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Technical Change and Productivity Growth in the Indian Sugar Industry

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Abstract

This paper applies MPI approach to measure technical change and productivity growth in 40 Indian sugar companies for the period 2004-05 to 2013-14. The empirical findings show that on an average, Indian sugar companies have registered a negative TFP growth rate of 0.7 percent per annum, though it varies considerably across years, indicating to the existence of sugar cycle. Decomposition of TFP growth into technical change and technical efficiency change reveals that the negative growth is only due to technological regress. The study suggests that apart from bringing the technical change, rationalization of sugarcane price policy is need of the hour.

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Keywords: Sugar Industry, MPI, TFP, Technical Change, Technical Efficiency Change

1. Introduction

Sugar industry, with an annual production capacity of more than 25 million tons, is one of the largest agro-based industries of India. Over the period, this industry has been subjected to strict government controls, regulations and interventions. However, since 1993, the regulatory environment has been constantly easing. The Government of India constituted various committees (Mahajan Committee:1998; Tuteja Committee:2004; and Rangarajan Committee:2012) to de-license and de-regulate the industry. Based on their recommendations, the industry was de-licensed in 1998 and gradually it has been partially de-regulated. Now, sugar mills are free to sell sugar in open market without any restriction and obligation to supply sugar at the subsidized rate for public distribution system.

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However, in spite of these policy changes, the industry still faces a number of regulations, including control over the supply and prices of sugarcane. Government of India fixes Fair and Remunerative Price (FRP) of sugarcane for the farmers every year on the recommendations of Commission for Agriculture Cost and Prices (CACP). Over and above it, some states, such as Uttar Pradesh, also announce State Advised Price (SAP), which is largely governed by politics rather than economics. Sale of molasses, a by-product of the industry, is also regulated.

It is believed that a large number of regulations and controls, along with high order of politicization, have contributed large-scale inefficiency in the sugar industry (Datta et al., 2003). Furthermore, distorted production and trade policies of some industrialized countries, especially during the post-liberalized period, have made the sugar market more volatile, posing a big challenge to the competitiveness of the Indian sugar industry. The studies show that wide-spread interventions and controls in the sugar producing countries have created inefficient pattern of world production, consumption and trade of sugar (Borrell and Duncan, 1992; Devadoss and Kropf, 1996; Larson and Borrell, 2001; Oxfam, 2004). In this situation, the Indian sugar industry has to improve its global competitiveness. As Total Factor productivity (TFP) is the driving factor in improving competitiveness, a study of TFP and its sources is warranted to provide inputs for improving the industry's performance. A high level of TFP growth can result in lower costs to consumers, better remunerations and working conditions to the employees, better returns to the investors, and adequate surplus to the company for its modernization and expansion (Singh & Agrawal, 2006). The TFP growth can be accomplished via improvement in the technical efficiency (catch up) or by the technical change (frontier shift) or by both. A study of these sources of TFP growth is crucial for adopting appropriate measures to improve performance. It is in this context that this paper examines the technical change and the productivity growth in the 40 Indian sugar companies (20 integrated and 20 others) for the period from 2004-05 to 2013-14.

Rest of the paper is organized as follows. The second section briefly discusses profile of the sugar industry; the third section overviews the literature; the forth section deals with the methodology, data and variables; and results and discussions are presented in the fifth section, followed by conclusions and policy implications in the last.

2. A profile of the industry

India is the second largest producer of sugar in the world after Brazil, with 15 percent share in the global sugar production. The industry plays a vital role in the rural economy of India and also has high potential source of renewable energy. It supports the livelihood of about 60 million farmers and their dependents and also helps in promoting the diversified ancillary activities. The industry's annual turnover in 2011-12 was Rs. 800 billion, with Rs. 550 billion as payment to the farmers (AFSIL: 2013). The Industry consists of more than 500 sugar mills, which are under different ownership and management structure. A majority of the sugar mills in Uttar Pradesh, a leading sugarcane producer state of India, are privately owned, while in Maharashtra and Gujarat (other two main sugar producing states), sugar mills are mostly under cooperative structure.

A profile of the industry is presented in Table 1. As is obvious from the table, area under sugarcane cultivation has increased from 3.84 million hectares (Mha) in 1991-92 to 5.04 Mha in 2011-12. During the same period, production of sugarcane has increased from 253.97 million tons (MT) to 361.04 MT. Yield of sugarcane ranged between 59 to 71 tons per hectare. Number of sugar mills went up from 392 in 1991-92 to 529 in 2011-12; while sugar production has more than doubled from 13.40 MT to 26.34 MT during the same period. It is relevant to note that the entire sugarcane production is not processed by the sugar mills; a part of it is diverted to produce raw sugar (indigenous sugar). Therefore, percentage of cane crashed by the sugar mills largely depends on the differences in sugarcane prices fixed by the government for the mills and the open market prices. Whenever open market prices are higher than the fixed prices, farmers would prefer to sell their produce in the open market and the sugar mills get less quantity to be processed. This is the reason why the percentage of sugarcane crashed by the mills varies significantly across years, ranging from 42.82% to 78.55%. Average crushing duration also varies significantly across years. It ranges from 87 to 181 days. Erratic supply of sugarcane and high variation in the crushing duration are the major problems of the industry. As far as, average sugar recovery is concerned, it is found ranging between 9.42 to 10.55 percent.

Table 1. A profile of Indian sugar industry

Year	Area under Sugarcane (Mha)	Sugarcane Production (MT)	Yield (T/ha)	No. of Sugar Mills	Cane crashed as % of Cane Production	Sugar Production (MT)	Average crushing duration (days)	Recovery (%)
1991-92	3.84	253.97	66.07	392	52.76	13.40	173	10.02
1992-93	3.57	228.03	63.84	393	45.17	10.61	123	10.31
1993-94	3.42	229.66	67.11	394	42.82	9.83	111	10.00
1994-95	3.87	275.54	71.25	408	53.58	14.64	159	9.92
1995-96	4.15	281.10	67.78	416	62.16	16.45	181	9.42
1996-97	4.17	277.56	66.50	412	46.97	12.91	130	9.9
1997-98	3.93	279.54	71.13	400	46.22	12.86	123	9.95
1998-99	4.06	288.72	71.20	426	54.57	15.54	141	9.87
1999-00	4.22	299.32	70.93	423	59.64	18.20	152	10.2
2000-01	4.32	295.96	68.57	436	59.69	18.51	139	10.48
2001-02	4.41	297.21	67.36	434	60.67	18.53	140	10.27
2002-03	4.52	287.38	63.58	453	67.62	20.14	141	10.36
2003-04	3.94	233.86	59.39	423	56.66	13.55	100	10.22
2004-05	3.66	237.09	64.76	400	52.63	12.69	96	10.17
2005-06	4.20	281.17	66.91	453	67.10	19.27	126	10.22
2006-07	5.15	355.52	69.02	504	78.55	28.36	174	10.17
2007-08	5.06	348.19	68.88	516	71.77	26.36	149	10.55
2008-09	4.42	285.03	64.56	488	50.86	14.54	87	10.03
2009-10	4.18	292.30	70.01	490	63.48	18.91	108	10.2
2010-11	4.89	342.38	70.07	527	70.04	24.39	136	10.17
2011-12	5.04	361.04	71.66	529	71.18	26.34	137	10.25

Source: Indiastat.com

We observe from the data given the table that the Indian sugar industry does not evince a steady growth. There are ups and downs in the area, production and yield of sugarcane and the percentage of sugarcane crushed by the industry and consequently generating a cyclical pattern in sugar production. In recent years, sugar prices in India are determined by the market forces, largely influenced by the global market, while prices of sugarcane are still regulated by the government. This creates sugar cycle in the industry. The two-year sugar cycle, observed in the industry mainly due to lack of alignment between prices of sugarcane and recovered prices of sugar, leads to sugarcane arrears and indebtedness among the sugar mills. Cyclical pattern in the industry is quite evident from the year-wise sugar production data shown in Table-1.

Currently sugar industry is facing financial crisis due steep decline in sugar prices and consequently heavy debt burden. The sugar mills owed about Rs.650 billion to banks and cane farmers (Economic Times, August 19, 2015, p12). The reform measures adopted by the government, based on the Rangarajan committee's recommendations seem to have not yet made any perceptible positive impact on the industry. In fact, removal of regulated release mechanism on open market sale of sugar in 2013 is likely to have depressed the market prices of sugar. The committee's recommendation to fix sugarcane prices at 70 percent of the revenue realised from sugar and its by-products, such as, molasses, bagasse and press-mud, is not yet accepted by the government. The major problem of the industry is that its final product prices are determined by the market mechanism, while prices of raw material (sugarcane) are fixed by the government. If prices of sugarcane are linked with the revenue realised by the industry, as suggested by the committee, then farmers may also argue for linking sugarcane prices to the farm input prices, which do not have a cyclical pattern, but rise constantly over a period of time. Therefore, remedy of the malady of

the industry seems to be in diversifying its activities, ranging from sugar production to ethanol, bio-electricity, bio-gas, bio-plastics products and carbon credits and making the sugarcane growers as stakeholders in the sugar companies. The industry has potential to generate about Rs 2000 crore annually through carbon credits from cogeneration, as electricity generation from bagasse produces no net carbon emissions (KPMG: 2007). Further, the problem of the industry can be solved to a greater extent by managing the sugar demand-supply mismatch by allowing the industry to directly produce ethanol from sugarcane juices.

3. Literature review

There is no dearth of studies on the Indian sugar industry. However, earlier studies on the industry are either production function based or general in nature identifying problems and prospects of the industry (for example see, Desai:1971; Metha:1974; Gupta and Patel:1976; and Damodaran and Singh:2007). More recent studies on the industry apply DEA, production function, and stochastic frontier approaches to measure technical efficiency and TFP (for example see, Ferrantino and Ferrier, 1995; Singh, 2006; Singh and Agarwal, 2006; Singh, 2007; Singh, et al., 2007; Kumar and Arora, 2011; Arora and Kumar:2013). The present study is different from earlier studies on the TFP growth in the sugar industry on two counts: First, it takes all inputs and output as flow variables, unlike some previous studies which take capital and labour as stock variables. Since sugar output is flow, it is justified to consider flow inputs to measure the TFP growth in the industry. Second, as the industry has undergone a significant policy changes in the recent years, inclusion of latest years' data in the analysis would help us to understand how these changes have affected the performance of the industry.

4. Data and methodology

This study is based on the company-level panel data of 40 Indian sugar companies (20 integrated and 20 others) collected from *Capitaline Database* for the period 2004-05 to 2013-14. The TFP growth and its sources (technical change and technical efficiency change) are estimated through DEA-based Malmquist Productivity Index (MPI). One output variable—value of output (VOP) and five input variables, namely, Capital cost (CA), Employee cost (EMP), Raw Material (RW), Energy & Fuel (E&F) and Other Manufacturing Expenses (OME) are taken at constant 2004-05 prices. VOP refers to the value of sugar produced by a company during financial year. CA comprises cost of depreciation and interest payment by a company during financial year. EMP includes wages and salaries paid to the employees during financial year. RW represents cost of sugarcane purchased by the company and other raw materials used in the sugar manufacturing. E&F includes value of all items of fuels, lubricants, electricity, gasoline, water, etc. used by a company during financial year. OME comprises all other operating expenses. Values of all these output and input variables are in Rs. crores at 2004-05 prices. Average descriptive statistics of these input-output variables are given in Table 2, which indicates that sugar companies in our study vary significantly in their sizes, as revealed by the magnitudes of summary statistics.

Table 2: Average summary statistics of output-input variables (2004-05 to 2013-14)

Statistics	VOP	CA	EMP	RW	E&F	OME
Mean	519.54	54.58	24.83	364.17	17.40	31.15
SD	749.90	87.79	26.16	592.72	38.93	29.73
Min	7.97	1.37	0.47	2.35	0.08	2.09
Max	8707.32	678.32	134.91	6968.50	334.22	149.86

In this paper, we apply Malmquist Productivity Index (MPI), a non-parametric DEA-based approach, to estimate TFP growth and its sources. TFP is defined as the ratio of weighted sum of output to the weighted sum of inputs. It can increase either due to technical progress (frontier shift) or due to increase in technical efficiency (catch-up) or due to both. The MPI is based on the distance function approach, which is defined in terms of inputs or outputs. With the given input vector, an output distance function maximizes the proportional expansion of the output vector, while an input distance function minimizes the input vector (x), given the output vector (y). We use the input orientation of MPI, which minimizes the inputs to produce the given level of output. $MPI > 1$ indicates the positive

TFP growth (i.e., productivity gain from period *t* to period *t* + 1; *MPI* < 1 indicates the negative TFP growth (i.e., decline in productivity); and *MPI* = 1 means no change in productivity from period *t* to period *t* + 1. Total factor productivity change (TFPCH) is a geometric mean of the two indices—technical efficiency change (EFFCH) and technical change (TECHCH). The EFFCH index measures changes in technical efficiency between periods *t* and *t* + 1, which compares the closeness of a firm in each period to that period's efficient boundary. The TECHCH index measures the technology frontier shift between time period *t* to *t* + 1. These indices can be interpreted as progress, no change and regress when their values are greater than one, equal to one and less than one, respectively (For more details about MPI, refer Coelli, et al. 1998).

5. Results and discussions

5.1 TFP growth in the industry

Table 3 presents the summary of TFP change (TFPCH), technical change (TECHCH) and efficiency change (EFFCH) indices during the period from 2005-05 to 2013-14. The indices for the year 2005-06 are estimated taking preceding year 2004-05 as base. Similarly, indices for 2006-07 are calculated taking the year 2005-06 as base and so on. A TFPCH index greater than 1.00 indicates progress in the TFP, while a TFPCH index lesser than 1.00 points to the regress. Our results show that average value of TFPCH index for the entire study period is 0.993, which indicates that during this period, the TFP has declined by a rate of 0.70 percent per annum. However, it varies significantly across years. The growth is observed highest in 2008-09 (10.9%), followed by 2009-10 (6.1%) and 2005-06 (3.2%). The TFP regress is found highest in 2006-07 (-8.2%), followed by 2007-08 (-6.5%) and 2011-12 (-3.9%). The industry observes a positive growth in the TFP only in five years and in rest of the years, it has recorded a negative growth. Year-wise TFPCH indices of the individual sugar companies are presented in Appendix Table A1.

Table 3: Mean EFFCH, TECHCH and TFPCH indices and percentage distribution of companies by TFP and its sources during 2005-05 to 2013-14

Year	Efficiency Change				Technical Change				TFP Change			
	Av. Effch	% distribution of companies			Av. Techch	% distribution of companies			Av. Tepch	% distribution of companies		
		Pro	Reg	Noch		Pro	Reg	Noch		Pro	Reg	Noch
2005-06	1.021	35.0	30.0	35.0	1.011	63.5	37.5	0.0	1.032	63.5	35.0	2.5
2006-07	1.014	47.5	25.0	27.50	0.905	12.5	87.5	0.0	0.918	30.0	70.0	0.0
2007-08	0.974	37.5	45.0	17.5	0.959	25.0	72.5	2.5	0.935	35.0	62.5	2.5
2008-09	0.997	42.5	37.5	20.0	1.112	97.5	2.5	0.0	1.109	87.5	12.5	0.0
2009-10	1.00	40.0	35.0	25.0	1.061	57.5	42.5	0.0	1.061	60.0	37.5	2.5
2010-11	1.034	57.5	17.5	25.0	0.933	15.0	85.0	0.0	0.965	37.5	60.0	2.5
2011-12	1.004	37.5	35.0	27.5	0.957	27.5	70.0	2.5	0.961	40.0	57.5	2.5
2012-13	0.995	30.0	35.0	35.0	1.007	72.5	25.0	2.5	1.001	57.5	42.5	0.0
2013-14	1.006	42.5	25.0	32.5	0.962	10.0	90.0	0.0	0.968	15.0	85.0	0.0
Mean	1.005	45.0	27.5	27.5	0.988	12.5	85.0	2.5	0.993	25.0	72.5	2.5

Note: Pro=progress; Reg = Regress; and Noch = No change

Table 3 also shows the year-wise percentage distribution of sugar companies by the TFP and its sources. It is significant to note that on an average, 72.5 per cent of the total sugar companies show regress (negative growth) in the TFP, whereas 25 percent companies achieve progress (positive growth) and 2.5 percent no change in the TFP. We observe significant variation in the percentage of companies having regress, no change and progress in the TFP. As far as positive growth in the TFP is concerned, 2008-09 has been the best performing year in terms of number of

companies achieving progress. It is followed by 2005-06, 2009-10 and 2012-13. In fact, these findings indicate that the sugar cycle exists in the industry. 2013-14 has been the worst year for the industry, as in this year not only the TFP growth is negative, but also a majority of companies show regress in their TFPCH indices. This is the year in which the regulated release mechanism on open market sale of sugar was abolished by the government.

5.2 Sources of the TFP growth

The MPI decomposes TFPCH into technical efficiency change (EFFCH) and technical change (TECHCH). The first term defines the change in technical efficiency from period t to t+1, i.e., moving closer to frontier or 'catching up'. The second term represents changes in technology, i.e., a shift in the frontier from period t to period t+1. Thus, TFPCH = EFFCH × TECHCH. Table 3 shows that average EFFCH index for the entire period is 1.005. It implies that technical efficiency has increased by a moderate rate of 0.50% per annum. Average technical change index in the industry is estimated to be 0.988, which indicates that there has been technological regress in the industry. Looking at the year-wise figures, we find that the EFFCH index achieves progress, no change and regress during five, one and three years, respectively, during the study period. The progress in EFFCH index is recorded highest during 2011-12 (3.4%), followed by 2005-06 (2.1%) and 2006-07 (1.4%). The TECHCH index shows progress in four years and regress in all the remaining years of the study period. Overall, there is a technological regress in the industry. The regress is found highest during 2006-07 (-9.5%), followed by 2010-11 (-6.7%). It can be inferred from the findings that the industry has experienced a moderate rate of negative growth in the TFP, which is largely driven by the technological regress, as technical efficiency shows a moderate positive growth rate during the study period.

As Table 3 reveals, a majority of the sugar companies, on an average, show regress in TECHCH index and progress in EFFCH index. As against 85% companies showing regress in TECHCH index, the corresponding percentage in case of EFFCH index is only 27.5. Year-wise figures show that the percentage of firms having regress in TECHCH is highest during 2013-14 (90%), followed by 2006-07 (87.5%) and 2010-11 (85%), while in case of EFFCH, the highest percentage of companies having regress is found during 2007-08 (45%), followed by 2009-10 (37.5%). It is also observed that during the study period, most of the companies either achieved progress or no change in the EFFCH index, while a majority of them observed regress (negative change) in the TECHCH index.

As discussed in section 2, Indian sugar companies have been undergoing into economic crisis. Most of them are running in losses and therefore are striving for funds to invest in the plant modernization. Moreover, in spite of partial de-regulation of the industry, prices of sugarcane are fixed by the government and supply of molasses is also regulated. High prices of sugarcane and low market prices of sugar in the recent years are considered to have affected the level of profit in the industry.

Table 4 shows that out of the 40 sugar companies that we have studied, 26 were running in losses in 2013-14. The number of loss making companies varies significantly across years, indicating that the fluctuations in market prices of sugar and constant rise in the government determined prices of sugarcane seem to be the main reason for the crisis. It is evident from the table that the profitability in the industry varies significantly across years. Average profit per company is found to be highest during 2008-09, followed by 2005-06 and 2004-05. The industry incurred heavy losses during 2013-14, followed by 2011-12. The table also indicates that first two years of the study period have been quite good for the industry, as out of 40 companies, 38 to 39 have earned profit. A close comparison of TFPCH index and average profit per company indicates that they are highly correlated to each other. The TFPCH index is greater than 1.00 during the years in which industry earns relatively higher level of profit.

Table 4: Profitability in the Indian sugar companies (2004-05 to 2013-14)

Profi/Loss	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Av. Profit/loss (Rs. crores)	39.30	56.96	16.85	5.58	60.61	38.34	18.37	-2.66
No. of companies earning profit	38	39	26	18	34	32	28	23
No. of loss-making Companies	2	1	14	22	6	8	12	17

Total Companies	40	40	40	40	40	40	40	40

5.3 TFP differences between integrated and non-integrated companies

To know the productivity differences between integrated and non-integrated sugar companies, we estimate year-wise average TFPCH index separately for these two types of companies. Integrated companies include cogeneration and distillery units along with sugar, while non-integrated sugar only. The appendix Table A1 reveals that on an average, TFPCH index is slightly higher for the non-integrated companies than the integrated ones. On an average, integrated companies have experienced TFP regress, while their counterparts show no change in the index. Though the TFPCH indices are greater than one in some years in both types of companies, the overall performance of the industry during the 10-year period has been quite dismal.

6. Conclusions and policy implications

The empirical findings show that on an average, Indian sugar companies have registered a negative TFP growth rate of 0.7 percent per annum during the study period, though the rate varies considerably across years, indicating to the existence of sugar cycle. The growth is observed highest in 2009-10 (10.9%) and lowest in 2006-07 (-8.2%). The study also finds that only 10 out of 40 companies achieve a positive growth in the TFP. The decomposition of TFP growth into technical change (frontier shift) and technical efficiency change (catch up effect) reveals that the negative growth in the TFP is only due to technological regress, as the technical efficiency witnesses a moderate positive growth. The study further reveals that TFPCH indices of the other companies are slightly higher than that of the integrated ones. It is observed that partial deregulation of the industry could not bring desired results, as SAP of sugarcane is fixed irrationally. The study suggests that apart from bringing technical change through R&D investment and allowing sugar companies to produce ethanol directly from sugarcane juice, rationalization of sugarcane price policy is need of the hour. Vertical integration of the companies with sugarcane growers may be promoted to improve productivity and profitability in the industry.

Appendix

Table A1. TFPCH in the Indian sugar companies (2005-05 to 2013-14)

Company Code	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Average
S1	0.903	0.876	1.026	1.251	1.004	1.114	0.873	0.944	0.965	0.989
S2	1.031	1.146	1.00	1.177	1.083	1.032	0.91	1.04	0.906	1.032
S3	1.082	0.922	0.869	1.144	1.072	0.82	1.03	1.026	0.916	0.981
S4	1.046	1.137	0.966	1.165	0.764	0.737	0.987	1.048	0.975	0.97
S5	1.022	0.895	0.929	1.072	0.996	0.938	0.996	1.025	1.036	0.988
S6	1.055	0.779	1.151	1.124	1.082	1.014	0.952	1.008	0.948	1.007
S7	0.913	0.857	0.796	1.193	1.392	0.98	0.992	0.993	0.956	0.995
S8	1.008	0.823	0.833	1.209	1.109	0.851	1.072	0.968	0.963	0.974
S9	1.039	0.855	0.876	1.14	1.094	0.828	1.007	0.979	0.91	0.964
S10	1.129	0.875	1.062	1.078	0.933	0.993	0.932	1.066	0.86	0.988
S11	1.134	1.005	0.707	0.936	1.28	0.951	1.027	0.991	0.92	0.983
S12	1.134	1.005	0.707	0.936	1.28	0.951	1.027	0.991	0.92	0.983
S13	1.013	0.972	0.972	1.004	1.068	0.84	1.049	1.004	0.919	0.98
S14	1.129	0.988	0.879	1.021	1.468	0.873	1.00	0.676	0.957	0.98

S15	1.029	0.975	0.94	1.138	0.953	0.975	0.996	0.958	0.952	0.989
S16	0.945	0.869	1.113	0.976	0.902	1.029	1.029	0.941	0.997	0.976
S17	1.096	0.758	0.776	1.165	0.993	0.888	1.002	1.112	0.883	0.954
S18	1.157	0.794	0.978	1.181	0.794	1.034	1.045	1.001	0.983	0.988
S19	0.978	0.775	1.106	1.109	0.945	0.973	0.993	0.963	0.989	0.977
S20	1.00	1.017	1.002	1.018	0.928	1.056	1.04	1.123	0.925	1.011
S21	1.033	0.664	1.247	1.024	1.42	1.106	0.798	0.669	0.923	0.958
S22	0.91	1.265	0.765	1.137	0.991	0.925	0.96	0.963	0.931	0.974
S23	1.073	0.939	0.932	1.017	1.065	0.907	1.049	1.048	1.057	1.008
S24	1.153	0.809	0.912	1.052	1.101	0.867	1.056	1.081	0.954	0.992
S25	0.911	0.912	0.81	1.323	0.964	0.847	1.112	0.917	0.994	0.967
S26	1.09	1.452	0.507	1.081	1.033	1.014	0.93	0.998	1.013	0.983
S27	1.026	0.786	1.113	1.18	0.807	1.084	1.041	1.09	0.922	0.997
S28	0.893	1.095	1.127	0.963	1.019	1.103	0.876	1.084	0.978	1.011
S29	0.942	1.037	0.951	1.107	1.072	1.034	0.804	0.987	1.202	1.009
S30	1.258	1.051	0.716	1.232	1.18	1.017	1.026	1.041	0.952	1.04
S31	0.962	0.803	0.939	1.11	1.071	1.454	0.641	1.022	0.952	0.973
S32	0.99	0.812	1.208	1.103	0.875	0.983	0.991	1.032	0.949	0.988
S33	1.067	0.904	0.974	1.269	0.972	0.981	1.133	1.095	1.405	1.079
S34	1.027	1.049	1.233	1.096	1.533	0.875	0.57	1.024	0.874	1.00
S35	1.477	0.903	0.921	1.148	1.00	0.906	0.931	0.973	0.988	1.015
S36	0.882	0.866	1.046	0.943	1.225	1.017	0.983	0.973	1.095	0.998
S37	0.962	0.846	1.098	1.126	0.882	1.092	0.975	1.033	0.978	0.995
S38	0.834	0.685	1.002	1.303	1.237	1.00	0.942	1.129	0.906	0.987
S39	1.23	0.927	0.879	1.162	1.306	0.868	0.978	1.116	0.978	1.039
S40	0.963	1.031	0.867	1.094	1.10	0.9	0.969	1.118	0.932	0.993
Av. (All)	1.032	0.918	0.935	1.109	1.061	0.965	0.961	1.00	0.968	0.993
Av.(Integrated)	1.040	0.910	0.926	1.098	1.043	0.939	0.997	0.988	0.943	0.985
Av.(Others)	1.025	0.925	0.943	1.119	1.078	0.990	0.928	1.013	0.992	1.000

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