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A Study on Post-Implementation of GST and its Impact on Inflation and Tax Revenue Across Other Countries Using Intervention Analysis and Event Study: Implications for India

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ABSTRACT

The present study aims to evaluate the post-implementation of GST and its impact on inflation and tax revenue for eleven developing and developed countries. The study uses Event study and Intervention Model to analyze the pattern and reasons for the change in inflation and tax revenue. Event Study employs parametric t-test for testing the significance of changes in both the key variables during the year of implementation of GST, after the year of implementation, and before & after the implementation of GST. The study concluded that post-implementation of GST have no significant impact on inflation and tax revenue in any of the eleven countries. The study also used Intervention model to evaluate the post-implementation impact of GST for short run and long run on inflation only. Overall results showed that except China, there was no significant evidence of increase in inflation after the introduction of GST both in the short run (one year) and in the long run (3 years). The study found that countries like Portugal and New Zealand experienced a significant drop in inflation after introducing GST.

Keywords: Inflation; Post Implementation; Tax Revenue; FDI

1.0 INTRODUCTION

Presently, India has a tax structure that encompasses a number of indirect taxes levied by Centre and State on goods and services separately. Multiple taxes with diverse rates and tax bases is the root cause of complexity of the Indian tax structure which results in high cost of compliance and tax administration, tax avoidance, litigation, unexpected delays in supply chain and business processes which has affected FDI as well. The cascading effect of taxes at various stages in a supply chain has made Indian goods artificially expensive compared to our trading partners who have implemented GST. (Kothari, 2007) The long standing Goods and Services tax Bill (GST Bill) officially known as the Constitutional (122nd) Amendment Bill, 2014 was passed on 3rd August, 2016 by the Rajya Sabha, 12 years since [1] it was first recommended in 2004. Goods and Service Tax is a consumption based tax charged on value added at every stage of production. The manufacturer or distributor charges GST on its sales (output tax) and but gets credit for GST paid on the purchases made (input tax). Owing to the benefits, around 160 countries have implemented GST and have shown erratic impact on inflation and tax revenue as a result of this adoption

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1.1 Objective of the Study

- To study aims to evaluate the post-implementation of GST and its impact on inflation and tax revenue for eleven developed and developing countries across the world.
- The results drawn will be used to make predictions with regards to changes in key variables (inflation and tax revenue) after GST gets introduced in India.

1.2 Methodology

To achieve the aforesaid objectives, the present study considers the data for Inflation and GST for eleven developing and developed countries, namely, Australia, Singapore, Japan, Canada, China, Greece, Portugal, Thailand, New Zealand, Maldives and Vietnam. Availability of data being the constraint, only those countries are considered for the study for which both data on tax revenue and inflation rate are available.

1.3 Data

The data employed in this study is annual time series data for the Inflation rate and tax revenue of the eleven countries, namely, Australia, Singapore, Japan, Canada, China, Greece, Portugal, Thailand, New Zealand, Maldives and Vietnam. The data period and year of implementation of GST [2] has been shown in Table 1.

Table 1: Data Description

Countries	GST Implementation Year	Data Period (Inflation)
Australia	2000	1960-2015
Singapore	1993	1961-2015
Japan	1989	1960-2015
Canada	1991	1960-2015
China	1993	1987-2015
Greece	1987	1960-2015
Portugal	1986	1960-2015
Thailand	1991	1960-2015
Vietnam	1999	1996-2015
New Zealand	1986	1960-2015
Maldives	2011	1989-2015

The data for all countries is available from 1960 to 2015, except for few exceptions. The data for China is available from 1987, whereas for Vietnam and Maldives data is available from 1996 and 1989 respectively.

Table 2: Descriptive Statistics (For Inflation Data only)

Country	Mean	Standard Deviation	Minimum	Maximum	Count
Australia	4.966546	3.819794	-0.27840	15.11014	56
Singapore	2.678408	4.142426	-1.84189	22.36842	56
China	5.437697	6.681579	-1.40789	24.23709	29
Greece	8.678918	8.022219	-1.73590	26.86995	56
Japan	3.252629	4.233116	-1.34672	23.17623	56
Canada	3.884623	3.067353	0.18528	12.46241	56
Portugal	8.600651	8.282985	-0.83553	28.78333	56
Thailand	4.425295	4.686133	-0.89502	24.31356	56
Vietnam	6.750986	5.785388	-1.71034	23.11632	20
New Zealand	5.776653	5.176485	0.22983	17.09277	56
Maldives	4.460477	8.120770	-23.82210	20.1337	27

Table 2: presents the summary statistics of the data employed on annual rate of inflation for the 11 countries considered for the study. The mean inflation is lowest for Japan, whereas highest for Greece. The standard deviation is highest for Maldives, observing a highest inflation of 20.1337 percent and minimum of -23.82210 percent in just 27 years.

Using the data, Figure 1 plot the inflate rate for all countries considered in the study. The year in the bracket with country name represents the year in which GST has been introduced, which is represented by dashed vertical line in the figure. The cursory inspection of this graph clearly show increase in inflation in the year of implementation of GST for Australia, Japan, Maldives and China, whereas, inflation drops in Greece, Portugal and Vietnam by a considerable amount.

The Augmented Dickey-Fuller (ADF) [3] test has been used to examine the stationary, of the time series data. Table 3 presents the results of applying the ADF tests to the data. On the basis of these results, consumer price index (CPI) is I(1) for all countries except Singapore.

Table 3: The Dickey Fuller Test for Stationarity

Country	Level Series (CPI)		1st Difference	
	Tau (Observed value)	p-value	Tau (Observed value)	p-value
Australia	-2.4779	0.3254	-6.6731	0.0000
Singapore	-3.9666	0.0143	-6.7232	0.0000
China	-2.5899	0.2675	-4.6571	0.0049
Greece	-1.4420	0.8200	-7.1374	0.0000
Japan	-2.5577	0.2899	-8.0924	0.0000
Canada	-2.2042	0.4660	-6.4619	0.0000
Portugal	-2.1124	0.5171	-8.2116	0.0000
Thailand	-3.2373	0.0821	-7.9024	0.0000
Vietnam	-0.6441	0.9215	-5.9098	0.0009
New Zealand	-2.0266	0.5639	-8.5647	0.0000
Maldives	-2.6893	0.2239	-3.8723	0.0158

Note: p-value less than .05 indicates that the series is stationary at a significance level of 5 per cent.

The rate of inflation, defined as natural log difference of CPI, is found to be stationary (p-value is less than .05). The present study assumes that CPI data for Singapore is not stationary and uses first log difference data in intervention model.

2.0 EMPIRICAL RESULTS AND POLICY IMPLICATION

2.1 Event Study

Table 4: Inflation Rate

Country	GST Implementation Year	Year Before Implementation & Inflation Rate ( )	Year of Implementation & Inflation Rate ( )	Year After Implementation & Inflation Rate ( )			
Australia*	2000	1.47	4.48	4.38	3.01	-0.09	2.92
Singapore**	1993	2.26	2.29	3.10	0.03	0.81	0.84
Japan*	1989	0.66	2.28	3.03	1.61	0.76	2.37
Canada*	1991	4.76	5.62	1.51	0.85	-4.11	-3.26
China**	1993	6.34	14.58	24.24	8.24	9.65	17.9
Greece**	1987	23.02	16.38	13.53	-6.64	-2.86	-9.49
Portugal*	1986	19.65	11.76	9.34	-7.88	-2.42	-10.3
Thailand**	1991	5.86	5.71	4.14	-0.15	-1.57	-1.72
Vietnam**	1999	7.27	4.12	-1.71	-3.15	-5.83	-8.98
New Zealand*	1986	15.41	13.22	15.74	-2.19	2.52	0.34
Maldives**	2011	6.61	12.83	12.13	6.22	-0.70	5.52

The inflation rate before and after the implementation of GST is shown in Table 4. Results [4] show that the inflation increased in Australia, Singapore, Japan, Canada, China and Maldives in the year of introduction of GST (see column number 6 from left), whereas Greece, Portugal, Thailand, New Zealand and Vietnam experienced a drop. Inflation rate in these countries declined in the year of implementation of GST. Inflation declined after the introduction of GST (see column number 7 from left) in Australia and Canada which earlier experienced an increase in inflation, whereas it continues to decline for countries like Greece, Portugal, Thailand and Vietnam. The last column of the table shows the changes in inflation year before and after the introduction of GST. Results are a mix. Some countries like Australia, Singapore, Japan, China and Maldives experienced an increase in inflation, whereas, countries like Canada, Greece, Portugal, Thailand, and Vietnam experienced a decline in inflation.

Table 6: Tax Revenue as Percent of GDP

Country	GST Implementation Year	Year Before Implementation & Inflation Rate ( )	Year of Implementation & Inflation Rate ( )	Year After Implementation & Inflation Rate ( )			
Australia	2000	26.36	25.98	27.72	-0.39	1.75	1.36
Singapore	1993	16.10	16.28	16.59	0.18	0.31	0.50
Japan	1989	12.69	12.57	13.07	-0.11	0.50	0.38
Canada	1991	NA	14.42	14.33	NA	-0.09	NA
China	1993	16.27	16.86	16.15	0.59	-0.71	-0.12
Greece	1987	15.59	16.36	15.10	0.76	-1.26	-0.49
Portugal	1986	17.61	17.55	15.57	-0.06	-1.98	-2.04
Thailand	1991	16.91	17.41	15.59	0.51	-1.82	-1.32
New Zealand	1986	29.69	30.18	33.25	0.49	3.06	3.55
Maldives	2011	9.86	13.68	-	3.82	-13.68	NA
Vietnam	1999	-	-	-	NA	NA	NA

2.2 Researcher Computation. Data source: World Bank

The tax revenue as percent of GST before and after the implementation of introduction of GST is shown in Table 6. Results show that tax [5] revenue increased in Singapore, China, Greece, New Zealand, Maldives and Thailand in the year of introduction of GST (see column number 6 from left), whereas Australia, Japan, and Portugal experienced the opposite. Tax revenue in these countries declined in the year of implementation of GST. Tax revenue declined after the introduction of GST (see column number 7 from left) in Canada, China Greece, Portugal, Thailand and Maldives, which earlier experienced an increase in tax revenue except Portugal. The last column of the table shows the changes in tax revenue before and after the introduction of GST. Results are A mix. Some countries like Australia, Singapore, and Japan and New Zealand, experienced an increase in tax revenue, whereas, countries like China, Greece, Portugal, and Thailand experienced a decline in tax revenue.

Intervention Model

Only China has shown significant increase in inflation by 9.81 percent in the year of introduction of GST and 15.215 percent in the subsequent year after the introduction of GST. In Portugal inflation fell by 7.117% after the introduction of GST. New Zealand experienced a decrease in inflation by-8.54 percent in the 2nd year post-implementation of GST. Overall results show that except China, there is no significant evidence of increase in inflation after the introduction of GST [6] both in the short run (one year) and in the long run (3 years)[6].

3.0 CONCLUSION

It is a common perception among policymakers, academicians and general public that implementation of GST leads to rise in inflation. However, results are often a combination of both. Some countries like Australia, Singapore, Japan, Maldives, and China experienced an increase in inflation, whereas, countries like Canada, New Zealand, Greece, Portugal, Thailand, and Vietnam experienced a decline in inflation. Similar results were found while analyzing the impact on tax revenue as a percentage of GDP.

Event study which was based on the parametric t-test found no significant increase in both tax revenue and inflation rate in all five developed and six developing countries post-implementation of GST. Also, the results of the Intervention model concluded that only China experienced a significant increase in inflation for two years post-implementation of GST, whereas, Portugal and New Zealand experienced a dip in inflation. China's initial hike in inflation can be explained by a pre-GST spending rush which further extends because of a phenomenon called inflation spiral

India might not face a hike in inflation in the long run and also the tax revenue might remain significantly unaffected. There is no reasonable ground to doubt that once implemented, GST will mark the consummation of the third generation fiscal reforms and would accelerate India's journey to the orbit of economic super powers of the world economy.

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