

OCCASIONAL PAPER SERIES 08/2020

INSTITUTE OF PUBLIC POLICY (IPP)

MEASURING THE IMPACT OF GOVERNMENT REGULATIONS ON THE PRIVATE SUGAR MILLS OF UTTAR PRADESH

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Measuring the Impact of Government Regulations on the Private Sugar Mills of Uttar Pradesh

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Abstract[§]

In this study, we examine the effects of regulatory instruments on the financial performance of 18 private firms in the sugar industry of Uttar Pradesh using panel data from 2000 to 2015. The econometric analysis is conducted to figure out to what extent price regulations for sugar industry impacts the profitability of the firms. The datasets are collated from secondary sources using Capitaline from Rabo Bank's Food & Advisory Research Division and Indian Sugar Mill Association Year Books - both of which have historical datasets for the financial and productivity indicators to study the economic impacts. It is observed that the profitability of the private mills drops considerably as the cane prices regulated by the state government increases. The other instruments to regulate the byproducts like molasses and the regulation on jute packaging also adversely affect the profitability of the private mills.

1. Introduction

Across the world, the system of regulation is largely owned by the State throughout several industries like electrical utilities, telecommunications, energy, transportation, and even commodities like sugar. India continues to follow the old style of regulation where the independence of the regulators is in some ways limited to expertise in knowledge, independence in funding, membership selection and related tenure granting process, and quasi-judicial status since they enforce compliance to State owned Enterprises (Rao, 2004).

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§ This is abridged version of dissertation undertaken as part of MPP post-graduate degree programme at NLSIU (2014-16) by Shreoshee Mukherjee. Subsequently, revisions have been undertaken with the help of Prof Kaushik Basu and Ridhi Verma.

However, the regulators are largely limited in its independence as they seek 2 policy directives by the government, so the government does not give up its authority on them.

In this paper, we attempt to study the sugar industry in India and evaluate the impact of regulations imposed on the value chain at each level of output. The outcome of the variations in the regulatory policies, mandated by the independent regulators like the Commission for Costs and Prices and Rangarajan Committee, which are then superseded by the state governments, particularly in the state of Uttar Pradesh is presented to assess the extent of effect on the financial health of the firms. The central argument of the paper is that the regulations imposed across the value chain – procurement pricing of the raw cane, production of by-products such as molasses, packaging and the eventual supply chain – is affecting the profitability of the mills. Even though primary rationale for regulating the sugar industry is to support the interest of the farmers and consumers, for instance, by declaring a remunerative price that would create a hedge against the crop, we argue that the government policy directives which supersede the independent regulators affect the profitability of the private millers. The paper will attempt to reframe the problem that the industry is facing due to discretionary regulatory policies over and above the non-discretionary regulatory instruments as advised by the independent regulatory agencies and their impact on the financial performance of the millers.

There are several studies that suggest formulae for cane pricing and profit sharing (Reddy, 2012). Studies by Indian Agricultural Research Institute acknowledge the absence of co-integration between sugar and cane prices and administratively determined sugarcane prices and surplus production of sugar have resulted in declining ex-mill sugar prices (Upreti, Singh, & Jha, 2018). However, there exists a research gap that definitively quantifies the impact of regulations on limiting profitability of mills. This paper attempts to close this research gap.

Sugar manufacturing is one of the largest agro-processing industries in India and plays an important role in the economic development of the rural pockets of the country. It forms a strong base for the development of the rural economy through backward and forward linkages. It not only provides

employment to fifty million farmers and their families in the rural sector but also meets the demand of sugar in the country (Solomon, 2011). Production of sugarcane has been on an increase since the past one decade with the crop accounting for 6 per cent of the total agricultural production (Commission for Agriculture Cost and Prices, 2014). Since it is a highly water-intensive crop, the only states which produce sugarcane are either in the tropical or subtropical region. In terms of sugar production, Maharashtra (tropic region) is the largest producer in India accounts for 32 per cent, followed by Uttar Pradesh which lies in the sub-tropical region and accounts for 28 per cent of the total production.

The state of Uttar Pradesh was chosen for the purpose of the study because, it is the leading state in sugarcane production and is dominated by private players as opposed to Maharashtra which is predominantly covered by cooperatives. There are at present 119 sugar mills operational in the state out of which 81 per cent are under the private sector and the remaining 19 per cent are under the cooperative sector. The cooperatives were not taken into consideration as the government bears the difference in the regulatory prices imposed between center and the state, which considerably reduces the economic burden on them.

The relevance of the paper is that attempts to provide an empirical assessment of the impact of the state government imposed discretionary regulations such as the State Advised Prices. The paper collates secondary level panel data on the financial health of 18 private mills from 2000 to 2015, along with the variation in the costs imposed due to regulatory instruments. The analysis provides a counterfactual that compares the current policy scenario of the Uttar Pradesh state government on the sugar industry to the recommended regulatory policies by the Commission for Costs and Prices (CACP). Given, the anarchy caused in the recent years over the rising arrears owed to the farmers by the millers, the research becomes extremely relevant to assess whether the inability to make payments by the millers to cane growers is an effect of these discretionary regulations. In such a case, it is imperative that policy makers view the empirical evidence and make relevant changes to the regulatory systems and to question whether independent regulators should report to politicians; and whether policy directives by the

The rest of the paper proceeds as follows. Section 2 will discuss the historical progression of the regulatory environment as discussed in other landmark papers and delineates the political economy of the sugar industry to understand the influence and impact of various stakeholders within the design of the regulation as it exists. Section 3 describes the empirical strategy and discussed the results in the variations of costs between the state-imposed regulations versus the regulations as recommended by expert and independent regulatory committees. Section 4 presents the results of the evidence that has been collated from the different data sources and section 5 presents a conclusion along with policy recommendations in alignment with the results.

2.1 Historical Framework to Industrial Regulation

Regulation, although often deemed to be restrictive and seen as a stick to prevent undesirable activities, is in fact approached by policy makers as an enabler or facilitator of orderly behavior under uncontrolled market dynamics (Thomas, 2011). Post-independence, as India struggled with mobilizing resources to build an industrial base, regulatory policies were established as instruments of optimal allocation of scarce productive resources. Across the board, licensing was aimed at providing basic and intermediate goods, pursue self-reliant industrialization, maximize employment and create socially equitable distribution of wealth. Price regulations were an important tool to subdue the inflationary pressure in a resource-scarce environment.

The evidence on industrial regulation acting as barriers to their profitability and growth substantiated, proponents of free market drew parallel from across the world to argue the impediments caused due to regulatory barriers. Starting from Desai and Bhagwati's critique (1970) on the industrialization strategy where they make compelling arguments against the dysfunctional and discretionary regulatory policies on the industries of the country, the chips were severely stacked against the regime. The free market dynamics had its own negative consequences as evidenced during the Latin America and African debt crisis of the 1980s which led to deflation, debt, labor intensive

growth and de-industrialization (Nagaraj, 2017). However, the Indian policy experts pushed for liberalization, which was seen as a big reform at the turn of the decade in the early '90s.

Sugar production commenced in India in the year 1920s but it earned an industry status in late 1920s/early 1930s when India had 29 sugar mills producing just 0.1 million tons of sugar (Amin, 1984). The industry was facing adverse competition from the Japanese sugar which had taken the Indian market by storm. To protect the indigenous industries from the foreign imports, Sugar Industry Protection Act was passed in 1932 by the Indian legislature. The objective of the legislation was to protect the sugarcane growers by regulating the procurement price of sugarcane and ensuring the growers a fair price. Within four years of time the industry became self-sufficient with an increase in the number of mills from 29 in 1930-31 to 130 in 1934-35. There was a 460 per cent expansion observed in the production levels of sugar and it reached almost 1.3 million tons in 1938-39. However, a set-back was observed and the production levels faced a crisis during the years between 1938 and 1952. The farmers switched to essential food products during the world war as it generated higher remunerations.

“...Indeed, the stage was reached when the action of the Government in making India a party to the International Sugar Agreement was bitterly resented as imposing an unmerited handicap on the expansion of the Indian Sugar Industry. The nightmare of shortage of sugar which the last war raised was dispelled just when the approach of the present war should have made it more harrowing than ever to the public at large...” (Gandhi, 1945).

The development of the sugar industry post 1951 came under the development of the five – year plans which was set by a structured planned growth based on the projected requirement of sugar for consumption. The Sugar Control Order, 1966 placed the industry under government regulations to manage the production, sale of sugar and stock limit (Kansal, 1997). A major step to liberate the sugar sector from controls was taken in 1998 when the licensing requirement for new sugar mills was abolished. Delicensing caused the sugar sector to grow at almost 7% annually during 1998-99 and

2011-12 compared to 3.3% annually during 1990-91 and 1997-98. However, 6 the Indian sugar industry is still fraught with many regulations at the Centre and State level in the entire sugar value chain right from sugarcane procurement, pricing, export and import, production of by-products etc. These regulatory instruments are not just a matter of economic administration, but the political facets play a central role in the sugar economy. Political control is a characteristic feature of the entire cooperative sector that dominates in states like Maharashtra and Andhra Pradesh (Attwood, 1991). Public funds are used to set up these mills and provide bailouts when mills face threats of bankruptcy and provide subsidized loans for operation (Damodaran & Singh, 2005). Sugar mills have monopsony power under the “command area” or zoning system, whereby farmers who have land in a particular area can only sell cane to the assigned mill in that region, and the mill can only buy cane from the farmers in its command area (Sukhtankar, 2015). This paper has limited its scope in quantifying the opportunity costs associated with the command area regulations. Other economic regulations which have been included within the scope of the paper are –

1. **Price of Sugarcane** - The pricing of sugarcane is governed by the statutory provisions of the Sugarcane (Control) Order, 1966 issued under the Essential Commodities Act (ECA), 1955. Prior to 2009-10 sugar season, the Centre used to fix Statutory Minimum Price (SMP) of sugarcane where in the farmers were supposed to receive a share of profit of a sugar mill on 50:50 basis. Unfortunately, it was difficult to implement the sharing provision and therefore the concept of SMP was replaced by Fair and Remunerative Price (FRP) of sugarcane in October 2009. The amendment required the Commission for Agricultural Costs and Prices to fix the prices of the sugarcane according to some statutory factors listed under the Control Order⁶ (Commission for Agriculture Cost and Prices, 2014). The states can also intervene in the pricing of sugarcane and set a higher benchmark with a State Advised Price (SAP) to strengthen the interests of the farmers. States like Uttar Pradesh and Haryana have the highest SAPs in the country which results in the inability of the mills to repay the cane farmers leading to a huge discontent amongst the farmers and the millers alike.

2. **Levy and Non-levy Sugar Obligation** – The levy sugar policy mandated every mill to yield 10% of its production to the central government at a price lower than the market price – known as levy sugar. This levy sugar was used by the centre to distribute it under the PDS (Public Distribution System) program. Rangarajan committee report recommended the abolition of the policy as the burden of this government social welfare scheme was shifted to the millers which put them at a competitive disadvantage. The policy also mandated the release of the non-levy sugar on a monthly basis. This led to the inability of the millers to repay the farmers as they could not sell their finished product above or below the amount stipulated by the government. The levy sugar policy and release of non-levy sugar was abolished in 2013 temporarily for two years and considered for a revision after that. In 2015, the policy has not been revived yet.
3. **Related to By-products** – The primary by-products that are generated from sugar production are molasses, bagasse and presmud. The center does not dictate any control over the production, distribution and pricing of these by-products however the State excise authorities control the allocation and movement of these by-products. Bagasse is largely utilized in the co-generation of electricity⁷ which falls under the regulatory regime under National Electricity Policy, 2005. The molasses policy for Uttar Pradesh in 2013- 14 mandates the mills to sell 34 per cent of the molasses production to the liquor industry (known as the levy sale) at the cheaper rate than the open market price (known as the free sale). This cross subsidization of the sugar mills by the UP state government should be scrutinized as a policy, especially since private sugar millers are bearing the burden of it. Sugar makes up hardly 10 per cent of the cane in terms of recovery during processing. The biggest constituent in sugarcane, about 30 per cent by weight, is bagasse: the fibrous residue remaining after extraction of the juice and a rich source of biofuel. Sugar industry generates its own energy, not only to meet captive consumption requirements but also to supply to the grid. This again has to do with biomass, which is nothing but stored energy from photosynthesis that gets released as heat on burning. The high-pressure boilers used in modern sugar mills can generate around 130 kilowatt- hours of electricity from

every tonne of cane (that is, 300 kg bagasse or 660 kg steam). After deducting 25 units of in-process consumption by the mill and another 11-12 units of auxiliary consumption in the boilers/ turbo-generators, about 95 units is exportable to the grid. It is strange that when people discuss non-conventional energy, they mainly speak of solar, wind, micro-hydel and power from rice husk, mustard stems or cotton stalks, while only incidentally referring to bagasse-based cogeneration. This, even after sugar mills have installed some 2,700 MW of grid-interactive capacity producing real and reliable power. Balrampur Chini Mills, for instance, generated 75 crore units and exported 55 crore units valued at Rs 229 crore to the UP-Power Corporation in 2013-14. At 70 tones, the average one-hectare Indian cane farmer's yield can contribute 6,500- odd units of exportable electricity — well above the annual consumption of most urban middle-class households. The aggregate potential can be estimated by multiplying that by five million hectares and yet, sugar mills in UP and Tamil Nadu are paid Rs 3.7-4.2 for every unit supplied, as compared to tariffs of Rs 7.5-12.8 (plus a host of gratuitous subsidies) under the Jawaharlal Nehru National Solar Mission (Department of Sugar Industries and Cane Development, 2013).

4. **Jute Packaging** – According to the Jute Packaging Materials (JPM) Act 1987, the sugar industry is mandated to use jute packaging for 20 per cent of its sugar production. Instead of using a cheaper variant of packaging material like the HDPE bags, the cross subsidization of the jute industry increases the costs of the millers. Till 2014, the Act required 100% production mandatory packaging with jute material which has now been reduced to 20% for sugar, but remains 90% for food grains.
5. **Cane Reservation/Command Area** – Although this regulatory arm has not been included within the scope of this paper, we have discussed the legal and policy implications to keep a holistic view of the larger regulatory governance. The instruments of regulation for reserving the cane area are - command area and distance restrictions between mills (KPMG, 2007). The study presents the report of the Bhargava Commission, Tuteja Commission and Mahajan Commission which mandates the minimum radial distance between any two mills to be 25 kms in Punjab, Haryana and Maharashtra

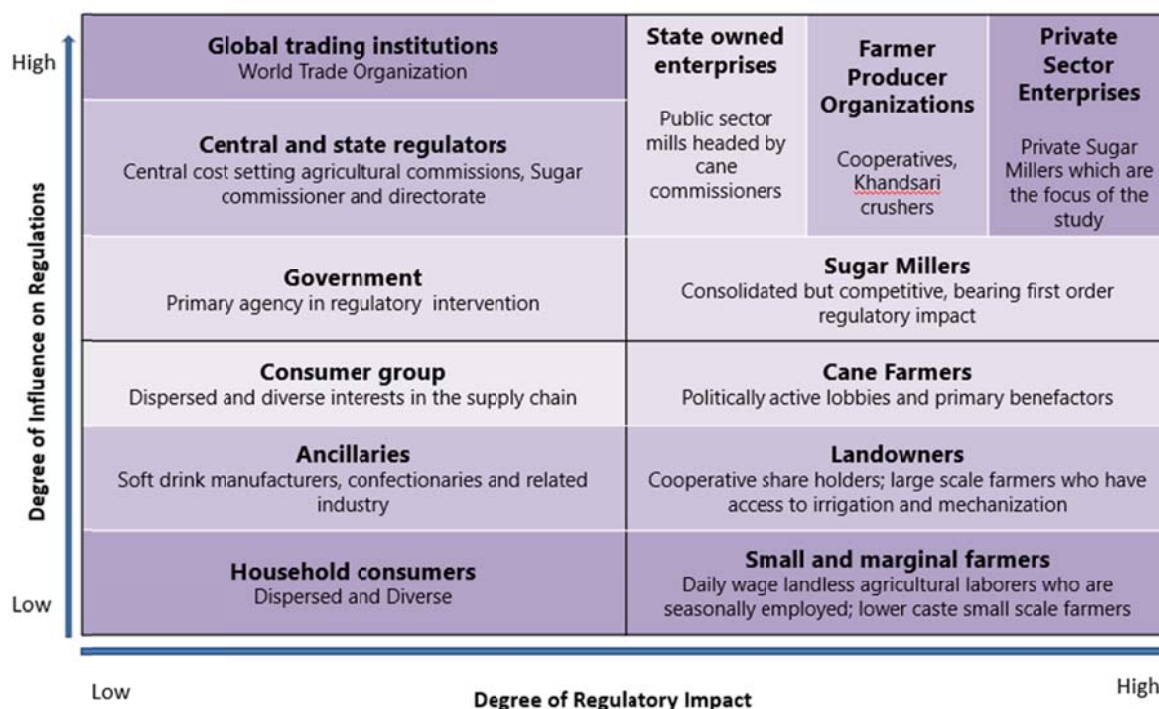
whereas 15 km in the other states. The command area on the other hand restricts the mills to procure sugarcane only from the specific allotted area. In case a farmers in the command area, registers a specific acreage of cane then he is legally bound to sell the harvest to the mill which has been allotted that command area. The Rangarajan Committee report has recommended the states to encourage development of market-based long-term contractual arrangements and phase out cane reservation area and bonding. Such individual contracts with farmers would give them the flexibility to decide which mill they want to sell their produce to.

Having established the importance of the sugar industry in the economic growth of our nation and set the context of the regulatory instruments within which the mills operate, we will now examine the political economic framework of the entire industry in the next chapter. The ancillaries and other stakeholders relevant to the industrial set up will be essential to understand the design of the regulatory environment.

2.2 Political Economy of the Sugar Industry Regulation

To understand the political backing behind regulatory governance of sugar sector, it is imperative to acknowledge and identify the conflicting interests of the sugar lobbies in the value chain of the industry. There are four primary stakeholders characterizing the value chain of Indian sugar sector: 1. Government; 2. Sugar Farmers; 3. Sugar Mills; and 4. Consumers. These groups have been further bifurcated to their relevant sub-groups with varied degree of impact and influence associated with the regulatory governance.

Figure 1: Prime Stakeholders in Indian Sugar Industry



Source: Author's Analysis

One of the primary agencies in the regulatory framework is the government, which plays a dominant role with an oversight on all decisions related to the pricing, purchase, zoning and other regulatory enforcements of the value chain. Taking the case of Maharashtra's cooperatives, Sukhtankar presents a direct political connection between the heads of public sector mills, i.e. the sugarcane commissioners with the electoral representatives (Sukhtankar et al., 2012). In this section of the paper, while discussing the case of Uttar Pradesh, it's imperative to draw a parallel because the region is dominated by private mills unlike Maharashtra. We explore the legislative framework, within which the design of the independent industry regulation operates. To elucidate further, the definition by Mark Thatcher on independent regulation can help build more clarity.

He says, “The creation, design and consequences of independent regulatory agencies represent a classic example of delegation to non-majoritarian institutions. They are created by legislation; hence elected officials are their principals. They are organizationally separate from governments and headed by unelected officials. They are given powers over regulation, but are also subject to controls by elected politicians and judges.”(Thatcher, 2002)

To bring this back to the context, the sugarcane commissioner works as a bureaucrat who directly reports to the minister of the cane development department, who would then report to the chief minister of the state. Therefore, the political connection seems to have constitutional backing within the design of the regulatory framework. Even if it is desirable for the independent regulators to be at an arm’s distance from the government for non-discretionary decision making role in inspection, licensing or enforcement; by design of the old style regulation, the ministry has the last word unless it is a matter of the courts. The decisions are supposed to be open and unbiased like any other administrative decisions. Therefore, whichever political party forms the government, has a hold over the regulatory framework.

We place the global trading institutions at a higher level of hierarchy than the national level governments, to highlight the importance of global demand and supply of sugar in its pricing in domestic markets. Any subsidies and protective regulations enforced by national governments can be disputed by the international authorities by setting up reviewing panels within the frameworks of General Agreement of Tariffs and Trade that is consistent with the global trade rules (Trujillo, 2007).

Secondly, the sugar cane farmers who happen to be the primary benefactors of the regulatory governance have high stakes in the enforcement of the regulations. The Rangarajan Committee report suggests that regulation of the sugar industry is primarily set up to protect the interests of the farmers. The literature on the political economy of the cane farmers delineates their hierarchies on land holding and caste,

with more fragmentation observed in lower caste peasants as a results 1 lower political power in the village economy (Attwood, 1991). Then there is further evidence on the political economy that differentiates the segment based on access to irrigated canal and further again with access to mechanized cane crushers with a direct correlation between more powerful cultivators and access to the irrigation and mechanization (Chithelen, 1985). We show through the figure above that lower the power of the farmers on the vertical axis, stronger is their disadvantage when regulation affects the firms. It would be interesting to research further whether the firms' payment of arrears follow any pattern on the scale of hierarchy.

Thirdly, we explore the sugar mills who used to rely on a nexus of landlord-moneylender-middleman to procure their cane supplies, before the regulations related to zoning helped in streamlining the operations. The sugar mills in Uttar Pradesh came to dominate the national cane productions post the 1990s as Maharashtra lost its position due to multiple droughts that adversely impacted it's productivity and yields (Damodaran & Singh, 2007). As the state government lined up a host of policy incentives in 2004 related to capital subsidy on investments, reimbursements on transport costs and exemptions from administrative taxes, Uttar Pradesh saw a thousand of crores being invested into the rural agrarian economy (refer to Table 2). The sugar barons form a consolidated nexus with a strong influence on the regulations and, also the ones who react most strongly to the policy changes by the government. A counter argument thereby noted is that if millers have a high influence within the regulatory framework, why have they not been able to use the influence for increasing their own profits. In here, comes the dominant role of the agency which is the government. The mandate of the State with the regulatory governance is a) market correction and b) protecting the interests of the marginal groups, in this case – the famers. Therefore, even while millers hold a considerable influence on regulatory agencies because of the huge amount of capital investments they bring into the rural agrarian economy, the influence does not encompass regulatory capture and thus, they are unable to promote policies that could induce their profitability.

Lastly, the consumer group which forms the actors who drive the supply chain of the sugar in the market and it includes household consumers as well as other industries (soft drinks, chocolate, confectionaries, etc.) that form the ancillaries to the sugar industry. They are fragmented, dispersed and have no direct impact on the regulatory framework; however, they do have a direct bearing due to the price fluctuations of the final output of the industry i.e. refined sugar.

There is extensive literature that notes the impact of regulation on the slowdown of the economy (Christainsen & Haveman, 2018; Jorgenson & Wilcoxon, 2015) and the paper is adding to the literature by putting it in the context of the sugar industry that pumps millions into the rural economy of the country, but is unable to maximize on all of its productivity due to the constraints as per the old style regulation.

3. Data and Methodology

A comprehensive analysis of the impact of government regulations on the sugar industry would require an in-depth examination of the various financial parameters of sugar companies along with the status of their revenue and expenditure in addition to the burden added due to the barriers by the government and analyze the variations in the net profit retained by the industry post the added expenditure on the various economic regulations choking the value chain at several intervals. For this, we studied the long- run relationship between the net profit after tax of each company and a set of explanatory variables representing the quantified impact of government regulations using panel data regression modeling. The chapter is presented under the following heads:

3.1 Nature and Source of Data

The sugar industry of Uttar Pradesh is one of the most organized sectors with data documented right from 1930's when the first sugar mill was established. It is one of the few industries which have maintained its statistical documents up to date with the help of several organizations

which publish technical as well as financial data on the industry. Table 1 1 notes the source and nature of data that was collected for this study.

The study is confined to 18 private sugar companies of Uttar Pradesh which has its mills across the geographical area of the state; and the historical data spanned over 15 years from 2000 to 2015. The research intends to assess the significance of impact on the government regulations on the financial performance of all these 18 sugar companies which account for almost 80% of the sugar production in the state. All the data pertaining to the companies was sourced through Capitaline, whereas the data related to production variables was sourced from Handbook of Sugar Statistics, published by Indian Sugar Mill Association.

3.2 Analytical Tools Employed

The present study would attempt to analyze the impact of the various economic regulations on the financial health of the sugar mills. In the present study, we have used panel regression model that will be used to analyze the impact of the government regulatory instruments on the performance of the sugar mills.

The variable of interest is the profitability of the companies, and the independent variables would be the cost borne by the companies in the entire value chain due to the regulatory policies of the government.

The model used for the analysis is as follows –

$$\mathbf{Profit}_{it} = \text{Cane Procurement}_{it} + \text{Sugar sale}_{it} + \text{Molasses sale}_{it} + \text{Packaging}_{it} + \text{Labour}_{it} + \text{Capital}_{it}$$

The construction of explanatory variables are given below:

$$\mathbf{Cane Procurement}_{it} = (\text{SAP} - \text{FRP}) * (\text{Amount of cane crushed by the company over a year})$$

$$\mathbf{Sugar sale}_{it} = (\text{Sugar sale at market price} - \text{Sugar sale at reserved/levy price}) * (\text{Sugar production by the company over a year})$$

$$\mathbf{Molasses sale}_{it} = (\text{Molasses sale at market price} - \text{Molasses sale at reserved/levy price}) * (\text{Molasses production})$$

Packaging_{it} = (Jute bag price – HDPE bag price) * (Sugar sales quantity over a year) Labour_{it} = labour costs or the employee costs.

Capital_{it} = Fixed capital costs also known as the gross block in the data banks

All these values have been deflated or accounted for inflation at constant prices for the i^{th} firm at the t^{th} year. (Goldar and Aggarwal, 2004) B.N. Goldar in his paper has used the variable - Price cost margin (PCM) - which has been conceptualized as the current economic profit over sales plus the competitive return to capital over revenue.

$$\text{PCM}_{it} = \frac{\pi}{pq} + \frac{(r+\delta)K}{pq}$$

where π denotes profits, r market return on capital, δ depreciation rate, K capital, p price and q quantity produced. Similarly, the present study has used the explanatory variable as profit by dividing Profit After Tax (PAT) over sales value. This would provide us with return on sales, as PAT is the net profit earned by the company after deducting all expenses like interest, depreciation and tax.

The dependent variable, PAT and the independent variables fixed costs and employee costs have been collated from Capitaline and the annual reports of the companies. For the entire data set, we have used the whole sale price index series obtained from the official series of sugar on Index number of Wholesale Prices. The data has also been normalised by dividing the data to the sales value of sugar. Logarithmic transformation could not be used since PAT had a lot of negative numbers and log of negative number is undefined.

To capture the effect of regulatory policies, the variables have been quantified using their impact on the profit mark up. However, certain regulatory policies such as the cane reservation area and non-levy obligation could not be quantified as part of this study. Even with respect to the regulation on by-products, only molasses policy has been taken into consideration since the inclusion of restrictions placed on the other by-

products such as bagasse, co-gen and pressmud did not generate a good result in the regression equation.

Besides the regression modeling, the compounded average growth rate was computed for each company over the past 15 years. Various other tools such as the trend lines, descriptive statistics, bar graphs etc. were used to understand the movement in the industry and the relationship between sugar prices, cane prices, profitability of the companies, production and sales.

3.3 Model Estimation

The regression model has only one exogenous variable which is the dependent variable estimated for the profitability, while the rest of the independent variables are endogenous, calculated as the additional cost incurred due to the government regulations. Therefore, to estimate the impact of the regulations on the variation in the profitability, based on the data the following model has been used –

$$\mathbf{Profit}_{it} = \text{Sales Value}_{it} + \text{Cane Procurement}_{it} + \text{Sugar sale}_{it} + \text{Molasses sale}_{it} + \text{Packaging}_{it} + \text{Labour}_{it} + \text{Capital}_{it}$$

Initially there were 290 observations that were collected for the analysis, but many of the observations had to be dropped as there were gaps in the data. Final observation count was 175 for the econometric analysis.

The main data source on all regulatory policies was Handbook of Sugar Statistics, published by ISMA and the Rangarajan Committee report. All the variables for regulatory policies have been computed as follows –

$$\text{Norm} \left\{ \frac{\text{SAP} = ((\text{SAP} - \text{FRP}) * \text{Cane Crushed})}{(\text{Sales Value Sugar})} \right\} * (\text{WPI sugar})$$

$$\text{Norm} \left\{ \frac{\text{JP} = ((\text{Jute bag price} - \text{HDPE price}) * (\text{reserved \% of sugar production}) * (\text{WPI sugar}))}{(\text{Sales Value Sugar})} \right\}$$

$$\text{Norm Levy} = \frac{\left[\left((\text{Market price sugar} - \text{Levy price sugar}) * \text{Levy \%} * \text{sugar production} \right) * (\text{WPI sugar}) \right]}{(\text{Sales Value Sugar})}$$

$$\text{Norm Mol} = \frac{\left[\left((\text{Open market price of molasses} - \text{Reserved price of molasses}) * (\text{reserved molasses sale}) \right) * (\text{WPI sugar}) \right]}{(\text{Sales Value Sugar})}$$

Each independent variable that has been normalized by sales value represents expense ratio shows what percentage of sales is an individual expense or a group of expenses. A lower ratio means more profitability and a higher ratio means less profitability.

Analyst must be careful while interpreting the ratio of expenses to sales¹⁹. Some expenses vary with the change in sales (i.e variable expenses). The ratio for such expenses normally does not change significantly as the sales volume increases or decreases, but for fixed expenses (rent of building, fixed salaries etc.), the ratio changes significantly as the sales volume changes. The ratio is helpful in controlling and estimating future expenses. Ram Upendra Das used the concept of expense as a ratio to sales to as a measure of variable to study the productivity in the era of trade and investment liberalization in India post 2000, using a firm level panel data regression analysis.

NormSap = Loss incurred due to State Advised Prices, deflated at constant prices and normalized using sales value of sugar.

NormFC = Fixed Costs, deflated at constant prices and normalized using sales value of sugar.

NormEC = Employee Costs, deflated at constant prices and normalized using sales value of sugar.

NormJP = Loss incurred due to Jute Policy, deflated at constant prices 1 and normalized using sales value of sugar.

NormLevy = Loss incurred due to levy policy, deflated at constant prices and normalized using sales value of sugar.

NormMol = Loss incurred due to Molasses policy, deflated at constant prices and normalized using sales value of sugar.

Another model used is the pooled OLS (Ordinary Least Squares) regression which provides consistent and efficient estimates of the common intercept and the slope vector. Lastly, panel corrected standard errors have also been used to generate more robust standard error (Deng, 2015).

These models are basically classical linear regression models using different estimation techniques analyzed through STATA software with unbalanced panel data.

The variable of interest is the profitability of the companies, and the independent variables would be the cost borne by the companies in the entire value chain due to the regulatory policies of the government.

4. Results

4.1 Descriptive Analysis of Key Performance Indicators: Financial and Operational Performance

The secondary data collated for 18 private sugar companies in Uttar Pradesh have shown some fascinating trends in its profit and operational variables, which have been termed as the key performance indicators. The revenue has been increasing at the growth rate of 11% over the past 15 years for the sugar industry, whereas the Profit after Tax has reduced drastically from 2006 to 2015, going into negatives over the past half a decade, as shown by Table 3.1. The debt has shot up at the growth rate of almost 14 percent with a small dip in 2013 as observed in the trend line and that's because companies like Bajaj Hindusthan and Triveni Engineering have reported their revenue only in 2014 after 2012 for 18 months together. Since both these companies have an aggregate capacity

of 80,000TCD and 20,000 TCD respectively, which is more than most of the other sugar groups, the average debt and sales both seem to be going down in 2013.

Moving ahead, the following points emerge from Table 3.2 that gives the compounded annual growth rate for the profit variables –

1. The revenue grew consistently in the first two five years while dropping slightly from 15 per cent to 11 per cent in the past five years from 2010 to 2015.
2. Profit After Tax has plunged drastically in the last decade especially in 2010 when the markets crashed and profits fell to almost 130 per cent as depicted in the above tables. Post that, the growth rate has kept declining further to and has fallen at the rate of 270 per cent in the past 5 years.
3. EBITDA has also been falling and gone into a negative spiral in the last decade.
4. Sales Value increased from 5.95 per cent to 15.74 per cent and then fallen to 4.61 per cent in the past 5 years.

Sugar production has observed cyclicity over the past 15 years with each cycle lasting about 5- 6 years during which is most 2-3 years of high production, followed by another 2-3 lull years. This cyclicity is dependent upon the cane prices offered by the government, area under production, weather shocks and ex-mill sugar prices. The selected units observed from UP's cohort shows the same trend as observed on a macro level all over India as shown in Table 4.3. While comparing prices and profits of the industry, we observe in Table 4.4 how the average profits of the industry have largely reduced even though the prices have been soaring up, which suggests that merely the increase in sugar prices have had virtually no effect in improving the financial health of the industry. We observe that after 2004 in UP, post the intervention of sugar industry promotion policy, the profits of the companies went up and remained stable till before 2010. Post 2010, although the prices soared up to almost double the amount as compared to 2008, we observe that the profits crashed to almost 130 per cent from 268 crore Rs to losses upto -83.85 crore in 2010 which accumulated to -1221.45 crore in 2015.

Some of the most important reasons for the profits to plummet could be due to the sharp increase in the government price regulations for cane procurement i.e. FRP by 41.32% and SAP by 31.7%; the levy sugar prices increased by 30.9% where a part of the sugar production by a company had to be sold diverted to the public distribution system at below market price. In addition to that, the molasses levy prices were decreased by the government for the liquor industry by 75 per cent, which means the difference in the market price for molasses and its reserved prices increased substantially contributing to the sudden losses incurred by the industry post 2010.

4.2 Production trends

All India availability of sugar, as shown in Table 4.10 that represents the balance sheet with production data and closing stocks depict a fall in production in the year 2015-16. This has been attributed primarily to drought in Maharashtra and Karnataka. India's sugar production is expected to fall to 252 Lakh Tonnes this season from 284.6 Lakh Tonnes in 2014-15 mainly because of huge drops in the two states — from 10.52 MT to 8.4 MT for the former and from 4.99 MT to 4.1 MT for the latter. Given carry-over stocks of 8.88 MT with mills, estimated domestic consumption of 25.6 MT and exports of 1.5 MT, there would be some 7 MT of sugar when the next 2016-17 season begins in October. The real problem, though, will be in 2016-17. Sugarcane being a 12-month crop, the effects of lower plantings in Maharashtra and Karnataka will be felt more in the coming season. With its projected cane area contracting to around 6.3 lakh hectares (LH), from 9.3 LH and 10.5 LH in the preceding two seasons, Maharashtra's sugar output may further dip to 5.5-6 MT (reference). Low reservoir water levels in the northern districts of Gulbarga, Bijapur, Bagalkot and Belgaum are, likewise, slated to pull down Karnataka's production to 3-3.1 MT. Even assuming Uttar Pradesh (UP), Tamil Nadu and other states to produce an extra 1.5 MT, it isn't going to take the country's total output in 2016-17 beyond 22-23 MT. The recovery rates in UP has gone up in 2015-16 by 1 percentage point from 9.5 to 10.5 per cent and this is being attributed to the new hybrid high yield variety of cane Co 0238 that has been produced by the Sugar

Breeding Institute which has increased the yield in all the northern states 2 in India substantially. Before Co 0238, the most widely cultivated cane variety, CoS 767, yielded 60-65 tonnes per hectare on most farmers' fields. Co 238, by contrast, gives upwards of 75 tonnes, with many farmers harvesting 100 tonnes and more (Bakshi Ram, 2011).

4.3 Debt, Capital and Labour Costs

Sugar mills in Uttar Pradesh are staring at the prospect of being denied working capital finance by banks, following a recent Supreme Court ruling that cane payment dues to growers would receive priority over the claims of secured creditors. The industry is highly working capital- dependent, as they crush only for about five months (from mid-November to mid-April) whereas the sugar produced gets sold over 13-14 months, as observed from Table 4.11. Banks usually lend up to 85 per cent of the value of mills' production. Further, 85 per cent of the advance received, in turn, goes towards cane payments and the balance for workers' salaries, chemicals, packaging bags, repairs and maintenance of machinery, etc. Thus, on an ex-factory sugar realization of Rs 30 per kg, mills can obtain working capital of Rs 25.5 per kg, of which Rs. 21.7 per kg would finance cane purchases (Damodaran, 2015).

Mills enter into financing arrangements with banks by early-November when they submit their working capital requirement projections based on the likely quantity of cane to be crushed, average sugar recovery and price realizations. Millers claim that at the current State Advised Price (SAP) of Rs 280 a quintal and 9.2 per cent recovery, the cost of cane alone in sugar is about Rs 30.4 per kg. Adding other costs takes the total to Rs 35 a kg, as against ex-factory realisations that are under Rs 29 now (Bajaj, 2014). In the event of no working capital from banks, mills are left with the option of buying cane on credit from growers at zero interest and paying from sugar sales over time.

4.4 Regression Output

The government regulations on the sugar industry have been quantified by assessing their impact on the extra cost incurred by the companies. For

instance, the cane price regulation which is the minimum price² guaranteed to the cane growers i.e. Fair and Remunerative Price is superseded by the State Advised Price as announced by the state governments. This has been considered as the extra cost incurred by the manufacturers. Similarly, the impact of regulation on the molasses have been quantified by the additional cost incurred by the manufacturers by selling a substantial part of their produce reserved for the liquor manufacturers at below market price, instead of the free sale. The sugar industry also cross-subsidizes the jute industry by packaging the final product into jute bags instead of cheaper HDPE alternative available. And, finally the levy sugar policy which was abolished in 2013 has been taken as another source of burden while analysing the panel data over the past 15 years. All these additional costs have been tabulated below to fit the multi-variable regression equation to assess its impact on the Profit After tax. Since additional costs such as labour and capital have to be included as well, the final equation has been modelled to determine the amount of variation caused in the profits due to all these independent regulatory variables.

Estimating the results from the above model based on the panel data, the Table 4.5 shows that the impact of cane price regulation denoted by $NormSAP_{it}$ is statistically significant for fixed effects model at 15% significance level while for other models such as random effects, OLS pooled and CPCS, it is significant at 1% significance level. This means that for a unit increase in the difference between SAP and FRP, which is the extra cost borne by the private sugar mills due to state intervention, the profitability will decrease by 7.6 per cent as estimated by the fixed effects model. A similar decrease is observed for other models as well, where the magnitude of impact in the profitability due to SAP is 12.2% and 13.1% respectively for random effects and OLS regression. The Hausman test is done to choose between fixed or random effects model for panel data where if the P value is significant or lesser than 0.05 which fixed effects model is chosen over random effects (Bell and Jones, 2014). It is known that fixed effects model is more consistent and shows the impact of the variation on the DV by an entity. It is important that we consider fixed effects model for this study because there are several corporations in

the sample which have a higher capacity to produce sugar as compared to 2 the rest of them, as shown in Table 4.6. The capacity of production reflects the scale of production, sales and profits and depending on that the impact on their profitability also varies. For instance, Bajaj Hindustan has a total production capacity of over 60,000 tonnes crushed per day which is way more than Dwarikesh, and therefore can explain the variance in the impact of regulatory measures.

The impact of levy sugar policy on the profitability of the industry is statistically significant at 15% level of significance according to the fixed effects model where as not significant according to the random effects model, as the p-value for latter is higher. This could be due to the reason that for the past 3 years i.e. in 2013, '14 and '15 the policy had been abolished and in the data was kept as 0, and since random effect model can vary randomly for all the observation, the conclusion drawn will not be consistent. The output shows that with every unit increase in the difference between market price and levy price, the profits plunged by almost 55 per cent.

Jute packaging policy has a statistically significant outcome at 5% level of significance though the coefficient is positive which implies that with every increase in the jute packaging costs, the profitability also increases. The policy related to by-products (molasses in particular) has a statistically insignificant outcome on the profitability, though it shows that every increase in the difference between the molasses prices and free market prices leads to a reduction in the profitability up to 23 per cent.

The R-squared of the regression is the fraction of the variation in the profitability variable that is accounted for (or predicted by) all the independent variables. The R-squared holds secondary importance in this analysis, since the main objective in using the regression equation is not to make accurate predictions. Nonetheless, the overall coefficient of determination or amount of variance in the profitability explained by the regulatory policies is 84 per cent. This is a slightly inflated value since there could be a case of multicollinearity.

5. Conclusion

The present study has used panel data in order to analyze and identify regulatory impacts on the profits of sugar companies which have fallen drastically in the past 5 years post 2009-10, as shown in the previous chapters. Today the Central government as well as the state government have imposed several regulations across the value chain that has increased the cost of production for the industry. The prices of the final products and by-products have not increased proportionately which have ultimately led to the reduction of the profitability. Chapter 1 has given a broad overview of the Indian sugar industry and the delineation of the rationale behind regulating the industry. It is important to note that the industry has been a stronghold for the rural economy and accelerating the growth of the industry will sustain the livelihoods of almost 50 million farmers who are dependent upon it. The methodology to collate the data for the study has also been described within its bounds. Chapter 2 focuses on the extensive literature that covers the regulatory policies on not just sugar but also the by-products, and the political economic framework within which all the interests of the stakeholders can be examined. Chapter 3 elaborates on the nature and source of panel data for 18 companies that have been compiled over the past 15 years for cost performance indicators, operational performance indicators and financial performance indicators for all the companies. The regression model used to assess the impact of regulatory policies has been formulated to measure profit as the dependent variable and the regulations have been quantified as endogenous variables, which are an added cost borne by the industry due to either cross subsidization of other industries (jute or liquor industry, for instance) or price regulation in favor of farmers. It gives the final empirical result of the various parameters whose trend has been compared over the years to understand the sugar market. The movement of prices and its impact on the profits of the industry, the compounded annual growth rate of the key performance indicators for all the companies, rising capital-labour ratio to understand its significance on the capital-intensive industry and its debt burden, and ultimately the

regression results. Empirical results support the notion that stringent regulatory policies have a significant impact on the profitability of the industry. We find that the almost 84 per cent variability in the profitability of the industry can be explained by the regulatory policies through the panel data. Although, a small sample could lead to an extended bias, but the process of quantification of the regulatory measures can help build the research in future to study whether the effects of non-discretionary regulatory policies also impact the inability for the millers to pay farmers.

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Appendix

Table 1

Cost Performance Indicators	Data Source
Sugarcane Procurement Costs	Indian Sugar Mill Association
Sugar Prices	Sugar Technologists Association of India
Molasses Prices	Indian Distillery Association
Packaging Costs	Commission for Agricultural Costs and Pricing
Fair and Remunerative Prices	Commission for Agricultural Costs and Pricing
State Advised Prices	Commission for Agricultural Costs and Pricing
International Sugar Prices	Indian Sugar Journal
Domestic Sugar Prices	Indian Sugar Journal
Prices for reserved quota (levy prices)	Indian Sugar Journal
Prices for free sale (market prices)	Indian Sugar Journal
Jute bag prices (100 KG bags)	National Sugar Institute
HDPE bag prices (100 KG bags)	National Sugar Institute
Operational Performance Indicators	
Area under sugarcane cultivation	Commission for Agricultural Costs and Pricing
yield per hectare	Commission for Agricultural Costs and Pricing
sugarcane production	Commission for Agricultural Costs and Pricing
sugar production	Commission for Agricultural Costs and Pricing
rate of recovery	Annual reports of all the listed companies
Cane crushed	Annual reports of all the listed companies
Molasses production	Annual reports of all the listed companies
Installed production capacity	Annual reports of all the listed companies
Financial Performance Indicators	
Sugar Sale	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Molasses sale	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Sugar sale realization	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Molasses sale realization	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Profit After Tax (PAT)	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Earning before Depreciation	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.
Income, Tax	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.

Amortization (EBDITA)	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	2
Revenue	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	
Total Debt	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	
Cost of Production	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	
Employee Costs	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	
Fixed Assets	Capitaline sourced from the data base of Rabo Bank's Food and Agribusiness Research and Advisory department.	

Table 2: Company-wise data on production, capacity and Number of mills

S. No	Name of Company UP)	Sugar Production (000'tons) (2013-14)	Sugar Production (000'tons) (2012-13)	Capacity (TCD)	Mills established post 2004 policy changes	No. of Mills (UP)
1	Bajaj Hindustan	1,051	1,305	136,000	7	14
2	Balrampur Chini Mill	742	823	79,000	2	11
3	Triveni Engg.	433	522	40,500	4	7
4	Dhampur Sugar	376	439	44,500	1	5
5	Dwarikesh	213	238	21,500	1	3
6	Oswal	29	17	3500	0	1
7	Uttam Sugar	134	171	20,000	3	4
8	DSCL	318	384	33,000	2	4
9	Oudh Sugar	246	271	21,200	0	3
10	Rana Sugar	93	95	10,000	3	2
11	Sir Shadi Lal	123	125	6250	0	1
12	Simbhaoli Sugar	206	224	19,500	1	3
13	Upper Ganges Sugar	121	146	18,000	0	3
14	Mawana Sugar	232	305	29,500	1	3
15	SBEC Sugar	91	91	10,000	0	1
16	Gobind Sugar	87	87	7500	0	1
17	J.K. Sugar	83	83	4000	0	1
18	Daurala	140	140	10000	0	1

Source: Capitaline and UP Cane Commissioner's office, Lucknow

Table 4.1 – Key Performance Indicators for Sugar Companies

Years	2001	2006	2011	2015
Average Revenue (Rs cr)	231.52	332.89	1051.85	1171.48
Average EBITDA (Rs cr)	28.11	117.96	180.32	30.36
Average PAT (Rs cr)	3.13	71.99	-3.53	-122.14
Average Debt (Rs cr)	195.83	237.81	1069.98	1409.09
Average Sales Value (Rs cr)	234.85	313.57	651.49	815.64

Source: Compiled by author

Table 4.2 – Production Trends

Years	Average Sugar Production (Qtl)	Avg Sales value (Rs/Qtl)	Average Sales Quantity (Qtl)
2001	1919777.70	234.85	1354247.70
2003	2518506.00	241.48	1743040.40
2005	2025806.08	313.57	1703855.58
2008	3766554.38	397.52	1903379.53
2010	3968598.18	651.49	1534174.18
2015	4562100.00	815.64	1803797.11

Source: Compiled by author

Table 4.3 – Sugar Prices and Profitability of Companies

Years	Sugar prices (India) (Rs/Qtl)	Sugar Prices (international) (Rs/Qtl)	AVG PAT (Rs Cr)	Avg EBITDA (Rs Cr)
2001	1285	823.95	31.13	281.117
2003	1300	908.01	-36.54	186.89
2005	1400	709.91	358.40	601.98
2008	1650	893.98	268.36	588.27
2010	3201	1896.78	-83.85	1114.74
2015	3100	2330.00	-1221.45	303.63

Source: Capitaline and CACP report 2015-16

Table 4.4: Comparing the Costs of Regulation

Years	FRP	SAP	Molasses Free	Molasses Levy	Sugar Free	Sugar Levy	Jute Packaging	HDPE packaging
	Rs/qt	Rs/ctl	Rs/ctl	Rs/ctl	Rs/ctl	Rs/ctl	Rs/100kg	Rs/100 kg
2001	65.00	90.00			1580	1165.18	16	5.588214
2002	69.50	95.00			1285	1247.10	21	5.588214
2003	69.50	95.00			1300	1293.48	25	6.718929
2004	73.00	95.00			1350	1330.03	29	7.849643
2005	75.40	95.00	225	85	1400	1330.03	34	8.980357
2006	79.50	107.00	263	90	1500	1330.03	33	10.11107
2007	80.20	125.00	165	85	1550	1330.03	43	11.24179
2008	81.18	125.00	445	331	1650	1330.03	40	12
2009	81.18	140.00	395	231	1700	1330.03	55	13.05
2010	129.80	165.00	226	85	3201	1792.51	64	13.87
2011	139.12	205.00	287	46	2985	1883.55	65	16
2012	145.00	240.00	338	51	3230	1942.95	69	16.3
2013	170.00	280.00	396	61	3508	0	60	22.75
2014	210.00	280.00	531	146	3306	0	65	19.7
2015	220.00	280.00	410	101	3100	0	79	16.97

Source: Indian Sugar Mill Association

Table 4.5 - Estimates of the Model Explaining Profit after Tax in Sugar Industry Using Regulatory Policies

Explanatory Variables	Fixed Effects (t test)	Random Effects (z test)	Pooled OLS (t test)	Correlated Panels Corrected Standard Errors (PCSEs) (z test)
NormSap	-.0764136	-.1220208	-.1311068	-.1311068
P>(t) or (z)	0.114	0.000	0.000	0.000
NormFC	-.0096119	-.0346815	-.0504336	-.0504336
P>(t)	0.114	0.094	0.000	0.003
NormEC	-.6827868	.1228482	.5970326	.5970326
P>(t)	0.062	0.663	0.001	0.061
NormJP	1.393523	.3695533	-.5704009	-.5704009
P>(t)	0.010	0.440	0.480	0.274
NormLevy	-.547772	-.4561087	-.4641623	-.4641623
P>(t)	0.124	0.202	0.066	0.061
NormMol	-.2301659	-.1895546	.1479789	.1479789
P>(t)	0.488	0.576	0.635	0.596
Cons	.1255697	.1062284	.0924245	.0924245
P>(t)	0.000	0.000	0.000	0.000
R ² overall	0.8404	0.8813	0.8889	0.8889
F-test	312.33	6.58	2775.76	Wald chi2(6) = 7658.38
Prob> F	0.000	0.000	0.000	Prob > chi2 = 0.000
Hausman (prob>chi2)		0.0572	None	None
No. of observations	175	175	175	175