# Chapter 5

## Socio-economic Impacts of an LPG Subsidy Removal on the Household Sector in India

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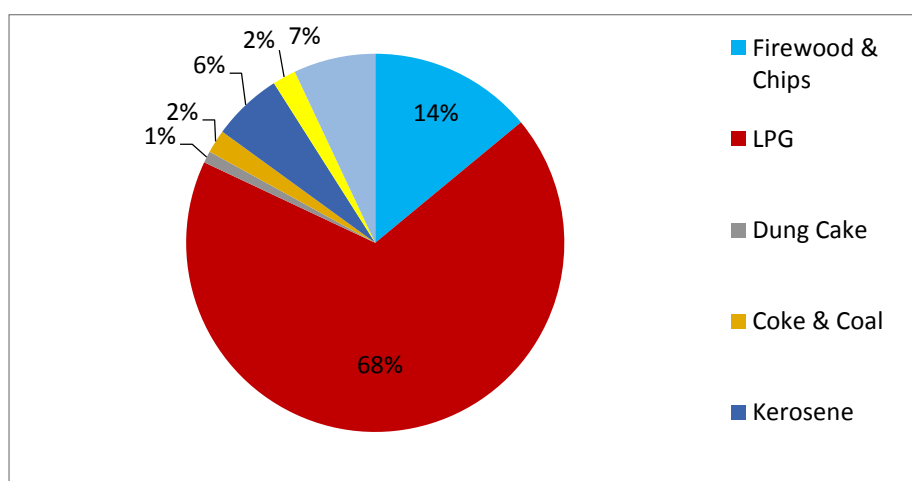*Indira Gandhi Institute of Development Research (IGIDR), India*

**Abstract**

This study examines the socio-economically acceptable strategies that India should adopt for removing its liquefied petroleum gas (LPG) subsidies. In India, a large number of rural households and poorer households in urban areas still use inefficient fuels for cooking and other household needs. The use of clean forms of energy, namely LPG, as a cooking fuel and for lighting, is mostly restricted to urban and affluent households. This energy-use inequity has adverse socio-economic impacts, such as negative effects on health, increased deforestation, and environmental degradation. The Government of India provides large subsidies on LPG use in the household sector, resulting in a negative impact on the country's economy. To reduce the LPG subsidy burden on the fiscal budget, the Government of India has introduced many ameliorative measures, such as fixing the number of annual subsidised LPG cylinders per household, providing direct beneficiary cash transfers, and encouraging affluent consumers to forgo their subsidies. In our study, we use sets of regressions to predict the socio-economic impacts of the removal of LPG subsidies on the Indian economy. However, a limitation of our analysis is the availability of data, as we use data for the period 2001–2014. This data is available only on an annual basis, so we have 14 observations per variable for all sets of regressions. From our analysis, we infer that the impact of the LPG subsidy removal indicates a positive relationship between gross domestic product and the consumption of LPG, as income generated during the fiscal year is positively related to LPG consumption. Secondly, estimating the total LPG subsidy as a function of total consumption, we see that consumption is not a determinant of the total subsidy bill of LPG. Thirdly, when total LPG consumption is regressed on the LPG market price, gross domestic product, and the regressand's lagged value, the results indicate that the price of LPG, with or without the subsidy, is not a significant determinant of its consumption expenditure. Finally, evaluating the macroeconomic impact of a change in the LPG subsidy on the economy suggests that the rate of growth of the economy is not affected by changes in the LPG subsidy. Thus, we summarise that removal or reduction of the current LPG subsidy will not have a significant impact on the Indian economy.

# 1. Introduction

In India, liquefied petroleum gas (LPG) is used as the primary cooking fuel by urban and rural households as well as commercial establishments. At the national level, a larger share (about 68.4 %) of LPG is consumed by urban households, followed by firewood and chips (14 %) and kerosene (5.7 %), while 6.9 % households do not have any arrangement for cooking. In terms of the change in the type of energy used for cooking for the period 1999–2000 to 2011–2012, for urban households, the use of firewood and chips dropped from about 22.3 % to 14.0 %; and kerosene from 21.7 % to 5.7 %; while LPG use increased from 44.2 % to 68.4 %. The share of energy for cooking for urban households by primary source is shown in Figure 5.1 (MoSPI, 2012).

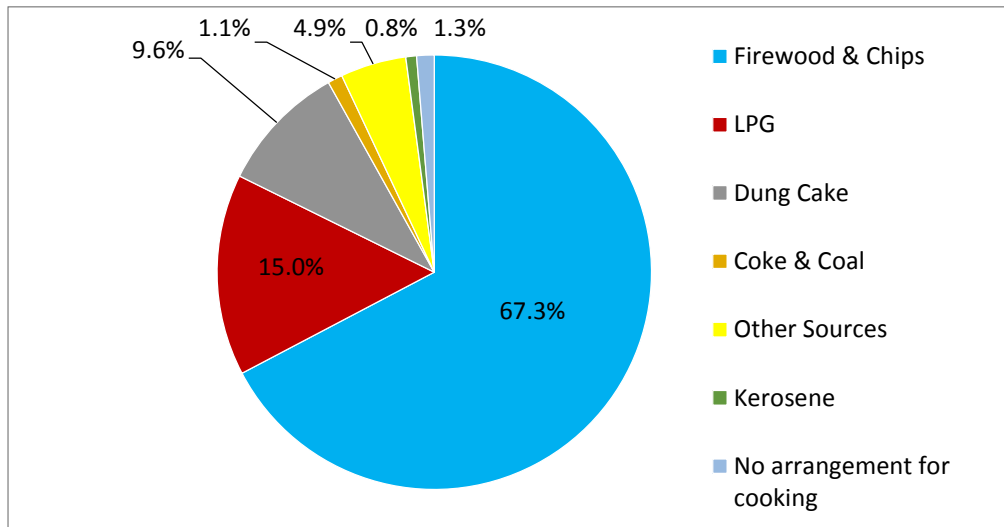**Figure 5.1. Primary Source of Energy for Cooking for Urban Households in India**



LPG = liquefied petroleum gas.
Source: MoSPI (2012).

In sharp contrast, the majority of rural households across India still depend on polluting fuels for cooking and other household needs. Firewood and chips are used as a primary cooking source by more than two-thirds (67.3 %) of rural households, followed by LPG (15.0 %), dung cake (9.6 %), and coke and coal (1.1 %) , while 1.3 % of households do not have any arrangement for cooking. For the type of energy used for cooking for the period 1999–2000 to 2011–2012, for rural households, the use of firewood and chips (67.3 %) dropped by only 8.2 %, while the use of LPG increased from about 5.4 % to 15.0 % as shown in Figure 5.2 (MoSPI, 2012).

**Figure 5.2. Primary Source of Energy for Cooking for Rural Households in India**



Pie chart legend:
- Firewood & Chips
- LPG
- Dung Cake
- Coke & Coal
- Other Sources
- Kerosene
- No arrangement for cooking

Chart values: 9.6%, 1.1%, 4.9%, 0.8%, 1.3%, 15.0%, 67.3%

LPG = liquefied petroleum gas.
Source: MoSPI (2012).

Thus, a large number of rural households still use inefficient fuels for cooking, which are not only detrimental to the health of the household members but are also responsible for increased deforestation and environmental degradation. This energy-use inequity has larger social implications, as women and children in the household using inefficient fuels are more likely to suffer from the resulting adverse health impacts and are also forced to go through the drudgery of collecting firewood. LPG for both urban and rural households is provided at a highly subsidised rate in India, while LPG for commercial use is sold at a non-subsidised rate.

Most of the beneficiaries of LPG subsidies are enjoyed by urban households, many of which are affluent and can afford LPG at non-subsidised rates. The subsidies on LPG for the household sector may be negatively affecting the Indian economy. Meanwhile, it has been observed in India and elsewhere that the removal of such subsidies may not have much effect on even poor households, and, in the long run, lead to socio-economic development (Gangopadhyay, Ramaswamy, and Wadhava, 2005; Musa and Hounsou, 2014).

Recently, there has been an impetus on the removal of LPG subsidies for domestic consumers and the number of subsidised LPG cylinders per year has been fixed for each household. Through regular awareness campaigns, the Government of India (GoI) is encouraging people to voluntarily give up their LPG subsidies so that the government can continue to provide these subsidies to the economically weaker sections of society. These efforts include an appeal by the prime minister to consumers, particularly the affluent households, to forgo their subsidies and buy LPG at the market (non-subsidised) rate.

Under the "Give It Up" campaign, launched by the GoI, around 10 million consumers have voluntarily given up their LPG subsidies, helping the government save Rs.41.660 billion. The initiative asking consumers to give up their LPG subsidy started in 2012, but the movement gathered pace in the past year due to a massive outreach programme run by the petroleum ministry. For each "Give It Up" consumer, one free connection is given to a below poverty line

(BPL) family under a scheme called the "Give Back Scheme". Thus, every consumer who voluntarily gives up the LPG household connection is matched against a BPL consumer who gets the LPG in lieu of the subsidy saved. At present, about 6.5 million poor households have been given new LPG connections under the scheme (MoPNG, 2016).

This research focuses on investigating the socio-economic impacts of a removal of the LPG subsidy on the household sector in India. Removal of this subsidy may reduce consumption and wasteful use of LPG, which consequently could have a positive impact on the national economy, but some marginal negative impact on households' economies. The market price of LPG may induce other impacts too, such as social and environmental impacts. A complete removal of the LPG subsidy for all domestic consumers may adversely affect the economically weaker households as it may compel them to use cheaper but unclean fuels, thereby creating indoor air pollution and adversely affecting their health. On the other hand, the high cost of non-subsidised LPG may reduce its consumption, in general, and discourage wasteful use, particularly by rich households. This could reduce greenhouse gas (GHG) emissions and thus may positively affect the environment.

The research questions raised by the study are as follows:

- What is the impact of LPG subsidies on the economic growth of India? Are the subsidies an incentive or a deterrent?

- What will be the impact of an LPG subsidy removal on the national economy and fiscal balance?

- How would the removal of the LPG subsidy affect real income per household?

- What could be the other impacts, such as the social repercussions or the environmental impacts of the LPG subsidy removal?

- Which strategies should India adopt for removing the LPG subsidies so that they are socially acceptable?


## 2. Energy Subsidies: A Brief Overview


Energy is heavily subsidised across the globe and energy subsidies exert an extensive economic burden on many countries, particularly on developing economies. ERIA and the International Energy Agency (IEA) (2013) estimate that inefficient energy subsidies amounted to US$51 billion in 2012 in Southeast Asia alone. Theoretically, a reduction or removal of energy subsidies should result in several socio-economic and environmental benefits, such as more energy efficient consumption and a reduction in local and global pollution. It is often argued that subsidies, in general, seldom benefit the poor and needy and are more favourable to the affluent sections of society, thereby defeating the very purpose of subsiding energy. According to the World Bank (2008), energy subsidies are a burden on fiscal budgets, and also on the environment as they increase GHG emissions due to the increased or wasteful consumption of energy.

It is estimated that fuel subsidies alone are 2–7.5 times as large as public spending on health in some countries, namely in Bangladesh, Ecuador, the Arab Republic of Egypt, India, Indonesia, Morocco, Pakistan, Turkmenistan, Venezuela, and the Republic of Yemen. The lack of energy reforms implies diverting public funds from investments that fight poverty and fostering inefficient economies that are increasingly exposed to energy shocks. Energy pricing reforms and the removal of subsidies encourage energy efficiency and are conducive to the promotion of renewable energy. Strategies that are designed and implemented to keep in mind social safety nets can facilitate energy price reforms that protect the economically weaker sections of society (World Bank, 2008).

The various factors that determine the provision of subsidies are their total cost, the fiscal burden on the economy, the social benefits, and impact on the welfare of the beneficiaries. The IEA defines an energy subsidy as any government action that lowers the cost of energy production by either raising the price received by energy producers or lowering the price paid by energy consumers. Many countries across the world, subsidise fossil fuels to provide financial support and compensate for steep increases in international energy prices. The IEA estimates that fossil fuel subsidies worldwide amounted to US$548 billion for the year 2013 (IEA, 2015). However, these subsidies prove to be very costly in economic terms as they create huge spending for government budgets and distort national and international markets. Studies suggest that fuel subsidies hamper economic growth and undermine the fundamental principle of equity, and therefore should be reduced, if not eliminated completely. Experiences from countries that have implemented reforms show a remarkable improvement in social services delivery (IISD, 2014; Musa and Hounsou, 2014).

The strategies and policies for the removal or reduction of energy subsidies vary from country to country. In general, subsidy policies in most developed nations are framed based on issues related to the environment, international trade, and market competitiveness. On the other hand, in developing nations, like India, the subsidy framework is consumer driven and based upon more pressing issues, namely social welfare, poverty alleviation, and electoral politics, as the beneficiaries of the subsidies are often considered as the voting banks.

Fuel subsidy removal programmes in any country must be responsive to the country's economic structure, level of development, political system, and economic state. Most countries that have taken a phased or gradual approach for subsidy removal programmes, after deliberations based on in-depth research and a dedicated approach to policy making, have been successful in the removal or reduction of subsidies. Governments in such countries have created awareness and gained the trust of their citizens through effective communication.

In India, for a long time, the high cost of imported fossil fuels was subsidised to make them affordable to masses. However, due to their excessive burden on the economy, the GoI took steps to reduce or remove the subsidies. Subsequently, subsidies on diesel and petrol were removed, but subsidies on kerosene and LPG for domestic consumers were kept in place. The removal of subsidies on LPG may create problems for economically weaker sections of society and may also become a political issue with repercussions for the government. Thus, a reduction or removal of subsidies on LPG warrants carefully designed strategies and policies

that do not have long-term negative impacts on beneficiaries and that are also able to address the politics involved.

## 2.1. LPG Subsidy in India

Since fossil fuel subsidies have a negative impact on India's economy, there has been increasing attention on reducing and removing the subsidies. Although subsidies on petrol and diesel have been removed completely, those on kerosene and LPG are still imposing a tremendous pressure on the government's fiscal budget. India's total subsidy bill for the current (2015–2016) budget was estimated at Rs2.43 trillion (Indian Rupees), about 9 % below the revised estimate of Rs2.66 trillion for 2014–2015. The reduction has been aided by the fall in the price of crude oil, the decontrol of diesel and petrol prices, and the cash transfer scheme for disbursing LPG subsidies.

The total petroleum subsidy in the current budget (2015–2016) is estimated at Rs300 billion, which includes Rs220 billion for cooking gas (LPG) and Rs80 billion for kerosene, a cut of 50.22 % from the revised estimate of Rs602.7 billion for 2014–2015. The revised estimate is almost 5 % below the budgeted estimate of Rs634.27 billion. This provision is based on taking the average crude price at US$70 a barrel during the fiscal yearl. According to the GoI, until now, Rs63.35 billion has been transferred directly as LPG subsidies to 115 million LPG consumers. The estimates for the current fiscal year indicate a saving of about Rs65 billion in LPG subsidies due to the direct cash transfers to the bank accounts of beneficiaries (Bhaskar, 2015; Sinha, 2015). Table 5.1 shows the total subsidy on kerosene and domestic LPG for the past decade.

LPG subsidies are supposed to benefit economically weaker households, but in reality, often fail to reach the target population. For example, while the GoI provides a large subsidy for LPG, the majority of Indians who use LPG as a cooking fuel are urbanites and the economically well-off. On the other hand, most of India's 1.2 billion people who are below the poverty line dwell in rural areas and continue to use traditional fuels, such as coal, wood, or dung, for cooking and heating. Also, both subsidised kerosene and LPG, which were made available to needy people through a public distribution system, have in the past been wrongly diverted for commercial use. Table 5.2 shows the sector-wise outgoing subsidies and their proportion of GDP for 2011–2012 to 2014–2015.

**Table 5.1. Total Subsidy on Kerosene (Rs/litre) and Domestic LPG (Rs/cylinder)**

**(2002–2003 to 2014–2015)**

| Year | *Public Distribution Scheme, Kerosene | | | Domestic LPG | | |
|---|---|---|---|---|---|---|
| | From government budget | By public sector oil companies | Total subsidy | From government budget | By public sector oil companies | Total subsidy |
| 2004–2005 | 0.82 | 7.96 | 8.78 | 22.58 | 124.89 | 147.47 |
| 2005–2006 | 0.82 | 12.10 | 12.92 | 22.58 | 152.46 | 175.04 |
| 2006–2007 | 0.82 | 15.17 | 15.99 | 22.58 | 156.08 | 178.66 |
| 2007–2008 | 0.82 | 16.23 | 17.05 | 22.58 | 214.05 | 236.63 |
| 2008–2009 | 0.82 | 24.06 | 24.88 | 22.58 | 234.88 | 257.46 |
| 2009–2010 | 0.82 | 14.85 | 15.67 | 22.58 | 178.13 | 200.71 |
| 2010–2011 | 0.82 | 17.39 | 18.21 | 22.58 | 249.94 | 272.52 |
| 2011–2012 | 0.82 | 26.46 | 27.28 | 22.58 | 320.30 | 342.88 |
| 2012–2013 | 0.82 | 31.16 | 31.98 | 22.58 | 427.14 | 449.72 |
| 2013–2014 | 0.82 | 33.98 | 34.80 | 22.58 | 499.52 | 522.10 |
| 2014–2015 | 0* | 27.93 | 27.93 | 0* | 409.72 | 409.72 |

*
Rs = Indian Rupees
Extension of Subsidy schemes for 2014–2015 approved by Government. However, no payment was made in 2014–2015.
Source: Ministry of Petroleum and Natural Gas, Government of India (2016).


**Table 5.2. Sector-wise Outgoing Subsidies and their Share of GDP in India**

**(2011–2012 to 2014–2015)**

| Year | Subsidy (Rs billion) | | | | Share of GDP (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | Food | Fertilizer | Petroleum | Total | Food | Fertilizer | Petroleum | Total |
| 2011–2012 | 728.22 | 700.13 | 684.84 | **2,113.19** | 0.81 | 0.78 | 0.76 | **2.35** |
| 2012–2013 | 850.00 | 656.13 | 968.80 | **2,474.93** | 0.84 | 0.65 | 0.96 | **2.45** |
| 2013–2014 BE | - | - | - | **-** | 0.79 | 0.58 | 0.57 | **1.94** |
| 2013–2014 RE | 920.00 | 679.71 | 854.80 | **2,454.51** | 0.81 | 0.60 | 0.75 | **2.16** |
| 2014–2015 BE | 1,150.00 | 729.70 | 634.27 | **2,513.97** | 0.89 | 0.57 | 0.49 | **1.95** |

BE = budget estimate, GDP = gross domestic product, RE = revised estimate.
Source: Lok Sabha (2015).

The GoI has also initiated the Direct Benefit Transfer scheme for LPG subsidies, now renamed as PaHaL, an abbreviated form of Pratyaksha Hastaantarit Laabh, meaning "Direct Benefit Transfer", which covers more than 65 % of the 154 million LPG consumers. This scheme is the largest in the world and surpasses similar cash-transfer programmes in other countries, such as China, Mexico, and Brazil, where the maximum number of beneficiaries is no more than 22 million (Economic Times, 2015).

Under the PaHaL scheme, LPG cylinders are sold at the market rate and consumers receive the subsidy amount directly into their bank accounts to enable them to buy the fuel at the market rate. The main objective of the PaHaL scheme is to cut down diversions and eliminate ghost beneficiaries in LPG connections. Subsidies amounting to Rs320 billion have been directly transferred into the bank accounts of the beneficiaries. Also, 33.4 million duplicate/inactive/ghost accounts have been identified and blocked. PaHaL has resulted in a government saving of over INR 210 billion worth of subsidy (MoPNG, 2016).

LPG is distributed to retail customers through a network of three public sector oil marketing companies (OMCs), namely the Indian Oil Corporation Limited, Bharat Petroleum Corporation Limited, and Hindustan Petroleum Corporation Limited, and the burden of the subsidy is shared by these OMCs and the GoI. Each household must be registered with one of the authorised LPG dealers in order to buy an LPG cylinder for domestic use. As per the present scheme of the GoI, there is a limit on the LPG subsidy, and domestic consumers can only avail of 12 refills of subsidised LPG cylinders per household per year.

In addition, the GoI also regulates the price at which the OMCs can sell domestic LPG, leading to under-recoveries (the difference between the cost price incurred by the companies and the price realised upon sale to the final consumer). Subsequent to the realisation of under-recoveries by the OMCs, the government then applies an *ad hoc* burden-sharing mechanism, distributing the total subsidy cost between the exchequer (through direct budgetary transfers to the companies, the OMCs, and the main upstream and midstream public sector undertakings, mainly the Oil and Natural Gas Corporation, and to a lesser extent Oil India Limited and the Gas Authority of India Limited (IISD, 2014). Thus, any reform on the removal or reduction of the LPG subsidy will have a direct impact on government spending at the macro level, and on household budgets at the micro level. The indirect impact could be in terms of reduced fuel consumption and subsequent reductions in air pollution and emissions of GHGs.

## 3. Data and Methodology

The main objective of this study is to thoroughly review India's subsidy on LPG, a common and highly subsidised household fuel in the country, and analyse the socio-economic impacts of its removal. The study involves empirical analysis and suggests steps and approaches that could be acceptable to various stakeholders and help sustain efforts to remove the LPG subsidy. The study uses econometric and statistical tools for examining the socio-economic

impacts of the LPG subsidy removal.

The study uses secondary data from 2000 to 2015 obtained from various sources, namely the World Bank Database; the Reserve Bank of India; the Petroleum Planning and Analysis Cell of the Ministry of Petroleum and Natural Gas; and the Ministry of Statistics and Programme Implementation, Government of India. The most limiting part of this analysis is the availability of data, and the current study uses data from 2001–2014. As this data is available only on an annual basis, we have only 14 observations per variable, thus time series techniques are not used as there could be a significant loss of degrees of freedom, making the estimates erratic.

The following sets of regressions have been assessed to predict the socio-economic impact of the removal of the LPG subsidy as given below.

*(1) Impact of the LPG subsidy removal on LPG consumption*

*Step 1*

$$LPGC = f\,(GDP,\ LPGP/CPI,\ LPGC{-}1) \hspace{4cm} (1)$$

where:
LPGC = LPG consumption (kg)
GDP = gross domestic product (Rs)
LPGP = LPG retail price (including subsidies; Rs/kg)
CPI = consumer price index (2010 = 100)
LPG–1: lag of LPG consumption
f: linear function

The econometric model used in the study is stated as follows:

$$LPGC = \beta_0 + \beta_1 GDP + \beta_2 LPGP/CPI + \beta_3 LPGC - 1 + ut \hspace{2.5cm} (2)$$

where:
$B_0$ = constant factor
$\beta_1$ = coefficient of GDP
$\beta_2$ = coefficient of LPG Rs/kg divided by   the consumer price index
$\beta_3$ = coefficient of lagged value of the dependent variable
ut = error term

The log of equation (2) is calculated as:

$$\ln LPGC = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln LPGP/CPI + \beta_3 \ln LPGC - 1 + ut \hspace{1.5cm} (3)$$

$B_0$, $\beta_1$, $\beta_2$, and $\beta_3$ are the parameters in the model to be estimated, and we expect $\beta_1<0$, $\beta_2>0$, and $\beta_3>0$. Thus, we expect that the LPG subsidy removal in the short term could have a negative impact on social welfare. However, in the long term, the impact of the LPG subsidy removal could be positive. The lagged value of the dependent variable, which is LPG consumption, is expected to have a positive relationship with GDP.

*Step 2*

$$LPGS = f(LPGC) \qquad\qquad (1)$$

where:
LPGS = LPG subsidies (retail price)
LPGC= LPG consumption (kg)

Accordingly, the econometric model used in the study is stated as follows:

$$LPGS = \beta_0 + \beta_1 LPGC + ut \qquad\qquad (2)$$

where:
$B_0$ = constant factor
$\beta_1$ = coefficient of LPG consumption/kg
ut = error term

The log of equation (2) is as follows:

$$\ln LPGS = \beta_0 + \beta_1 \ln LPGC + ut \qquad\qquad (3)$$

We expect that the spending on the total LPG subsidy is not determined by the consumption expenditure on LPG.

*(2) Estimation of government savings on LPG consumption (LPGSV) and LPG subsidies from the removal of the LPG subsidy (LPGSS)*

$$LPGCC = f\,(GDP, LPGPP/CPI, LPGC{-}1) \qquad\qquad (1)$$

where:
LPGCC = LPG consumption (kg) at the market price
GDP = gross domestic product (Rs)
LPGPP: LPG price without subsidies (market price)
CPI = consumer price index (2010 = 100)
LPGC = LPG consumption (kg)

We estimate LPGSS = f(LPGSV), where LPGSV = LPGC – LPGCC.

The econometric model used in the study is stated as follows:

$$LPGCC = \beta_0 + \beta_1 GDP + \beta_2 LPGPP/CPI + \beta_3 LPGC - 1 + ut \qquad (2)$$

where:

$B_0$ = constant factor

$\beta_1$ = coefficient of GDP

$\beta_2$ = coefficient of LPG price without subsidies (market price)/kg divided by consumer price index

$\beta_3$ = coefficient of lagged value of the dependent variable

ut = error term

The log of equation (2) is as follows:

$$\ln LPGCC = \beta_0 + \beta_1 \ln GDP + \beta_2 \ln LPGPP/CPI + \beta_3 \ln LPGC - 1 + ut \qquad (3)$$

*(3) Macro impact*

$$GDPP = GDP + LPGSS$$

where:

GDPP: GDP after removing the LPG subsidies

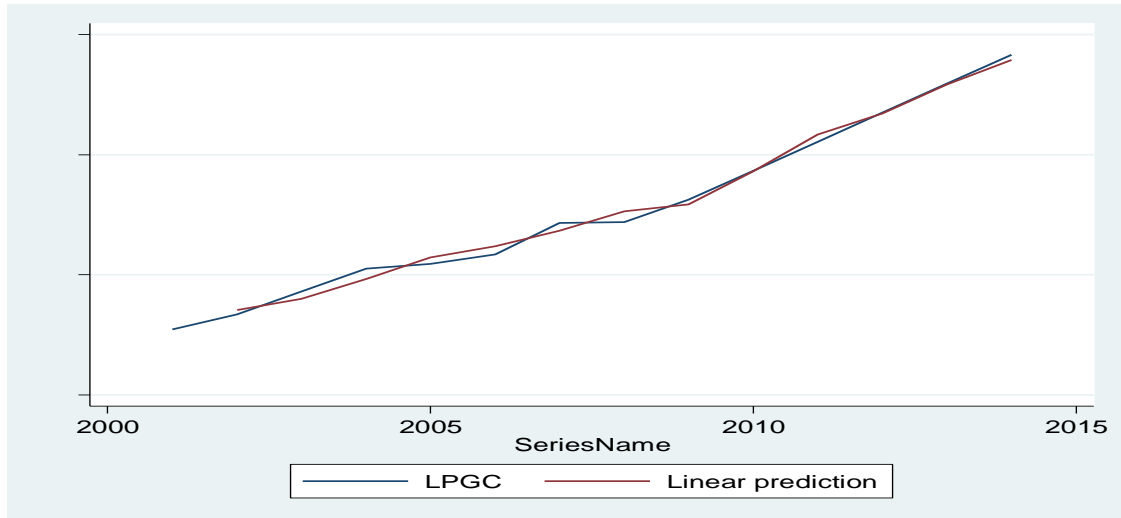LPGSS: saving amount of LPG subsidies after removing the subsidies

## 3.1. Results and Discussion

*3.1.1. Impact of the LPG subsidy removal on LPG* consumption

$$LPGC = \beta_0 + \beta_1 GDP + \beta_2 LPGP/CPI + \beta_3 LPGC - 1 + ut$$

In terms of the impact of the LPG subsidy removal on LPG consumption, when we regress the total consumption of LPG in the Indian economy over the total GDP, the discounted price of LPG (including subsidies), and the lagged value of the repressor (LPGC), we observe that GDP is the only significant variable. The results show a positive relation between GDP and consumption of LPG, which is expected since the greater the income generated in a fiscal year, the higher we can expect consumption to be. Figure 5.3 shows the actual values and the fitted values. The fit is very good and this is supported by the value of R-squared and adjusted R-squared (Figure 5.3 and Appendix A).

**Figure 5.3. Impact of the LPG Subsidy Removal on LPG Consumption**


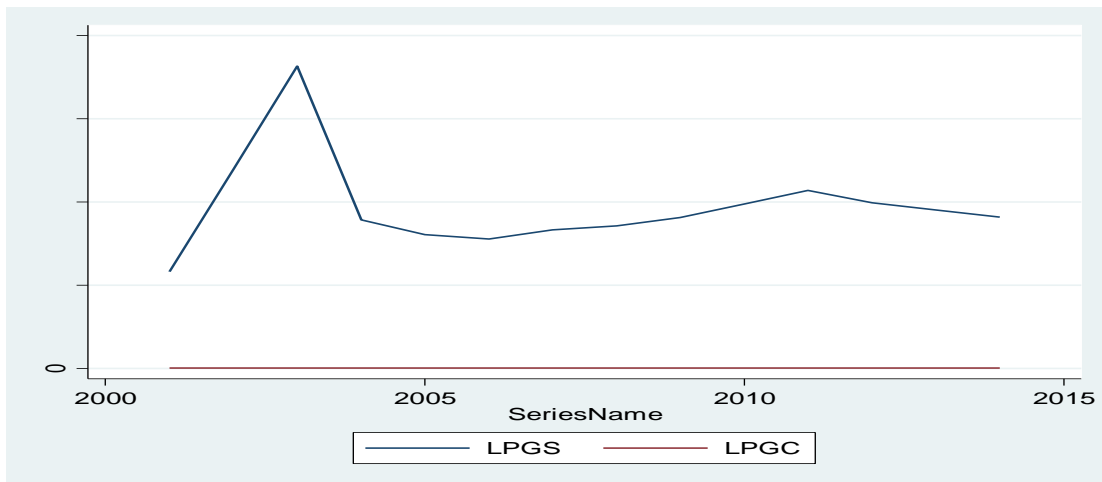
LPGC = liquefied petroleum gas consumption.
Source: Authors.

*3.1.2. Impact of the total LPG subsidy on LPG consumption expenditure*

$$LPGS = \beta_0 + \beta_1 LPGC + ut$$

From the regression analysis for estimating the total subsidy on LPG as a function of the total consumption (Appendix B), we see that the consumption is not a determinant of the total subsidy bill of LPG. Even if we use the lagged value of the total consumption, the results remain the same. Hence, we can interpret that the total subsidy bill is not determined by the consumption expenditure on LPG. This can be seen in Figure 5.4, where the LPGS curve is volatile while the LPGC curve does not share the same trend.

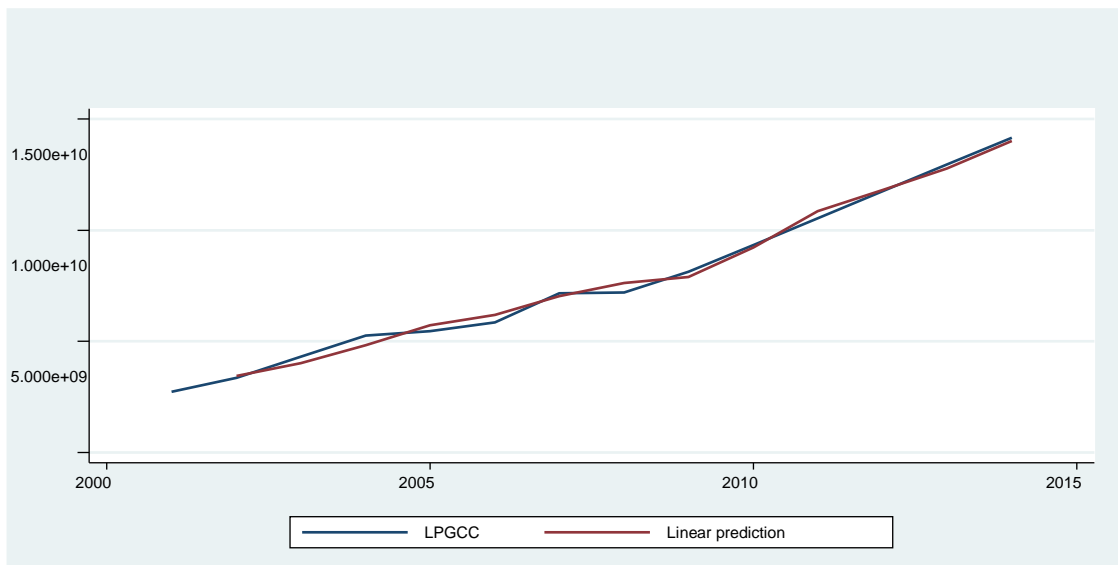**Figure 5.4. Estimate of the Influence of the Total LPG Consumption on the Total Subsidy Bill of LPG**



LPGC = liquefied petroleum gas consumption, LPGS = liquefied petroleum gas subsidy.
Source: Authors.

*3.1.3. Estimating government savings on LPG consumption (LPGSV) and LPG subsidies due to removal of the LPG subsidy (LPGSS)*

$$\text{LPGCC} = \beta_0 + \beta_1 \text{GDP} + \beta_2 \text{LPGPP/CPI} + \beta_3 \text{LPGC} - 1 + ut$$

When total LPG consumption is regressed upon the LPGPP, GDP, and the regressand's lagged value, the results indicate the same observations as earlier. In this analysis, too, only the coefficient for GDP is significant, while the others are insignificant. Further, the relation is positive as expected. Thus, it can be concluded that *the price of LPG, with or without subsidy, is not a significant determinant of the consumption expenditure.* In this case, also, the R-squared and adjusted R-squared values are very high, indicating that the model is a good fit (Figure 5.5 and Appendix C).

**Figure 5.5. Estimates of Government Savings on LPG Consumption (LPGSV) and LPG Subsidies due to Removal of the LPG Subsidy (LPGSS)**



LPGCC = liquefied petroleum gas consumption at the market price.
Source: Authors.

*3.1.4. Macroeconomic impact of change in the LPG subsidy on the economy*

$$GDPP = GDP + LPGSS$$

When evaluating the macroeconomic impact of a change in the LPG subsidy on the economy, one must account for the other variables which impact the GDP's rate of growth. Under this analysis, it has been assumed that the rate of growth for an economy depends upon the employment rate, the savings rate and the lagged value of the rate of growth (Appendix D). It is seen that the coefficient for the LPG subsidy is insignificant; this suggests that changes in the LPG subsidy will not influence the rate of growth of the economy. Thus, based on the above analysis, we can conclude that the LPG subsidy, in its current form does not have a significant impact at the economy level.

## 4. Conclusions and Policy Implications

In India, LPG is one of the primary fuels used by households for cooking and it is subsidised by the government for domestic consumption where the exchequer provides LPG to consumers at a discounted price. This not only causes an immense burden on the fiscal budget, but also leads to market distortions as it affects government debt, imports, and the exchange rate, etc. A gradual deregulation of subsidised petroleum products has been witnessed over the past few

years wherein the GoI deregulated the prices of diesel and petrol in 2010–2012, thereby reducing some of the fiscal burden. However, in an environment in which the least intervention in market operations is desirable, the policy option of doing away with these subsidies or reforming them needs to be considered.

This study has assessed the socio-economic impacts of an LPG subsidy removal in India through empirical analysis. It recognises that removal of this subsidy must be gradual and also socio-economically acceptable to all stakeholders and consumers. This is not an easy task, and thus any reform or removal of the LPG subsidy must be done through policy that benefits poorer households. The recent success of the GoI's "Give it Up" scheme to encourage voluntary refusal of the LPG subsidy by affluent households is a new and promising beginning. Around 10 million households have surrendered their LPG subsidy, resulting in government savings of about Rs41.660 billion. Additionally, these subsidised LPG connections can be provided to economically weaker households, who are and should be the real beneficiaries. Based on the results of the analysis, we suggest the following policy implications.

- In order to implement the domestic LPG subsidy removal in India, it is important to involve all the stakeholders in consultations or discussions related to the current cash transfer subsidy scheme and the government programme related to it. Based on intense discussions among the stakeholders and in-depth research and analysis, the LPG subsidy data should be made readily available and the beneficiaries must be educated about the pros and cons in the long run for the subsidy removal to be acceptable economically and socially.

- The government should create more awareness through publicity and campaigns to sensitise citizens to the benefits of phasing out or removing the LPG subsidy. Subsequently, the government should adopt a transparent policy to brief the citizens on how the money saved due to the removal of the LPG subsidy in the household sector will be channelled to other social welfare measures, such as healthcare, education, increased job opportunities, and better infrastructure, to benefit low-income groups.

- An empirical analysis of the socio-economic impacts of the removal of the LPG subsidy estimates the fiscal pressure of the LPG subsidy policy on the household sector for government spending and GDP. The results of the regression analysis suggest a positive relationship between GDP and the consumption of LPG. Estimates of the total LPG subsidy as a function of the total consumption reveal that the consumption is not a determinant of the total subsidy bill of LPG. Further, the analysis indicates that the LPG price (both the subsidised price as well as the market price) is not a significant determinant of India's consumption expenditure. Thus, as the total subsidy bill is not determined by the consumption expenditure on LPG, the removal of the LPG subsidy will not have a negative impact on the consumption of LPG.

- In terms of the macroeconomic impact of the change in the LPG subsidy on the economy, using variables that have an impact on the rate of GDP growth indicates that the coefficient for the LPG subsidy is insignificant. This implies that the rate of growth of the Indian economy is not influenced by the LPG subsidy, and thus removal of the LPG subsidy will not have a broad impact on the economy.

- The study also suggests that any decision for the removal of the LPG subsidy needs to be a dedicated effort that is buffered by social security programmes to protect the economically weaker households from the consequences of such a policy transformation.

- Finally, the amount of government spending that is saved due the removal of the LPG subsidy for the current beneficiaries can be the channelled to provide these LPG connections to the economically weaker sections of society, in both urban and rural areas. This section of the population is still using polluting fuels, and the GoI can provide them with LPG connections at subsidised rates to encourage them to switch to cleaner fuels. This will also result in better health in these households and also save the time spent on cooking. It will result in a cleaner environment and benefit women and children, who would otherwise be continuously exposed to the air pollutants emitted by the polluting fuels.

**References**

Bhaskar, U. (2015), Budget 2015: Petroleum Subsidy Slashed by Half. *Live Mint*. 1 March. Available at: http://www.livemint.com/Politics/OQaYOOKMJcCNNliEV6SWTJ/India-to-spend-37-billion-on-major-subsidies-in-201516.html, (accessed June 01, 2015).

Economic Times (2015), DBT for LPG is World's Largest Direct Benefit Transfer Scheme. *Economic Times of India*. 5 February. Available at: http://articles.economictimes.indiatimes.com/2015-02-05/news/58838422_1_lpg-subsidy-54-districts-subsidised-lpg, (accessed July 07, 2015).

Gangopadhyay, S., B. Ramaswamy, and W. Wadhava (2005), 'Reducing Subsidies on Household Fuels in India: How Will It Affect the Poor?', *Energy Policy*, 33(2005), pp. 2326–2336. Available at: http://ijecm.co.uk/wp-content/uploads/2014/12/21213.pdf, (accessed, April 13, 2016).

International Energy Agency (IEA) (2015), *World Energy Outlook*. International Energy Agency. Available at: http://www.worldenergyoutlook.org/resources/energysubsidies/, (accessed August 08, 2015).

International Institute for Sustainable Development (IISD) (2014), Subsidies to Liquefied Petroleum Gas in India: An overview of Recent Reforms. IISD. Available at: https://www.iisd.org/publications/subsidies-liquefied-petroleum-gas-india-overview-recent-reforms, (accessed July 08, 2014).

Lok Sabha (2015), Lok Sabha Starred Question No. 342, dated on 01.08.2014, Available at: http://164.100.47.132/lssnew/psearch/QResult16.aspx?qref=5366,

(accessed July 25, 2015).

Ministry of Petroleum and Natural Gas (MoPNG) (2016), Ministry of Petroleum & Natural Gas, Government of India, Report-2016-two-years-of-work. Available at: http://jan-sampark.nic.in/jansampark/images/campaign/2016/10-Jun/index.html (accessed, May 16, 2016).

Ministry of Statistics and Programme Implementation, Government of India (MoSPI) (2012), *NSS Report No.567: Energy Sources of Indian Households for Cooking and Lighting, 2011-2012*, Report No. 567 (68/1.0/4). Ministry of Statistics and Programme Implementation, Government of India, National Sample Survey Office.

Musa, A. and R. Hounsou (2014), 'The Impact of Fuel Subsidy Removal on Socio-Economic Development In Nigeria: An Econometric Investigation', *International Journal of Economics, Commerce and Management*, Vol. II(12).

Sinha, S. (2015), 'Subsidy Bill to Drop to Rs.40,000 Cr in 2015-16', The Hindu Business Line. Available at: http://www.thehindubusinessline.com/economy/subsidy-bill-to-drop-to-40000-cr-in-201516/article7474538.ece, (accessed June 05, 2015).

World Bank (2008), 'Climate Change and the World Bank Group - Phase I: An Evaluation of World Bank Win-Win Energy Policy Reforms', World Bank: Washington, DC. Available at: https://openknowledge.worldbank.org/handle/10986/10594, (accessed May 15, 2016).