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Diesel Pricing Reforms in India – a Perspective on Demand

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1. Introduction

India, together with China, has been an important source of the incremental growth in global oil demand over the last decade. This is expected to continue well into the future, and it is estimated that these two countries will account for roughly half of the increase in world energy demand to 2030 (WEO, 2012). A big part of the growth story has been about diesel. Over the last decade, diesel has assumed a growing importance in the energy production and consumption of the world's fastest growing emerging market economies.¹ Fuelled by trade and investment, non-OECD GDP growth, mainly in China and India, has strongly supported diesel demand over the last decade. The dominant position of diesel in commercial freight traffic has made it the fastest-growing demand component in countries characterized by long-distance internal trade. Further, energy-intensive mining industries (including coal) use vast amounts of diesel-powered equipment (roughly 30 to 40 per cent of mining costs relate to diesel) for extraction and transportation, as does the agricultural sector, due to continuing mechanization through the last decade. Additionally, the already diesel-biased incremental demand barrel often receives an extra boost from the power sector that leads to the use of diesel as a back-up fuel. Again, this is particularly the case in India, where frequent power shortages are almost always met by burning diesel in back-up generators in households and small factories. India, which had a surplus refining capacity of roughly 65 million tonnes at the end of 2012,² is also expected to be a major exporter of refined petroleum products, particularly of diesel.

In January 2013, the Government of India began deregulating the retail price of diesel by permitting Oil Marketing Companies (OMCs) to progressively raise retail prices over a period of several months, subject to a monthly ceiling, until their losses³ from the subsidization of diesel were completely offset. This policy decision represents one of the final stages of the 'decontrol' of prices for the two most heavily consumed petroleum products in India: diesel and gasoline.⁴ These, along with Liquefied Petroleum Gas (LPG) and kerosene,

¹ Diesel comprises 30 per cent of the world's demand for refined products; Indian diesel demand is about 5 per

² Roughly 500,000 barrels per day (b/d).

³ Estimated at US\$17 billion in 2011, and roughly US\$4 billion during April–June 2013.

⁴ Gasoline prices were liberalized to the retail level in June 2010.



form a group of products that are classified as ‘sensitive’ – given that they have historically been provided at subsidized prices to consumers, and that policy decisions to increase their prices are perceived to have economic and political ramifications.

Two key questions which arise from these recent measures are:

- Whether these recent pricing reforms will play a role in slowing the pace of growth in India’s oil consumption.
- Whether these pricing reforms have impacted the structure of India’s demand for petroleum products, and whether these reforms could make a difference to the economic situation in relation to fuel subsidies.

This Comment therefore focuses on the potential impacts of these important reforms on Indian diesel demand. This is relevant not just to the country’s domestic economy, but also to global oil demand and trade flows of refined products. Increases in diesel prices towards parity with international prices and the consequent impact of this on Indian diesel demand could, for instance, determine whether refining firms eventually find it more profitable to market diesel within the domestic market, which would influence the trade flows of petroleum products.

The argument in this Comment can be viewed as being in three parts. The first looks at the Indian reforms in the context of wider literature on the response of demand to the progressive elimination of subsidies – arguing that, contrary to the expectation that higher prices lead to a reduction in demand, for a developing economy like India, the demand for diesel is likely to continue growing as income effects are stronger than price effects. However, the second argues that the price effects *by themselves* are quite complex; the lag between reforming the prices of different petroleum products, and the relative price changes which have prompted substitution between them, complicates the dynamics of demand. And third, it argues that India’s system of differential taxation at the state level could lead to outcomes completely different to those intended by reform at the federal level, particularly in relation to subsidy removal.

The Comment begins by looking at the motivation behind these reforms and continues with a summary of the evolution of petroleum product pricing in India and its impacts on India’s fiscal situation. Section 3 details the arguments, outlined above, relating to expected impacts on demand; Section 4 concludes with some intuitive observations on likely future trends.

2. Evolution of Petroleum Product Pricing and Reforms in India

The primary motivation for the deregulation of diesel prices in January 2013 was the same as that for gasoline in 2010 – namely, the worsening finances of public sector OMCs which were made to bear the cost of subsidies to diesel⁵ (officially referred to as ‘under-

⁵ Defined as the difference between the price at which OMCs purchase petroleum products at the refinery gate and their retail selling price after accounting for a fiscal (on-budget) subsidy provided by the Government. Prices at the refinery gate are determined on a ‘trade parity’ basis which is a weighted average of import and export parity prices, with the percentages of imports and exports comprising the weights.



recoveries'⁶) and the associated fiscal sustainability of this in relation to a widening current account deficit, together with concerns over the slowdown in foreign investment. In September 2012 (immediately prior to the January 2013 deregulation) the Government announced a 14 per cent increase in the price of diesel (to US\$0.89 per litre) stating that price increases were necessary to bring down the fiscal deficit, and to improve investor confidence, so that the current account deficit could be financed increasingly through foreign investment inflows rather than the drawing down of foreign exchange reserves.

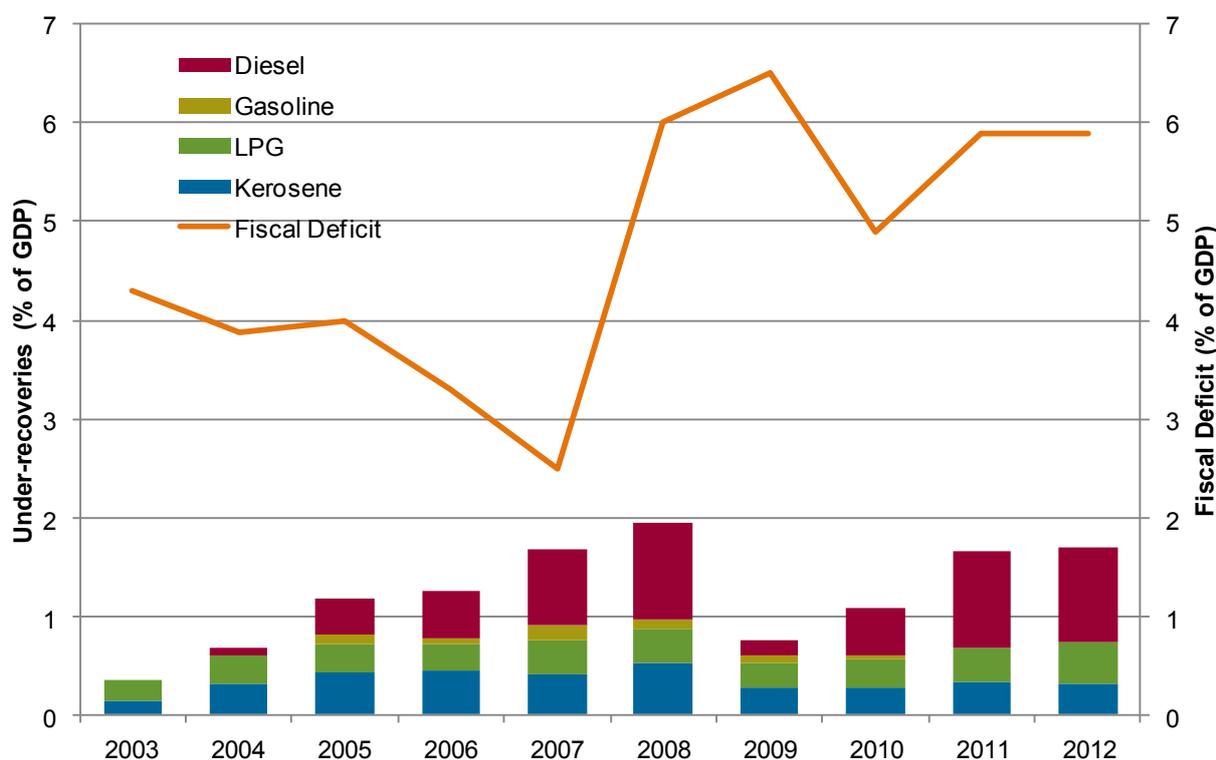
In examining the motivations for diesel pricing reforms, one question that arises is why they were not implemented at the same time as gasoline reforms in 2010 (when gasoline prices were liberalized up to the retail level) as the political fallout from the two was presumably similar and could have been dealt with at the same time. Instead, diesel pricing reforms were taken up nearly two years later, in September 2012. A possible answer lies in the wider consumer base for diesel relative to gasoline, and in its heavier usage, particularly in the transportation of goods – diesel formed roughly 38 per cent of petroleum product consumption in 2010 compared with 9 per cent for gasoline (Anand, 2012). The 2010 Parikh Committee (constituted to recommend 'A Viable and Sustainable System of Petroleum Product Pricing') estimated that the trucking sector represented roughly 37 per cent of total diesel consumption, followed by passenger cars at 15 per cent, agriculture at 12 per cent, buses at 12 per cent, industry at 10 per cent, power generation at 8 per cent, and railways at 6 per cent (GoI, 2010). Therefore, concerns associated with inflation and a potential backlash from voters may have led the government to adopt a more gradual approach to deregulating diesel prices.

However, the lag between gasoline and diesel reform, although perhaps justifiable at the time, may have in fact complicated the policy problem further. As Figure 1 shows, the reduction in 'under-recoveries' of OMCs associated with the liberalization of gasoline prices and elimination of subsidies on gasoline in 2010 had a relatively small net effect on total fuel subsidies. Diesel constituted the major proportion of under-recoveries, particularly from 2010 onwards, and by 2012, it made up 60 per cent of the Government's fuel subsidy bill. As we later elaborate, this may well have been due to consumers switching from the more expensive gasoline to relatively cheaper diesel – a consequence of the 2010 gasoline price reform per se. Further, the dynamics of substitution between gasoline, fuel oil, and diesel (discussed later in this Comment), may also have contributed to an increase in the consumption of diesel and higher under-recoveries.

⁶ Governments have been reluctant to equate under-recoveries with outright losses, on the justification that OMCs make profits on other lines of business, such as aviation turbine fuel.



Figure 1: Under-recoveries on ‘Sensitive’ Petroleum Products



Source: GoI (2010); GoI (2012); Planning Commission (2013); Economic Survey (2012)

The announcement on diesel reforms coincided with a reduction in gasoline prices by OMCs.⁷ At the same time, the federal government increased the allowance of subsidized LPG cylinders for domestic consumers (households), from six to nine – this measure was carried out to reduce potential consumer backlash. Therefore, although the deregulation had been estimated to lead to an immediate reduction of roughly US\$2.36 billion (Rs129 billion)⁸ in the subsidy bill relating to bulk consumers, the compensatory measure increasing the ceiling on the number of subsidized LPG cylinders for domestic consumers partially offset this as it increased costs by US\$1.74 billion, so the net effect on the fuel subsidy bill was relatively smaller. This ‘back of the envelope’ calculation demonstrates the complex nature of fuel pricing reform and some of its unintended consequences, and the role of relative price changes in changing the subsidy bill.

Attempts to reform the pricing of petroleum products in India are not new. They began in 2002, when India officially abolished its ‘Administered Pricing Mechanism’ (APM) regime for petroleum products. The APM had been put in place after the first oil shock of 1973, ‘to shield the Indian economy from the high and volatile oil prices generated by the first oil shock (GoI, 2010). This was done by preventing OMCs from passing through increases in international crude oil prices to consumers. The APM was administered through an ‘Oil Pool Mechanism’ which consisted of three main oil pool ‘accounts’ (Crude Oil Price Equalization

⁷ This happened to occur at the same time as OMCs reduced prices in line with international oil prices.

⁸ Assuming an exchange rate of US\$1 = Rs 54.66 for the week 13–18 January. At the time of writing, the Rupee had depreciated in value to US\$1 = Rs 59 at current market exchange rates.



Account, Cost and Freight Account, and Product Price Adjustment Account). These accounts, along with the price-setting rules, collectively made up the system of price controls on petroleum products (GoI, 2010). In theory, the oil pool accounts were meant to moderate the net effect of increases in the international price of oil by offsetting each other – in a sense mimicking the Balance of Payments mechanism.⁹ In practice, however, this was rarely the case as adjustments often required political sanction.

The APM led to the subsidization of both inputs (such as the prices of petroleum products sold as intermediate goods to industry – for example fertilizers and power) and outputs (such as the retail prices of petroleum products) rather than a direct output subsidy (to the consumer), creating a system largely responsible for the series of distortions in pricing that developed later on.

In 1997, a Government Committee recommended abolition of the APM, setting out three main objectives: first, that the price of domestically produced crude oil should be market determined; second, that the prices of petroleum products produced by refineries should be based on an Import Parity Price; and third, that consumer prices for all petroleum products apart from LPG and kerosene should be market determined (GoI, 2010). Subsequent to this, the prices of gasoline, diesel, and LPG were occasionally revised upwards by OMCs between 2002 and 2004. However, as the international oil price began an upswing in 2004, price controls were reinforced; in July 2004, a ‘price band’ mechanism was introduced which permitted the OMCs to revise retail prices within a band of ± 10 per cent of a 12 month rolling average of the international oil price (GoI, 2010). This band was replaced in 2005 by Trade Parity Pricing for gasoline and diesel at the refinery gate (GoI, 2010).¹⁰ In 2006, the path-breaking Integrated Energy Policy Report (published by the Planning Commission) recommended that, along with rational pricing mechanisms, subsidies should be delivered directly to eligible consumers using new smart card technologies.

Despite these attempts at reform, as international oil prices continued to rise between 2004 and 2008, the retail prices of gasoline and diesel continued to be subsidized. During this period, the Government introduced various measures to deal with the growing subsidy burden without raising petroleum product prices. In addition to on-budget subsidies (relatively small in proportion) and under-recoveries, one of these measures required public sector upstream companies to provide discounts on the sale of crude oil to the OMCs. Off-budget ‘oil

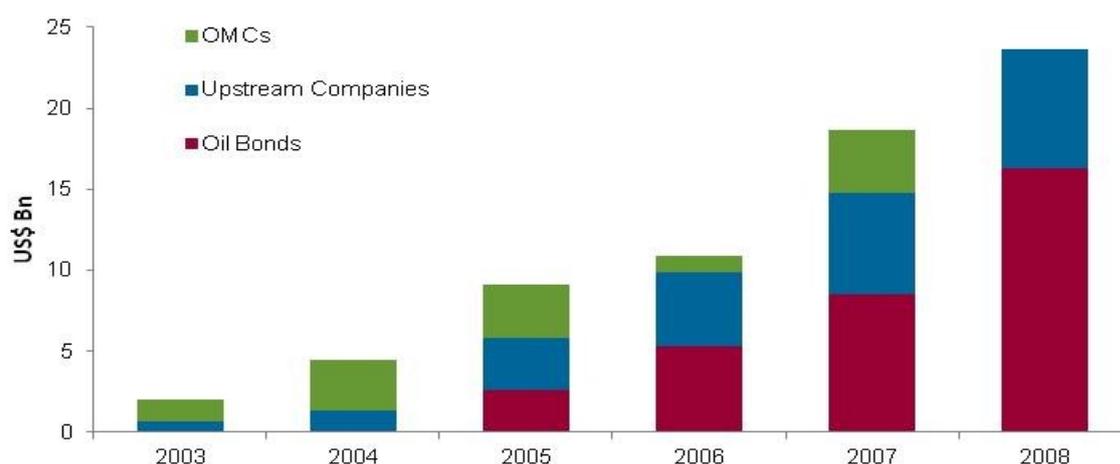
⁹ In theory, there are good reasons for offsetting temporary commodity price fluctuations. Consumers and producers may incur costs in adjusting their consumption and production in the face of volatile energy prices. Smoothing the effects on consumption can allow economies to be made in these adjustment costs (Federico et al., 2001). Households and the private sector can smooth the budgetary shock through resorting to capital markets or by taking self insurance through accumulating precautionary savings, which can be drawn on when energy prices are high, and paid into when energy prices are low. Alternatively, the private sector can engage in hedging activity. These tools for consumption smoothing, however, may not be available to households or the private sector. For instance, consumers and producers may not have access to credit markets. Furthermore, although the market for energy commodities derivatives is well developed, the private sector in developing countries usually does not have access to such instruments. Building stabilization funds, controlling domestic prices when prices in international markets are high, and increasing taxes when prices in international markets are low, can smooth consumption in the face of highly volatile energy prices.

¹⁰ Based on recommendations from the Rangarajan Committee.



bonds¹¹ were also issued to the OMCs to keep them solvent – essentially disguising the fiscal impact of subsidies. Part of the motivation for this may have been related to the adoption of the Fiscal Responsibility and Budget Management (FRBM) Act in 2003, which required the fiscal deficit to be brought down to 3 per cent of GDP by March 2008.¹²

Figure 2: Sharing of ‘Under-Recoveries’, 2003–8



Source: GoI (2010)

Another measure undertaken to mitigate the impact of under-recoveries, was the adjustment of federal excise and customs duties on petroleum products by the Central Government. Customs duty on LPG and kerosene was abolished in 2005, and excise duty reduced to zero by 2008. Customs duty on imported petrol and diesel was brought down from 20 per cent to 2.5 per cent on an *ad valorem* basis, and excise was brought down to a flat rate of Rs13.35 per litre for gasoline and Rs3.60 per litre for diesel by 2008¹³ (IEA, 2009; GoI, 2010). However, the structure of fiscal federalism in India meant that the continued indirect taxation of petroleum products by states at differential rates countered the effectiveness of this strategy.¹⁴ In 2008, the Chaturvedi Committee recommended that subsidies ought to be targeted at households living below the national poverty line and that direct methods such as direct cash transfers or smart cards should be used rather than the existing Public Distribution System.¹⁵

¹¹ ‘Oil bonds’ were issued as off-budget debt and therefore did not immediately show up as part of the fiscal deficit.

¹² This was postponed in 2007 due to the onset of the global financial crisis, and suspended in 2009.

¹³ Or US\$0.31 and US\$ 0.008 per litre at 2008 market exchange rates of 1US\$= 43.72 INR.

¹⁴ It was estimated that roughly 20% of the retail price of petroleum products at the time could be attributed to state taxes (GoI, 2010).

¹⁵ The Public Distribution System is a network of retail outlets managed by the Government of India. It distributes subsidized food and non-food items to poor households. The system has attracted wide criticism for its leakages and for its failure to accurately target the intended beneficiaries of subsidies.



In 2008, the International Energy Agency estimated India's effective fossil fuel subsidies at roughly 3.4 per cent of GDP (WEO, 2010). According to the Asian Development Bank (2008) the Government of India would have needed to issue oil bonds to OMCs equivalent to 2.2 per cent of GDP in 2008 to cover their losses. The drop in international oil prices in late 2008 led to a temporary reduction in under-recoveries, which began increasing again as prices rose in 2009, eventually reaching over US\$100 per barrel.

In 2009, the Indian Government faced some hard policy options and a combination of fiscal, development, and political constraints. First, fiscal measures to prevent price increases were unsustainable, given a period of rising international oil prices. Public sector oil companies faced financial problems due to their growing share in the subsidy burden, and the issuing of oil bonds to keep them solvent (through monetizing these bonds in the markets) was untenable as not only did these bonds not count towards the Statutory Liquidity Ratios of banks and financial institutions (demand for them was therefore low), but they also had to compete with numerous farm and fertilizer bonds in a saturated market (IEA, 2009; Clarke and Graczyk, 2010).

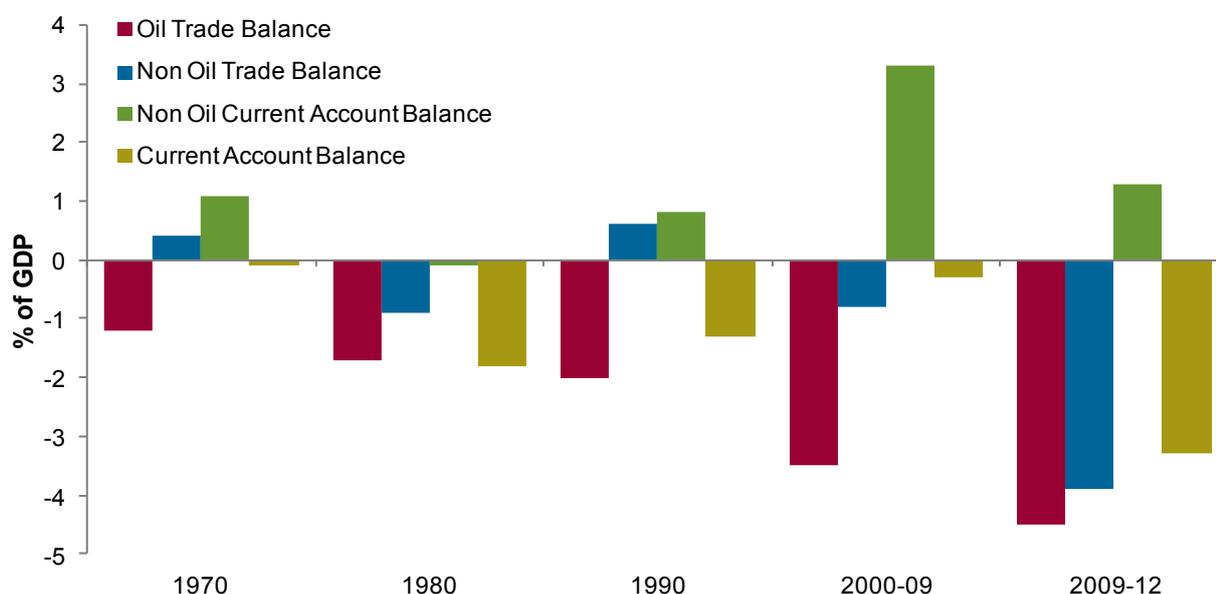
Second, the Government faced serious distributional and poverty alleviation problems, given that over half the population lacked access to modern commercial energy – a major proportion of the population using kerosene and LPG for lighting and cooking. Therefore, these products had to be kept affordable.

And third, there were political consequences, specifically for the federal government, attached to price increases, as despite their attempts to mitigate impacts through reductions in federal taxation, state governments were unwilling to match these reductions as these taxes formed a major and inelastic proportion of their revenues (Clarke and Graczyk, 2010).¹⁶ Added to the above were macroeconomic concerns. The import of over 70 per cent of crude oil requirements had led to a substantial current account deficit, while the financing of subsidies added to the fiscal deficit. In addition to the above, there were concerns over the impact on inflation of raising the retail prices of petroleum products.

¹⁶ This situation (Clarke and Graczyk, 2010) has been called a 'vertical fiscal imbalance': while the Central Government was cutting taxation and increasing outlay in the form of oil bonds, state governments continued to reap tax revenues from the petroleum product sector whilst offering no fiscal support.



Figure 3: Composition of India's Current Account Balance



Source: Mohanty (2012)

Under pressure to find a consensus solution to the policy issue above, the federal government appointed an Expert Committee¹⁷ in August 2009 to examine and suggest a 'viable and sustainable system of pricing of petroleum products' (GoI, 2010), which delivered its report in early 2010. This Committee recommended the liberalization of gasoline and diesel prices to the retail level, combined with the elimination of subsidies on these products. It also recommended increases in the prices of LPG and kerosene, and the use of a targeted form of subsidy provision to households below the poverty line, namely, direct cash transfers. The Committee's recommendations were based on its own analysis, which showed:

- Rapidly increasing under-recoveries, assuming continuing positive rates of GDP growth and international oil prices of US\$80, US\$100, and US\$120 per barrel.
- An analysis of expenditure and consumption patterns of petroleum products for households using National Sample Survey data which suggested that the poorest decile of rural households may be able to spend a marginally higher amount on LPG and kerosene.^{18,19}

Although these recommendations largely reiterated those of previous Committees, there are two possible reasons why they were adopted very quickly. The first motivation may have been macroeconomic. The second may have been due to the fact that a new system of delivering subsidies had been trialled during 2009 and early 2010 – the 'Unique Identification

¹⁷ The Parikh Committee.

¹⁸ A highly debatable observation, as the definition of 'poverty' and the 'national poverty line' are themselves a subject of intense debate.

¹⁹ The Committee also argued that measures to keep down the prices of petroleum products in order to keep inflation down were temporary, at best.



Number' (UIN).²⁰ The creation of this system involved the collection of biometric information for, and assignment of a social security number to, every citizen, allowing the federal government to transfer subsidy amounts directly into eligible consumers' bank accounts. The UIN was designed to essentially bypass the Public Distribution System and the associated problems of leakages, wastage, and exclusion of informal sector workers – thus reforming prices without breaking the 'social contract'. This new method of 'targeted subsidies' also reflected an ongoing global trend.

The federal government liberalized gasoline prices up to the retail level in June 2010, permitting OMCs to review prices on a fortnightly basis and set them in line with international oil prices. At the time, LPG and diesel prices were to be raised but subsidized beyond a certain threshold international oil price (roughly US\$83 at the time for diesel). This was eventually followed by announcements liberalizing retail prices of diesel for bulk consumers and deregulating them in stages for retail consumers in January 2013.

Specifically, the reforms in diesel pricing comprised two parts: first, it deregulated the prices of diesel sold to bulk consumers, by allowing OMCs to set prices in alignment with international oil prices, in the same manner as gasoline. This meant an immediate increase of 21 per cent for bulk consumers of diesel, creating a differential between bulk and retail prices.²¹ And second, it allowed the 'partial deregulation' of diesel prices for retail consumers – in that OMCs were allowed to review retail prices on a fortnightly basis and increase them every month to a maximum of Rs0.50²² per litre, over a period of time, until under-recoveries from diesel (roughly US\$17 billion in 2012) were completely wiped out. For retail prices, this meant a series of price increases at the maximum permissible limit over a period of several months²³ – the objective was to fully deregulate the price of diesel within a 24 month period of the initial reform (this excluded taxes and duties at the federal and state levels). Subsidies for LPG and kerosene are to continue until March 2014, when they will be reviewed.

3. The Impact on Diesel Demand

Whilst the impacts of diesel pricing reforms are likely to be widespread and varied, encompassing debates on the effectiveness and accuracy of international price benchmarks, and on distributional methods for compensating the poorest consumers, here we focus specifically on the impact of reforms on the demand for diesel.²⁴

²⁰ The UIN was conceived by the Indian Planning Commission in 2007, and was operationalized in 2009, after the Government appointed Nandan Nilekani, the co-founder and former CEO of Indian technology firm Infosys, as Chairman of the Unique Identification Authority of India – the organization tasked with implementing the UIN system.

²¹ US\$0.2 based on the average market exchange rate of US\$1= INR54.66 during the week 13–18 January.

²² US\$0.0092 based on the average market exchange rate of US\$1= INR54.66 during the week 13–18 January.

²³ Based on the international price of oil in January 2013, this period was 20 months, but it later increased due to various factors including the depreciation of the Rupee. At the time of announcement of reforms, OMCs had under-recoveries of Rs10.16 (US\$0.19) per litre on diesel, Rs32.17 (US\$0.59) per litre on kerosene, and Rs490.50 (US\$8.97) per 14.2 kg cylinder of LPG.

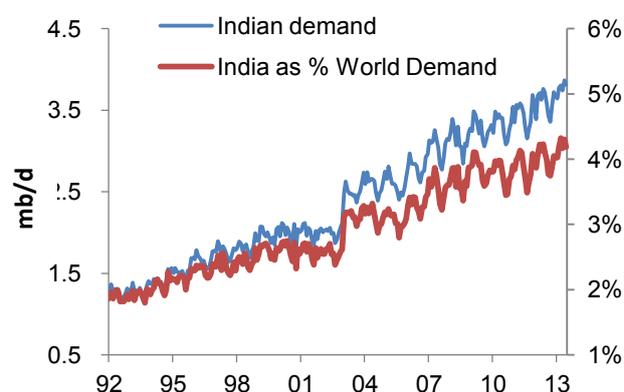
²⁴ There are also impacts on households and it may be argued that higher prices may be unaffordable not just to the poorest but also to a large majority of Indian consumers, and that solutions to this may lie elsewhere – for instance through adjusting taxation through the fiscal terms of exploration to capture a larger amount of rent,



Figures 4 and 5 provide further context on Indian oil and diesel demand. Over the last three decades or so, Indian demand has outpaced global oil demand growth. In the period between 1990 and 2000, Indian oil demand rose from 1.3 million barrels per day (mb/d) to 2 mb/d (a 10 year Compound Average Growth Rate (CAGR) of 4.4 per cent), while global oil demand grew from 68.2 mb/d to 74.2 mb/d (10 year CAGR of 0.9 per cent). In the period between 2000 and 2010 Indian demand picked up from 2 mb/d to 3.2 mb/d (10 year CAGR of 5.1 per cent), while global oil demand increased from 74.7 mb/d to 84.6 mb/d (10 year CAGR of 1.3 per cent). In the three year period between 2010 and 2013, Indian demand has grown on a three year CAGR of 5.8 per cent while global oil demand has grown by 2.5 per cent.

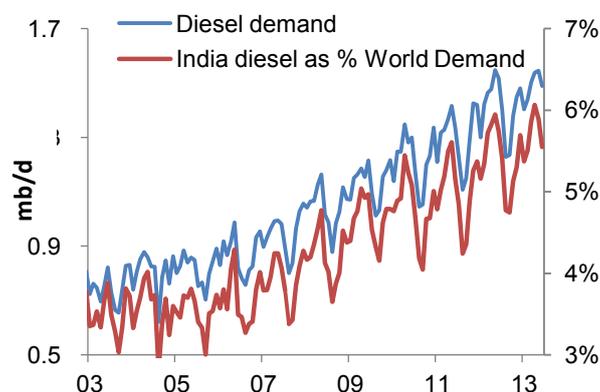
In terms of diesel, the picture is different, and shows some interesting changes in dynamics. In the 10 year period between April 2001 and April 2011, Indian diesel demand rose on a CAGR basis by 5.6 per cent, while world diesel demand outpaced that, growing by 6.6 per cent. However, in the two years since 2011, Indian diesel demand has picked up to a 2 year CAGR of 6 per cent, while world diesel demand growth has been sluggish at just under 1 per cent (see Figure 5). We examine some of the causes behind this strong rebound in diesel demand and consider whether the robust growth in the last couple of years will continue into the next decade.

Figure 4: Indian Oil Demand (mb/d and as percentage of World Demand)



Source: Petroleum Planning and Analysis Cell; Energy Aspects

Figure 5: Indian Diesel Demand (mb/d and as percentage of World Demand)



Source: JODI, Energy Aspects

Income and Price Elasticity

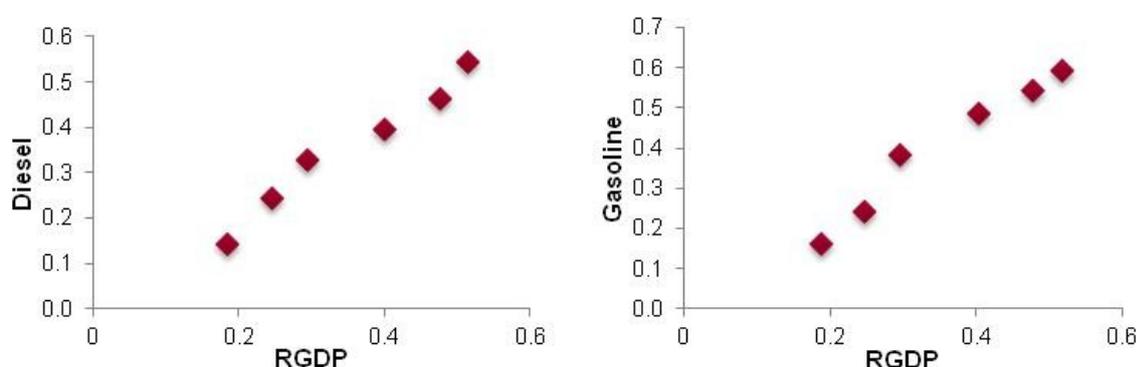
At the level of the broader economy, a general expectation following an increase in retail prices of previously subsidized products is that this will reduce demand through eliminating excessive consumption at low prices. The evidence, however, suggests that this may be unlikely for India at current levels of income development. Figures 6 and 7 show a scatter plot indicating the cumulative change in the natural logarithm of India's real GDP and the cumulative change in the natural logarithm of gasoline consumption and diesel consumption

which could then be utilized in a more transparent way towards offsetting the impacts of price increases at the retail level. However, these wider debates lie outside the scope of this comment.



between 2005 and 2012. As can be seen from these figures, the observations fall almost on the 45-degree, line implying income elasticity for diesel and gasoline demand of around one. Indeed, between 2005 and 2012, India's real GDP grew at an average annual rate of 7.35 per cent, while the rates for diesel and gasoline were 7.78 per cent and 8.51 per cent respectively, implying an income elasticity of 1.05 for diesel and 1.15 for gasoline. These figures are consistent with a large number of studies that find similar income elasticity values for developing countries (IMF, 2011, Dahl 1993). The IMF predicts that between 2012 and 2018 the Indian economy will grow at around 6 per cent on average. An income elasticity of around unity implies that diesel and gasoline consumption will grow at a similar rate.

Figures 6 and 7: Changes in Gasoline and Diesel Consumption versus Changes in Real GDP for India (2005–12)



Source: Energy Aspects and IMF; Calculated by Author(s). The horizontal axis measures the cumulative change in natural logarithm of real GDP from 2005 until 2012. The vertical axis measures the cumulative change in natural logarithm of gasoline and diesel demand.

Another interesting feature of the above graphs is that the increase in prices of gasoline and (to a lesser extent) diesel did not break the trend in growth of fuel consumption. During this period, gasoline prices increased from Rs37.99 to Rs67.24²⁵ while diesel prices increased from Rs28.22 to Rs47.²⁶ This implies a very small value for short-term price elasticity in the case of India. Recent studies put the estimate for short-run and long-run price elasticity close to zero for non-OECD economies (IMF, 2011). Thus, contrary to the popular argument that oil demand in developing countries will fall substantially if petroleum product prices are raised, the removal of subsidies is not likely to have a big impact on oil demand given the high income elasticity.

However, evidence from other countries also suggests that as a country's economy develops and household incomes grow, income elasticity of oil demand starts to fall. In particular, some studies find that when countries attain a certain threshold of per capita income, the

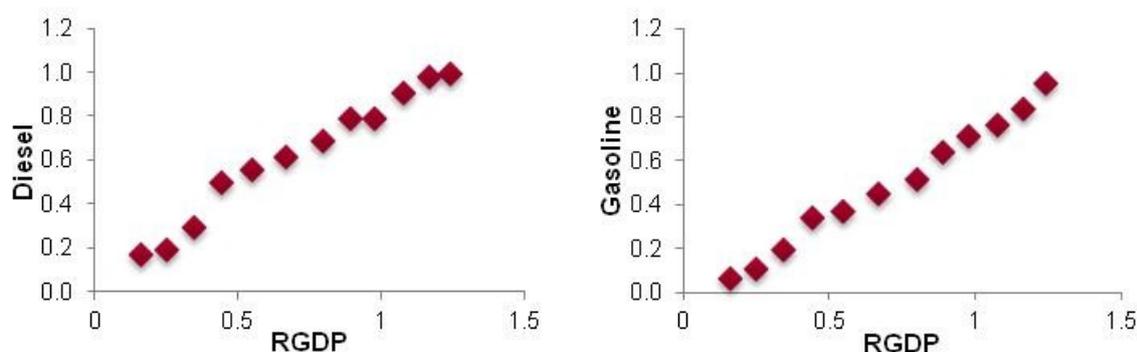
²⁵ Or US\$0.782 (from the beginning of 2005) to US\$1.254 (at end 2012) at prevailing market exchange rates. Based on retail prices in Delhi.

²⁶ Or US\$0.581 (from the beginning of 2005) to US\$0.879 (at end 2012) at prevailing market exchange rates. Based on retail prices in Delhi.



responsiveness of oil demand to GDP growth becomes smaller (Hamilton, 2009). India is yet to achieve convergence with the developed world in this regard. However, repeating the above exercise for China shows that income elasticity of demand has fallen slowly over time to less than unity.

Figures 8 and 9: Changes in Gasoline and Diesel Consumption versus Changes in Real GDP for China (1999–2012)



Source: Energy Aspects and IMF; Calculated by Author(s). The horizontal axis measures the cumulative change in natural logarithm of real GDP from 1999 until 2012. The vertical axis measures the cumulative change in natural logarithm of gasoline and diesel demand.

Between 1999 and 2012, the Chinese economy grew at around 9.5 per cent while gasoline and diesel consumption grew at 7.6 per cent and 7.3 per cent respectively, implying income elasticity for diesel of 0.80 and income elasticity for gasoline of 0.76. Thus if India's income elasticity were to fall, then its fuel consumption growth rate would also fall. For instance, assuming the Indian economy will grow at around 6 per cent between 2012 and 2018, the country's annual diesel consumption growth will fall from 6 per cent to 5 per cent if its income elasticity of diesel is adjusted to China's current level.

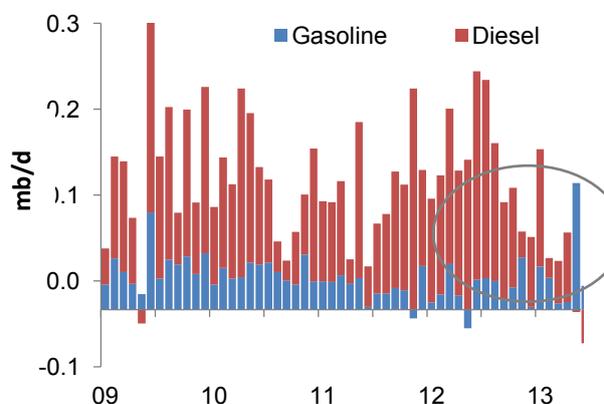
Therefore, whilst an increase in prices is unlikely to reduce the growth in demand for diesel significantly at India's current level of economic development, there are two aspects of the Indian diesel story suggesting that the impacts on demand, on economic sectors, and on consumers could be much more complicated than conventional wisdom implies. The first relates to changes in the *relative prices* of petroleum products and their impact on economic sectors – particularly on fuel substitution. The second is associated with the impact of differential rates of taxation at the state level. We discuss each briefly in turn.

The Role of Relative Prices

Essentially, diesel has two close substitutes – gasoline and fuel oil – Figures 10 and 11 chart trends in their demand and both show strong growth in Indian diesel demand relative to gasoline and fuel oil.

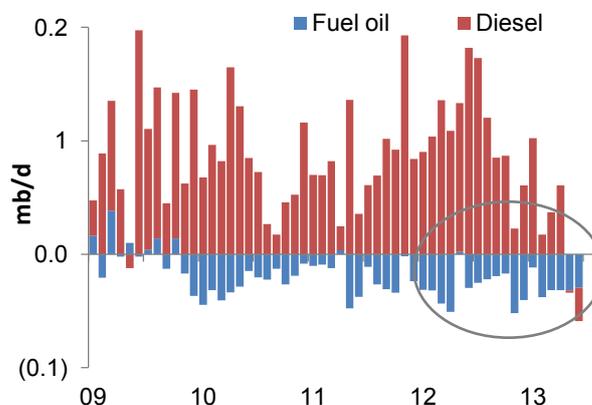


Figure 10: Gasoline and diesel demand growth, y/y change



Source: Energy Aspects

Figure 11: Fuel oil and diesel demand growth, y/y change



Source: Energy Aspects

The growth in diesel demand in the last three years has arguably been driven by a shift in the structure of demand for petroleum products, and we argue here that much of this has in fact been triggered by the 2010 gasoline price liberalization and the lag with diesel pricing reform.

As discussed earlier, diesel remained highly subsidized (keeping the price at about two-thirds that of gasoline), primarily due to its higher usage in politically sensitive sectors such as trucking and agriculture.²⁷ Between June 2010 and January 2013, the retail price of diesel was increased by roughly 20 per cent. After the partial deregulation of prices in 2013, its retail price went up by roughly 5 per cent between January and June. In July 2013, the differential was still Rs10.50 in favour of diesel.²⁸

The wide price disparity between diesel and gasoline prices therefore resulted in higher diesel usage in the automobile industry (substituting for gasoline) and in other industrial sectors (substituting for fuel oil). Of the two, the substitution effects in automobiles have been large, and reflect a new trend. Diesel car sales in India soared over 2012, as they continued to penetrate the gasoline car market. According to the Centre for Monitoring Indian Economy (CMIE) the Indian auto industry, which in 2010 was 70 per cent gasoline, had turned into an 80 per cent diesel market by 2012, and auto companies were either diverting gasoline vehicles to export markets or using heavy promotions and discounts to market them domestically. This swing towards diesel in the passenger vehicle market and the growth in the commercial vehicle population pushed up diesel consumption sharply.

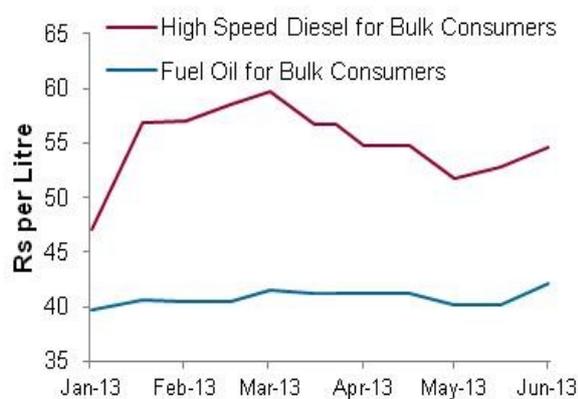
²⁷ In agriculture, diesel is used in tractors, for tube well pumps, and generator sets. This is usually 'light diesel' compared to the 'high-speed' diesel used in the auto sector. The share of diesel in commercial energy consumption represented by Indian agriculture has progressively increased, from 1.5 per cent in 1980 to roughly 20 per cent in 2006.

²⁸ Based on retail selling prices in Delhi and an average exchange rate of US1=INR54.97 for the period January–June 2013.



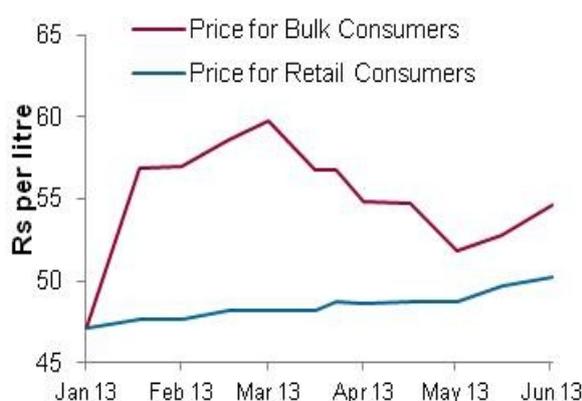
Following the 14 per cent increase in diesel prices in September 2012, the differential with gasoline was still too high (roughly US\$0.42 depending on varying state taxes) for diesel demand to alter course. However, by April 2013, there were signs that the share of gasoline in the auto sector was beginning to increase – rising from roughly 15 per cent to 30 per cent, with a proportional drop for diesel. Given the large investments already undertaken by auto companies in developing diesel engines for cars, the demand for diesel is unlikely to fall in the short term. As the complete deregulation of the retail price of diesel is likely to take at least 20 months, if not longer, there is arguably sufficient time for auto manufacturers to plan their inventories in the event of indications of a further narrowing of the differential between gasoline and diesel.

Figure 12: Differential between Diesel and Fuel Oil Prices, January-June, 2013



Source: PPAC (2013); Data for Delhi

Figure 13: Differential between Bulk and Retail Diesel Prices, January-June, 2013



Source: PPAC (2013); Data for Delhi

The second area where a substitution effect has been stimulated by a change in relative price levels is in the substitution of fuel oil with diesel in industry.²⁹ Figure 12 shows the differential between the price of fuel oil and the price of bulk diesel, for the period January–June 2013. Following the September 2012 increase in diesel prices (concurrent with a drop in fuel oil prices) the differential was nearly Rs10 in favour of fuel oil. Following the deregulation of diesel prices in January 2013, it is possible that this differential may be less predictable, and that substitution could be influenced much more by trends in international prices.

In addition to these structural changes, temporary ‘shocks’ – specifically a massive power blackout, which left 20 states without electricity over two days in July 2012 – have also boosted diesel demand in the country. This, combined with a poor monsoon, meant that back-up diesel generators were used heavily in 2012. Not only did residential and commercial users ramp up their usage of small diesel generators (15–75 kVA) but there was ad hoc

²⁹ The substitution between diesel and fuel oil in industry has arguably always existed, but the substitution effect between gasoline and diesel is recent and more prominent.



support for infrastructure (including telecoms and railways) using medium diesel generators (75.1–375 kVA). Additionally, large diesel generator (375.1–2000 kVA) usage among industries increased, in order to keep production going.

Following the discussion above, although we can argue that the demand for diesel will continue to grow (given that the income effects are stronger than the price effects in a situation of rising diesel prices, at current levels of economic development) we have also suggested that some of the strong growth, particularly from 2010 onwards, can be attributed to substitution effects brought on by the time lag between gasoline and diesel price reforms. Therefore, as diesel prices continue to rise, the pace of growth in diesel demand is likely to slow due to the narrowing of price differentials between various fuels.

In addition to impacts on demand from substitution between diesel, fuel oil, and gasoline, there are indications of changes in demand patterns *within* the diesel sector, with bulk consumers opting for retail purchases where permissible, as there has been a differential between the bulk and retail price since the complete deregulation of prices for bulk consumers in January 2013, in comparison to the partial deregulation for retail consumers (Figure 13 above).

For instance, this pattern can be seen among State Transport Corporations operating public transportation facilities³⁰ based on diesel. Most of these already run at a loss and are hesitant to pass on higher costs to consumers. In some states such, as Tamil Nadu, this strategy is being used as a temporary measure *in lieu* of raising public transportation tariffs whilst these Corporations challenge the applicability of federal price hikes to public sector transport systems.³¹ This brings us to the final part of our main argument, which relates to India's system of differential state taxation. This system could imply that 'final' outcomes at the state level are different, and even opposite to, those intended by federal reform.

The Role of Taxation

The final aspect of the Indian diesel story relates to India's fiscal federalism and the fact that states have autonomy in setting indirect taxes – which include the sales taxes and value added taxes (VAT) on petroleum products. For diesel, state taxes can form a substantial proportion of the retail selling price; for instance, in Delhi the effective rate of sales tax and VAT is about 20 per cent. The impact on retail consumers of continuous increases in the price of

³⁰ Mainly buses.

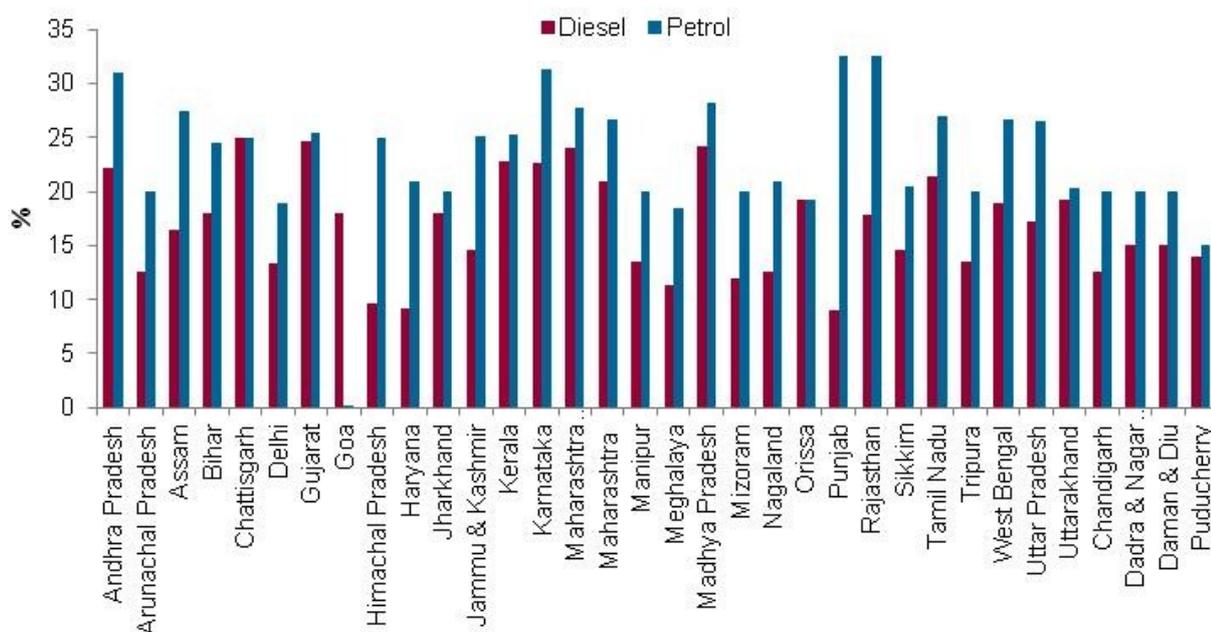
³¹ In March 2013, the Tamil Nadu State Transport Corporation filed a case in the Madras High Court challenging the applicability of the federal price hike to its road operations – which it argued was a public sector service that could not afford to pass on the cost to consumers via a higher tariff, nor take on the subsidy burden itself. The Madras High Court issued an interim order to the OMCs to continue selling diesel to the Corporation at subsidized prices until a final decision could be made. Shortly afterwards, the Kerala State Road Transport Corporation filed a case in the Kerala High Court on the same grounds, resulting again in an interim order to OMCs directing them to hold off on selling diesel to the Corporation at the higher price until a final decision could be made. On the other hand, Maharashtra's State Road Transport Corporation increased tariffs without challenging the federal price hike.



diesel is therefore contingent on whether states are willing and able to adjust these indirect taxes; this in turn depends upon each state's consumption of diesel, and the amount of revenue it raises from indirect taxation of diesel (and other petroleum products). The impact is likely to be different in richer versus poorer states, with respect to the collection of revenues.

Although a detailed state-level analysis is beyond the scope of this paper, the intuitive conclusion is that retail consumers in poorer states could be affected to a greater extent by price increases should state taxes be left unchanged. This is because poorer states can raise only a limited amount of their total revenues – leaving the remainder of their financing requirements to be funded through borrowings and grants from the Centre – they therefore may be less willing to reduce indirect taxation. In comparison, richer states have greater traction in their revenue raising capabilities – and higher per capita incomes in richer states may allow price increases to be passed through to consumers.

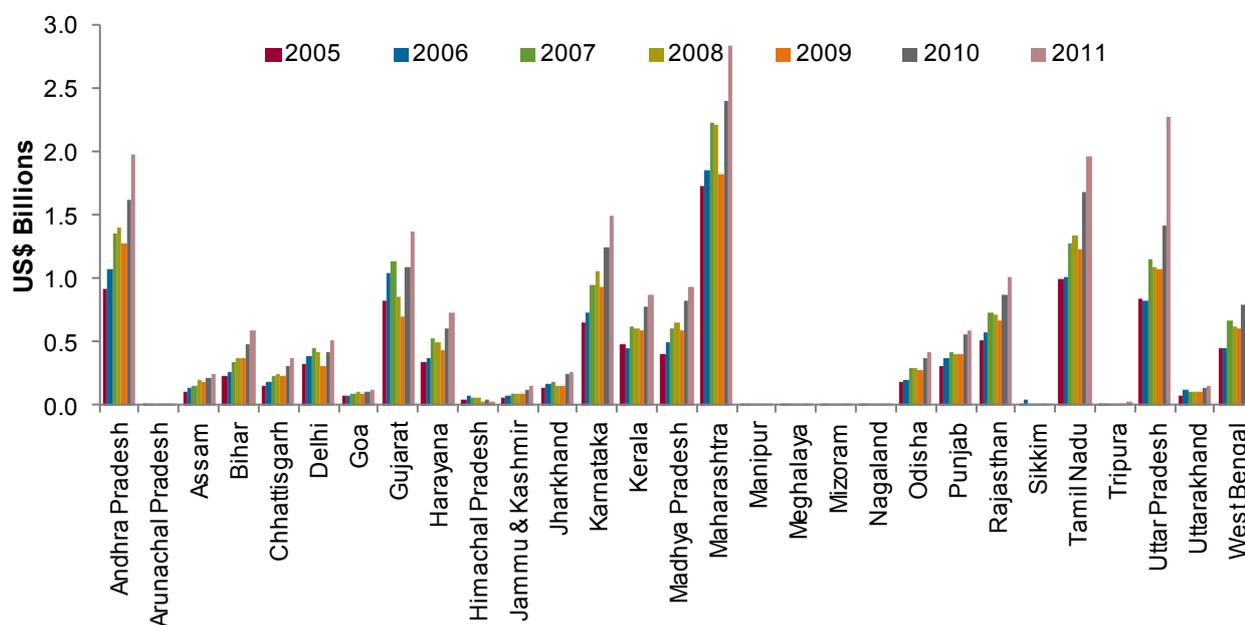
Figure 14: Variations across States in Effectives Rates of Sales Tax/VAT, 2012



Source: PPAC, 2012

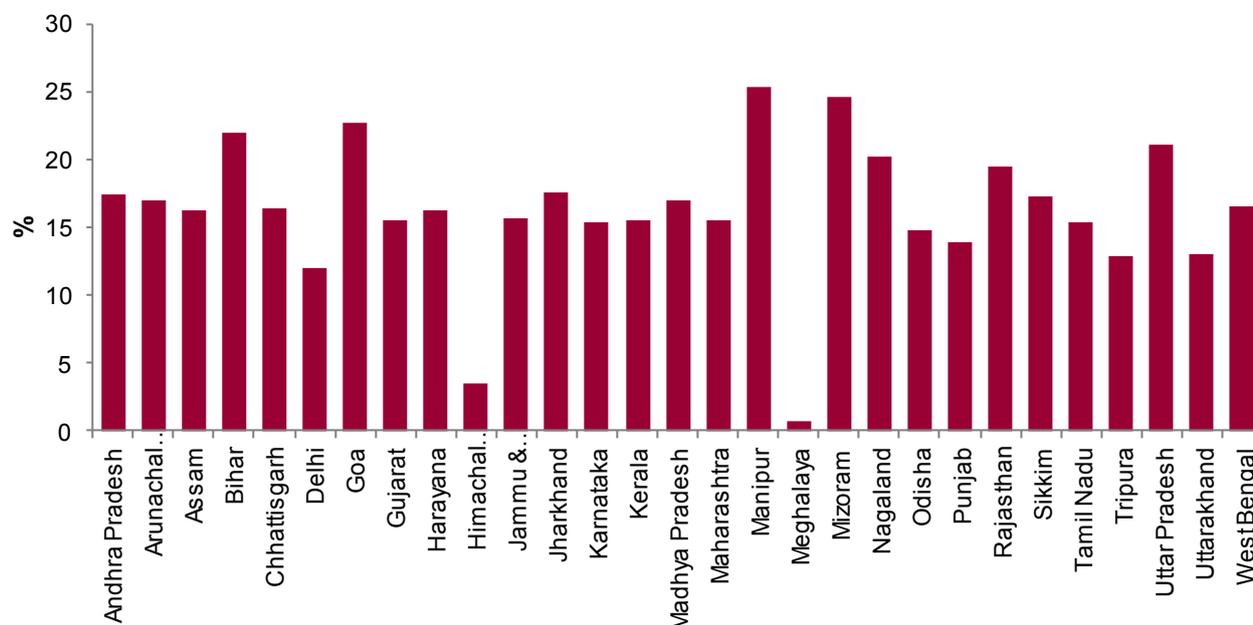


Figure 15: States' Revenues from Sales Tax on Petroleum Products, 2011



Source: MoPNG (2011)

Figure 16: States' Revenues from Sales Tax on Petroleum Products as Percentage of Own Tax Revenue, 2011–12



Source: Reserve Bank of India, 2013; MoPNG (2011)

Presumably, it is consumers in the poorest states that the federal government will need to target with its direct cash transfers – making the outcomes in these states completely



contingent upon the effectiveness of the UIN system. There are, however, indications that the system is not being put in place fast enough, due to an underdeveloped rural banking network which is not expanding with sufficient speed (Kazmin, 2013). To date, roughly 360 million citizens of India's population of 1.2 billion have been registered onto the UIN system, with a target of 600 million set for March 2014.

A potential game-changer for diesel, and more generally for fuel pricing reforms, for the federal government could be the successful implementation of a Goods and Services Tax (GST) regime, replacing the myriad of state-level taxes. A GST regime would ensure that producers paid taxes at a constant fraction of the value they add to each stage of supply, with consumers bearing the GST charged by the last dealer in the supply chain. GST would be applied at a uniform rate to all goods and services at each stage of the supply chain. Producers could claim back input tax credits against goods and services purchased for use in the manufacturing process. The GST system was first proposed in India in the National Budget for 2006, but its implementation has been continually postponed due to a failure to obtain consensus from the states either on what would be included under the GST (energy has thus far been excluded), or on the rates to be used. Given the reluctance of Indian states to surrender autonomy over indirect taxes, a dual GST has been proposed; this would consist of one GST levied by the Centre and one by the states, at predetermined rates on the same tax base, at each stage of the supply chain. Although the rates are yet to be decided, an aggregate range of 14–16 per cent was suggested by a government task force, which could be lower than the current rates of sales tax/VAT on diesel. However, even in GST systems, there may be additional duties or cesses levied on particular products or sectors.

It is very likely that in the event that states do not pass on increases in diesel prices³² or do not adjust their indirect taxes, the difference will have to be financed elsewhere, through an implicit or explicit subsidy – essentially leading to a situation similar to that discussed in Section 2– where the originally intended impacts of reforms will be offset at the state level.

4. Conclusion

Although an ideal reform might well have involved the coordinated implementation of three simultaneous measures – deregulation of fuel prices, a complete rollout of the Unique Identification Number system, and a Goods and Services Tax regime – it can be argued that India, like certain other developing nations (such as China) has, since 2010, taken significant steps towards reforming its policy on fuel pricing to resemble something that appears to be rational and efficient, whilst also attempting to meet important distribution and poverty alleviation objectives. However, the administration faces a struggle to implement these reform measures given the challenges outlined in this comment.

This Comment has demonstrated three important conclusions. First, at a broader, macroeconomic level, price increases brought on by reforms in diesel pricing are unlikely to lead to sharp falls in the demand for diesel, as income effects tend to 'swamp' price effects

³² Whilst compensating the poorest consumers in a transparent way.



(or income elasticity is higher than price elasticity) at India's current level of economic development. Second, we indicated that there *have* been price effects in terms of the relative changes in the prices of different fuels, with subsequent substitution effects – importantly, we have argued that some of these price effects are in themselves a consequence of the lag in reforms between gasoline and diesel, and that these price effects could lead to a lower trend in the growth of diesel demand. And third, the fact that Indian states have autonomous power over indirect taxation could mean that the final impacts of diesel reforms at the state level could be completely different to those intended at the federal level. In fact, where states do not either adjust their own rates of indirect taxation or pass on increases in diesel prices, there is a risk of creating a subsidy counterpart (either explicit or implicit) elsewhere in the system, which essentially takes the situation 'back to square one'.

It can in fact be argued that the Indian diesel demand story is, to a large extent, a broader story of liberalization and reform in India where, as parts of the system are reformed, often in stages, different sorts of distortions are created. For instance, reforms in gasoline pricing have led to large substitution effects and consequently to higher subsidies of diesel. However, as distributional objectives begin to be addressed, the system collectively moves towards something more rational and efficient.

This takes us back to the important question of the sustainability of reforms, given that prices will be deregulated in stages, over a period of nearly two years. Ultimately, the pace and sustainability of reform will be determined by the conflict between economics and politics that is only likely to intensify in the run-up to the general election in April 2014. It has been the experience in other countries that there is always the risk that 'bad politics' can turn 'good economics' into bad by creating wider distortions in the economy. In the case of India, the outcome of this struggle remains highly uncertain.



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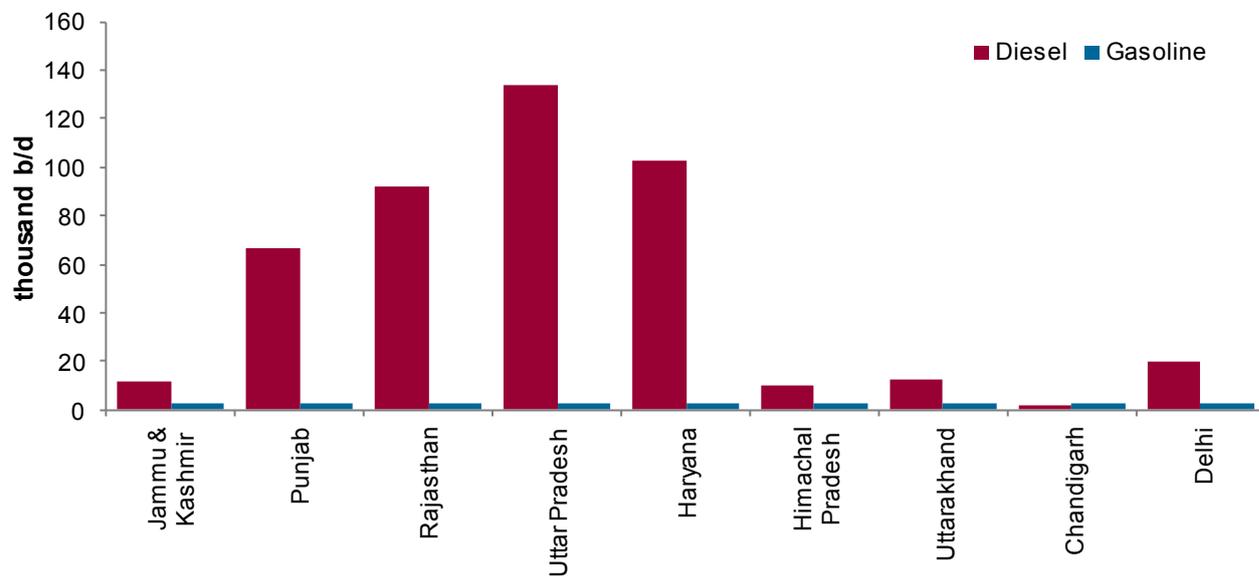
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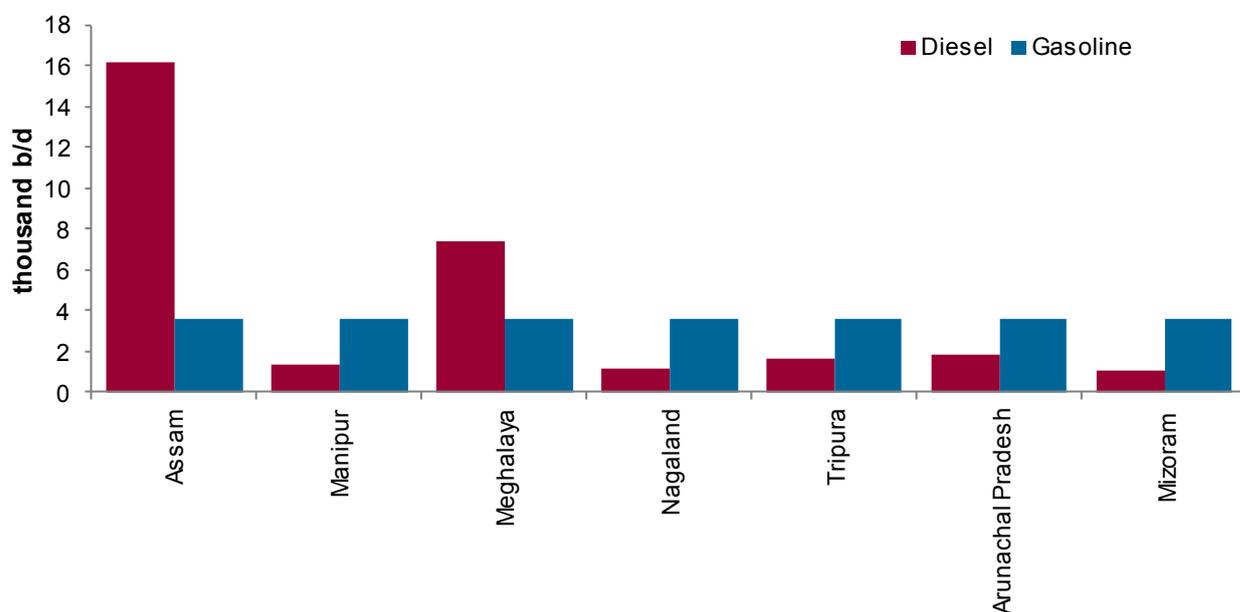


Appendix: Analysis of Diesel Consumption across Indian States, 2011-12

A. Northern Region

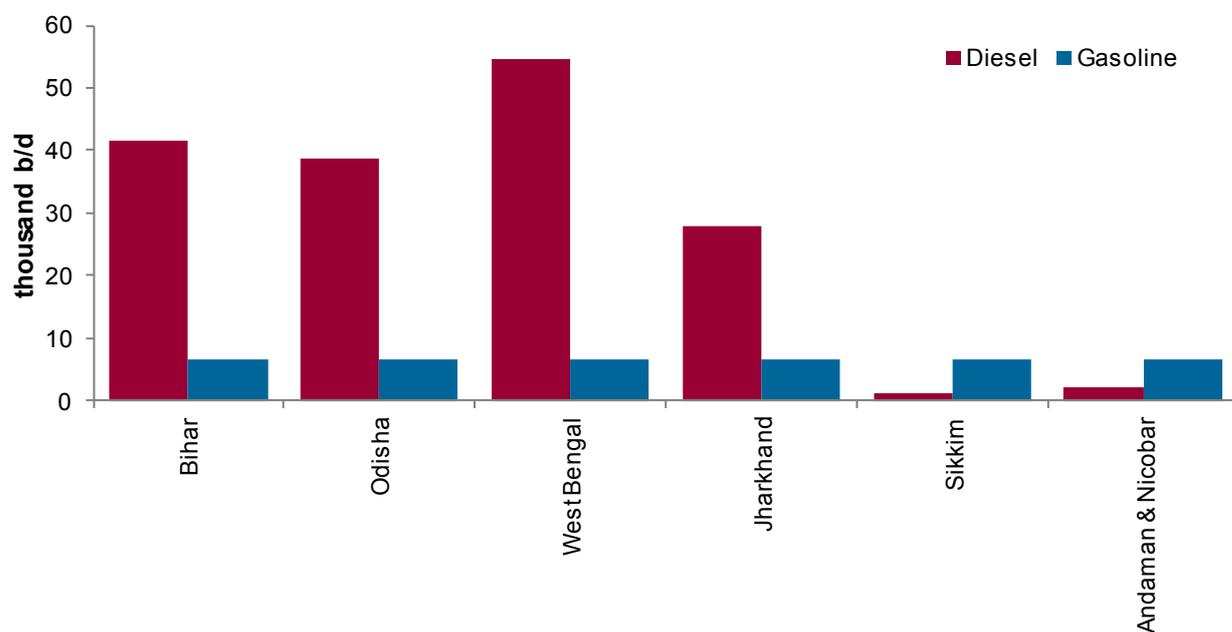


B. North-eastern Region

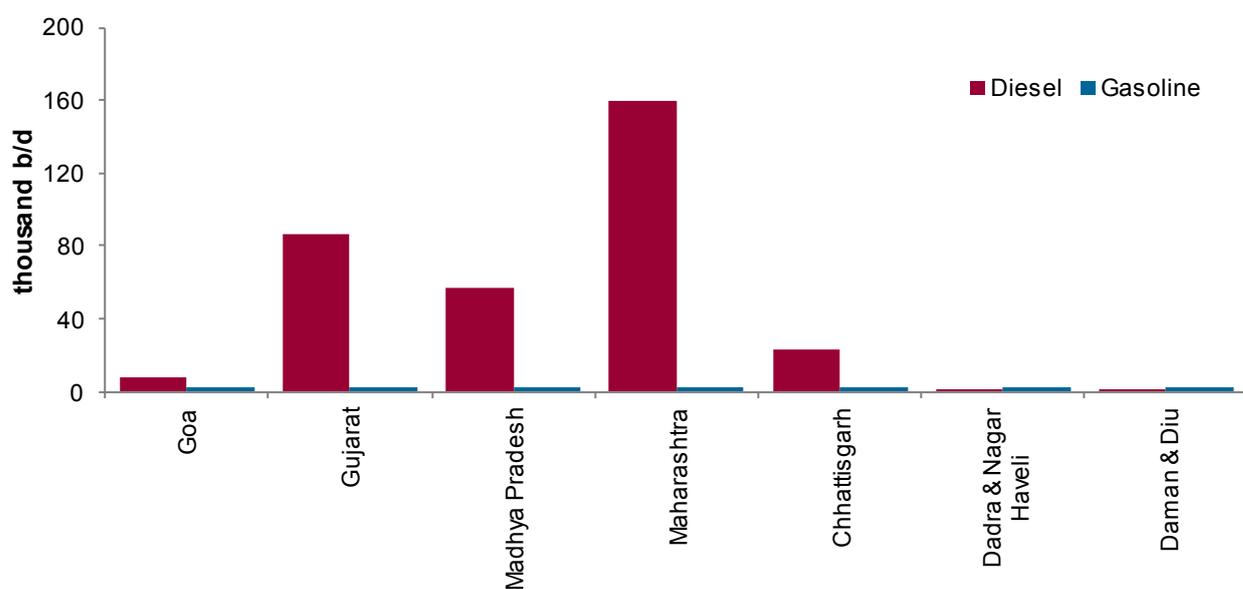




C. Eastern Region

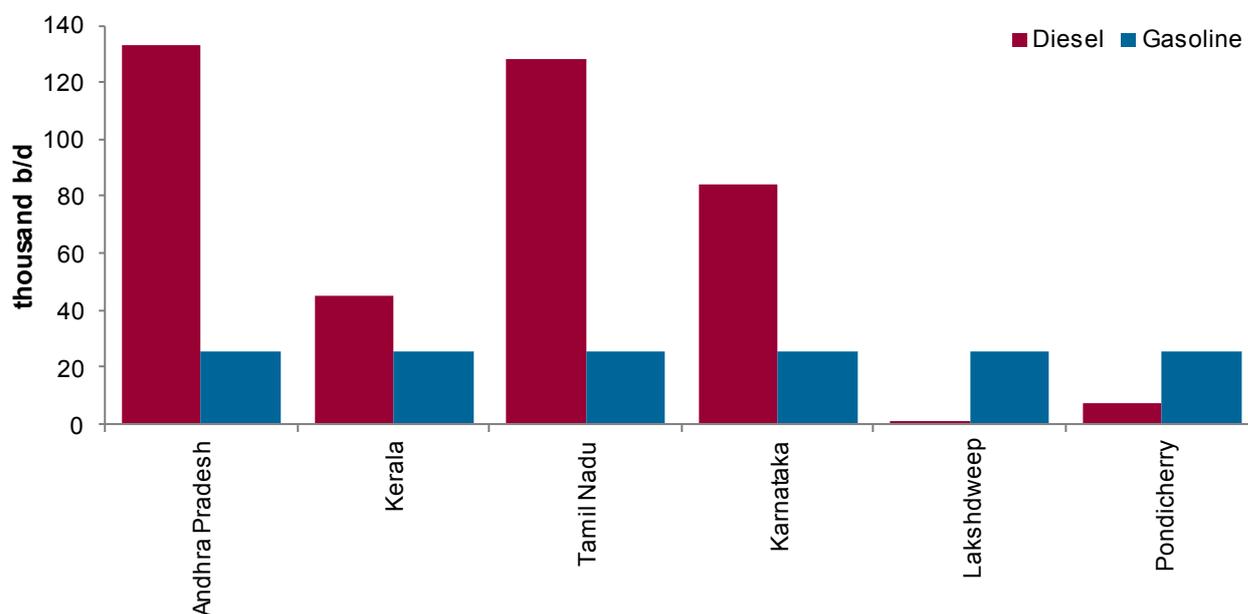


D. Western Region

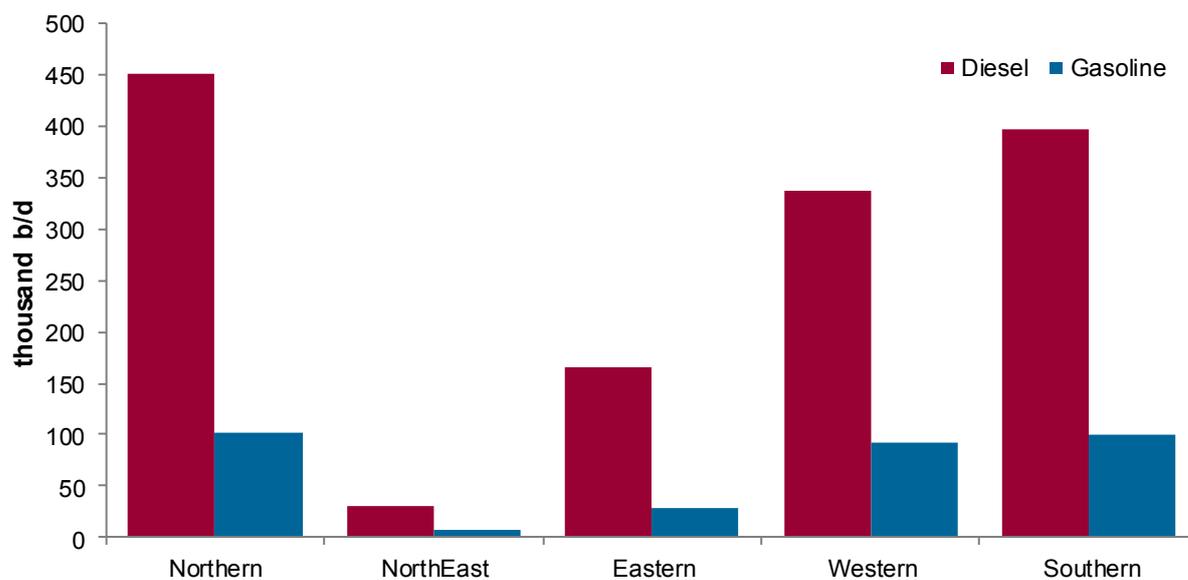




E. Southern Region



F. Regional Totals



Source: MoPNG (2011)