Impact of Services Trade on India's Economic Growth and Current Account Balance:
Evidence from Post-Reform Period

Mini P. Thomas[1]

Abstract

Economic Growth and External Stabilisation (defined in terms of Current Account Balance as a percentage of GDP) is a top priority for policy-makers, while laying out the macroeconomic framework for Indian economy. Government of India had targeted for an average GDP growth rate of 9 percent and a Current Account Deficit (CAD) below 2.5 percent of GDP during the five-year period from 2012-2017. However, the actual CAD of Indian economy widened to 4.2% of GDP in 2011-12, and further reached a historic high CAD of 4.7 percent of GDP in 2012-13. Given such a scenario, this paper aims to estimate the impact of services trade on India's Economic Growth and Current Account Balance, during the post-reform period from 1990-91 to 2011-12. Facilitated by economic globalisation, domestic liberalization, and technological advances which resulted in increasing international fragmentation of the production process, India's services trade began growing rapidly post 1991. With the help of Thirlwall's Balance of Payments Constrained Growth Model and ARDL approach to cointegration, this study estimates and establishes the crucial role of services trade in achieving the policy objectives of economic growth and external stabilisation simultaneously for Indian economy. This study also examines the impact of services exports on India's economic growth, by comparing the latest officially published input-output table of India for 2007-08, with that of 1993-94. Among the major services in India's export basket, construction, transport and business services are found to exhibit strongest backward linkages, and hence can act as engines of export-led growth. Role of services imports in India's export-led growth and the import content going into production of India's services exports is analysed using the TIVA database for 1995 and 2008, which have implications for India's external stabilisation. Foreign value added content in India's services exports is found to be highest in case of business services, transport services and telecommunications.

JEL: F14, F32, F43, C67
Keywords: Services Trade, Current Account Deficit, Economic Growth, Backward Linkages, Trade in Value Added

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ABSTRACT

Economic Growth and External Stabilisation (defined in terms of Current Account Balance as a percentage of GDP) is a top priority for policy-makers, while laying out the macroeconomic framework for Indian economy. Government of India had targeted for an average GDP growth rate of 9 percent and a Current Account Deficit (CAD) below 2.5 percent of GDP during the five-year period from 2012-2017. However, the actual CAD of Indian economy widened to 4.2% of GDP in 2011-12, and further reached a historic high CAD of 4.7 percent of GDP in 2012-13. Given such a scenario, this paper aims to estimate the impact of services trade on India's Economic Growth and Current Account Balance, during the post-reform period from 1990-91 to 2011-12. Facilitated by economic globalisation, domestic liberalization, and technological advances which resulted in increasing international fragmentation of the production process, India's services trade began growing rapidly post 1991. With the help of Thirlwall's Balance of Payments Constrained Growth Model and ARDL approach to cointegration, this study estimates and establishes the crucial role of services trade in achieving the policy objectives of economic growth and external stabilisation simultaneously for Indian economy. This study also examines the impact of services exports on India's economic growth, by comparing the latest officially published input-output table of India for 2007-08, with that of 1993-94. Among the major services in India's export basket, construction, transport and business services are found to exhibit strongest backward linkages, and hence can act as engines of export-led growth. Role of services imports in India's export-led growth and the import content going into production of India's services exports is analysed using the TIVA database for 1995 and 2008, which have implications for India's external stabilisation. Foreign value added content in India's services exports is found to be highest in case of business services, transport services and telecommunications.

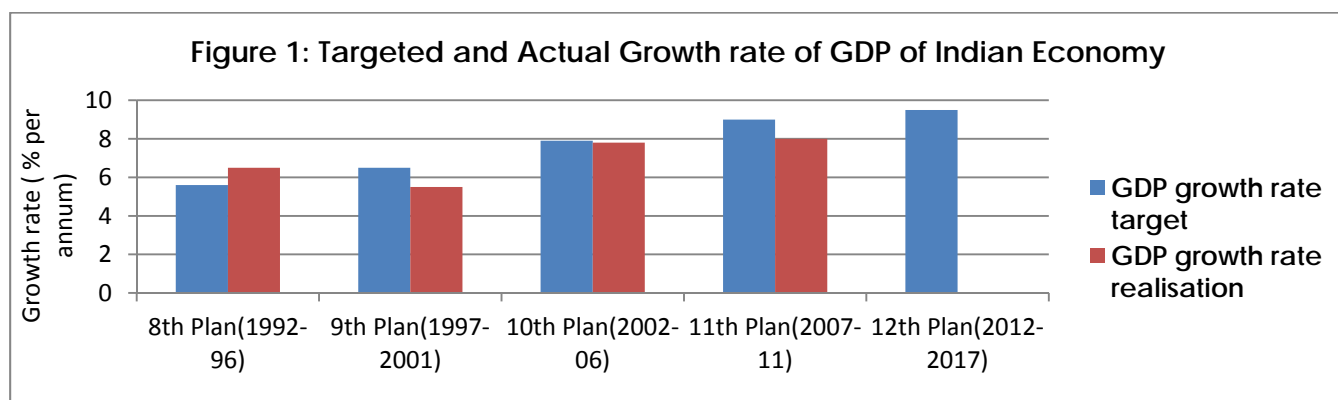**JEL CLASSIFICATION CODE:** F14, F32, F43, C67

KEYWORDS: Services Trade, Current Account Deficit, Economic Growth, Backward Linkages, Trade in Value Added

1. Introduction

Economic Growth and External Stabilisation is a top priority for policy-makers, while formulating Five-Year Plans for the Indian Economy. Since its inception, Five-year plans have always specified a targeted rate of economic growth and targeted Current Account Deficit (CAD), while laying out the macro-economic framework for the Indian Economy. During the post-reform period, it was only during the 8th Five-Year Plan (FYP) period that the actual growth rate of the Indian economy (6.5%) exceeded the targeted growth rate of 5.6%. During the 9th, 10th and 11th FYP period, the actual growth rate of the economy lagged behind the targeted growth rate (Figure 1). Similarly, the Five-Year Plans also target for a sustainable level of Current Account Deficit, expressed as a percentage of GDP at market prices. The actual CAD realised by the Indian Economy was less than the CAD targeted by the policy-makers, during the 8th, 9th and 10th FYP period. India's Current Account was found to be in balance during the 10th FYP period, if the CAD for the five years from 2002-2003 to 2006-07 was averaged. However, during the 11th FYP period, the actual CAD of 2.7% far exceeded the targeted CAD of 1.9 % of GDP (Figure 2). This was because the global financial crisis surfaced in 2007-08, followed by the European sovereign debt crisis in 2011, both of which took a severe toll on India's balance of payments and economic growth.

The Approach Paper to the Twelfth FYP (GOI 2011) had stated that the fundamentals of the Indian Economy have remained strong even after the global economic recession, and targeted for an average GDP growth rate of 9 to 9.5 % for the Indian economy during the five-year period from 2012-13 to 2016-17. Commensurate with this economic growth target, it was also stated that for prudent management of the external account, it would be desirable to restrict the CAD to an average of 2.5% of India's GDP, during the Twelfth FYP period. Subsequently, these targets were revised downwards in the Twelfth FYP document (GOI 2013b) due to the gloomy macro-economic scenario. The new target for GDP growth rate is 8%, and for CAD is 3.4% of GDP, during the Twelfth FYP period. Falling short of FYP targets, the actual CAD of the Indian economy widened to 4.2% of GDP in 2011-12, and further reached a historic high CAD of 4.7% of GDP in 2012-13 which was the first year of Twelfth FYP. Widening of India's CAD in recent years reflects a sluggish global

economy, elevated international commodity prices, domestic supply constraints, and burgeoning gold and oil imports. Excessive CAD tends to make an economy vulnerable to external debt and currency crisis, and brings along financial instability, and substantial output and welfare losses.

Figure 1: Targeted and Actual Growth rate of GDP of Indian Economy

Source: Author's compilation based on data from Five-Year Plan documents, Government of India

Figure 2: Targeted and Actual Current Account Deficit of Indian Economy
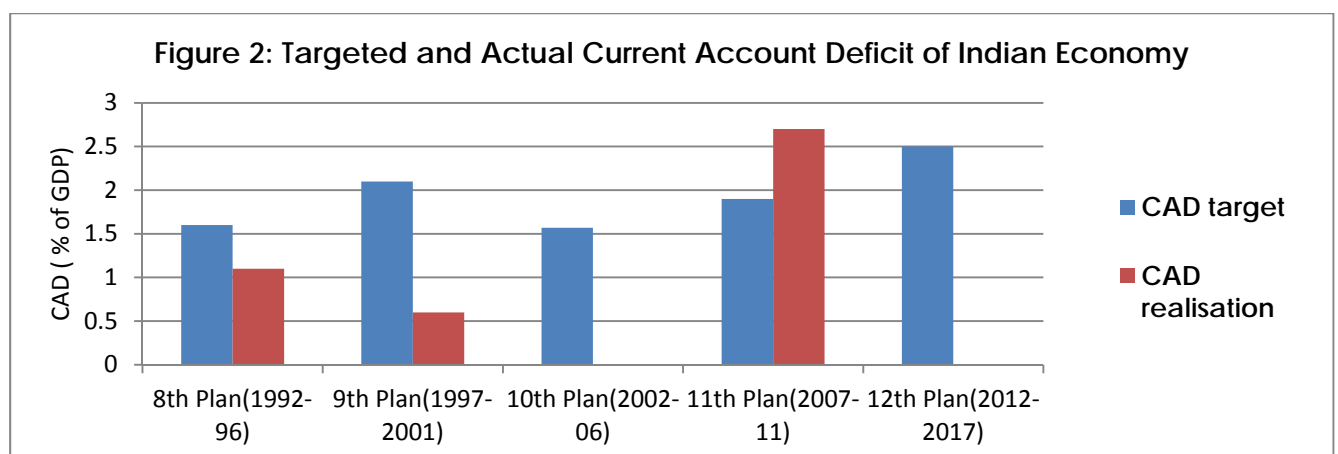
Source: Author's compilation based on data from Five-Year Plan documents, Government of India

Beginning with the early 1980s, technological advances have progressively weakened the proximity burden between the supplier and consumer, which used to characterise international trade in services. Bhagwati (1984) explored the implications of this phenomenon and argued that "splintering" of the production chain geographically and advances in Information and Communication Technology provided incentive for expanding share of intermediate services in total trade. Facilitated by economic globalisation, domestic liberalization, and technological advances which resulted in increasing international fragmentation of the production process, India's services trade began growing rapidly post 1991. Technological advances have proved to be a boon for India's international trade in

new economy services, especially software, financial and telecommunication services. New economy services, categorised as "miscellaneous services" in India's balance of payments, have emerged as a major component in India's export basket in the post-reform period. Services exports have been growing at a pace even faster than services GDP in the post-reform period, reflecting the international trade-oriented nature of India's service sector growth. The share of service sector in India's GDP rose from 43% in 1990-91 to 59% in 2011-12 (GOI 2013a). The share of services trade in India's GDP has also increased significantly from 3.38% in 1990-91 to 14.8% in 2011-12 (World Bank 2013). Given this background, the main focus of this paper is to estimate the impact of services trade on India's economic growth and Current Account Balance, from 1990-91 to 2011-12. At the outset, economic growth and external stabilisation (defined in terms of Current Account Balance as a percentage of GDP) appear to be separate targets. However, the two objectives can be linked to international trade in an essential way using two different approaches, namely, the Balance of Payments Constrained Growth (BPCG) model and input-output approach. Applying the BPCG model to services trade throws light on how the two objectives of economic growth and external stabilisation can be achieved simultaneously. Applying the input-output approach to services trade helps in identifying the major internationally traded services capable of acting as engines of economic growth for Indian economy. It also reveals the import content going into the production of exports, which has implications for external stabilisation.

Rest of the paper is organised as follows. Section 2 gives the review of literature and Section 3 gives the empirical analysis. Section 3.1 specifies the empirical framework and Section 3.2 discusses the technique of estimation. Section 3.3 elaborates on the variable and data descriptions. Section 3.4 gives the empirical results. Section 3.4.1 gives the results of application of BPCG Model for Indian Economy in general, and service sector in particular. Section 3.4.2 gives the results of estimation of the impact of services trade on India's economic growth and Current Account Balance, using input-output approach. Section 4 discusses the major conclusions from this study.

2. Review of Literature

Services have not figured prominently in economic growth theory, and have only recently been highlighted in the international trade theory. However, the relationship between international trade and economic growth has been extensively studied in

the literature. Proponents of Export-led Growth Hypothesis (Beckerman 1965; Balassa 1978; Feder 1983) have argued that export growth leads to an expansion in production; via Foreign Trade Multiplier, economies of scale and technological innovation. Oulton (2001) has shown that trade in services may increase overall growth, because greater outsourcing of services by productive firms in non-stagnant sectors entails a reallocation of factors, that increases overall output and aggregate productivity.

Thirlwall (1979), in his seminal article, related the balance of payments consequences of international trade with economic growth. He put forth the Balance of Payments Constrained Growth (BPCG) Model, wherein he stated that the growth rate of any country in the long-run can be approximated to the ratio of "growth rate of its exports" to "income elasticity of demand for imports". Foreign exchange is a major constraint on growth performance of many countries, and with improved export performance and a lower income elasticity of demand for imports, they would grow faster. He empirically validated his model using two data-sets on the growth of output and exports for 18 developed countries, one for the period from 1953 to 1976, and another for the period from 1951 to 1973. Income elasticity of demand for imports estimated by Houthakker and Magee (1969) was used for the empirical analysis. It was found that there was a general tendency for the estimates of balance of payments equilibrium growth rate to be higher than the actual growth rate, which if true, produced a balance of payments surplus. The rank correlation between the predicted growth rates using the BPCG model and actual growth rates were found to be quite high. The BPCG Model provided strong support to the proponents of export-led growth. Razmi (2005) applied BPCG Model for the Indian economy, for the time period was from 1950 to 1999. Utilising Johansen's cointegration technique and Vector Error Correction Model (VECM) to estimate the trade parameters, he found that the average growth rates predicted by BPCG hypothesis are close to the actual average growth rates during the study period.

Mann (2004) studied the implications for sustainability of the US current account of widespread uptake of "new economy services" around the world. She estimated income elasticities of services exports and imports for the United States (US), and incorporated it into a simple model of US Current Account. Sustainability of external balance was measured in terms of Current Account to GDP ratio. Study-period for

the time-series analysis was from 1986 to 2001. Estimates of income elasticities and assumptions on global growth yielded a trajectory for the US current account deficit, which was then compared to a base case without increased integration of "new economy services" in international trade and around the world. It was found that although "new economy services" reduced the asymmetry in estimated income elasticities for US (Houthakker and Magee 1969), and contributed to raising global growth, reasonable estimates of these two structural improvements were not sufficient to stabilise the US current account deficit, partly because the share of new economy services in international trade was still small.

Rath and Rajesh (2006) studied the trend in India's services exports and CAD for the post-reform period, using descriptive statistics and growth rates. The period of their study was from 1990-91 to 2005-06. They found that the rising surplus in net services exports have been significantly responsible for lower CAD in the Indian economy since the early nineties. Dash and Parida (2012) examined the role of services exports and services imports in India's economic growth, using bound-testing approach to ARDL model and VECM. Using quarterly data from 1996-97 to 2010-11, they found the existence of a long-run equilibrium relationship between GDP, services exports, services imports and REER for the Indian economy. The direction of short-run causality was found to be present only from services exports to GDP, and not vice-versa.

Bayerl, Fritz and Streicher (2007) studied the impact of services exports on service-sector growth, which has come to occupy a major share of value-added in developed economies.They used the input-tables of Austria for 1995, 2000 and 2003 for their empirical analysis. It was found that the output multiplier for services increased from 1995 to 2000, after which it fell significantly. It was also found that the multiplier effect of services exports was found to be higher than other components of final demand, since it induced more impact on domestic services. Rojicek (2009) studied the demand effect of exports on economic performance of Czech economy, using input-output tables of Czech Republic for the years 2000 and 2005. It was found that the share of exports in production increased from 42% in 2000 to 47% in 2005, and the import-intensity of exports in the Czech economy increased from 2000 to 2005.

3. Empirical Analysis

3.1 Empirical Framework

Thirlwall's 1979 Balance of Payments Constrained Growth (BPCG) model relates a country's international trade to its economic growth and current account balance. The model is explained in Thirlwall (2011) is as follows:

Current account equilibrium is given by:
$$P_d X = P_f M E \quad \text{---- (1)}$$

where X and M refers to exports and imports respectively.

P_d is domestic price; P_f is foreign price, and E is the exchange rate.

Export and import demand functions are specified as multiplicative with constant elasticities:

$$X = a\left(P_d / P_f E\right)^\eta Z^\varepsilon \qquad \eta < 0, \varepsilon > 0 \qquad \text{---- (2)}$$

$$M = b\left(P_f E / P_d\right)^\Psi Y^\pi \qquad \Psi < 0, \pi > 0 \qquad \text{---- (3)}$$

where η is price elasticity of demand for exports ; ε is income elasticity of demand for exports ; Ψ is the price elasticity of demand for imports ; π is the income elasticity of demand for imports ; Z is world income, and Y is domestic income.

Taking log of equations (2) and (3), differentiating with respect to time, substituting the growth of exports and imports into equation (1) in growth rate form, and solving for the growth of income, gives

$$y_B = [(1 + \eta + \psi)(p_d - p_f - e) + \varepsilon(z)] / \pi \qquad \text{---- (4)}$$

where lower case letters stand for growth rates of the variables.

If relative prices in international trade are constant, equation (4) reduces to:

$$y_B{}^* = \varepsilon(z) / \pi \qquad \text{---- (5)}$$

and on the same assumption,

$$y_B** = x/\pi \qquad\qquad \text{---- (6)}$$

Equation (6) states that long run GDP growth of a country is determined by the ratio of export growth to the income elasticity of demand for imports. It gives the balance of payments equilibrium growth rate. According to Thirlwall (1979), many models (Ball, Burns and Laury 1977; Wilson 1976) and empirical evidence suggests that over the long-period, there is little movement in relative international prices, measured in a common currency. This is either because of arbitrage (the law of one price) or due to exchange rate depreciation which forces domestic prices to go up equi-proportionately, so that in long run ($p_d - p_f - e$) becomes approximately equal to 0.

Given the above-mentioned framework, the following two hypotheses are tested to study the impact of services trade on economic growth and external stabilisation. The first hypothesis tests whether balance of payments constrained growth model holds for Indian economy, goods sector and service sector separately, under the assumption of constant relative prices in international trade (i.e., equation 6). The second hypothesis tests whether balance of payments constrained growth model holds for India's service sector in particular, if the assumption of constant relative prices in international trade is relaxed (i.e., equation 4).

To estimate the balance of payments equilibrium growth rate as per equation (6), estimates of income elasticity and price elasticity of imports need to be first estimated. Long-run income and price elasticity of imports is estimated by adopting the framework put forth by Houthakker and Magee (1969). Import demand (M) is specified to be a function of domestic income (GDP) and relative prices(NEER), and specified in the log-linear form. The import demand function is then estimated using an ARDL Model, which is specified in equation (7).

$$\Delta \ln M_t = \alpha + \sum_{i=1}^{q} \beta_{1i}\Delta \ln M_{t-i} + \sum_{i=0}^{r} \beta_{2i}\Delta \ln GDP_{t-i} + \sum_{i=0}^{s} \beta_{3i}\Delta \ln NEER_{t-i} + \beta_4 \ln M_{t-1} +$$

$$\text{---- (7)}$$

$$\beta_5 \ln GDP_{t-1} + \beta_6 \ln NEER_{t-1} + u_t$$

To estimate the impact of services trade on economic growth, the concepts of forward and backward linkages are used, as put forth by Rasmussen (1958) and

Hirschman (1958). From the standard "n" sector input-output table, equilibrium output is estimated as follows -

$$Y = (I - A)^{-1} F = BF \qquad \text{---- (8)}$$

In equation (8), Y is the (nx1) vector of total output of the economy, and A is the (nxn) Absorption Matrix of input coefficients a_{ij}. F is the (nx1) vector of final demand. B containing b_{ij} s is the (nxn) matrix of $(I-A)^{-1}$. B or $(I-A)^{-1}$ is the standard Leontief Inverse Matrix. The backward linkage BL_j is computed as -

$$BL_j = \frac{\frac{1}{n}\sum_{i=1}^{n} b_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}} \qquad \text{---- (9)}$$

The backward linkage for sector j reflects the effects of one unit increase in final demand in sector j on overall economic activity. The forward linkage FL_i is computed as -

$$FL_i = \frac{\frac{1}{n}\sum_{j=1}^{n} b_{ij}}{\frac{1}{n^2}\sum_{i=1}^{n}\sum_{j=1}^{n} b_{ij}} \qquad \text{---- (10)}$$

The forward linkage for sector i reflects the effect of one unit increase in production of sector i on overall economic activity.

3.2 Technique of Estimation

The first step in estimation of income and price elasticity of imports is to check the stationarity properties of relevant variables. ADF test and KPSS test are used to check the unit-root properties of the variables. The bound testing approach to ARDL model (as specified in equation 7), developed by Pesaran, Shin and Smith (2001), is then performed to check for the presence of cointegration between imports, GDP and NEER. Wald test is used to examine the joint null hypothesis of zero cointegration between the variables (In equation 7, H_0: $\beta_4 = \beta_5 = \beta_6 = 0$), against the alternate hypothesis of presence of cointegration. Subsequently, long-run coefficients are

derived from the ARDL model. Once the income and price elasticity of imports are estimated separately for India's total imports, merchandise imports and services imports, it is used to calculate the balance of payments equilibrium growth rate. Subsequently, the balance of payments equilibrium growth rate is compared with the actual growth rate. Balance of payments equilibrium growth rate of service sector is also estimated, as per equation (4). For this purpose, income and price elasticity of services exports is estimated using the ARDL approach as elaborated earlier. A country's structure of production and propensity to import also plays a major role in determining its balance of payments equilibrium growth rate. Hence, the "imports to domestic demand ratio" of India's service sector as well as its goods-producing sector is calculated, using the methodology put forth by Diez and Gopinath (2014).

The impact of services exports on economic growth is estimated, with the help of input-output tables. Leontief (1941) put forth the Input-Output Tables, which details the structure of an economy's entire production system for a particular year. Column shows cost structure of an economy for intermediate and primary inputs (land, labour, capital) plus any taxes paid on production less any subsidies received. Row shows the total sale of output of each industry to different users. Impact of services exports on India's economic growth is studied by undertaking a comparative analysis of input-output tables of Indian economy at two points in time, during the post-reform period. The forward and backward linkages of different service sub-sectors is computed for both input-output tables and ranks are allotted, to identify which are the key internationally traded services which are contributing to India's economic growth. The output multipliers of different service sub-sectors are computed for both input-output tables. The output multiplier of an industry i is defined as the total value of production by all industries of the economy required to satisfy one extra unit's worth of final demand for i-th industry's output. In-addition to this, the underlying economic importance of services imports in the phenomenon of export-led growth, by adding value to production of exports across different sectors of Indian economy, is also highlighted. The foreign value-added content in India's services exports is analysed using an international database, which is based on input-output tables.

3.3 Variables and Data Descriptions

Economic growth is measured in terms of growth rate of GDP and external stabilisation is measured in terms of current account balance. The right hand side of equation (6) in BPCG Model gives a measure of current account adjustments, and left hand side of equation (6) gives a measure of economic growth. For estimation of income elasticity of imports, India's GDP at Market Prices (at current prices) is taken as a measure of domestic income. Nominal Effective Exchange Rate (NEER) is taken as a proxy for relative prices. The NEER (base year: 2004-05) computed from 36-currency bilateral weights (trade-based weights), compiled by RBI, have been used for estimation. GDP of OECD countries (base year: 2005) at current prices, is taken as proxy for GDP of importing countries, to estimate income elasticity of India's services exports. The actual growth rates of Indian economy, service sector and commodity-producing sector are computed as average annual growth rates (AAGR) of GDP for the time-period under consideration. Export growth rate is computed as AAGR of exports during the study period. Imports to Domestic Demand ratio is calculated as the ratio of *"imports"* to *"gross output + imports - exports"*. As this study pertains to international trade in services, the RBI definition of "service-sector" is adopted for the empirical analysis. The RBI definition includes "construction activities" also within the ambit of service sector. Input-Output Table analysis follows the same definition. The time-span for the empirical analysis relating to BPCG Model is from 1996-97 to 2011-12, with 64 quarterly time-series observations. 1996-97 is chosen as the starting point because quarterly data on India's GDP is available from that particular year. Import dependence of the Indian economy is analysed for the entire post-reform period up to 2011-12.

Data on India's GDP at Market Prices, NEER, Exports, Imports, Services GDP, Services Exports, Services Imports, Merchandise GDP, Merchandise Exports and Merchandise Imports, is published in Handbook of Statistics on Indian Economy (HBSIE) 2012-13, Reserve Bank of India. Data on these macro-economic variables, available at current prices (in rupees billion), and with base year 2004-05, is used for the empirical analysis relating to BPCG Model and Import Dependence. Balance of payments data published by RBI is at current prices. All the variables are taken at their current prices for estimation since the estimation results were sensitive to the choice of deflator. Quarterly data on GDP of OECD countries as per expenditure approach,

expressed in millions of US dollars (at current prices, current purchasing power parity, seasonally adjusted) published by OECDStat is used to estimate income elasticity of services exports for Indian Economy. Figures in millions of US dollars are converted into billions of Indian rupees, by taking the average exchange rate (Rs. 44.21 per US $) for the period 1996-97 to 2011-12. Annual data on world prices (World CPI: all items) and domestic prices (India's WPI: all items) published in IMF's International Financial Statistics are used for calculating growth rates of domestic and foreign prices.

The latest (Commodity X Commodity) matrix and Leontief inverse matrix for the Indian economy for the year 2007-08, published by Central Statistical Organisation, is used to calculate the forward and backward linkages of different service sub-sectors, output multipliers and equilibrium output. The same exercise in then carried out using 1993-94 input-output table of Indian economy, for comparison purposes. The trade-in-value added (TIVA) database, published jointly by WTO and OECD, measures the source of value (by country and by sector) that is added in producing goods and services for export and import. The TIVA database is derived from construction of a world input-output table, which in turn is based on official national input-output tables. It covers 58 countries including the BRICS (Brazil, Russia, India, China and South Africa). TIVA database is used in this study to highlight the role of services imports in India's economic growth.

TIVA database for the years 1995 (earliest year for which data is available) and 2008 are used in this study for comparison purposes, although the latest TIVA database is available for the year 2009. TIVA database for 2008 is chosen to achieve consistency while juxtaposing the conclusions derived from TIVA database, with that of CSO's input-output tables for 2007-08. Moreover, as per OECD (2013), the year 2009 is not very representative of international trade in value-added and care needs to be taken in interpreting the TIVA data for 2009. Global value chains were adversely affected in 2009 as a result of the synchronised slowdown in international trade that characterised the recent financial crisis, which is best illustrated by increasing domestic value-added to export ratios compared to 2008 data.

3.4 Empirical Results

3.4.1 Application of Balance of Payments Constrained Growth Model for Indian Economy

Long-run income and price elasticities of total imports, merchandise imports, services imports and services exports are estimated separately from different ARDL models. Stationarity tests are carried out for each of the macroeconomic variables required for estimation of ARDL models, namely, total imports (*TOTM*), merchandise imports (*MERCM*), services imports (*SERVM*), services exports (*SERVX*), India's GDP at market prices (*GDP*), GDP of OECD Countries (*MCGDP*) and *NEER*. Table 1 shows that the null hypothesis of presence of unit root cannot be rejected by ADF test, when *lnTOTM, lnMERCM, lnNEER, lnGDP* and *lnMCGDP* are in level form. But the null hypothesis of non-stationarity is rejected, when the first difference of these variables are subject to ADF test. Optimal lag length to perform ADF test is chosen based on Akaike Information Criteria (AIC).

Table 1: Augmented Dickey Fuller (ADF) test Results

Variable	Test statistic (level of variables)	Test statistic (level of variables)	Test statistic (first difference)	Test statistic (first difference)
	Intercept	Intercept + trend	Intercept	Intercept + trend
lnTOTM	0.99	-2.36	-7.28***	-7.33***
lnGDP	1.57	-1.05	-15.4***	-17.4***
lnNEER	-0.55	-2.91	-7.01***	-7.16***
lnMERCM	1.04	-2.28	-6.27***	-6.51***
lnSERVM	-1.02	-6.26***	-8.37***	-8.35***
lnMCGDP	-1.25	-1.78	-3.49**	-3.71**
lnSERVX	-1.16	-4.17***	-7.25***	-7.34***

Source: Author's calculations
***,**,* denotes rejection of Null H_0 of presence of unit root at 1%, 5% and 10% level of significance, respectively.

Table 2 shows that KPSS test rejects the null hypothesis of stationarity, when the variables *lnTOTM, lnMERCM, lnNEER, lnGDP* and *lnMCGDP* are taken in level form. The KPSS test results indicate that these five variables become stationary at first difference. Hence, based on ADF test and KPSS test, it can be concluded that these five variables are I(1). However, in case of *lnSERVM* and *lnSERVX*, ADF test and KPSS

test results does not provide conclusive empirical evidence that these variables are I(1). This provides justification for choosing ARDL approach to cointegration for estimation, which can be used irrespective of whether the concerned variables are I(1) or I(0).

Table 2: KPSS Test Results

Variable	Test statistic (level of variables)	Test statistic (level of variables)	Test statistic (first difference)	Test statistic (first difference)
	Intercept	Intercept + trend	Intercept	Intercept + trend
lnTOTM	1.01***	0.19**	0.29	0.08
lnGDP	1.02***	0.25***	0.23	0.11
lnNEER	0.87***	0.18**	0.15	0.03
lnMERCM	1.01***	0.201**	0.27	0.07
lnSERVM	1.01***	0.07	0.13	0.13
lnMCGDP	1.01***	0.17**	0.26	0.07
lnSERVX	1.02***	0.11	0.09	0.04

Source: Author's calculations
***, **, * denotes rejection of Null H_0 of stationarity at 1%, 5% and 10% level of significance respectively.

Table 3: Long run Determinants of Total Import Demand Function: Estimates from ARDL (1,0,1) Model approach to Cointegration

Dependent variable is *lnTOTM*		
Regressor	**Coefficient**	**Probability values**
lnGDP	2.01***	0.000
lnNEER	3.48	0.215
C	-26.46*	0.091
R-Squared : 0.99		
F(4, 55): 2530.6[0.000]		
Akaike Info. Criterion: 78.35		
Schwarz Bayesian Criterion: 73.12		
DW-statistic: 1.85		

Source: Author's calculations
***,**,* denotes 1%, 5% and 10% level of statistical significance, respectively.

Assuming a model with unrestricted intercept and no trend, and with 2 regressors (*k*=2), the lower and upper bound values of *F statistic* from Pesaran, Shin and Smith

(2001) are [3.17, 4.14] at the 10 per cent level of significance, and [3.79, 4.85] at the 5 per cent level of significance. Using the Bound Testing Approach to cointegration, it is found that there is presence of cointegration between imports, GDP and NEER in all the three cases. Table 3 reports the long-run income and price elasticities of total import (*TOTM*) demand function for the Indian economy, estimated from ARDL(1,0,1) model selected based on SBC. Table 4 reports the long-run income and price elasticities of India's merchandise import (*MERCM*) demand function, estimated from ARDL(1,0,1) model selected based on SBC. Table 5 reports the long-run income and price elasticities of India's services import (*SERVM*) demand function, estimated from ARDL(1,0,0) model selected based on SBC.

Table 4: Long run Determinants of Merchandise Import Demand Function: Estimates from ARDL (1,0,1) Model approach to Cointegration

Dependent variable is *lnMERCM*		
Regressor	Coefficient	Probability values
lnGDP	2.12***	0.000
lnNEER	4.24	0.216
C	-31.35*	0.103
R-Squared: 0.99		
F(4, 55): 1980.9[0.000]		
Akaike Info. Criterion: 70.26		
Schwarz Bayesian Criterion: 65.03		
DW-statistic: 1.85		

Source: Author's calculations
***,**,* denotes 1%, 5% and 10% level of statistical significance, respectively.

Results of diagnostic tests carried out for these three ARDL models are reported in Table 9. It is found that all three estimated ARDL models are free from auto-correlation, heteroscedasticity, non-normality and specification error. The null hypothesis (H_0) of Lagrange Multiplier test of zero serial correlation, Jarque-Bera test's H_0 of normally distributed residuals, White test's H_0 of homoscedasticity and Ramsey's RESET test's H_0 of model being correctly specified are not rejected, in case of all three ARDL models.

Table 5: Long run Determinants of Services Import Demand Function: Estimates from ARDL (1,0,0) Model approach to Cointegration

Dependent variable is *lnSERVM*		
Regressor	Coefficient	Probability values
lnGDP	1.60***	0.000
lnNEER	0.99	0.363
C	-13.38**	0.028
R-Squared: 0.95		
F(3, 57): 392.16[0.000]		
Akaike Info. Criterion: 16.35		
Schwarz Bayesian Criterion: 12.13		
DW-statistic: 2.12		

Source: Author's calculations

***,**,* denotes 1%, 5% and 10% level of statistical significance, respectively.

Table 6: Application of BPCG Model for Indian Economy

Variables	Indian Economy	Goods sector (Agriculture+ Industry)	Service Sector
Income elasticity of Imports (π)	2.01	2.12	1.60
Export Growth Rate (x)	19.45	18.16	24.16
Balance of Payments Equilibrium Growth Rate = (x/π)	9.68	8.57	15.1
Actual Growth Rate (y)	13.29	11.39	15.02

Source: Author's calculations

Growth rates are average annual growth rates (in percentages).

The long-run income elasticity of imports is found to be positive and statistically significant in all the three cases. However, the long-run price elasticity of imports is found to be positive but statistically insignificant in all the three cases. This implies that movements in nominal exchange rate don't exert a significant influence on India's import demand, in comparison with income movements. The balance of payments equilibrium growth rate is arrived at by utilising these estimates of income

elasticity of imports, along with data on growth rate of exports. Table 6 gives a comparison of the balance of payments equilibrium growth rate with the actual growth rate of the Indian economy, goods sector and service sector separately.

As per the BPCG Model, when the balance of payments equilibrium growth rate of a country is greater than the actual growth rate, the country produces a balance of payments surplus. When the balance of payments equilibrium growth rate is lesser than the actual growth rate, the country produces a balance of payments deficit. Balance of payments equilibrium growth rate is thus the rate at which a country should grow if it has to maintain balance of payments equilibrium on current account. From Table 6, it is clear that the Indian economy has been growing at a rate (13.29%) much faster than its balance of payments equilibrium growth rate (9.68%), during the study-period from 1996-97 to 2011-12. As a result, Indian economy suffers from a balance of payments deficit. When this growth phenomenon is further decomposed, it is found that India's goods sector is growing at a rate (11.39%) much faster than the sector's balance of payments equilibrium growth rate (8.57%), resulting in a merchandise trade deficit. On the other hand, India's service sector is found to grow at a rate (15.02%) almost equal to its balance of payments equilibrium growth rate (15.1%). In fact the balance of payments equilibrium growth rate of service sector is found to be slightly higher than the sector's actual growth rate, implying a surplus.

The direct implication of BPCG Model is that the higher the income elasticity of demand for imports, the lower is the balance of payments equilibrium growth rate. Similarly, the higher the export growth performance, the higher is the balance of payments equilibrium growth rate. Results in Table 6 shows that income elasticity of merchandise imports (2.12) is higher than that of services imports (1.6). On the other hand, merchandise export growth performance (18.16%) is lower than that of services export growth performance (24.16%). Therefore, the balance of payments equilibrium growth rate of goods sector is found to be lower than that of service sector. Consequently, the service sector is pushing up the balance of payments equilibrium growth rate of the Indian economy. This application of BPCG Model for the Indian economy provides strong evidence for the positive impact of services trade on India's economic growth and external stabilisation, such that the twin objectives of economic growth and external stabilisation are achieved

simultaneously. However, export promotion policies relating to both goods as well as services can help Indian economy to achieve a higher balance of payments equilibrium growth rate in the future.

Table 7: Long run Determinants of Services Export Demand Function: Estimates from ARDL (1,0,4) Model approach to Cointegration

Dependent variable is *lnSERVX*		
Regressor	Coefficient	Probability values
lnMCGDP	4.6***	0.000
lnNEER	-1.2	0.144
C	-53.6***	0.000
R-Squared: 0.99		
F(7, 52): 580.41[0.000]		
Akaike Info. Criterion: 41.67		
Schwarz Bayesian Criterion: 33.29		
DW-statistic: 2.10		

Source: Author's calculations

***,**,* denotes 1%, 5% and 10% level of statistical significance, respectively.

Now, let us look at a scenario when the assumption of constant relative prices in international trade is relaxed in Thirlwall's Balance of Payments Constrained Growth Model. This implies estimation of service sector's balance of payments equilibrium growth rate, as per equation (4). To arrive at the balance of payments equilibrium growth rate as per equation (4), we need long run estimates of income and price elasticity of services exports. GDP of importing countries (OECD countries) at current prices, denoted as *MCGDP* in Table 7, is used to estimate income elasticity of services exports. NEER is taken as the measure of relative prices. Table 7 reports the long run determinants of services export demand function, estimated from ARDL (1,0,4) model selected based on SBC. Income elasticity of services exports is found to be 4.6 and statistically significant in the long run, whereas price elasticity of services exports is found to be -1.2 and statistically insignificant in the long run. Results of diagnostic tests carried out for ARDL (1,0,4) model are reported in Table 9. The null hypothesis (H_0) of Lagrange Multiplier test of zero serial correlation, Jarque-Bera test's

H_0 of normally distributed residuals, White test's H_0 of homoscedasticity and Ramsey RESET test's H_0 of model being correctly specified are not rejected, in case of ARDL(1,0,4) model.

Theoretically income elasticity of demand is expected to be positive, whereas price elasticity of demand is expected to be negative. Under the assumption of different set of price indices for exports and imports, we expect price elasticities of demand for exports and imports to be less than 0. In this study, income elasticities of exports and imports possess the expected positive sign. Price elasticity of exports is found to be negative, whereas price elasticity of imports is found to be positive. This is because the same measure of relative prices, namely, Nominal Effective Exchange Rate, is used to estimate price elasticity of services imports as well as price elasticity of services exports. As a result, empirically, price elasticity of services exports is found to be negative with respect to NEER (Table 7), whereas price elasticity of services imports is found to be positive with respect to NEER (Table 5). Price elasticities of total imports and merchandise imports are also found to be positive with respect to NEER. An appreciation of NEER causes a decline in exports and increase in imports in the real world.

Table 8 gives the solution of balance of payments constrained growth model for India's service sector, as per equation (4). India's Wholesale Price Index is found to grow at an average annual growth rate (AAGR) of 5.73 % during 1996-97 to 2011-12. World Consumer Price Index is found to grow at an AAGR of 4.24 % during 1996-97 to 2011-12. India's NEER is found to grow at an AAGR of -1.05% during 1996-97 to 2011-12. Growth rate of India's services exports (x_s) is taken as a measure of the term $\varepsilon(z)$ in equation (4). Utilising these figures, balance of payments equilibrium growth rate of service sector is estimated to be equal to 16.36 when NEER is taken as measure of exchange rate. The balance of payments equilibrium growth rate of service sector is thus found to be higher than the actual growth rate of service sector (15.02). This implies that services trade is in surplus, as per BPCG model. Thus, it is found that relaxing the assumption of constant relative prices in international trade doesn't significantly alter the major conclusions that can be drawn from BPCG Model for India's service sector. When this assumption holds, service sector is found to grow at its balance of payments equilibrium growth rate. When this assumption is relaxed, service sector grows at a lower rate than its balance of payments equilibrium growth

rate, i.e., $y_s < y_B$. This has better impact on India's external stabilisation, because the service sector is generating trade surplus, thus helping to bring down India's current account deficit.

Table 8: Balance of Payments Constrained Growth Model for India's Service sector (under non-constant relative prices in international trade)

Variable	Value
Growth rate of domestic prices (p_d)	5.73
Growth rate of foreign prices (p_f)	4.24
Growth rate of exchange rate NEER (e)	-1.05
Price elasticity of services imports (Ψ)	0.99
Price elasticity of services exports (η)	-1.2
Income elasticity of services imports (π)	1.60
Income elasticity of services exports (ε)	4.6
Growth rate of services exports (x_s)	24.16
Actual growth rate of India's service sector (y_s)	15.02
Balance of payments equilibrium growth rate (y_B) estimated for India's service sector (when the assumption of constancy of relative prices in international trade is relaxed)	16.36

Source: Author's calculations

Table 9: Results of Diagnostic Tests for ARDL Models

| Model	Diagnostic Tests	Null H_0	LM Version	F Version
Total Import Demand Function ARDL(1,0,1) Model	Lagrange Multiplier test	zero serial correlation	CHSQ (4) = 1.12[0.891]	F(4, 51)= 0.24[0.913]
	Jarque Bera test	Normality(normally distributed residuals)	CHSQ(2)= 2.54[0.281]	Not Applicable
	White test	Homoskedasticity	CHSQ(1)= 0.05[0.833]	F(1, 58)= 0.04[0.836]
	Ramsey's RESET Test	Model is correctly specified.	CHSQ(1)= 0.42[0.515]	F(1, 54)= 0.38[0.538]
Merchandise Import Demand Function ARDL(1,0,1) Model	Lagrange Multiplier test	zero serial correlation	CHSQ (4) = 3.39[0.493]	F(4, 51)= 0.77[0.553]
	Jarque Bera test	Normality(normally distributed residuals)	CHSQ(2)= 3.80[0.149]	Not Applicable
	White test	Homoskedasticity	CHSQ(1) = 0.24[0.625]	F(1, 58)= 0.23[0.632]
	Ramsey's RESET Test	Model is correctly specified.	CHSQ(1) = 0.27[0.601]	F(1, 54)= 0.25[0.621]
Services Import Demand Function ARDL(1,0,0) Model	Lagrange Multiplier test	zero serial correlation	CHSQ (4) = 4.77[0.312]	F(4, 53)= 1.10[0.364]
	Jarque Bera test	Normality(normally distributed residuals)	CHSQ(2)= 3.22[0.200]	Not Applicable
	White test	Homoskedasticity	CHSQ(1)= 0.32[0.569]	F(1, 59)= 0.32[0.576]
	Ramsey's RESET Test	Model is correctly specified.	CHSQ(1)= 0.79[0.372]	F(1, 56)= 0.71[0.402]
Services Export Demand Function ARDL(1,0,4) Model	Lagrange Multiplier test	zero serial correlation	CHSQ 4)= 4.83[0.305]	F(4, 48)= 1.05[0.391]
	Jarque Bera test	Normality(normally distributed residuals)	CHSQ(2)= 0.63[0.731]	Not Applicable
	White test	Homoskedasticity	CHSQ(1)= 1.94[0.163]	F(1, 58)= 1.94[0.169]
	Ramsey's RESET Test	Model is correctly specified.	CHSQ(1)= 2.22[0.136]	F(1, 51)= 1.96[0.167]

Source: Author's calculations

***, **,* denotes rejection of Null H_0 at 1%, 5% and 10% level of significance, respectively.

Figures in parenthesis [ ] are probability values.

Import Dependence of Service sector and its Implications for Balance of Payments Equilibrium Growth Rate of Indian Economy

A major conclusion of BPCG Model is that difference in balance of payments equilibrium growth rate across countries is primarily associated with the characteristics of the goods produced, which determine a country's propensity to import. Figure 3 gives a comparison of the imports to domestic demand ratio between goods and services, for the Indian economy. Imports to domestic demand ratio give the share of India's domestic demand which is being met by imports. It is found that during the post-reform period, merchandise imports to domestic demand ratio has gone up from 0.20 in 1992-93 to 0.61 in 2011-12. This implies that the share of India's domestic demand for goods which is being met by goods imports has increased more than three times over the past two decades, from 20% in 1992-93 to 61% in 2011-12. This further implies that there has been a significant increase in off-shoring in the goods-producing sectors of Indian economy during the post-reform period, which is detrimental for India's CAD.

Figure 3: Import Dependence of India's Goods and Service sector
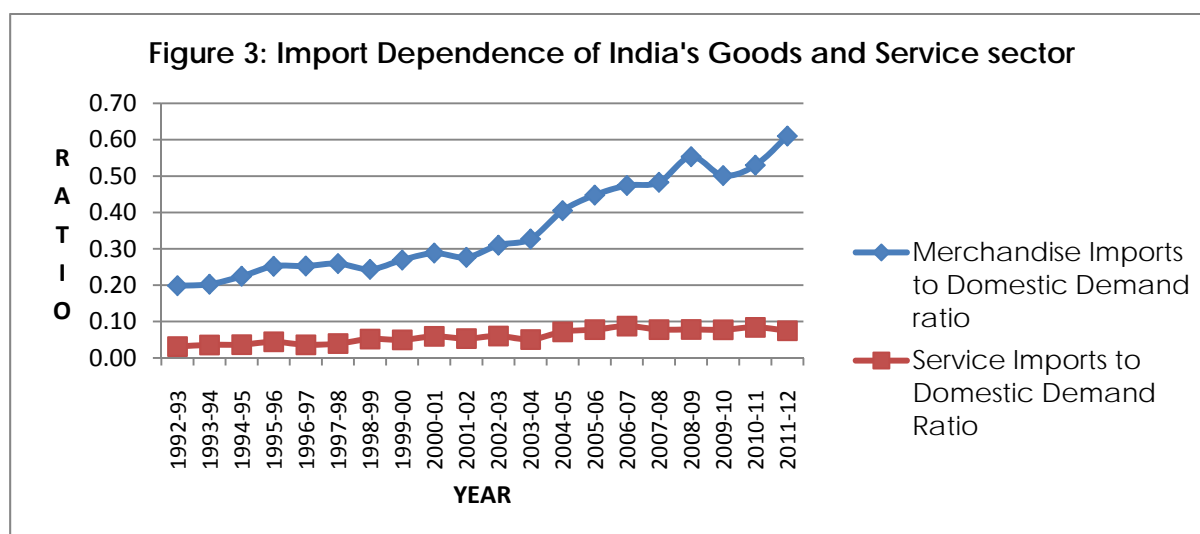
Source: Author's calculations based on data from HBSIE 2012-13, Reserve Bank of India

On the other hand, it is found that the services imports to domestic demand ratio have remained below 0.10 during the post-reform period. This implies that the share of India's domestic demand for services which is being met by services imports has increased only marginally over the past twenty years, from 3% in 1992-93 to 7% in 2011-12. This analysis further reinforces the argument that service sector exerts a significant positive impact on India's economic growth and external stabilisation, by

helping to raise India's balance of payments equilibrium growth rate, given the high import dependence of goods-producing sectors. It also points to the importance of policies for nurturing the domestic commodity-producing sector.

3.4.2 Estimation of Impact of Service Trade on India's Economic Growth and Current Account Balance, using Input-Output Approach

3.4.2.1 Impact of Services Exports on India's Economic Growth

The latest input-output table for Indian economy is published by CSO for the year 2007-08. Out of 130 sectors classified in the 2007-08 input output table, 23 sectors can be classified as "services", following the RBI definition of "service sector". Table 10 gives the forward and backward linkages of different service sub-sectors in 2007-08 computed as per equations (9) and (10), and their respective ranking. It is found that among 130 sectors of the Indian economy, only 9 service sub-sectors find place in the first 65 ranks, when ranked on the basis of forward linkages. But in case of backward linkages, 13 service sub-sectors find place in the first 65 ranks. This implies that the backward linkages of service sector with the Indian economy are stronger than service sector's forward linkages in 2007-08. Within service sector, the Spearman's rank correlation coefficient between forward linkages and backward linkages is found to be only 0.06, implying no linear correlation in the ranking.

It is found that within service sector, storage and warehousing, business services, banking, insurance, rail transport services and air transport are the six service sub-sectors with strong forward linkages. Storage and warehousing is the only service sub-sector which exhibits significant forward linkage (greater than 1) in 2007-08. Within service sector, construction, land transport, trade, hotels and restaurants, rail transport services and business services are the six sub-sectors with strong backward linkages. For these six sub-sectors, the backward linkage is found to be greater than 1. This implies that the influence of each of these sectors is greater than that of all other sectors in the Indian economy (global average). The forward linkage of these six sectors is less than 1.

Table 10: Inter-sectoral Linkages of Service sector with Indian Economy in 2007-08

Code	Service Sub-sector	Forward Linkages (FL) Values	Backward Linkages (BL) Values	Rank Within Service Sector		Rank Among 130 sectors of Indian Economy	
				FL Rank	BL Rank	FL Rank	BL Rank
Traded services							
106	Construction	0.42	12.35	18	1	113	1
110	Land transport including via pipeline	0.62	4.28	14	2	77	5
111	Water transport	0.64	0.71	13	12	73	58
112	Air transport	0.74	0.89	6	7	54	40
113	Supporting and aux. transport activities	0.65	0.51	12	16	72	83
115	Communication	0.73	0.74	7	11	57	55
118	Banking	0.803	0.69	3	13	40	59
119	Insurance	0.75	0.49	5	17	50	86
121	Education and research	0.35	0.47	20	18	125	89
122	Medical and health	0.34	0.86	21	8	127	43
123	Business services	0.95	1.02	2	6	28	31
124	Computer & related activities	0.38	0.82	19	9	122	48
125	Legal services	0.69	0.39	9	21	62	108
126	Real estate activities	0.55	0.40	16	20	89	104
129	Other services	0.68	0.51	10	15	66	82
Non-Traded services							
109	Railway transport services	0.77	1.03	4	5	44	30
114	Storage and warehousing	1.04	0.34	1	22	19	118
116	Trade	0.67	2.59	11	3	67	9
117	Hotels and restaurants	0.59	1.99	15	4	81	12
120	Ownership of dwellings	0.31	0.43	22	19	129	96
127	Renting of machinery & equipment	0.72	0.52	8	14	58	78
128	Other community, social & personal services	0.51	0.79	17	10	94	50
130	Public administration	0.31	0.31	22	23	129	130
Spearman's Rank Correlation Coefficient between FL and BL(within service sector) = 0.057							

Source: Author's calculations based on data from CSO (2007-08 Input-Output Table)

India's services exports are classified by RBI under five sub-headings in the country's balance of payments – travel, transportation, insurance, g.n.i.e. (government not included elsewhere) and miscellaneous services. Miscellaneous services, also known as "new economy services" worldwide, have emerged as the major component of India's service export basket in the post-reform period. Miscellaneous services mainly include business services, construction, banking, communication, management consultancy, accounting and auditing, advertising, R & D, architectural and legal services. From Table 10, it is clear that among traded services, business services exhibit strong forward as well as backward linkages. Business services find place in the top six ranks in case of both forward and backward linkages. The forward linkage of business services is equal to 0.95, which implies that if output of business services increase by one unit, supply of input to other sectors increase by 0.95. The backward linkage of business services is equal to 1.02, which implies that if business services final demand increase by one unit, it contributes to increase in total output by 1.02. Construction, which is also a traded service, has the strongest backward linkage of 12.35 across 130 sectors of the Indian economy. If final demand (eg. exports) in construction sector increases by one unit, it contributes to increase in total output by 12.35. Although railway transport services is ranked within the top 5 among 23 service sub-sectors, and exhibit strong forward as well as backward linkages, it is not a traded service. Trade, hotels and restaurants is also a non-traded service. Since construction and business services are the two miscellaneous services which exhibit strongest backward linkages, it can be concluded that a rise in final demand in the form of a rise in exports of construction and business services will exert a significant positive impact on India's economic growth. The output multiplier, derived from backward linkages, is 3.25 for business services and a towering figure of 39.35 for construction services (Table 11). Land transport also exhibits a strong backward linkage of 4.28 and an output multiplier of 13.64. It has a rank of 5 across 130 sectors of the Indian economy, when ranked on the basis of backward linkages.

Among other miscellaneous services, communications is found to have a backward linkage of 0.74, and a rank of 11 among 23 service sub-sectors. Medical and health services exhibit a backward linkage of 0.86 and a rank of 8. Computer and related activities exhibit a backward linkage of 0.82 and a rank of 9. Banking exhibits a backward linkage of 0.69, and a rank of 13. However, banking exhibits strong forward linkages and is ranked 3 among 23 service sub-sectors. Among other traded

services, air transport is found to have a backward linkage of 0.89 (7th rank) and output multiplier of 2.86. Water transport exhibits a backward linkage of 0.71 (12th rank) and output multiplier of 2.26. Although forward linkage of insurance sector is quite strong, it exhibits weak backward linkages. Backward linkage of insurance is 0.49, and is ranked 17 among 23 service sub-sectors. Hence, it can be concluded that among major services in India's export basket in 2007-08, construction, transport and business services exhibit strongest backward linkages and policies aimed at promoting exports in these three sub-sectors will go a long way in accelerating the country's economic growth.

Table 11: Equilibrium Output and Output Multipliers of Service sector in 2007-08

Code	Service Sub-sector	Equilibrium Output = $(I-A)^{-1}F$	Output Multiplier
Traded Services			
106	Construction	105372175	39.35
110	Land transport including via pipeline	53402663	13.64
111	Water transport	24416023	2.26
112	Air transport	22720805	2.86
113	Supporting and aux. transport activities	25440099	1.62
115	Communication	23924075	2.37
118	Banking	38853295	2.21
119	Insurance	31817889	1.58
121	Education and research	19212994	1.50
122	Medical and health	12177812	2.73
123	Business services	49290244	3.25
124	Computer & related activities	19001399	2.61
125	Legal services	19241066	1.24
126	Real estate activities	19967251	1.28
129	Other services	18366371	1.62
Non-Traded Services			
109	Railway transport services	31035655	3.29
114	Storage and warehousing	66120375	1.10
116	Trade	64857984	8.28
117	Hotels and restaurants	33219299	6.34
120	Ownership of dwellings	25039216	1.36
127	Renting of machinery & equipment	23339438	1.67
128	Other community, social & personal services	14953756	2.54
130	Public administration	23499200	1.00

Source: Author's calculations based on data from CSO (2007-08 Input-Output Table)

Table 12 gives the inter-sectoral linkages of India's service sector, based on 1993-94 input-output table. 1993-94 input-output table is the first input-output table published by CSO during the post-reform period, and hence useful for comparison purposes. Out of 115 sectors classified in 1993-94 input output table, 14 sectors can be classified as "services", following the RBI definition of "service sector". Concordance of service sub-sectors between the 1993-94 input output table and 2007-08 input output table is given in the Appendix. From Table 12, it is found that among 115 sectors of the Indian economy, 8 service sub-sectors find place in the first 57 ranks, when ranked on the basis of forward linkages. However, when 115 sectors of Indian economy are ranked on the basis of backward linkages, none of the service sub-sectors figure in the first 57 ranks. This indicates that in 1993-94, forward linkages of service sector with the Indian economy was much stronger than the backward linkages. However, 14 years of economic reforms have resulted in backward linkages of India's service sector becoming stronger than forward linkages in 2007-08, which is a crucial finding while studying impact of services exports on economic growth. In 1993-94, the spearman's rank correlation coefficient between forward linkages and backward linkages is found to be 0.44, implying greater degree of positive correlation than in 2007-08.

In 1993-94, wholesale and retail trade is found to exhibit the strongest forward linkage of 5.92, across 115 sectors of the Indian economy. Within service sector, rail transport and other transport services, banking, insurance, other services, construction and communications, are the other sub-sectors which exhibited significant forward linkage (greater than 1) in 1993-94. However, by 2007-08, none of these sub-sectors exhibited a forward linkage greater than 1. In case of backward linkages, construction exhibited the strongest backward linkage among 14 service sub-sectors, and was ranked 58 across 115 sectors of the Indian economy, in 1993-94. Other transport services, hotels and restaurants, medical and health services are also found to exhibit significant backward linkage (greater than 1) in 1993-94. This implies that the influence of each of these sectors was greater than that of all other sectors in the Indian economy in 1993-94.

Table 12: Inter-sectoral Linkages of Service sector with Indian Economy in 1993-94

Code	Service sub-sector	Forward Linkages (FL)	Backward Linkages (BL)	Rank Within Service Sector		Rank Among 115 sectors of Indian Economy	
		Values	Values	FL Rank	BL Rank	FL Rank	BL Rank
Traded Services							
99	Construction	1.37	1.09	6	1	18	58
104	Other transport services	4.55	1.01	2	3	3	67
106	Communication	1.09	0.65	7	10	25	100
109	Banking	3.26	0.61	3	11	5	108
110	Insurance	1.06	0.66	8	9	26	99
112	Education and research	0.50	0.60	12	12	109	109
113	Medical and health	0.63	1.04	10	2	65	63
114	Other services	2.58	0.96	4	5	8	71
Non-Traded Services							
103	Railway transport services	1.69	0.95	5	6	13	72
105	Storage and warehousing	0.55	0.79	11	7	88	84
107	Trade	5.92	0.72	1	8	1	91
108	Hotels and restaurants	0.64	1.00	9	4	64	69
111	Ownership of dwellings	0.49	0.56	13	13	114	114
115	Public administration	0.49	0.49	13	14	114	115
Spearman's Rank Correlation Coefficient between FL and BL(within service sector) = 0.44							

Source: Author's calculations based on data from CSO (1993-94 Input-Output Table)

Among internationally traded services, construction services are found to exhibit strong forward as well as backward linkages in 1993-94. The forward linkage of construction sector is 1.37 in 1993-94, which implies that if output of construction sector increase by one unit, supply of input to other sectors increase by 1.37. The backward linkage of construction sector is found to be 1.09 in 1993-94, which implies that if final demand in construction sector increase by one unit, it contributes to increase in total output by 1.09. Construction sector benefited from the economic reforms unleashed in the country post 1991, and emerged as the sector exhibiting the strongest backward linkage across 130 sectors of the Indian economy in 2007-08. Among other miscellaneous services in India's services export basket, medical and health services also exhibited strong backward linkage of 1.04 in 1993-94. Transport services are also an internationally traded service, as per RBI definition. "Other

transport services" exhibited strong forward linkage of 4.55 and strong backward linkage of 1.01 in 1993-94. "Other transport services" in the 1993-94 input-output table corresponds to 4 sectors in the 2007-08 input-output table, namely, land transport including via pipelines, water transport, air transport, and supportive and auxiliary transport activities, as given in Appendix.

As already noted earlier, while studying the impact of services exports on economic growth, backward linkages of service sector with rest of the Indian economy become more crucial than the forward linkages. Since construction, medical and health services, and other transport services are the three traded services which exhibited strong backward linkages with Indian economy in 1993-94, it can be concluded that a rise in final demand in the form of an increase in exports in any of these key service sub-sectors would have exerted a significant positive impact on India's economic growth. The output multiplier for 1993-94, derived from backward linkages, is 2.2 for construction sector, 2.1 for medical and health services and 2.04 for other transport services (refer Table 13).

Table 13: Equilibrium Output and Output Multipliers of Service Sector in 1993-94

Code	Service sub-sector	Equilibrium Output = $(I-A)^{-1}F$	Output Multiplier
Traded Services			
99	Construction	10733021	2.19
104	Other transport services	9929571	2.04
106	Communication	1130652	1.32
109	Banking	4260314	1.23
110	Insurance	673326.1	1.33
112	Education and research	2888483	1.22
113	Medical and health	1757860	2.10
114	Other services	5368349	1.93
Non-Traded Services			
103	Railway transport services	1795097	1.92
105	Storage and warehousing	90937.56	1.59
107	Trade	14425514	1.46
108	Hotels and restaurants	1682683	2.03
111	Ownership of dwellings	4672400	1.12
115	Public administration	4309400	1.00

Source: Author's calculations based on data from CSO (1993-94 Input-Output Table)

When these results are compared with that of 2007-08 input-output table, it is found that construction and other transport services continued to remain key traded services exhibiting strong backward linkages even in 2007-08. But the relative

importance of medical and health services to contribute to the phenomenon of export-led growth declined in 2007-08, when backward linkage of this sector dipped to less than 1. Business services took its place as the third key traded service exhibiting strong backward linkage of greater than 1 in 2007-08. Business services reaped the benefits of 14 years of economic liberalisation, and emerged as the focus sector capable of acting as an engine of export-led growth for the Indian economy. "Business services" in 2007-08 input-output table is classified as a constituent of "other services" in 1993-94 input-output table, as given in Appendix. Although communication, banking and insurance are internationally traded services which exhibited strong forward linkages both in 1993-94 and 2007-08, their role to act as engines of export-led growth is limited by their relatively weak backward linkages. When Indian economy is seen through the prism of services export-led growth, it can be concluded that the 1991 economic reforms and India becoming a signatory to GATS in 1995 has altered the structure of Indian economy for better in 2007-08, by strengthening the backward linkages of India's service sector.

3.4.2.2 Role of Services Imports in India's Export-led Growth, and Implications for External Stabilisation

The WTO-OECD Trade in Value Added (TIVA) database tracks the growing importance of global value chains in international trade, which mean that a country's exports increasingly rely on intermediate imports, ie., value added by industries in upstream countries. TIVA follows the *System of National Accounts 1993* definition of "value-added (in basic prices)", which is equivalent to the difference between output (in basic prices) and sum of intermediate inputs (in purchasers' prices) of goods and services. Since imports are treated as a negative item while accounting for GDP according to the expenditure approach, statistics on gross imports often mislead the relevance of imports in economic growth and competitiveness. Another advantage of using this database, as stated by OECD, is that it better reflects the contribution made by services. About 80% of world trade happens in goods. In gross terms, trade in services typically account for less than one quarter of total trade. However, these statistics masks the important role played by services in producing goods. TIVA provides estimates of the contribution of services (both domestic and foreign) as inputs in producing exports. In the Third Chapter of this thesis, it was empirically established that direction of causality runs from services

imports to economic growth in case of Indian economy. This section takes the empirical analysis forward by analysing the contribution of services imports in production of exports, and thus in export-led growth of Indian economy.

Foreign services value added of gross exports in TIVA reflects the services import content of the exports, and covers 18 economic activities. Table 14 gives a comparison of the service import content of exports for Indian economy during two points in time, namely 1995 and 2008. It is found that in 1995, foreign services value added share of gross exports was relatively low (below 5%) for most sectors of Indian economy. Service import content of exports is found to be highest for chemical and non-metallic mineral products industry in 1995, at 6.8%. The share of foreign services value added exceeded 5% of gross exports for 4 other sectors as well, namely, machinery and equipment industry, manufacturing and recycling industry, transport equipment industry and basic metals and fabricated metal products industry. The services import content going into the production of services exports is found the highest for transport and storage, post and telecommunication services in 1995, at 4%. Benefiting from 13 years of economic liberalisation, globalisation and India's membership in WTO, the services import content of exports of whole of Indian economy increased from 4.2% in 1995 to 10.3% in 2008.

From Table 14, it is evident that out of 18 sectors of Indian economy classified by TIVA, 14 sectors had foreign services value added share of gross exports exceeding 5% in 2008. In 2008, the contribution of services imports in production of exports arising from manufacturing and recycling industry is found to be highest, at 21.1%. Within service sector, in 2008, share of services imports going into production of gross exports of business services is found to be highest, at 10.2%. The foreign services value added embodied in gross exports is mentioned as nil for construction sector, in TIVA database. Services import content in gross exports is found to be the least for agriculture and allied activities, both in 1995 and 2008. Production of manufacturing and other industrial exports has gained the most from value-added trade in services under global value chains, in case of Indian economy. Services import content going into production of manufacturing exports increased the knowledge intensity of these exports in terms of design, R & D, software etc. Based on above analysis, it can be concluded that services imports makes a significant contribution to India's

export-led economic growth, by adding value to the production of industrial exports to a great extent, and production of services exports to a lesser extent.

Table 14: Services Import Content of India's Exports (1995 and 2008)

	1995	2008
Sectors	(in percentages)	
All sectors	4.2	10.3
Agriculture, hunting, forestry and fishing	1.0	1.5
Mining and quarrying	2.2	2.9
Food products, beverages and tobacco	3.6	5.9
Textiles, textile products, leather and footwear	3.6	8.9
Wood, paper, paper products, printing and publishing	4.7	6.7
Chemicals and non-metallic mineral products	6.8	11.5
Basic metals and fabricated metal products	5.4	8.3
Machinery and equipment, nec	5.6	10.9
Electrical and optical equipment	3.7	10.1
Transport equipment	5.5	11.8
Manufacturing nec; recycling	5.7	21.1
Electricity, gas and water supply	0.0	7.6
Construction	0.0	0.0
Wholesale and retail trade; Hotels and restaurants	2.9	5.0
Transport and storage, post and telecommunication	4.0	9.1
Financial intermediation	1.3	4.2
Business services	1.2	10.2
Other services	3.5	5.8

Source: Author's calculations based on data from OECD (TIVA 2008)

A higher share of foreign value-added in exports is not favourable for a country's external stabilisation. Table 15 gives the total import content of India's services exports. It is found that both in 1995 and 2008, foreign value added share of services exports is highest for transport, storage, post and telecommunications services. Share of imports in this service sub-sector's exports, which were a little less than 10% in 1995, more than doubled as a result of opening up of the economy and international fragmentation of production, and stood at 22.4% in 2008. The total import content has gone up in case of all services exports in 2008, when compared to 1995, which is an indication of international fragmentation of production, and inevitable with opening up of the Indian economy. The most dramatic increase in the share of foreign value added of services exports is in case of business services. Import content of business services exports has risen from 2.7% in 1995 to 14.6% in 2008 as evident from Table 15. From CSO's 2007-08 input-output table, it was noted earlier that construction, transport and business services are the three key traded services which

are capable of acting as engines of export-led growth for Indian economy. Foreign value added embodied in services exports is mentioned as nil for construction sector, in TIVA database. However, from TIVA database for 2008, we find that foreign value added embodied in exports of transport and business services is relatively high. If the import content of these services exports continues to rise in future, it would adversely affect India's current account deficit by cancelling out the gains from increase in gross exports of these two key traded services. The declining trend witnessed in domestic value-added content of exports of all service sub-sectors during the 13-year period from 1995 to 2008 is thus a cause of concern. Policies aimed at increasing the domestic value-added content of exports would help the country in achieving the twin objectives of economic growth and external stabilisation simultaneously, and maximise its gains from participation in global value chains.

Table 15: Import Content of India's Services Exports (1995 and 2008)

	1995	2008
Service sub-sectors	(in percentages)	
Construction	--	--
Wholesale and retail trade; Hotels and restaurants	6.79	11.86
Transport and storage, post and telecommunication	9.52	22.36
Financial intermediation	2.29	6.89
Business services	2.66	14.62
Other services	7.92	10.83

Source: Author's calculations based on data from OECD (TIVA 2008)

4. Conclusion

The major findings that emerge from this study are as follows. When Thirlwall's Balance Of Payments Constrained Growth Model is applied to the Indian economy, it is found that the balance of payments equilibrium growth rate of goods sector is lower than that of service sector. Also, service sector is found to grow at a rate almost equal to its balance of payments equilibrium growth rate (15.1%), whereas goods sector is growing at a rate higher than its balance of payments equilibrium growth rate. This inherent asymmetry between goods sector and service sector has resulted in Indian economy growing at a rate much higher than its balance of payments equilibrium growth rate, producing a balance of payments deficit. The analysis highlighted the crucial role played by service sector in propelling Indian economy to reach a higher balance of payments equilibrium growth rate, thus

helping to achieve the twin objectives of economic growth and external stabilisation simultaneously. When the assumption of constant relative prices in international trade is relaxed, the balance of payments equilibrium growth rate of service sector (16.36%) is found to be higher than the actual growth rate of service sector (15.01%), producing a services trade surplus, which is even better for India's external stabilisation. When import dependence of service sector is analysed, it is found that services imports to domestic demand ratio of Indian economy has remained below 0.10 throughout the post-reform period. This implies that the share of India's domestic demand for services which is being met by services imports has increased only marginally over the past twenty years, from 3% in 1992-93 to 7% in 2011-12. On the other hand, import dependence and off-shoring in India's goods-producing sectors is found to be quite high.

When impact of services exports on India's economic growth is estimated using input-output tables, it is found that construction, medical and health services, and other transport services are the three key internationally traded services which exhibited strong backward linkages with Indian economy in 1993-94. Among major services in India's export basket, construction and transport services continued to exhibit strongest backward linkages even in 2007-08. Business services reaped the benefits of 14 years of economic liberalisation and India's membership in WTO, and emerged as a focus sector capable of acting as an engine of export-led growth for the Indian economy in 2007-08. Policies aimed at promoting services exports from these key sub-sectors will go a long way in accelerating the country's economic growth. Using TIVA database, it is found that India's services imports made a significant contribution to economic growth in 2008, through value-addition in the production of India's manufacturing and other industrial exports to a great extent, and production of services exports to a lesser extent. The services import content of exports for whole of Indian economy shot up from 4.2% in 1995 to 10.3% in 2008, benefiting from economic reforms. It is also found that the total import content has gone up in case of all services exports in 2008, when compared to 1995. This is an indication of international fragmentation of production, and inevitable with opening up of the Indian economy. During the interim period between 1995 and 2008, the most dramatic increase in the share of foreign value added in services exports is found to be in case of "transport, storage, post and telecommunication" and "business services". Policies aimed at increasing the domestic value-added content

of exports would help India to achieve the twin objectives of economic growth and external stabilisation simultaneously, and maximise its gains from participation in global value chains.

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Appendix

Concordance between 1993-94 Input-Output Table and 2007-08 Input-Output Table

Sector Code in 1993-94 IOT	Sector Code in 2007-08 IOT	Sector Name
99	106	Construction
103	109	Railway transport services
104	110,111,112,113	Land Transport including via Pipelines, Water Transport, Air Transport, Supportive and Auxiliary transport activities
105	114	Storage and warehousing
106	115	Communication
107	116	Trade
108	117	Hotels and restaurants
109	118	Banking
110	119	Insurance
111	120	Ownership of dwellings
112	121	Education and research
113	122	Medical and health
114	123,124,125,126, 127,128,129	Business services, Computer & related activities, Legal services, Real estate activities, Renting of machinery & equipment, Community, social & personal services, Other services
115	130	Public Administration and Defence

Source: Central Statistical Organisation (2007-08 Input Output Table)