

Latest Issue

THE PAKISTAN DEVELOPMENT REVIEW

Volume 52, Number 4, Part I (2013)

ABSTRACTS

1. **Hafiz A. Pasha and Wasim Saleem.** The Impact and Cost of Power Load Shedding to Domestic Consumers. 52:4, 355–373.

This paper analyses the impact and cost of the high level of power load shedding to domestic consumers in 2012 by a survey based approach. The paper develops a methodology for quantification of the cost of outages by deriving the utility loss, cost of self-generation and other costs incurred. Overall, the total outage cost to residential consumers in the urban areas of Pakistan is estimated at close to Rs 200 billion. The willingness to pay more for uninterrupted electric supply is also determined. Policy recommendations are made to mitigate the impact of load shedding on domestic consumers.

2. **Lubna Naz.** What Inspires Electricity Crises at the Micro Level: Empirical Evidence from Electricity Consumption Pattern of Households from Karachi. 52:4, 375–403.

The present study uses the conditional demand model to analyse end use electricity demand. It also uses Binary logistic model to find out likelihood of households being affected from electricity crises. The model also uses household's characteristics and ownership of modern appliances as determinants of electricity crises. The study employs cross-sectional data collected from Karachi, Pakistan, in 2013. The results from two-sample t-test show that a gender-specific difference exists in the holding of air-conditioners, dryers and washing machines. The estimates of the conditional demand model infer that electricity demand depends on end use of electricity in Karachi, and dwelling type, household size and income interact with end use electricity consumption. The estimates of logistic model imply that male-headed and households who protest in the streets have lower probability of getting affected from electricity breakdown than female-headed and passive households. In addition, household with limited or no alternate provisions during electricity load shedding is more vulnerable to electricity breakdown. The study suggests to focus on the role of demand-side management by motivating electricity conservation at the household level and legislation against power theft to redress problems caused by electricity breakdown.

JEL Classification: C25; C51; D12

Keywords: Conditional Demand Model; End-Use Electricity Consumption; Binary Logistic Model

3. Rehmat Ullah Awan, Falak Sher and Akhtar Abbas. An Investigation of Multidimensional Energy Poverty in Pakistan. 52:4, 405–419.

This study uses Alkire and Foster's (2007) methodology to measure Multidimensional Energy Poverty in Pakistan using Pakistan Social Living standard Measurement (PSLM) data for 2007-08. This measure also satisfies the property of decomposability. Multidimensional Energy Poverty Index (MEPI) has been calculated. Value of MEP headcount for rural Pakistan is 71 percent as compared to 29 percent in urban areas of Pakistan. Multidimensional Energy Poverty headcount for rural Pakistan is 71.4 percent and 28.6 percent of the households residing in rural areas of Pakistan are energy poor. Households of Pakistan are most deprived in cooking fuel dimension (55 percent) while deprivation is the least in dimension of home appliances ownership (15 percent). In urban areas of Pakistan, households are more deprived in dimension of cooking fuels (23 percent) followed by indoor pollution (19 percent). Almost one third households of rural Pakistan are deprived in dimension of indoor pollution (69 percent). Contribution of indoor pollution (32 percent) to multidimensional energy poverty headcount in Pakistan is the highest followed by the cooking fuels dimension (31 percent) and collectively these two dimensions contribute up to 63 percent in overall Multidimensional Energy Poverty headcount for Pakistan. Study further concludes that households deprivation in energy decreases with the increase in value of cut offs. Overall indoor pollution, cooking fuel and entertainment appliances are the three major contributors, to overall MEP headcount not only as a whole but region wise also. Based on results, the study established that there is significant and higher incidence and severity of energy poverty in rural areas as compared to urban areas in Pakistan.

JEL Classification: I00, I3, I32, Q00. Q4, Q40, Q49

Keywords: Multidimensional Energy Poverty, Energy Poverty, Poverty Measurement, Multidimensional Energy Poverty Index (MEPI), Decomposability, Deprivation, Intensity of Poverty

4. Umbreen Fatima and Anjum Nasim. Interprovincial Differences in Power Sector Subsidies and Implications for the NFC Award. 52:4, 421–435.

Power sector subsidies constituted 83 percent of the federal government's total subsidies of PRs 558 billion in 2012; the tariff differential subsidy (TDS) amounted to PRs 457 billion. TDS is provided to distribution companies (DISCOs) to cover the difference between the NEPRA-approved tariff schedules and the uniform tariff schedule (by consumer group) set by the Ministry of Water and Power for all regions of the country. The tariff approved by NEPRA takes account of all components of DISCOs' costs, including salaries, overheads, depreciation and maintenance, line losses, return on assets and so on. These cost elements differ across DISCOs. The fact that NEPRA approves different per-unit tariffs while the Ministry of Water and Power sets a uniform tariff (by consumer group) across all DISCOs implies that each DISCO receives a different per-unit TDS (by consumer group) from the federal government. The TDS to individual DISCOs can be aggregated to calculate provincial shares in the total power sector subsidy.

This paper outlines the electricity tariff determination process; reports on the TDS by consumer group, DISCO and province; and considers the likely changes in the federal/provincial shares of the divisible pool of tax revenue if TDS were given to the provinces in the form of a revenue share from the divisible pool. We find that residential consumers are the highest recipients of TDS and that it is distributed unequally among the DISCOs. Moreover, TDS is distributed unequally among the four provinces and the distribution is not in line with the shares determined under the 7th National Finance Commission Award.

JEL Classification: Q430, L940, L980, H240, H250, H770

Keywords: Energy Consumption, Energy Prices, Electric Utilities, Electricity, Electricity Sector, Regulation, Federalism, Subsidies

5. Farrukh Mahmood and Haider Ali. Energy-Cost Optimisation in Water-Supply System. 52:4, 437–446.

Households as well as community water-supply systems for utilisation of underground aquifers are massive consumers of energy. Prevailing energy crisis and focus of the government on demand-side energy policies (i.e., energy conservation) in Pakistan raises need of using energy efficient techniques in almost every aspect of life. This paper analyses performance of community relative to household water-supply system in connection with efficient energy utilisation. Results suggest that total operational energy cost in case of community (centralised) water supply system is lower than the cost incurred under the household (individual) water pumping units. Besides, average fixed cost under community water supply system is three times less than that incurred under household water supply system.

JEL Classification: Q25, Q41, D24

Keywords: Water Supply, Energy, Cost Efficiency, Economies of Scale

6. Haider Ali and Muhammad Nawaz. Energy Crisis and Productive Inefficiency: Micro-Evidence from Textile Sector of Faisalabad. 52:4, 447–465.

This study measures productive inefficiency in the textile sector of Faisalabad due to recent energy crisis in Pakistan. Primary data is collected randomly from 125 firms of the industry. Results explain that these firms are facing huge production loss which varies from 23 to 65 percent in 8-hour shift and 21 to 60 percent in 10-hour shift. Spinning and textile firms are facing severe electricity outage while dyeing, chemical and processing firms have huge production losses due to gas shortage. The study further explains that 64 percent of the firms are willing to pay for uninterrupted energy supply and their willingness to pay varies on average in the range of PAK Rs 5 to 9 per unit of electricity.

JEL Classification: D22, Q4, R34

Keywords: Energy Crisis, Production Loss, Order Delays, Willingness to Pay

7. **Rafat Mahmood, Sundus Saleemi, and Sajid Amin.** Impact of Climate Change on Electricity Demand: A Case Study of Karachi District. 52:4, 467–478.

In the backdrop of growing concern over climatic changes occurring across the globe but specifically important for South Asia, the study aims at contributing in future design of power policies by projecting the need for capacity generation in response to climate change. Specifically the objective of the study is to see how electricity demand responds to changes in temperatures and using this response co-efficient, projecting increase in electricity demand under different climate change scenarios. Employing electricity consumption as a proxy for electricity demand for Karachi district, the results of the study suggest that electricity demand is expected to rise in future; the increase in demand being more significant and larger for residential consumers than commercial ones. Future research in this field may include larger set of control variables and projections of monthly temperatures for the region.

JEL Classification: Q41, Q47

Keywords: Climate Change, Energy, Electricity Demand, CDD, HDD, Temperatures

8. **Saima Nawaz, Nasir Iqbal, and Saba Anwar.** Electricity Demand in Pakistan: A Nonlinear Estimation. 52:4, 479–492.

This study attempts to estimate the electricity demand function for Pakistan using smooth transition autoregressive model over the period 1971-2012. The empirical results have shown that there is nonlinear relationship between electricity consumption and economic growth and also between electricity prices and consumption. The income elasticity of electricity is high while price elasticity is less than unity. Further, results have shown that the average real prices are below the optimal level. The weak relationship between electricity demand and electricity prices is primarily due to lack of alternatives for electricity. Continuous investment in power sector is required to fulfill the future electricity needs.

Keywords: Electricity Demand, Smooth Transition Autoregressive Model, Pakistan

9. **Muhammad Zahir Faridi and Ghulam Murtaza.** Disaggregate Energy Consumption, Agricultural Output and Economic Growth in Pakistan. 52:4, 493–516.

The basic goal of the study is to analyse the impact of energy consumption (i.e., electricity, oil and gas) on economic growth and agriculture sector output in Pakistan. It is desirable to find out relationship between disaggregate energy consumption, economic growth and agricultural sector output of Pakistan because energy crisis has become a central issue now-a-days. Production sector of Pakistan relies on electricity and gas consumption to large extent and these sources of energy are falling short because of many reasons which is disrupting output and consequently exports and real output of the country. To analyse the relationship, we employed time series data from 1972 to 2011. In order to find out long run and short run effects of energy consumption on agricultural output and economic growth, ARDL modelling approach to cointegration is applied after scrutinising the stationarity of data through ADF Test. Where, bound testing procedure is

utilised for cointegration to judge the existence of long run relationship among variables and ECM models are formulated for short run analysis. Our econometric models include agricultural output and economic growth as dependant variables and electricity, coal and gas consumption as independent and core variables. The findings of the study indicate that gas and oil consumption are important determinants of economic growth and agricultural output.

Keywords: Disaggregate Energy Consumption, Agricultural Output, Economic Growth, ARDL, Co-integration, Pakistan

- 10. Bushra Yasmin and Wajeeha Qamar.** The Role of Power Generation and Industrial Consumption Uncertainty in De-industrialising Pakistan. 52:4, 517–536.

The declining time path of the industrial share in GDP and employment has long been viewed as a natural outcome of the matured stages of development analogous to the radical decline in agricultural sector and a persistent move towards services sector. But the situation in country like Pakistan is not due to such structural transformation. Rather, the energy crises is expected to play a detrimental role in the growth of industrial sector. The volatility in power consumption by industrial sector and stagnant power generation not only hurts the industrial sector but also has devastating effects on the other interlinked sectors of the economy. This study endeavours to identify the role of power sector's crises behind the industrial downfall in Pakistan and attempts to work out the extent to which this phenomenon may prevail in future. The attempt is made for Pakistan over a time span of 1970-2010. The Johansen Cointegration, Error Correction Model, Impulse Response Functions and Variance Decomposition techniques are applied to explore the short and long-run relationships among selected variables from the power sector. The uncertainty in industrial consumption of electricity and power generation are identified as major factors in undermining industrial growth whereas domestic consumption did not appear significantly volatile. For the future, power generation will remain the major contributing factor in shaping the time path of industrialisation in Pakistan.

JEL Classifications: O13, O14, D81

Keywords: Industrialisation, Energy, Uncertainty

- 11. Syeda Qurat-ul-Ain and Saira Tufail.** The Effect of Oil Price Shocks on the Dynamic Relationship between Current Account and Exchange Rate: Evidence from D-8 Countries. 52:4, 537–556.

The research aims to assess the dynamic relationship between current account and exchange rate and to analyse the effect of oil price changes on their relationship for D-8 countries. The research is based on the time series analysis and covers the time span from 1981-2010. For achieving the objective of the study, recursive Vector Autoregression technique is used. Impulse response function and variance decomposition analysis is also conducted to forecast the results for next ten years. The results revealed that J-curve phenomenon exists in all oil importing countries of the group. Among oil exporting countries, J-curve phenomenon exists for Egypt and Nigeria while for Iran, Marshal

Lerner condition holds both in short and long run. The case of Malaysia is opposite to that of Iran where depreciation could not stimulate current account improvement even in long run. After including oil prices in the model, J-curve phenomenon continues to exist in Bangladesh and Turkey, though, it dampens the long run favourable effect of currency depreciation for current account for both of the countries. For Pakistan, in presence of oil prices exchange rate depreciation not only deteriorates current account in short run, this deterioration exacerbates in long run. Current account balance of Indonesia happens to improve with depreciation of exchange rate after inclusion of oil prices both in short and long run. For all oil exporting countries the role of exchange rate for improving current account balance strengthens in long run after the inclusion of oil prices. Given the results it is recommended that oil exporting countries should diversify their exports to overcome the recourse curse problem and oil importing countries should consider Bangladesh as role model to reduce the vulnerability of current account to oil price shocks.

JEL Classifications: Q43, Q48, F31

Keywords: J-Curve Phenomenon, Oil Price Shock, D-8, Vector Auto Regression