



Trade liberalization and tax reform strategies: The case of the Korean oil industry

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ABSTRACT

The decline in government revenues due to tariff reductions has become a major concern for most developing countries, including Korea. This paper focuses on the Korean oil industry to examine which post-trade liberalization tax reform strategy is optimal, depending on the government's priority between social welfare and government revenue. We find that the important factors for choosing an optimal tax reform policy are price elasticity of demand and market competition. Based on a price-inelastic demand and the low competitive market for Korea's oil industry, if the goal of a tax reform policy is to increase social welfare, the recommended strategy is to raise the consumption tax by a scale of less than the sum of tariff cuts times the crude oil price and oil import tax cuts. This strategy would also reduce inflation, but it could be detrimental to government revenue. However, if the policy's goal is the preservation of government revenue, the recommended strategy is to raise the consumption tax by a scale equal to the sum of tariff cuts times the crude oil price at the pre-tax reform and oil import tax cuts. This strategy does not change either government revenue or social welfare.

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1. Introduction

Taxes related to the oil industry have been important sources of government revenue in Korea. The tax revenue from imported crude oil and petroleum products accounts for a significant portion of the nation's total tax revenue. The Korean government collected 27.6 trillion won (the Korean currency) in oil-related tax earnings in 2009, which was 13.2 percent of the nation's 209.7 trillion-won total tax revenue, according to the [National Tax Service, Republic of Korea](#) and the [Korea Customs Service](#).

However, as trade liberalization represented by Free Trade Agreements (FTAs) has been accelerated, and as more FTAs are expected to be signed in the near future, the Korean government has begun to be concerned about revenue losses following tariff cuts on imported goods. Crude oil is one of the goods with tariffs that are likely to be cut. Korea is currently negotiating FTAs with its primary crude oil supplier, the Gulf Cooperation Council (GCC).² Potential revenue losses have become a major concern for the government of Korea. This naturally leads to a search for alternative domestic sources of revenue, often in the form of

indirect taxes. The government's optimal tariff and tax reform strategies to minimize revenue losses should be established while considering the welfare and inflation effects on the economy.

The objective of this paper is to examine the welfare and government revenue effects of tariff cuts and consumption tax reform, as they relate to both crude oil and petroleum products in Korea. We suggest appropriate tax reform strategies depending on the government's priority between welfare improvements and the preservation of government revenue. The new tariff and tax reform strategies should be based on the following precondition: the prices of the final goods³ at the post-tax reform should not be inflated by the new tax strategy.⁴ The focus of tax reform in this study is the consumption tax.

Keen and Ligthart (2005) and Naito and Abe (2008) have discussed tariff and tax reform under imperfect competition. Keen and Ligthart (2005) showed that combining tariff cuts with point-for-point increases in destination consumption taxes reduces domestic

³ Korea's retail oil prices have long been high relative to those of other nations. As of November 2008, Korea ranked 25th and 28th among 174 countries in gasoline and diesel prices, respectively, according to "International Fuel Prices 2009, 6th Edition" by Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ, 2009).

⁴ Since global oil prices began to rise in October of 2010, Korea's economy has been under inflationary pressure, and the government's taxes on fuel oils have been blamed for having increased inflation. In these circumstances, a tariff and consumption tax reform strategy that causes a rise in the retail oil prices is too burdensome for the government to implement.

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² Korea is highly dependent on GCC member countries (Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, and the Sultanate of Oman) for its oil supply; GCC oil accounts for 64.4 percent of its 2010 total crude oil imports.

welfare. By contrast, Naito and Abe (2008) showed that Keen and Ligthart's (2005) undesirable welfare effect resulting from tariff and tax reform under imperfect competition is due, in part, to ignorance about the role of intermediate goods. They also specified conditions under which each reform strategy increases welfare without decreasing government revenue.

We follow the methodology of Naito and Abe (2008), with a slight modification, to examine the effects of tariff cuts and consumption tax reform on both welfare and government revenue in Korea's oil market. Although Naito and Abe's (2008) analysis examines a country importing both final and intermediate goods, their model provides limited practical applications for their theoretical results. Our analysis focuses on the market importing not final goods, but only intermediate goods, which reflects that the Korean oil industry imports all of its crude oil. More specifically, Korea's oil market entails final goods (petroleum products) being supplied mostly by domestic firms importing only intermediate goods (crude oil). The total demand for domestic final goods is large enough to influence the price of intermediate goods supplied by foreign suppliers. In our model, consumer demand for final goods is assumed to be satisfied purely by the supply of domestic final good firms.⁵ Mujumdar (2004) and Haque and Mukherjee (2005) also analyze the effects of tariff and tax reform under imperfect competition. However, unlike our study, their analysis focuses on the profit tax on final goods and assumes that domestic final good firms are price takers with respect to the price of imported intermediate goods.

This study finds that when a government's policy priority for tax reform is to increase welfare, the optimal tax strategy – raising the consumption tax by a scale of less than the sum of tariff cuts times the crude oil price and the oil import tax⁶ – not only increases welfare but also reduces inflation. When the priority is to maintain government revenue at pre-tax reform levels, the optimal strategy – combining the sum of the oil import tax and the product of the tariff cuts and the crude oil price at the pretax reform level, with point-for-point increases in the consumption tax – does not change either government revenue or social welfare and increases the retail price of oil.

The rest of the paper is organized as follows. The next section briefly describes the structure of the oil market and the oil-related tax system in Korea. Section 3 develops a model that considers only domestic final firms that use imported intermediate goods as inputs in the production of final goods. Section 4 conducts comparative statics analysis, and Section 5 provides tariff and consumption tax reform strategies. Section 6 discusses policy implications and concludes.

2. The structure and tax system for Korea's oil industry

Korea is the ninth largest consumer of oil and the fifth largest crude oil importer in the world (as of 2009). In 2009, Korea

consumed about 2.33 million bbl/d⁷ and imported 3.1 million bbl/d. The country meets its crude oil demand exclusively through imports. Korea has been dependent on Middle Eastern crude oil for over 80 percent of its demand since 2006.⁸ This indicates that Korea has the market power to influence global energy markets, and subsequently, global crude oil prices.

Despite the reduction of barriers to entry that resulted from switching the licensing system to the current registration system in October of 1998, there have been no new entrants into the Korean refinery market. Four major companies – SK Innovation (formerly SK Energy), GS-Caltex, S-Oil, and Hyundai Oilbank – dominate the downstream oil market in Korea through oligopolistic competition. The firms' business activities range from refining to retailing.⁹ In 2007, their domestic supply of gasoline, kerosene, and diesel accounted for 98.2 percent of Korea's national total (Jeong, 2009). They also currently dominate the domestic retail market for vehicle fuel, as represented by gas stations. Gas stations with their brands account for about 95 percent of Korea's total gas stations (Jeong and Shim, 2010).

With respect to the taxes levied on the oil sector in Korea, various taxes are imposed in multiple stages, from crude oil imports to retail sales. In the importing stage of crude oil, two types of tariffs are levied. First, the "oil import tax" tariff, at 16 won per liter, is levied on imported crude oil. Simultaneously, a 3 percent ad valorem tariff is imposed on imported crude oil. When refiners supply petroleum products to retailers in the next stage, specific consumption taxes are imposed depending on the petroleum product concerned. For example, gasoline is subject to consumption taxes, including the transport-energy-environment tax, the education tax, and the driving tax. The base rate of the transport-energy-environment tax is 475 won per liter. Its actual tax rate can be adjusted from 70 to 130 percent of the base tax rate. As of April 2011, the actual rate of the transport-energy-environment tax was 529 won per liter, which is 111.4 percent of the base rate. For the education tax and the driving tax, 79.35 won and 137.54 won (15 and 26 percent of the transport-energy-environment tax rate, respectively) are additionally imposed (Ministry of Strategy and Finance, Korea Taxation, 2010). Finally, a 10 percent value-added tax is imposed when consumers purchase petroleum products at gas stations.¹⁰ Roughly half of what people pay at gas stations is collected by the government. This is verified by the last column of Table 1, which shows that the ratio of tax to the retail prices for regular unleaded gasoline for 2007, 2008, 2009, and 2010 are 0.579, 0.494, 0.562, and 0.527, respectively.¹¹

Korea's oil refinery industry and its oil-related tax structure can be summarized as follows, assuming that petroleum products are final goods and crude oil is an intermediate good: first, only domestic firms supply final goods in a home country under imperfect competition. Second, final good production requires the use of intermediate goods that are entirely imported from foreign suppliers. Third, in the stage of importing intermediate

⁵ The model in this study does not take imported oil products into account, although Korea imported petroleum products that amounted to 276.86 million barrels in 2010 and accounted for 25.8 percent of the domestic demand for oil products. Among its imported oil products, naphtha, LPG, and Bunker-C account for 99.6 percent of the nation's total imports of oil products. Naphtha's, LPG's, and Bunker-C's shares are 68.1 percent, 25.1 percent, and 6.3 percent, respectively. Most of the imported naphtha and some of the LPG and Bunker-C are used as feedstocks in the Korean petrochemical industry. Bunker-C is used for power generation as well. For those imported petroleum products being used as input materials in the petrochemical industry, power generation, and stockpiling, the Korean government fully refunds the oil import taxes imposed in the importing stage, except for LPG when it is used for power generation. This indicates that most of the imported petroleum products in Korea are not subject to tariffs. We therefore exclude imports of oil products from our analysis.

⁶ See the description of the oil import tax in the next section.

⁷ Barrels of oil per day.

⁸ The facts above can be verified through BP Statistical Review of World Energy (2010), Country Analysis Brief of U.S. Energy Information Administration (EIA) and Petronet of Korea National Oil Corporation.

⁹ These firms have historically focused on refining. Although some of them participate in overseas crude extraction projects, their upstream activities account for a minor portion of their total business. Korea National Oil Corporation (KNOC) is the sole upstream producer in Korea.

¹⁰ For simplicity, we exclude the value-added tax from our analysis. Additionally, 10 percent of the value-added tax is not limited to oil products but is generally imposed on products purchased in Korea.

¹¹ The fifth column in Table 1 shows the sum of taxes levied on the gasoline (final good), not including tariffs imposed on imported crude oil (intermediate good). Therefore, the actual tax proportion in the retail price of gasoline in Korea should be slightly greater than the tax shares in the last column of Table 1.

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