuel	11
HEAVY	Heavy industry (chemicals, metal products, machinery, equipment)	12-22
ELEC	Electricity and steam production and supply	23
GAS	Natural gas production and supply	24
WATER	Water production and supply	25
CONS	Construction	26
TRAN	Transport services	27
SERV	Services	28-42

Table 3: Energy subsidies in China in 2007 (billion RMB)

	Total subsidy	Subsidies to industry	Residential subsidies
Coal	53.2	53.2	0.0
Oil	189.0	179.8	69.3
Electricity	38.1	-164.4	202.6
Gas	76.4	68.3	8.1
Total	356.7	136.8	219.9

Source: Adopted from Lin and Jiang (2011).

Table 4: Simulation results: macroeconomic results (% change from baseline scenario)

Energy consumption by households	-13.96
Exchange rate	-4.43
Direct taxes	-13.98
Savings	1.97
Energy prices for households	15.66
Hicksian Equivalent Variation (% of GDP)	1.10

Table 5: Simulation results: sectoral results (% change from baseline scenario)

	VA	Q	E	L	D	r	w	X	M	C	C(en)	P(X)	P(M)
AGR	-0.92	-0.92	-0.38	-0.96	-0.47	1.85	2.81	-9.73	3.05	-0.64	-0.92	-0.95	1.09
COAL	-1.95	-1.95	-1.90	-2.80	-1.95	-0.95	1.84	0.00	0.00	-7.66	0.00	1.40	-0.05
OIL	-3.03	-3.04	-1.89	-3.03	-3.06	-1.19	1.84	0.00	0.00	0.00	0.00	1.12	-0.03
MIN	-2.86	-2.86	-1.79	-4.77	-2.78	-1.84	2.93	-8.15	0.50	0.00	-2.86	-0.72	0.23
LIGHT	-0.22	-0.22	-0.02	-0.37	-0.08	2.52	2.88	-6.12	1.82	-0.24	-0.22	-1.21	0.96
REF	-1.84	-1.84	-1.73	-3.42	-1.86	-0.49	2.93	0.00	-0.34	1.13	-1.84	0.00	-0.18
HEAVY	-1.89	-1.88	-1.00	-3.69	-1.15	-1.85	1.84	-7.06	-0.26	0.62	-1.88	-1.96	0.69
ELEC	-2.25	-2.25	-2.22	-2.25	-2.25	-0.41	1.84	0.00	0.00	-15.46	0.00	0.06	-0.01
GAS	-2.82	-2.82	-2.83	-2.83	-2.83	-0.98	1.84	0.00	0.00	-7.68	0.00	0.50	-0.04
WATER	0.03	0.02	0.03	0.03	0.02	1.88	1.84	0.00	0.00	2.10	0.03	0.00	0.00
CONS	0.11	0.11	1.70	0.16	1.95	-9.99	1.84	0.00	-4.42	5.44	0.11	-4.55	-1.58
TRAN	-3.32	-3.31	-1.56	-8.19	-2.92	0.00	1.84	-45.86	36.73	-25.10	-3.31	11.95	13.12
SERV	2.59	2.59	2.09	4.85	2.44	-6.92	1.84	6.05	-9.81	9.43	2.59	-6.59	-3.50

Note: VA: value-added, Q: output, E: Armington composite, L: labor demand, D: domestic supply, r: cost of capital, w: labor wage, X: export, M: import, C: household consumption, C(en): household energy consumption, P(X): export price, P(M): import price.