Economic Growth with Foreign Trade on the Reverse Gear: India's Re-experimentation

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Abstract

Hikes in customs tariffs in the period from 2011 (a de-facto reversal of the tariff reforms done during 1992-2008) and surge in the number of anti-dumping procedures initiated (ADPINI) by India in recent years make it a phenomenon of foreign trade on the reverse gear, although there is no apparent dilution in the emphasis on export promotion. This paper probes the interplay of some the long-term determinants of economic growth (such as, technological progress and human capital formation) associated with the changes noticed in foreign trade using data for the 1980-2020 period and deploying autoregressive distributed lag models. Tariff and ADPINI significantly influenced the import demand. Education, innovation, and competition are crucial determinants of productivity. The worsening in the position in all the three were responsible for the sharp drop in productivity growth in recent years. Erosion in competition and subdued productivity growth adversely impacted India's export performance, post-2011. The argument that the recent slow growth in India's exports was due to the slowdown in world economic activity is not assisted by data. These findings yield answers to a set of policy questions and provide an alternative on the economic slowdown in India during 2017-20. The long-term determinants of growth were crucial in the perceived-to-be-short term variation in economic growth in India, and this has relevance for the current policy debate on economic growth, globally and in India. The country experience may contribute to the understanding of contemporary growth process.

JEL Codes: F13, F14, O4.

1. Introduction

Short-term policy actions (relating to interest rates or other forms of monetary accommodation) are at the centre-stage of the policy debate on economic growth in recent times, globally and in India, capturing the limelight in the print- and electronic media, while the long-term determinants of economic growth (such as, human capital formation, technological progress, foreign trade, foreign direct investment, the role of structural transformation, and the role of income distribution and other socio-cultural and institutional factors) tend to be the fringe elements in the debate. This character of the debate perhaps leads to a sub-optimal policy choice. Evidence captured in this paper indicates that some of the long-term determinants of growth were crucial in the perceived-to-be-short-run variation in the pace of economic growth in India, and the short-term policy actions appeared ineffective.

One possible reason for this state of the debate (and the policy choice) may be the relative ease in the implementation of monetary policy as compared with the difficulty faced in the implementation of public policy elsewhere. In India, the monetary authority, i.e., the Reserve Bank of India (RBI) has been doing the "heavy-lifting", be it the fight against economic slowdown or the surge in inflation. The monthly economic review of the Finance Ministry of the Government of India (GoI) for May 2022 says that "RBI's monetary policy is now fully dedicated to reining in inflation pressures in the economy" (GoI, 2022). As monetary

policy was earlier not fully dedicated to this job, it is not a surprise that there are criticisms (Subramaniam and Felmen, 2022). Issues concerning the multiple roles that central banks perform and whether they are 'behind the curve' are less important in the present juncture, when there are persistent worries about a potential recession in the global economy, although the risk is presumably low in India; what policies are needed to improve economic growth is more important. A basic problem in this connection is that there are too many of them in the menu of options. In India's case, official publications routinely list out many reform requirements, and the government also occasionally announces several of them. Illustratively, one big chunk of reform intentions, aimed at addressing the four 'Ls' (Land, Labour, Liquidity and Laws), featured as part of the ₹ 20 lakh crore stimulus package announced in May 2020. They might be in the 'pipeline', legislative efforts face challenges. The withdrawal of the three farm legislations is a good example. It raises concerns about the prospects of reforms elsewhere (Aiyar, 2021; and Das, 2021).

The growth rate of India's gross domestic product (GDP) fell from 8.3% in 2016-17 to 3.7% in 2019-20.[1] Policy actions, based on the conventional narratives, did not revive the growth momentum. In this backdrop and drawing motivation from a set of related policy questions, this paper probes the interplay of some of the long-term determinants of economic growth associated with the changes noticed in India's foreign trade to draw policy perspectives. Changes in foreign trade emanate from hikes in customs tariffs in the period from 2011 (reversing the tariff reforms done during the 1992-2008 period) and unusually large number of anti-dumping procedures initiated (ADPINI) in recent years. Indian position in the case of a few long-term determinants of economic growth merit a mention here. Human capital formation and technological progress are crucial in the growth process. Investment in human capital is a 'pervasive phenomenon' (Becker, 1962; Schultz, 1975; Galore, 2005; and Deming, 2022). In India, 89% of rural schools are 'single-teacher schools' (UNESCO, 2021); and gross expenditure on research and development (GERD) relative to GDP, which is an input indicator of innovation, fell from 0.86% in 2008 to 0.65% in 2018.

Policy questions

i. Policy measures were taken by RBI and GoI to boost economic growth. They included, among other things, cuts in repo rate by a cumulative 250 basis points during February 2019-May 2020 and reduction in corporate tax rates in September 2019: the base rate was reduced from 30–22%; for new manufacturing companies, it was slashed from 25–15%. These were expected to spur investment and revive growth. Growth of gross fixed capital formation (GFCF) fell from Q4:2018-19 and GDP growth slid for eight quarters in a row (from 8.1% in Q4:2017-18 to 3.1% in Q4:2019-20) as if activity in Indian economy is insensitive to policy? What makes it so?
ii. Recent research highlights the role of government in economic growth. Regulatory policy reforms, by making the doing business easier, promote growth (De Soto, 2000; World Bank, 2020), while policy uncertainty retards growth (Baker et al, 2016; Bhagat et al, 2016; Wei, et al, 2021). In India, the subdued pace of economic growth during 2012-14 was attributed to the "policy paralysis" in the United Progressive Alliance government. With the National Democratic Alliance government in place from 2014, several reforms were implemented (Panagariya, 2018, 2020a and 2020b), and India's

position in World Bank's doing business ranking improved from 134th in 2014 to 63rd in 2020. GDP growth improved to 8.3% in 2016-17 from 6.4% in 2013-14. Growth fell to 3.7% in 2019-20, despite the reforms and no 'policy uncertainty'. It is "reforms without growth" (Chidambaram, 2020a and 2020b). Why it is so?

iii. The 'Make in India' initiative launched in 2014 had envisaged to raise the share of manufacturing in GDP to 25% by 2022 (from about 16–17% when it was launched). The sector's share in GDP at current prices had fallen to 13.5% in 2019-20. What is amiss?

In the orthodox scheme of things, the first question is about the short-run while the other two relate to the medium/long-run. Answer to the three questions put together tell a meaningful story. Standalone, they may not shed enough light to guide policy. In the search for explanation of these puzzling facts, this paper probes the consequences of the unusual developments that make it a phenomenon of 'foreign trade on the reverse gear' on economic activity in India by deploying autoregressive distributed lag (ARDL) models. The discussion on the growth impact of tariff and other import restrictions, in terms of the interplay of these developments with other long-term determinants of growth, differs from the assessment of short/medium-term impact of tariff on growth or welfare loss (e.g., Furceri et al 2019; Fajgelbaum et al, 2020; Ding et al, 2022). The motivation for the adopted approach is the following.

In recent literature, concerns are expressed about the return of protectionism and the perceived inability of economists, despite over two centuries of intellectual work, to change public's views on it, and it is suggested that the public's mild view on protectionism stem from the fact that most of economic analysis of protectionism is theoretical, microeconomic or dated (Furceri et al 2019). I submit that empirical, macroeconomic, or updated analysis is not the solution; the analyst would need to walk the extra mile to make the work persuasive. Take the case of the US. In the estimates of the short-run impact of the trade war on the US economy, the losses to US consumers and firms that buy imports were $51 billion or 0.27% of GDP, and the aggregate real income loss, adjusting for tariff revenues and gains to domestic producers, was $7.2 billion or 0.04% of GDP (Fajgelbaum et al, 2020). Will the 'public' worry about this much of loss in real income? US GDP grew 2.9% in 2018 and 2.3% in 2019, and these were above the average of high-income countries. In the medium-term, tariffs lead to significant decline in production and productivity, more unemployment, greater inequality, *etc*. (Furceri et al 2019). In the medium-term, many explanations could emerge about these variables, as the Indian case suggests. The slowdown in GDP growth during 2017-20 is attributed to many factors other than the import restrictions – cyclical, structural, or weak demand. In a situation like this, why should the 'public' be persuaded by the intellectual work of the profession on protectionism? It is important to explain how tariff and other import restrictions impacted economic activity amid other factors at play.

From the historical perspective, the expansion of international trade contributed to the early industrialization in Europe, especially in the UK. Trade was instrumental for the increased share of manufacturing in total output in the UK, and for the significant rise in real wages. While technological advances could have created the Industrial Revolution without an expansion of international trade, the growth in exports increased the pace of industrialization and the growth rate of output per capita (Galore,

2005, 217). India's experience in the post-independence period – with two episodes of 'foreign trade on the reverse gear' and one when foreign trade aided to economic growth – is unique in some sense. The developments in earlier two spells – one when the "Hindu rate of growth" (3.5%) was associated with the inward-looking development strategy and another when the pick-up in the growth rate of GDP was associated with the opening up to foreign trade – have been documented (discussed in Sections 2 & 3). India's share of world exports of goods had declined from 2.2% in 1948 to 0.4% in 1980; the share moved up to 1.7% in 2011 with India's increased integration with the global economy; and there has been no improvement in the position since then (Fig. 1: page 42). This paper sheds some light on the economic growth in the current episode of retrogression in foreign trade. Hopefully, the narrative contributes to the improvement in our understanding of contemporary growth process.

The rest of the paper is organised into five Sections. Section 2 documents the evidence on the *de facto* reversal of tariff reforms in India. Section 3 presents a brief review of literature on the growth impact of tariff. Section 4 empirically examines the impact of the import restrictions and other factors on economic activity. Section 5 assesses the received wisdom on the economic slowdown during 2017-20. Section 6 puts together the answers to the policy questions and spells out their policy implication.

[1]Activity in the following two years was impacted by the pandemic and related restrictions. Growth numbers cited in this paper are in real terms (at 2011-12 prices), unless specified otherwise.

2. De Facto Reversal Of Tariff Reforms

India pursued an inward-looking policy regime during 1950-75. Import-substituting industrialization of the extreme form gave rise to more expensive and lower quality products than that could be imported, and this impacted the exports. *Ad-hoc* liberalization measures were initiated during 1976–1991. The period from 1992 saw deeper and systematic trade policy reforms (Bhagwati and Desai, 1970; Bhagwati and Srinivasan, 1975; Ahluwalia, 1985; Mallik, 1994; Panagariya, 2004).

The simple average 'most favoured nation' tariff (SAMT) fell from 84.1% in 1990 to 12.8% in 2008 moving closer to the global average (9.9%). After the global financial crisis (GFC), the global average fell to 8.9% in 2017, while Indian average stayed at around the 2008 level till 2010 and rose to 13.8% in 2017. The key point is that others, especially in the low & medium income (LMY) country group, continued tariff reduction, India didn't (Table 1).

Table 1
MFN Tariff (All Products), India and Select Country Groups

%						
Country/group	**Tariff Rate**				**Change**	
	1990	**2000**	**2010**	**2017**	**1990–2010**	**2010–2017**
India	84.1	36.6	12.5	13.8	-71.6	1.2
LMY	37.3	14.9	10.2	9.2	-27.1	-1.0
World	22.6	12.7	9.7	8.9	-13.0	-0.8
Ratio of India to LMY	2.3	2.4	1.2	1.5	-1.0	0.3
Ratio of India to World	3.7	2.9	1.3	1.5	-2.4	0.3
Source: World Bank (WDI); Author's computations.						

According to the World Trade Organization (WTO), SAMT in India rose to 17.6% in 2019, which was higher than that in any other major economy in the World; the five-percentage point increase in SAMT in India between 2010 and 2019 was a global record.[2] Data for 22 major product groups show that SAMT in India in 2019 were generally higher than the levels of 2010, some surpassing the level of 2005 (Fig. 2: page 43). In several 2-digit harmonized system (HS) product groups, SAMT had risen to levels of 2000 or higher (Table A.1: page 54). The High-Level Advisory Group (HLAG) (Chairman: Surjit S. Bhalla) flags the recent increases in India's MFN tariff: "this trend needs to be arrested and reversed" (GoI 2019, 12). Union Budgets for the subsequent years raised customs duties on many products. The reversal of trade liberalisation "increasingly appears to be a firmly established policy of the government" (Panagariya, 2022).

[2] There are some differences in the tariff numbers across datasets. For instance, India's SAMT was 15.5% in 2019 in World Bank data while it was 17.6% in WTO data. Data from World Bank, which provides averages of country-groups up to 2017, is given in Table-1. Time series data used in econometric analyses are also from World Bank. Product-group wise tariff given here are from WTO data.

3. Brief Review Of Related Literature

In classical era, it was argued that tariffs would only reshuffle the fully employed workforce. The Keynesian case for protection, during periods of unemployment, is on the premise that tariffs would divert aggregate demand from foreign to domestic goods. Latter developments in the literature show that tariff under flexible exchange rates has a contractionary effect on output, with the policy implication that countries with flexible exchange rates should rely more on monetary and fiscal policy to correct large-scale unemployment (Mundel, 1961; Krugman, 1982). Using micro-level data, recent research highlights the efficiency enhancing effects of trade. Increase in trade participation improves the productivity of

domestic industry via economies of scale, allocative efficiency and spill-over benefits (Krugman, 1979; Ethier, 1982; Baldwin, 1992; Pavcnik, 2002; Melitz, 2003; Bernard et al., 2007; Melitz and Ottaviano, 2008; Melitz and Trefler, 2011). Tariff impacts productivity and exports via three channels:

Competition push channel

In theory, import-competition has an anti-growth effect in that it reduces the profitability and thereby discourages innovation; it has a pro-growth effect also: the domestic firms that do not increase their innovation are displaced by imports (Baldwin, 1992). The evolution in the theoretical literature on the relationship between competition and innovation has given rise to a large body of empirical research. Most of the empirical studies probing a linear relationship conclude that competition has a positive effect on innovation. There is also a growing mass of evidence suggesting an inverted U-curve (or non-linear) relationship between competition and innovation (Aghion et al., 2005 and 2009; Becker, 2013; Amiti and Khandelwal, 2013).

Imported inputs channel

Input-tariff reduction leads to product-diversification in domestic market, improving domestic firms' productivity and their likelihood of becoming exporters (Amiti and Konings, 2007; Kasahara and Rodrigue, 2008; Topalova and Khandelwal, 2011; Bas, 2011; Bas and Strauss-Khan, 2014; Cruz and Bussolo, 2015; Ahn et al., 2016; Feng et al., 2016; Roy, 2020).

Competitive elimination channel

Increased competition due to trade liberalisation forces domestic firms to behave more competitively and leads to shutdown of the least efficient firms (Hart, 1983: Melo and Urata, 1986; Levinson, 1991; Krishna and Mitra, 1998; Muendler, 2004).

India-specific studies

The impact of trade policy reforms on Indian industry has been widely debated (Chandrasekhar, 1987; Singh and Ghosh, 1988; Goldar and Renganathan, 1990; Mallik, 1994; Krishna and Mitra, 1998; Balakrishnan et al., 2000; Ahluwalia, 2000; Chand and Sen, 2002; Virmani, 2003; Goldar and Kumari, 2003; Das, 2004; Panagariya, 2004; Goldberg et al., 2010; Topalova and Khandelwal, 2011; Pradhan, 2011; Goldar, 2015; Haider et al., 2018; and Rijesh, 2019). The evidence that the trade reforms increased the productivity of Indian industry emerges from many of these studies. However, these studies mostly relate to the progress in overall trade policy reforms (not specifically tariffs), and the reversal of tariff reforms has not received research attention.

4. Evidence On The Impact Of Tariffs

Drawing on the literature cited, it can be postulated that, *ceteris paribus*, an increase in tariffs by making the imports costlier would lead to a fall in imports; and the resultant erosion in competition in domestic

product market and reduced availability of imported inputs would reduce productivity, which, in turn, would worsen export performance. The envisaged transmission channel is as under:

Tariffs → Imports → Productivity →Export performance.

As the direction of the causality among some of the variables is not a settled issue, the analyses would be exploratory in nature.

4.1 Imports

The impact of tariff on imports is discernible from visual description of the data. With tariff reforms, import-to-GDP ratio rose by about 23 percentage points between 1990 and 2012; it retreated half the distance in the period thereafter with reversal of tariff reforms (Fig. 3: page 44). The impact of tariff on imports is econometrically estimated using an extended form of the import demand equation and deploying an ARDL model with two additional explanatory variables, *viz*., SAMT and ADPINI.

The conventional aggregate import demand function takes the following form:

$M = VM/PM = f\ (P^M, P^Y, Y)$ ---------- (1)

An alternative formulation is:

$M = f\ (P^M/P^Y, Y/P^Y)$ ---------- (2)

Equation-1 says that the volume of imports (M) depends on the price of imports (P^M), prices of domestic goods (P^Y), and country's income (Y). Equation-2 relates import volume to the relative price of imports (P^M/P^Y) or RPM and real income. Equation-2 or some variant of it is generally used by researchers. The use of the variable real income assumes the absence of 'money illusion' by the consumer (Leamer and Stern, 2006). The choice of relative price variable is guided by the need to keep the number of price terms small for estimation purposes while "still capturing the dominant sources of demand or supply substitution" (Goldstein and Khan, 1985).

In the estimates of past studies on import demand function for India, the income elasticity of imports is generally more than unity except a few stray cases of negative number. The average of the price elasticity estimates works out to -0.4 (Table 2).

Table 2
Income and Price Elasticity of India's Imports: Estimates of Past Studies

Study	Period	Model	Income	Price
Houthakker and Magee (1969)	1951–1966	OLS	1.43	…
Nguyen and Bhuyan (1977)	1957–1969	OLS	1.76	-0.73
Patra and Ranjan (1992)	1970–1989	OLS	1.57	-0.42
Patra and Pattanayak (1994)	1970–1993	TSLS	-2.56	-0.72
Caporale and Chui (1999)	1960–1992	ARDL	1.55	-1.01
Sinha (2001)	1950–1996	Cochrane-Orcutt	-0.11	-0.51
Dutt and Ahmed (2006)	1971–1995	VAR	-0.03	-0.37
Emran and Shilpi (2010)	1952–1999	ARDL	1.23	-0.79
Sultan (2011)	1970–2008	ECM	1.88	-0.29
Zhou and Dube (2011)	1970–2007	ARDL	2.24	0.31
Nell (2013)	1952–1990	ARDL	1.23	0.10
	1991–2005		2.38	0.10
Mishra and Mohanty (2017)	1980–2014	ARDL	1.43	-0.45

Do these elasticity estimates help in interpreting the data for recent years? Import volume declined in 2013-14, 2016-17 and 2019-20 – unusual for a large growing economy. The previous occasion when such a thing happened was in 1991-92. That was due to the severe “import compression” measures to deal with the balance of payment situation, and economic growth was low. The decline in import volume in normal years, occurring with the growth in real GDP, at an accelerated pace in 2013-14 and 2016-17, and decline in relative price of imports turn the demand theory upside down (Table 3).

Table 3
Changes in variables relevant for import demand equation, India

								%
Year	QM	RGDP	UVM	WPI	RPM	FER ($)	SAMT	ADPINI
1991-92	-2.2	1.1	-11.3	13.5	-21.9	58.0	-16.9	…
1992-93	21.1	5.5	-4.8	11.9	-14.9	6.6	-20.3	…
1993-94	16.2	4.8	-16.8	7.5	-22.6	95.8	-7.6	…
1994-95	21.5	6.7	-3.0	10.5	-12.3	30.8	-8.3	…
1995-96	24.1	7.6	4.2	9.3	-4.7	-13.9	-9.0	-50.0
1996-97	5.1	7.5	4.0	4.5	-0.5	21.8	-9.9	1600.0
1997-98	10.3	4.0	-1.0	4.5	-5.3	11.1	-22.3	-35.3
1998-99	17.4	6.2	-11.7	5.9	-16.6	10.6	4.8	54.5
1999-00	3.6	8.8	5.5	3.5	2.0	17.1	4.5	152.9
2000-01	5.3	3.8	4.2	6.6	-2.2	11.2	11.0	-60.5
2001-02	1.5	4.8	-3.6	5.2	-8.3	28.0	-4.5	335.3
2002-03	4.3	3.8	7.5	2.5	4.9	40.6	-12.4	-1.4
2003-04	23.2	7.9	4.2	5.3	-1.1	48.4	-12.0	-42.5
2004-05	17.0	7.9	17.5	6.6	10.2	25.3	9.6	-50.0
2005-06	28.3	7.9	11.6	4.2	7.1	7.1	-35.5	14.3
2006-07	11.4	8.1	12.1	5.8	5.9	31.4	-11.7	25.0
2007-08	13.8	7.7	13.0	5.0	7.6	55.5	2.4	50.0
2008-09	26.2	3.1	10.9	8.8	2.0	-18.6	-25.5	22.2
2009-10	3.6	7.9	-22.7	2.4	-24.5	10.7	2.0	-43.6
2010-11	22.7	8.5	11.0	9.6	1.3	9.2	-4.2	32.3
2011-12	9.7	5.2	20.9	9.5	10.4	-3.4	6.8	-53.7
2012-13	5.7	5.5	-0.3	7.3	-7.1	-0.8	5.1	10.5
2013-14	-0.3	6.4	-4.7	5.4	-9.6	4.2	-0.8	38.1
2014-15	3.5	7.4	-3.9	3.4	-7.0	12.3	-2.8	31.0
2015-16	11.8	8.0	-23.8	-3.9	-20.7	5.4	-2.8	-21.1

								%
2016-17	-2.0	8.3	-6.4	-0.1	-6.3	2.7	4.2	130.0
2017-18	11.8	6.8	11.3	3.4	7.6	14.8	0.2	-29.0
2018-19	2.9	6.5	11.1	4.3	6.6	-2.7	0.4	-32.7
2019-20	-0.8	3.7	-4.7	1.9	-6.5	15.7	12.5	57.6
2020-21	-14.7	-6.6	-10.1	0.5	-10.6	20.8	-5.9	76.9
QM: Quantity of Import; RGDP: Real GDP: UVM: Unit Value of Imports; WPI: Wholesale Price Index; RPM: relative price of imports; FER: Foreign exchange reserves; SAMT: simple average MFN tariff; ADPINI: anti-dumping procedures initiated; ...: not available.								
Source: World Bank (WDI); WTO (WTO Stat); RBI (Handbook of Statistics on Indian Economy, 2020-21); author's computation.								

Some studies have used foreign exchange reserves as an additional explanatory variable in the import demand equation. The use of this variable was justifiable in the earlier policy regime when imports were rationed according to policy priorities and foreign currency reserves served as a budget constraint. That is not the case now. In any case, India's foreign exchange reserves increased during the years when import volume declined: this variable does not illuminate. It is here ADPINI comes into the picture. The years that witnessed a surge in ADPINI are the ones that had a decline or low growth of import volume. Changes in SAMT and/or ADPINI coincided with most of the large variations in import volume during 1990–2020. One would think that the fall in import volume in 2020-21 was due to the COVID-19 pandemic. India's GDP contracted by 6.6% in 2020-21; the decline in import volume was steeper (-14.7%): part of the explanation lies in the 77% increase in the number of ADPINI (Table 3).

In recent research, trade policy related variables are used in the estimation of import demand function deploying ARDL models. Illustratively, Hoque and Yusop (2010) use import duty rate and a dummy variable representing non-tariff barriers in the import demand equation for Bangladesh. Dummy variable on trade liberalisation has been used by Khan et al (2014) for Pakistan. In the Indian context, it should be possible to do the estimation using data available. Other than ADPINI, the number of other forms of non-tariff barriers initiated/notified by India (countervailing duties, safeguards, and sanitary and phytosanitary measures) are not too many, and they may not be a major factor. On ADPINI, a few issues need to be sorted out: what would be the expected sign, what would be the lag structure, and which variable to use out of three sets of numbers available: measures initiated, measures implemented (after investigation), and cumulated measures in force.

Anti-dumping measures are "trade remedial measures" and not "protective measures" (GoI, undated). Be that as it may, anti-dumping actions serve the purpose of restricting imports. Possible injury to domestic (import-competing) industry due to the alleged dumping by an overseas exporter is the guiding philosophy of anti-dumping investigation; the damage that the anti-dumping action, especially during

investigation, might be causing to domestic (user) industry is not a concern. Most of India's imports of goods (over 87% in 2019) are industrial inputs in some form or the other. That India is a major user of anti-dumping measures is known (Singh, 2017). India's share in the total number of ADPINI by all countries in the world was 27% in 2020, up from 3% in 1994. The number of measures implemented by India (*e.g.*, 19 in 2019, and 7 in 2020) is less than the measures initiated (52 in 2019, and 92 in 2020). In terms of cumulated number of measures in force (as of 2018), India (275) was second to the USA (359). Out of the three sets of numbers available, measures initiated (i.e., ADPINI) is the relevant variable for the import demand function, and it is expected to have a negative sign in that it adversely impacts import volume. The timeline prescribed for investigation of anti-dumping cases is useful in deciding the lag structure. Excerpts from a booklet (GoI, undated) are below:

Anti-dumping investigations are generally initiated after examination of merits of the case, within 30 days of acceptance of an application (p.8). A provisional duty not exceeding the margin of dumping or injury, whichever is less, may be imposed by the Central Government on the basis of the preliminary finding recorded by the Authority. The provisional duty can be imposed only after the expiry of 60 days from the date of initiation of investigation. The provisional duty will remain in force only for a period not exceeding 6 months, extendable to 9 months under certain circumstances (p.15). Normal time allowed by the statute for conclusion of investigation and submission of final findings is one year from the date of initiation of the investigation. The above period may be extended up to a period of 6 months, in exceptional circumstances, by the Central Government (p.16).

In annual data, it would be reasonable to expect that ADPINI would impact import volume during the current- and the following year. On tariff, the substantive issue relates to the choice of its measure. Citing the low weighted average tariff (particularly in non-agricultural product) and low customs duty collection rates, Singh (2017) argues that "the conventional view that India is a high tariff economy is incorrect". Palit (2019) explains why India is indeed a 'tariff king'. In the comparison in the *Global Competitive Report, 2019* of World Economic Forum, India's trade tariff of 14.43% was near the boundary of worst performance, *i.e.*, 15%. The tariff measures referred to by Singh (2017) can be misleading, especially when very little imports take place at the higher duty rates. For illustration, if the value of import of a product that attracts a high MFN tariff (say, 50%) is nil, it would depress the weighted average tariff. That apart, exemptions of various forms also render these measures low. Information on average MFN tariff is important in so far as the high tariff serves as a deterrent to the imports. Eq. 3, an extension of Eq. 2 in double-log form, is the base model for estimation.

$$\text{Ln } QM_t = \alpha + \beta 1 \text{ Ln } RGDP_t - \beta 2 \text{ Ln } RPM_t - \beta 3 \text{ Ln } SAMT_t - \beta 4 \text{ Ln } ADPINI_t + \varepsilon_t \text{ ------- (3)}$$

Here Ln QM is natural log of quantum index of imports of goods; ln RGDP is natural log of real GDP; Ln RPM is natural log relative price of imports (unit value index of imports divided by wholesale price index); Ln SAMT is natural log of simple average MFN tariff; Ln ADPINI is natural log of number of anti-dumping procedures initiated; and ε: error term; subscript t denotes time.

Data for 1994-2020 period have been sourced from the World Development Indicators (WDI) database of World Bank, WTO data, and Penn World Table (version 10.0)[3]. The coefficient of Ln RGDP is expected to be positive in keeping with the theory of imperfect substitution that precludes import of inferior goods. The coefficient of Ln RPM is expected to be negative in keeping with the demand theory: demand for imported goods rises with increase in domestic prices, while increase in import price reduces the demand. Supply elasticities are assumed to be infinite, so that import prices can be taken as exogenously given. The coefficients of SAMT and ADPINI are expected to be negative as explained.

It would be appropriate to mention at this stage that, following Giovannetti (1989), expenditure components have been used (in place of GDP) in the import demand equation in a good number of papers (Abbott and Seddighi, 1996; Alias and Cheong, 2000; Tang, 2013; Narayan and Narayan, 2005; Guncavdi and Ulengin, 2008; Agbola, 2009; and Yoon and Seddighi, 2019 to mention a few). Giovannetti (1989) uses only two components: consumption, and a composite variable on 'investment, stock-building and exports' (ISX). Others use more, and many interesting country-specific findings emerge. A few of the somewhat broad-based findings are that the coefficient of exports is relatively large and that of investment is small (even negative). The large size of the coefficient of exports is realistic, especially in countries exporting manufactured products with high import content, as in India. The small/negative coefficient of investment might be a reflection of the methodology used in its estimation. In the Indian case, in the data for 1994–2019 period, GFCF and related variables tracked the movements in steel prices (discussed in Section 5). Many countries follow similar methodology, and the econometric model yielding a small or negative coefficient of GFCF may not a surprise. Private final consumption expenditure (PFCE) is generally estimated as a residual after netting out government final consumption expenditure (GFCE) and investment from the output of various products. Stock-building can at times be negative as Giovannetti (1989) writes, and other components (valuables, and statistical discrepancy in GDP) are imponderables. Taking account of these aspects, this paper uses two expenditure components (exports and domestic demand), which capture the role of external- and domestic demand in the import function. Data on exports do not involve the estimation that other components of GDP do. Domestic demand (GDP minus exports) may not be as troublesome as its sub-components can be. Two variables, namely, Ln RDD (natural log of real domestic demand) and Ln REXP (natural log of real exports of goods and services) replace Ln GDP in the equations henceforth.

Equation-3 assumes that importers are always on their demand schedules such that demand equals the actual level of imports. However, imports may take time to adjust to their long run equilibrium level following a change in any of their determinants due to various factors, such as, adjustment costs, inertia, habit or lags in perceiving the changes (Carone, 1996). To capture the speed of adjustment, the following error correction model is estimated:

$$\Delta \ln QMt = \beta 0 + \sum_{i=1}^{n} \beta 1 \Delta \ln Mt - i + \sum_{i=0}^{n} \beta 2 \Delta \ln RDDt - i + \sum_{i=0}^{n} \beta 3 \Delta \ln REXPt - i + \sum_{i=0}^{n} \beta 4 \Delta \ln RPMt - i + \sum_{i=0}^{n} \beta 5 \Delta \ln SAMTt - i + \sum_{i=0}^{n} \beta 6 \Delta \ln ADPINIt - i + \psi \varepsilon t - 1 + \mu t ---------- (4)$$

Here Δ represents change, and ε_{t-1} is one period lagged error correction term (estimated from equation-3). ψ measures the speed of adjustment to obtain equilibrium. Other variables are as defined earlier. The bounds testing procedure developed by Pesaran, Shin and Smith (Pesaran et al. 2001) has been used to test the cointegrating relationship in levels among the variables. For this purpose, Equation-3 was estimated as a conditional ARDL model as in Equation-5.

$$\Delta \ln QMt = \beta 0 + \beta 1 \ln QMt - 1 + \beta 2 \ln RDDt - 1 + \beta 3 \ln RPMt - 1 + \beta 4 \ln SAMTt - 1 + \beta 5 \ln ADPINIt - 1 + \sum_{i=1}^{p} \emptyset 1 \Delta \ln QMt - i + \sum_{i=0}^{p} \emptyset 2 \Delta \ln RDDt - i + \sum_{i=0}^{p} \emptyset 3 \Delta \ln EXPt - i + \sum_{i=0}^{p} \emptyset 4 \Delta \ln RPMt - i + \sum_{i=0}^{p} \emptyset 5 \Delta \ln SAMTt - i + \sum_{i=0}^{p} \emptyset 6 \Delta \ln ADPINIt - i + \sum_{i=0}^{p} \emptyset 7 \varepsilon t - i + \mu t ---------- (5)$$

The decision rule is the following. If the computed F statistic is higher than the upper bound of the critical values then the null hypothesis of no cointegration is rejected. If the computed F statistic is lower than the lower bound of the critical values then the null hypothesis cannot be rejected. If the computed F statistic lies between the lower- and upper bounds of the critical values then it does not lead to a decision regarding cointegration, and the researcher would need to check the unit roots of the variables. The computed value of the F statistic in the model estimated (35.7) being higher than the upper bound of the critical values relating to large sample (from Pesaran et al, 2001) as well as finite sample (from Narayan (2005), a conclusive decision can be taken that there exists a cointegrating relationship in levels among the variables with Ln QM_t as the dependent variable (Table 4).

Table 4
Bounds test for cointegration in ARDL imports equation

Critical value of F statistic: restricted intercept and no trend at 1% level		
	Lower bound	Upper bound
Asymptotic (Pesaran et al 2001)	3.06	4.15
Finite sample (n = 30; Narayan, 2005)	4.13	5.76
Computed F statistic: 35.70		
Number of regressors: 5		
Number of observations: 26		

Long run estimates

The coefficients of all the explanatory variables are statistically significant with the expected sign. Of the two expenditure components, a 1% increase in exports leads to a 0.35% increase in imports, while a 1% increase in domestic demand leads to a 0.32% increase in import volume. These are smaller than the income elasticity estimates of past studies, while the price elasticity (coefficient of RPM) is comparable with past studies. The coefficients of SAMT and ADPINI are negative, as expected. SAMT has a big impact. A 1% increase in SAMT leads to a 0.82% decrease in import volume, while a 1% increase in the number of ADPINI leads to a 0.07% fall in import volume (Table 5).

Table 5
Long run elasticities from ARDL import equation

Dependent variable: Ln QM_t		
Explanatory variables	Coefficient	t statistic
Ln RDD	0.32**	2.95
Ln REXP	0.35*	8.79
Ln RPM	-0.34**	-2.84
Ln SAMT	-0.82*	-10.81
Ln ADPINI	-0.07*	-6.76
C	-12.28*	-3.52
* Significant at 1% level; ** Significant at 5% level.		

Short run estimates

The short run coefficients are statistically significant. The error correction term is negative and statistically significant (Table 6). The value of this parameter ranges between zero and − 2. When it is between − 1 and − 2, it indicates that the adjustment process is oscillatory. The size of the estimated coefficient being − 1.18, it implies that convergence to equilibrium is rapid (118% adjustment takes place within one year) and oscillatory. The trends in 2021-22 may be a good example. While data on import volume is not available, preliminary trade data show that the dollar value of India's merchandise imports during 2021-22 was 55% higher than the level of 2020-21 (29% higher than that of 2019-20).

Diagnostics

The error correction model was put to various diagnostic tests. The LM test sustains the null hypothesis of no autocorrelation. The Breusch-Pagan-Godfrey test sustains the null hypothesis of no heteroskedasticity. The model passes the Jarque Bera normality test. The Ramsey RESET test shows that the model is correctly specified. The cumulative sum of recursive residuals (CUSUM) and CUSUM square plots (page 57) do not show any instability.

4.2 Productivity

Productivity depends on several factors: education, health, infrastructure, institutions, openness, competition, financial development, geographical predicaments and absorptive capacity (including capital intensity), etc. (Isaksson, 2007). The availability and the quality of the data on these parameters poses a problem for time series analysis: studies on India are very few, and divergent conclusions emerge especially about the role of trade and FDI. Trade liberalization, among other things, played a role in the productivity surge in India around 1980 (Rodrik and Subramanian, 2005). Trade openness is cointegrated with TFP in the long run; in the short run, unidirectional Granger causality runs from trade openness to TFP (Haider *et al*, 2019). Trade-induced productivity gains in Indian manufacturing largely operate through imports and become prominent after a lag of 1 or 2 year (Rijesh, 2019). Inward FDI improves TFP growth in India, while trade appeared to have a "detrimental" effect on TFP growth (Choi and Baek, 2017). Inflation and financial development have a positive impact on TFP; FDI, imports, and capital formation have a positive but statistically insignificant impact on TFP; while exports, government size, and natural calamities have a statistically significant "negative" impact on TFP (Malik et al, 2021).

Table 6
Error correction representation for the selected ARDL import equation

Dependent variable: ΔLn QM_t		
Explanatory variables	Coefficient	t statistic
Δ Ln RPM	-0.24*	-4.76
Δ Ln RPM (-1)	0.26*	4.588
Δ Ln SAMT	-0.40*	-11.38
Δ Ln SAMT (-1)	0.38*	7.32
Δ Ln ADPINI	-0.05*	-7.99
CointEq (-1)	-1.18*	-18.89
Diagnostics		
R^2	0.95	
Adjusted R^2	0.94	
Autocorrelation LM Test (2): F statistic	0.89 (0.44)	
Obs*R-squared	3.36(0.19)	
Heteroskedasticity (Breusch-Pagan-Godfrey): F statistic	1.30(0.32)	
Ramsey RESET (2): F statistic	2.23(0.15)	
Jarque-Bera statistic	1.32(0.52)	
* Significant at 1% level.		
Figures in parentheses are p-values		

Equation 6 is the base model for productivity function. It uses data for 1980–2018 sourced from WDI (except RTFP taken from Penn World Table). The error correction form and the equation used for bounds test are not given here for brevity: these would be similar as in the import demand equation.

$$\text{Ln RTFP}_t = \alpha + \beta 1 \text{ Ln SSEN}_t + \beta 2 \text{ Ln RGERD}_t + \beta 3 \text{ Ln MGDP}_t + \beta 4 \text{ Ln XGDP}_t + \beta 5 \text{ Ln RFDIR}_t + \beta 6 \text{ DCRISIS}_t + \beta 7 \text{ DSIA}_t + \varepsilon_t \text{ ---------- (6)}$$

Here Ln RTFP is natural log of TFP at constant prices; Ln RGERD is natural log of real gross expenditure on R&D; Ln SSEN is natural log of secondary school enrolment (% of population), gross; Ln MGDP is natural log of imports-to-GDP ratio (%); Ln XGDP is natural log of exports-to-GDP ratio (%); Ln RFDIR is natural log of real Foreign Direct Investment (FDI) in Rupee; DCRISIS is a dummy variable for crisis (takes value 1 in 1991 and 2008, and zero in other years); and DSIA is a dummy variable for severely impaired

agriculture (takes value 1 in 2002, and zero in other years). The regressors represent education (SSEN), innovation (RGERD), competition in domestic product market (MGDP), access to global market and benefits of scale economies (XGDP), and access to global finance/know-how (RFDIR). The two crises of 1991 and 2008 severely impacted economic activity, while in 2002, due to a severe drought, marked by a 56% below normal rainfall in the crucial sowing month of July, the output of food-grains declined by 18%, impacting GDP as well as TFP (Fig. 4: page 45).

Bounds test

The computed value of the F statistic is higher than the upper bound of the relevant critical values, and this confirms the existence of a cointegrating relationship in levels among the variables with Ln $RTFP_t$ as the dependent variable (Table 7).

Table 7
Bounds test for cointegration in ARDL productivity equation

Critical value of F statistic at 1% level: restricted intercept and no trend		
	Lower bound	Upper bound
Asymptotic (n = 1000; Pesaran et al 2001)	2.73	3.90
Finite sample (n = 35; Narayan, 2005)	3.60	5.23
Computed F statistic: 18.196		
Number of regressors: 7		
Number of observations: 35		

Long run estimates

The long run coefficients of SSEN and RGERD are positive and statistically significant: the coefficient of RGERD is larger and highly significant. Clearly, innovation and education are crucial for productivity in the long run. The coefficient of exports-to-GDP ratio is also positive and statistically significant. The coefficients of the dummy variables are negative as expected. However, the coefficients of imports-to-GDP ratio and FDI have negative signs (Table 8).

Table 8
Long run elasticities from ARDL productivity equation

Dependent variable: Ln $RTFP_t$		
Explanatory variables	Coefficient	t statistic
Ln SSEN	0.141***	1.749
Ln RGERD	0.278*	5.996
Ln LNMGDP	-0.359*	-3.421
Ln XGDP	0.388**	2.436
Ln RFDI	-0.047**	-2.318
DCRISIS	-0.046***	-1.707
DSIA	-0.052***	-1.831
C	0.663***	2.060
* Significant at 1% level; ** Significant at 5% level. *** Significant at 10% level.		
# Dummy for crisis (takes value 1 in 1991 and 2008, zero in other years)		
$ Dummy for severely impaired agriculture (takes value 1 in 2002, zero in other years).		

Short run estimates

In the error correction model, the coefficients of contemporaneous and past changes in SSEN are negative. This is counter intuitive but in sync with ground realities (discussed later). The coefficients of current and past changes in imports-to-GDP ratios are positive and statistically significant. It implies that the increase competition due to increase in imports (relative to GDP) improves productivity. The coefficient of the error correction term is negative and statistically significant. The size of its coefficient indicates that about 44% of a deviation from equilibrium takes place within a year (Table 9).

Diagnostics

The model is free from autocorrelation as the LM test shows. The Breusch-Pagan-Godfrey test shows that there is no heteroskedasticity. The model passes the Jarque Bera normality test and Ramsey specification test. The CUSUM and CUSUM square plots do not show any instability (Page 57). The adjusted R^2 indicates that the model explains 86% of variation in productivity.

These estimates seem to be a fair portrayal of the on-ground situation. The growth rate of RTFP, which had improved from 0.4% during 2011–2013 (policy paralysis years) to 4% during 2014–2016 with implementation of various reforms, dropped to 1.5% during 2017–2019. Among the long run

determinants of productivity, education and innovation – internal efforts – are crucial. The growth rate of these variables weakened in the period after 2008 (Fig. 5: page 46). The negative coefficient of SSEN in the short-run model may be a reflection of the prevailing state of education with 89% of schools in rural India being ‘single-teacher schools’ and adverse ‘pupil-teacher ratio’ in secondary schools, among other things (UNESCO, 2021). A study on TFP in Pakistan reports negative coefficients of government expenditure on education both in the long- and short run, while the coefficient of secondary enrolment ratio is negative in the long run but positive in the short run (Adnan et al, 2020).

Table 9
Error correction representation for the selected ARDL productivity equation

Dependent variable: ΔLn $RTFP_t$		
Explanatory variables	Coefficient	t statistic
Δ Ln SSEN	-0.163*	-3.083
Δ Ln SSEN(-1)	-0.341*	-6.427
Δ Ln MGDP	0.089*	3.483
Δ Ln MGDP(-1)	0.099*	3.961
Δ Ln XGDP	-0.151*	-5.236
Δ Ln XGDP(-1)	-0.140*	-5.423
Δ Ln RFDIR	-0.016*	-6.148
Δ Ln RFDIR(-1)	-0.001	-0.493
Δ Ln RFDIR(-2)	0.005**	2.225
CointEq(-1)	-0.435*	-15.519
Diagnostics		
R^2	0.893	
Adjusted R^2	0.855	
Autocorrelation LM Test (lag 2): F statistic	0.668(0.53)	
Obs*R-squared	2.864(0.24)	
Heteroscadastity (Breusch-Pagan-Godfrey): F statistic	0.508(0.91)	
Ramsey RESET: F statistic	0.838(0.37)	
Jarque-Bera statistic	1.178 (0.56)	
* Significant at 1% level. ** Significant at 5% level.		
Figures in parentheses are p-values		

India's R&D expenditure had increased from 0.6% of GDP in 1996 to 0.9% in 2008. It fell to 0.6% in 2018. During the 1990s, India's R&D spending was above the medium income country groups. The increase in India's R&D spending during 2000–2008 was comparable with the trends in the medium income country-groups. The decline in India's R&D spending after 2008 was unusual (Fig. 6: page 47). Governments account for about 60% of the GERD in India, unlike in other major economies where most of it is done by

the business. R&D spending by governments fell regularly during 2000–2018. Business R&D, which had grown from 0.14% of GDP in 2000 to 0.32% in 2008, fell to 0.26% in 2018.

R&D spending by governments is perhaps dictated by their revenues and the priorities in the deployment of resources while business R&D would be influenced by government policies and market forces. There is a strong negative correlation between customs tariffs and business R&D with a correlation coefficient of -0.91 (Fig. 7: page 48), and this is corroborated by industry-level data (Fig. 8: page 49). The observed negative association, however, may not lead to a policy decision. If the elevated tariff reduced the incentive for innovation by firms operating in a relatively sheltered domestic market, tariff reduction might be the way. If, however, the firms – unable or unwilling to spend in R&D – had lobbied for the tariff hikes, then the policy implication would be different. This issue needs in-depth study. To provoke thinking, a suggested hypothesis can be that the decline in business R&D (relative to GDP) after 2008 shows the adverse effect of industrialisation. Using French data, Franck and Galore (2021) note that industrialization triggered a dual techno-cultural lock-in effect characterized by a reinforcing interaction between technological inertia reflected by the persistence predominance of low-skilled-intensive industries, and cultural inertia in the form of a lower predisposition towards investment in human capital. According to these authors, this calls for allocation of resources towards human capital formation and skill-intensive sectors rather than toward the development of an unskilled labour-intensive industrial sector. In the Indian case, exports of the products from unskilled labour-intensive industries declined during the 2012-20 period, while exports of technology-intensive industries products grew (discussed in Section 4.6). The imperative for innovation may be less for these firms when they sell their products mainly in the domestic market.

Among the external sector determinants of productivity, the low growth and high volatility of exports, overall (Section 4.6) did not provide the scale economy. The negative impact of imports on TFP in the long run could be due to efficiency loss in import-competing industries or other inefficiencies elsewhere; however, the gains to TFP growth captured in the error correction model are immense. The position of FDI is somewhat similar. If FDI is domestic market seeking, it may not have much of innovation and not aiding to efficiency in the long run – these aspects need to be verified by firm-level studies; nonetheless, the estimates of this study show that, in the short run, the lagged value of FDI (Ln RFDI (-2)) has a statistically significant positive impact on TFP. FDI data used in the model has been derived by converting the dollar-denominated FDI flows into Rupee and deflating them by GDP deflator. This makes FDI comparable with the dependent variable. Even then, any strong conclusion about the role of FDI is best avoided, given the known shortcomings of the data (Rao and Dhar, 2018).

4.3 Exports

Theoretically, world income and relative price are the two main determinants of exports. Elasticity estimates of recent studies on India's exports vary widely (Table 10). The Rangarajan-Kannan paper argues that "the only policy variable available for adjustment is nominal exchange rate". The HLAG (*op cit.*) says the opposite: "It is often (most often) contended by experts that yes, Indian exports have performed badly but it is due to our exchange rate policy… this is at best a bad (and untrue) excuse…

While one view could be that devaluation of the currency could enhance exports, our analysis shows that this may not be a viable option, or an effective option." (GoI 2019: p.xxi).

The analysis here uses data for 1980–2018 period and Eq. 7 as the base model.

$$\text{Ln } X_t = \alpha + \beta \text{ Ln RGDP}^W - \text{Ln RPX} + \text{Ln MGDP} + \text{Ln RTFP} + \varepsilon \text{ ---------- (7)}$$

Here Ln X is natural log of volume index of India's exports; Ln $RGDP^W$ is natural log of real GDP of the World; Ln MGDP is natural log of imports to GDP ratio (%); and Ln RTFP: natural log of real TFP. Data for 1980–2019 period is used. The rationale for the use of real GDP of world and relative price of exports is the same as in the import demand function. One crucial difference lies in the assumption about supply elasticity. To elucidate the point, the computed value of F statistic of the export equation in conventional form (i.e., with Ln $RGDP^W$ and Ln RPX as regressors) at 2.95 was lower than the lower bound of the critical values, which is a case of no cointegration. It suggests that supply elasticities are not that infinite as one assumes. Inclusion of two additional variables (Ln MGDP and Ln RTFP) make a lot of difference. These two represent competition in domestic product market and efficiency, respectively. Since exports features as an explanatory variable in the productivity equation, it raises the issue of causality. Evidence in this regard is discussed in a separate sub-Section.

Bounds test

The computed value of the F statistic is higher than the upper bound of the critical values at 1% level of significance, which confirms the existence of a cointegrating relationship in levels among the variables with Ln QX as the dependent variable (Table 11).

Table 11
Bounds test for cointegration in ARDL exports equation

Critical value of F statistic at 1% level: restricted intercept and no trend		
	Lower bound	Upper bound
Asymptotic (Pesaran et al 2001)	3.29	4.37
Finite sample (n = 35; Narayan, 2005)	4.09	5.53
Computed F statistic: 17.23		
Number of regressors: 4		
Number of observations: 37		

Long run estimates

The long run coefficients of world GDP, relative price of exports, and imports to GDP ratio have the expected signs and are statistically significant. A 1% increase in world GDP increases India's exports by 2.5% while a 1% increase in the relative price of exports decreases India's exports by 0.6%. The coefficient of TFP is not significant in the long run formulation (Table 12).

Table 12
Long run elasticities from ARDL exports equation

Dependent variable: Ln QX_t		
Explanatory variables	Coefficient	t statistic
Ln $RGDP^W$	2.506*	7.015
Ln RPX	-0.560**	-2.580
Ln MGDP	0.665*	8.051
Ln LNRTFP	-0.756	-1.024
C	-75.817*	-6.684
* Significant at 1% level; ** Significant at 5% level. *** Significant at 10% level.		

Short run coefficients

In the error correction model, the coefficient of contemporaneous change in world GDP is positive and statistically significant while the coefficient of RPX is negative and significant, as expected. Crucial is the statistically significant positive coefficient of the past change in TFP. The coefficient of error correction term is negative and statistically significant, and its size implies that about 40% correction of a deviation from equilibrium happens within a year (Table 13).

Table 13
Error correction representation for the selected ARDL exports equation

Dependent variable: ΔLn QX_t		
Explanatory variables	Coefficient	t statistic
Δ Ln $RGDP^W$	2.010*	4.958
Δ Ln $RGDP^W(-1)$	-1.584*	-3.945
Δ Ln $RGDP^W(-2)$	-1.198*	-3.355
Δ Ln RPX	-0.765*	-9.455
Δ Ln RTFP	-0.385	-0.135
Δ Ln RTFP(-1)	1.012*	3.583
CointEq(-1)	-0.406*	-11.139
Diagnostics		
R^2	0.914	
Adjusted R^2	0.897	
Autocorrelation LM Test (lag 2): F statistic	1.090(0.35)	
Obs*R-squared	3.20(0.20)	
Heteroscadastity (Breusch-Pagan-Godfrey): F statistic	0.345(0.97)	
Ramsey RESET: F statistic	3.992(0.057)	
Jarque-Bera statistic	1.596(0.450)	
* Significant at 1% level.		
Figures in parentheses are p-values		

Diagnostics

The model is free from autocorrelation and heteroskedasticity, and it passes the normality- and specification tests. The CUSUM and CUSUM square plots do not show any instability (page 59). The value of adjusted R^2 indicates that the model explains about 90% of the short run variation in QX.

4.4 Share of World Exports

Equation 8 is the base model for estimating India's share of world exports.

$$\text{Ln } SWX_t = \alpha + \beta \text{ Ln } MGDP_t + \text{Ln } RTFP_t + \varepsilon \text{ ———— (8)}$$

Here Ln SWX is natural log of India's share of world exports, and other variables are as defined earlier.

Bounds test

The computed value of the F statistic being higher than the upper bound of the critical values at 1% level of significance, it confirms the existence of a cointegrating relationship in levels among the variables with Ln SWX as the dependent variable (Table 14).

Table 14
Bounds test for cointegration in ARDL export share equation

Critical value of F statistic at 1% level: restricted intercept and no trend		
	Lower bound	Upper bound
Asymptotic (Pesaran et al, 2001)	4.13	5.00
Finite sample (n = 35; Narayan, 2005)	4.95	6.03
Computed F statistic: 15.11		
Number of regressors: 2		
Number of observations: 36		

Long run estimates

The long run coefficients of Ln MGDP and Ln RTFP have the expected positive signs and are statistically significant. A 1% increase in MGDP increases India's share of world exports by 0.7% while a 1% increase in RTFP increases India's share of world exports by 1.9% (Table 15).

Table 15
Long run elasticities from ARDL export share equation

Dependent variable: Ln QX_t		
Explanatory variables	Coefficient	t statistic
Ln MGDP	0.675*	4.426
Ln LNRTFP	1.945	3.722
C	-1.25**	-2.371
* Significant at 1% level; ** Significant at 5% level.		

Short run coefficients

In the error correction form, the coefficient of one year lag of Ln RTFP is positive but not significant, while the coefficients of its current and other lagged values are negative. The coefficient of error correction term is negative and statistically significant. Its size indicates that about 0.22% correction (of a deviation from equilibrium) takes place within a year (Table 16).

Diagnostics

The model is free from autocorrelation and heteroskedasticity, and it passes the normality- and specification tests. The CUSUM and CUSUM square plots do not show any instability (page 60). The value of the adjusted R^2 shows that the model explains about 57% of the short run variation in SWX.

Improvement in competition in domestic market and productivity assisted the increase in India's export share during 1990–2011; erosion in competition (manifested in the decline in imports-to-GDP ratio) and drop in TFP growth (since 2017) stalled the improvement in India's export share. Export market-share once lost takes time to regain: this is what the small size of the error correction term indicates. Admittedly, there are other determinants of export market share (such as, infrastructure and government policies, *etc.*) that have not been covered here due to the non-availability of data.

Table 16
Error correction representation for the selected ARDL export share equation

Dependent variable: ΔLn QX_t		
Explanatory variables	Coefficient	t statistic
Δ Ln RTFP	-0.319	-1.142
Δ Ln RTFP(-1)	0.060	0.201
Δ Ln RTFP(-2)	-0.830*	-2.860
Δ Ln RTFP(-3)	-0.912*	-3.145
CointEq(-1)	-0.223*	-8.181
Diagnostics		
R^2	0.622	
Adjusted R^2	0.573	
Autocorrelation LM Test (lag 2): F statistic	1.677(0.20)	
Obs*R-squared	4.113(0.13)	
Heteroscadastity (Breusch-Pagan-Godfrey): F statistic	1.112(0.38)	
Ramsey RESET: F statistic	2.414(0.13)	
Jarque-Bera statistic	1.057(0.59)	
* Significant at 1% level.		
Figures in parentheses are p-values		

4.5 Results of Pair-wise Granger Causality Tests

There is unidirectional Granger causality running from exports to imports, and this reinforces the conclusions from the import equation. Causality runs from productivity to exports, and this is consistent with the evidence from the error correction form of the export equation. Causality runs from imports to productivity, from imports to manufacturing value added (MVA), and from imports to GDP. Causality also runs from exports to GDP (Table A.2: page 57).

4.6 Technology-intensity, commodity prices, and export growth

Reduced innovation efforts adversely impacted exports via productivity as discussed earlier. Technology is a significant determinant of garment exports; lack of proper clusters and linkage with global value

chains affect the exports (Gupta, 2018; Ray, 2019; Ray and Miglani, 2020). Role of technology can be gauged from commodity-wise data. Overall growth rate of exports of goods in dollar terms fell to 0.6% per annum during 2012-20 (from 22% during 2002-12): exports of medium-high and high technology (MHT) products grew, and the changes were relatively stable; exports of non-MHT products declined, and the changes were volatile mainly due to commodity prices (Table 17).

4.7 Did India's exports suffer due to the slowdown in global economy?

It is often argued, even in empirical studies, that the recent slow growth in India's exports was due to the slowdown in global economic activity. This argument is not assisted by data. The average growth of world GDP (2015 $) at 3.0% during 2012–2019 was only marginally lower than the growth recorded during 2002–2011, and this would account for very little of the reduction in the growth rate of India's exports (Table 17).

Table 17
Changes and volatility of exports according to technology-intensity, India

				(%; US$)
Products/groups	**2002-03 to 2011-12**		**2012-13 to 2019-20**	
	Mean	**CV**	**Mean**	**CV**
MHT products	**23.6**	**47**	**6.1**	**100**
Chemicals	20.6	45	5.9	157
Pharmaceuticals	23.5	37	8.6	65
Non-electrical machinery	22.2	65	8.9	103
Electrical machinery and electronics	27.5	93	4.7	344
Transport equipment (except ship, boats, etc.)	30.9	53	4.7	232
Optical/photographic/medical instruments	20.3	32	7.4	51
Non-MHT products	**21.6**	**53**	**-1.3**	**-655**
Of which:				
Meat and edible meat	28.7	49	2.7	584
Marine products	12.0	156	9.7	192
Coffee, tea, mate and spices	16.9	89	1.1	493
Cereals	27.4	162	4.1	654
Ores, slag and ash	35.7	165	11.9	608
Petroleum products	41.4	66	-1.0	-2003
Plastic and rubber products	22.4	73	3.5	297
Hides, skin, leather and leather articles	9.1	111	-0.1	-7098
Cotton	19.6	131	-4.3	-319
Textiles	14.4	53	0.8	778
Apparel	11.5	70	2.1	309
Gems and jewellery	21.5	74	-3.2	-185
Metals	25.8	101	2.6	586
Ship, boats and floating structures	90.4	90	1.2	3562
Total Export	**22.0**	**49**	**0.6**	**1268**

				(%; US$)
Memo:				
Volume of India's exports	13.8	63.1	3.2	113.1
World GDP (2015 US$)	3.1	57.7	3.0	9.7
World commodity price (index: 2016 = 100)#	13.9	115	-4.4	-305
CV: Coefficient of Variation.				
Source: Ministry of Commerce and Industry; IMF (WEO); Author's computations.				

4.8 Other Factors

Several non-MHT exports originate from micro, small and medium enterprises (MSMEs), where activity is impeded due to inadequate infrastructure, absence of formalization, lack of backward/ forward linkages, lack of credit, low technology, *etc*. (Das, 2008 and 2017; Bhattacharya, 2013; Nair and Das, 2019; RBI, 2019a). Financing constraints are a significant binding factor for exports even for firms with access to internal capital markets (Mukherjee and Chanda, 2021). Exports of agricultural products suffer due to frequent changes in various form of non-tariff barriers. “Such short-term policy options may settle the current crises but have long term impact on trade relations” (GoI 2017, 101).
[3] Data on India’s SAMT for 1994, 1995, 1998 and 2014 have been interpolated.

5. Economic Slowdown During -20: Received Wisdom And An Alternative Hypothesis

The slowdown was initially viewed as a ‘soft-patch’ that could be looked through or was believed to be cyclical. As the problem persisted for a long time, it was thought to be structural. It is even argued that the slowdown was both cyclical and structural. Cyclical slowdown needed short-term policy action, while structural slowdown called for long-term reforms (Lahiri, 2019); solution to the ‘four balance sheet problem’ is also emphasised (Subramanian and Felmen, 2019). The ‘weak demand’ thesis derived its strength from episodes of ‘collapse’ in the growth of GFCF and PFCE. It is argued that the revival of economic growth will critically depend on the demand generation by direct government fiscal action (Mukhopadhyay, 2021).

5.1 Was the Slowdown Part of a Global Cyclical Downturn?

This hypothesis emanates from MVA. The size and shape of the “cycles” in MVA in recent times being very different from the ones noticed earlier (Fig. 9: page 50), its validity is questionable.

Global Comparison

Growth of global MVA decelerated during 2018–2019, mimicking OECD. Trends were somewhat similar in ASEAN but different in other major Asian countries. Growth fell in China during 2012–2019 while in Bangladesh, it was an improvement. In Pakistan, growth improved from 2016 to 2018, but fell steeply in 2019. In India, 2017 was a 'trough' (unlike the global peak) flanked by two other peaks – 2015 and 2018 (Fig. 10: page 51).

Value Added, Output, and Exports of Manufacturing

These variables had cycles of their own (Fig. 11: page 52). The decline in all of them in 2019-20 was a rare confluence. There were differences in earlier years. In 2015-16, exports dipped due to global commodity prices: the deceleration in manufacturing output was consistent with this position; the surge in MVA was a departure. In 2018-19, exports of manufactures grew 9.8% in dollar terms (same as in 2017-18): the huge surge in output and deceleration in MVA were deviations. Subramanian (2019) reports a negative coefficient of correlation (-0.3) between MVA and exports with one quarter lag in the post-2011 period as against a positive (0.4) in pre-2011. In the annual data for 2012-20 period, the coefficient of correlation between manufactured exports and MVA was negative (-0.2), but the correlation between exports and output was positive (0.6 using NAS output, and 0.5 using IIP).

Growth of MVA and Non-MVA

Macro-level GVA net of MVA (or non-MVA) shows a slowdown, nothing cyclical in it (Fig. 12: page 53). While the trends in MVA appear to be peculiar, the trends in a couple of non-MVA activities were similar to that in MVA (discussed in sub-Section 5.4).

5.2 Was It Due to Weak Demand?

Demand was not weak during 2017-19, with consumption growing at 7.1% and GFCF at 9.5%. In 2017-18, the slowdown on the demand side reflected the surge in negative net exports, while in 2018-19, it was mainly due to the reduction in discrepancies. In 2019-20, however, all the major components of demand showed a sharp deceleration (Table 18).

The genesis of the 'weak-demand' thesis can be traced to the low growth of PFCE in Q1:2019-20 (3.1%) in the provisional data. The data got revised, growth improved (5%), but the impression created by the initial data thrives, with commentators citing anecdotes on rural distress to make the point. Rural distress is an important issue, but economic slowdown during 2017-20 was due to other reasons. Investment too had an episode of "collapse", as the growth rate of GFCF fell to 3.6% in Q4:2018-19 from over 10% in several preceding quarters. In fiscal 2019-20, GFCF posted a growth of 1.6%, down from 11.2% in 2018-19. What happened? In the data for 1994–2019 period, GVA in construction (the main component of GFCF), GFCF, and investment rate (gross capital formation as % of GDP at current prices) moved with steel prices. Non-econometric simulation showed that a 20% increase in steel prices (controlling volume and other prices) leads to a 13.3% increase in GVA in construction at current prices, and that in constant price estimates by 7.4%. When steel prices decline by 20%, current price estimates fall by 13.3%, and constant price estimates by 8.3%. The increase/decline of GVA in construction is a 'windfall' (Mallik 2019, 53).

In NAS, the estimates of GVA in construction and macro-level GFCF are prepared by the “commodity flow” method while sectoral estimates of GFCF are partly based on accounts. The commodity flow method serves well when value added to output ratios are stable. This condition will not be satisfied in a situation of sharp movements in relative prices, rendering the estimates unrealistic. In 2015-16, for instance, growth of macro-level GFCF was relatively low (6.5%) and investment rate fell by 1.4 percentage points due to the dip in steel prices, even though GFCF in public- and private corporate sectors (estimated by analysis of accounts) grew 19% each; GFCF in household sector (a residual, after subtracting other two from the total) fell by 12%. The opposite trends were noticed in 2017-18. The patterns in 2019-20 were somewhat like 2015-16: growth rate of macro-level GFCF decelerated and investment rate fell by 3 percentage points partly due to steel prices: public sector GFCF declined, broadly in line with the slowdown in governments’ capital expenditure; growth of GFCF improved in private corporate sector, consistent with deployment of funds. GFCF in household sector – recipient of the residual – declined by 2%. The key point is that the improvement in private corporate sector investment negates the demand concerns from the investment side (Table 19).

Export performance eroded during 2011-20 due to policy-related or structural factors as explained earlier. In 2019-20, the sharp decline in commodity prices depressed the dollar-value of exports and imports, aggravating concerns about weak external- and domestic demand. Discrepancies represent the gap between the demand and supply sides of GDP. While its reduction is a welcome development, its sheer size (₹ 4.4 trillion or 3.4% of GDP in 2017-18) and year-to-year variations pose a problem in the assessment of the demand side.

5.3 Was the Slowdown Structural?

Growth of macro-level GVA fell from 7.7% during 2014-17 to 5.3% during 2017-20. Growth during 2017-20 was below 5% in six sectors: agriculture; mining; manufacturing; construction; transport, storage, communication & services related to broadcasting; and financial services (Table 20).

There are several structural issues in agriculture that policy-makers are grappling with, but then the growth rate of agricultural GVA improved to 4.7% during 2017-20 from 2.4% during 2014-17. Suffice to say that agriculture was a contributor to economic growth during 2017-20, not to its slowdown. In mining, volume growth measured by IIP during 2017-20 was close to the rate recorded during 2014-17. It implies that the decline in mining GVA was due to price movements. That apart, the activity in mining, manufacturing, and ‘real estate real estate, ownership of dwelling & professional services’ was impacted due to import restrictions (discussed in Section 5,.4). The low growth in construction was statistical, not structural. Within ‘transport, storage, communication & services related to broadcasting’, transport posted a decent growth during 2017-20 while storage staged an improvement; growth fell sharply in ‘communication & services related to broadcasting’. Recent years were witness to the entry, exit and merger of service providers in telecom. The number of wireless telephone service providers fell from 12 in 2015-16 to six in 2019-20, three of them posting a decline in subscriber base in 2019-20 (Telecom Regulatory Authority of India, Annual Report, 2019-20).

Two of the popular narratives (cyclical downturn and weak demand) are illusions, thanks to the weak official data and wayward global commodity prices. Problems in exports would appear to be structural. Structural constraints to the activity of MSMEs are known. This paper has argued that erosion in competition and subdued productivity growth hampered India's export performance, post-2011. Issues in financial services (non-performing loans, poor governance, etc.) are known. With delusions permeating the policy debate, these issues didn't get the attention they deserved.

5.4 Towards an alternative hypothesis

Evidence in Section 4 provide the foundation for the argument that the import restrictions and erosion in the position in some of the crucial long-term determinants of growth slowed economic growth in India via productivity and export performance. A few stylised patterns on the growth juxtaposed with the import restrictions are presented here as the elevation of the argument. Industrial inputs (capital goods, intermediate goods, and raw material) accounted for 87.4% of India's imports in 2019 (World Bank, WITS database). Manufacturing is the main (immediate) user, accounting for about two-thirds of total imports (NSO, *Supply and Use Tables, 2015-16*). Import-intensity is also high in two other sectors: mining & quarrying, and real estate, ownership of dwelling & professional services.[4] Combined GVA of the three (which together accounted for 36% of total GVA in 2019-20 and 94% of total imports in 2015-16) posted a growth of 3.8% during 2017-20, roughly a third of the rate recorded during 2014-17. GVA of non-import-intensive activities grew at 6.2% during 2017-20, as rapid as it did during 2014-17. Comparison among the import-intensive activities shows that the change in growth rate (2017-20 over 2014-17) was inversely related to import-intensity. Import-intensive activities got hurt first: by 2019-20, the adverse impact of import restrictions was visible in the non-import intensive segment as well due to intersectoral linkages (Table 21).

[4] Import-intensity of 'real estate, ownership of dwelling & professional services' owes mainly to other business services, information on which separately available in the Supply and Use Tables but not in NAS.

6. Conclusions

The merits of trade are known to the mankind. An ancient Sanskrit verse says: *Vanijye Vasate Lakshmi, Tadardham Krushikarmani, Tadardham Rajasevayam, Bheekhsayam Naiba Naiba Cha*. It means *Lakshmi* (prosperity) dwells in trade, half of it in agriculture, half of it in serving the king (government), and not at all in begging. Obstructions in the abode of Goddess *Lakshmi* would lead to hardship! This was India's experience earlier. "Economists have likened free trade to technological progress: although some narrow interests may be harmed, the overall benefits to society are substantial" (Irwin, undated). In the re-experimentation, hikes in tariffs and surge in the use of anti-dumping measures make it a phenomenon of 'foreign trade on the reverse gear', although there is no apparent dilution in the emphasis on exports. Its impact on economic activity is a key ingredient of the answer to the three policy questions: (i) Monetary policy failed to boost economic growth during the period studied due to three reasons: a) subdued productivity growth owing to the import restrictions and the erosion in the position some of the

crucial long-term determinants of growth; b) methodological rigidities distorting macro data; and c) banks' reluctance to lend. The first two have been explained. On the third, it may be mentioned that monetary policy succeeded in reducing the lending rates, that didn't lead to credit expansion.[5] Private corporate investment in 2019-20 was financed mainly by resources from abroad (Table 19). (ii) The enigmatic 'reforms without growth' is a display of the ill effects of the import restrictions and the erosion in the long-term determinants of growth militating against the benefits of reforms implemented, and weak official data. (iii) Manufacturing was severely hurt due to the import restrictions: the fate of two other import-intensive sectors (mining & quarrying, and real estate, ownership of dwelling & professional services) was similar. Exports suffered during the period after 2011 mainly due to the erosion in competition in domestic market and the subdued productivity. The argument that the recent slow growth in India's exports was due to the slowdown in global economic activity is not supported by data.

Education, innovation and competition are crucial determinants of productivity. In education, there is a need for deploying adequate number of teachers, among other things. The key to improving innovation and competition lies in doing away with the strategy of promoting domestic industrial activity by putting restrictions on imports: such a strategy might benefit some interest-groups, but it has harmful consequences elsewhere. The Union Budget for 2021-22 had spelt out the modalities of a 'National Research Foundation' with an outlay of ₹ 50,000 crore, over 5 years, to strengthen the research ecosystem of the country. Whether an amount of ₹ 10,000 crore a year (0.05% of GDP) would meet the objective is open to question. R&D intensity is awfully low in agriculture, mining, leather, textiles, and food products, where the activity seems to be thriving under the high tariff walls (Fig. 8). Governments' R&D expenditure, where they are the sole or main spenders (e.g., agriculture, education and human health) would need a big leap. Private sector should increase its R&D expenditure, matching business' in major economies. Why business R&D spending (relative to GDP) declined in India after 2008 would call for detailed firm-level evidence for policy to reverse the trend.

Current projections by international institutions place India's medium-term growth at about 6%. In a country that is home to 18% of the humanity living with 3% of global income, the need for rapid economic growth does not need elaboration. In the past decade, growth had improved from 5.9% during 2012-14 (policy paralysis years) to 7.9% during 2014-17 enabled by policy reforms, but fell to 5.7% during 2017-20 due to lower productivity and 'weak data' (not 'weak demand'). With the commodity flow method in place, steel prices remain a source of uncertainty for the growth outcome. If better method is deployed, and efforts are made to raise the productivity growth in the Indian economy by working on the factors flagged in the paper, it may be possible to take the GDP growth to a higher trajectory (8% or more), assuming normal monsoon and absence of pandemic-related restrictions.

[5] The weighted average lending rates on fresh rupee loans of scheduled commercial banks fell from 9.73% in 2018-19 to 8.79% in 2019-20. The increment of non-food bank credit shrank from ₹ 9.4 trillion in 2018-19 to ₹ 5.8 trillion in 2019-20 (RBI, *Handbook of Statistics on Indian Economy, 2020-21*).

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Tables

Table 10, 18, 19, 20 and 21 are available in the Supplementary Files section.

Figures

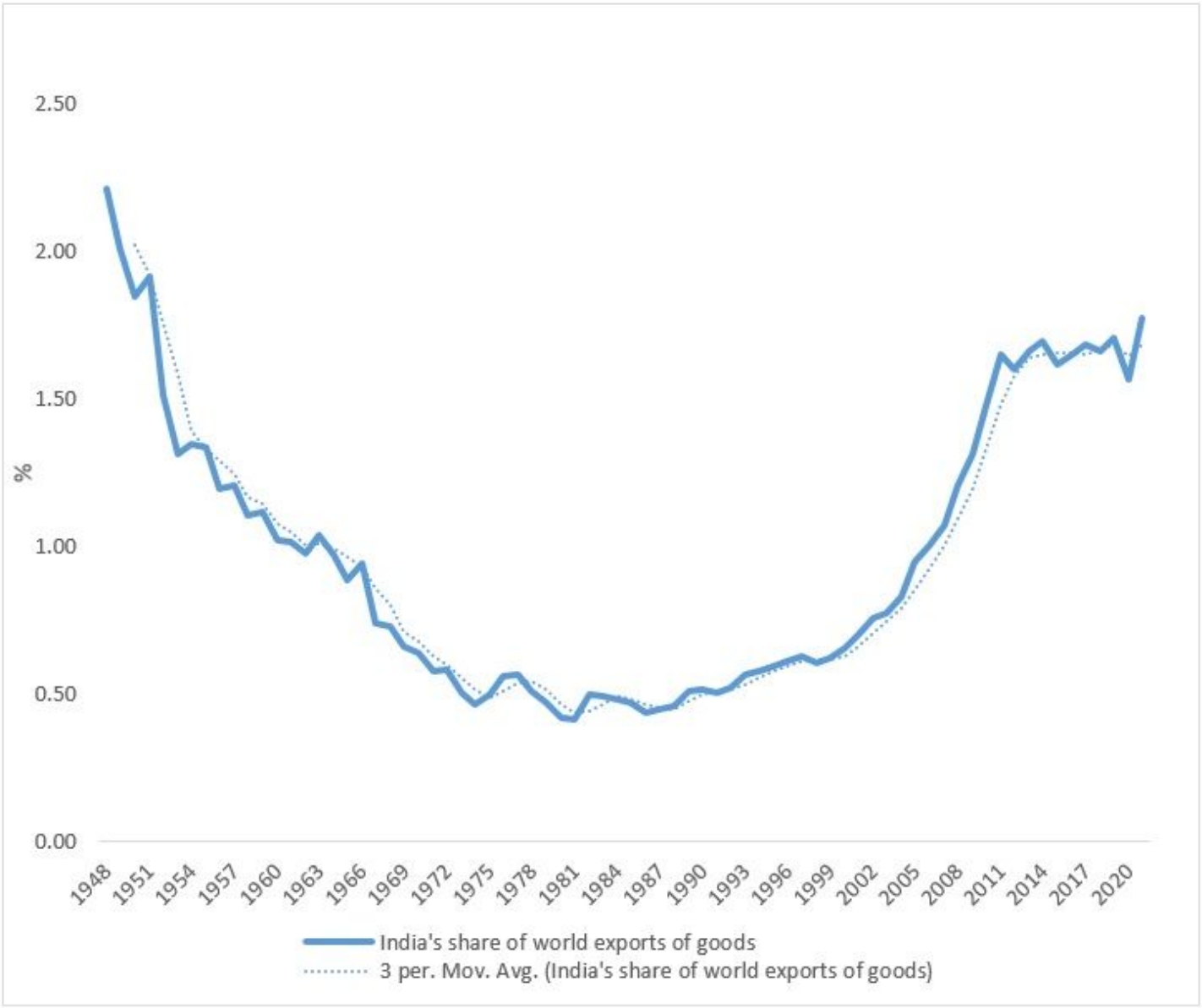

Figure 1

India's Share of World Exports of Goods

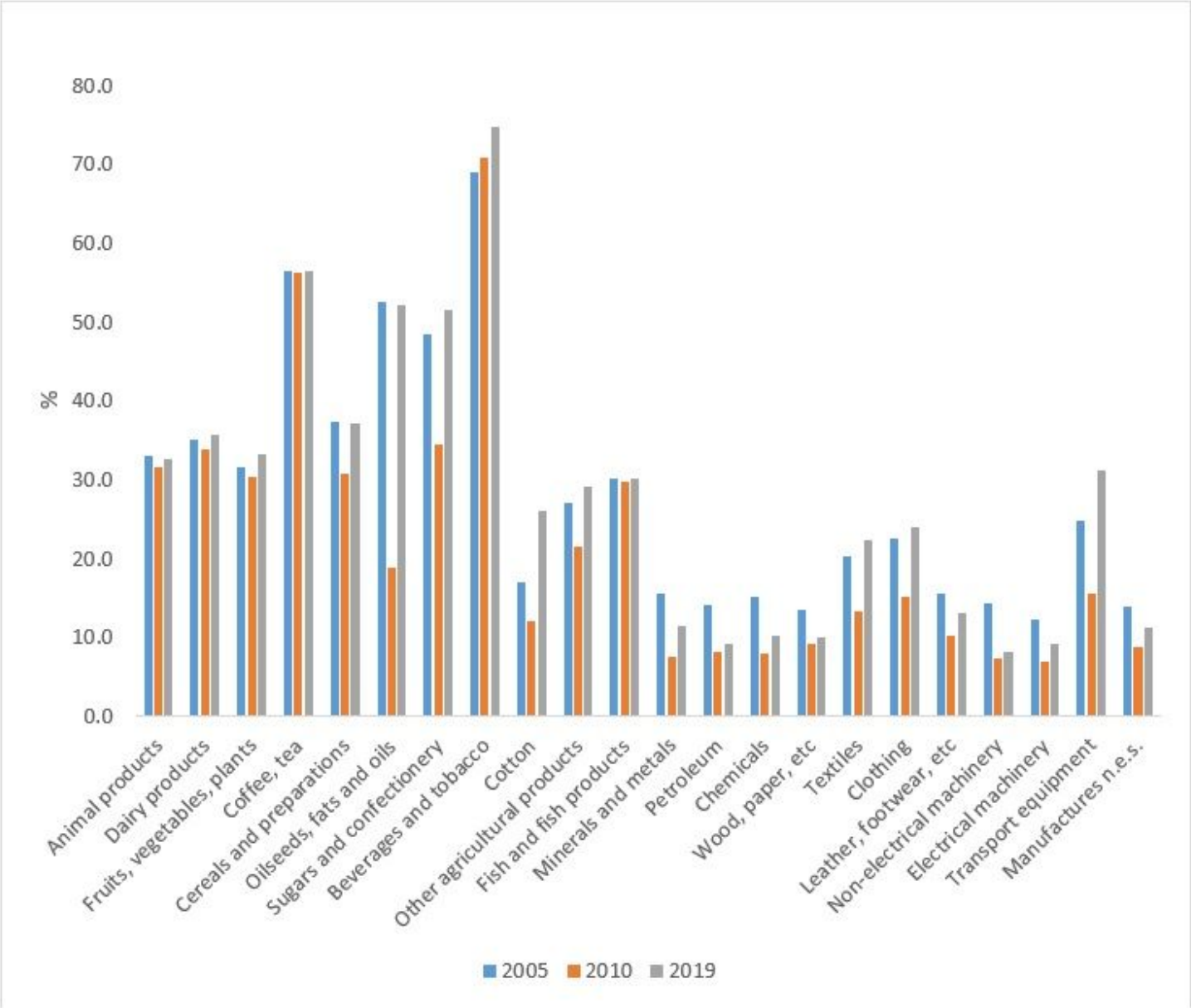

Figure 2

Simple Average MFN Tariff in 22 Product Groups, India

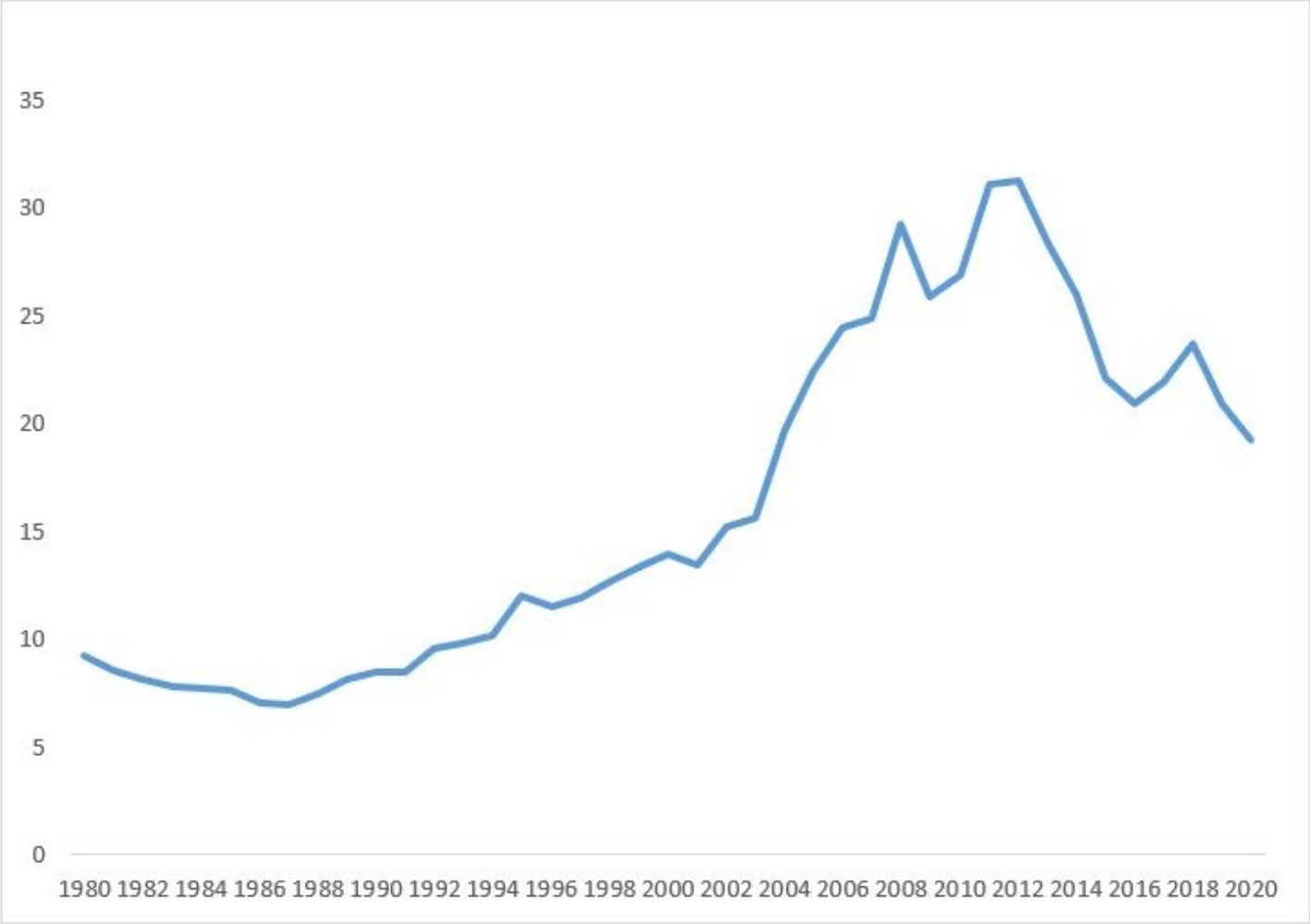

Figure 3

Imports of Goods and Services (% of GDP), India

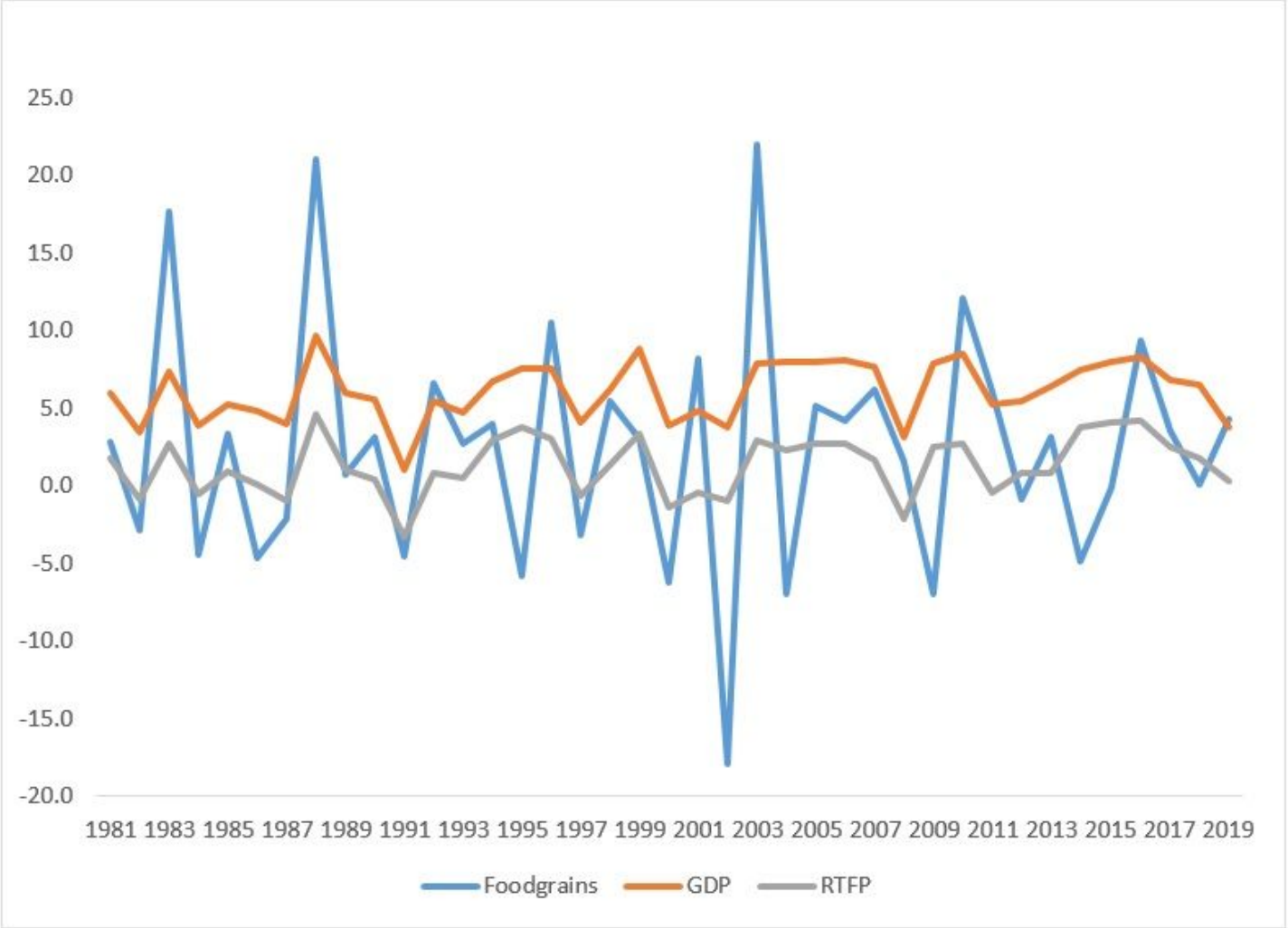

Figure 4

Changes in Output of Foodgrains, GDP and TFP, India

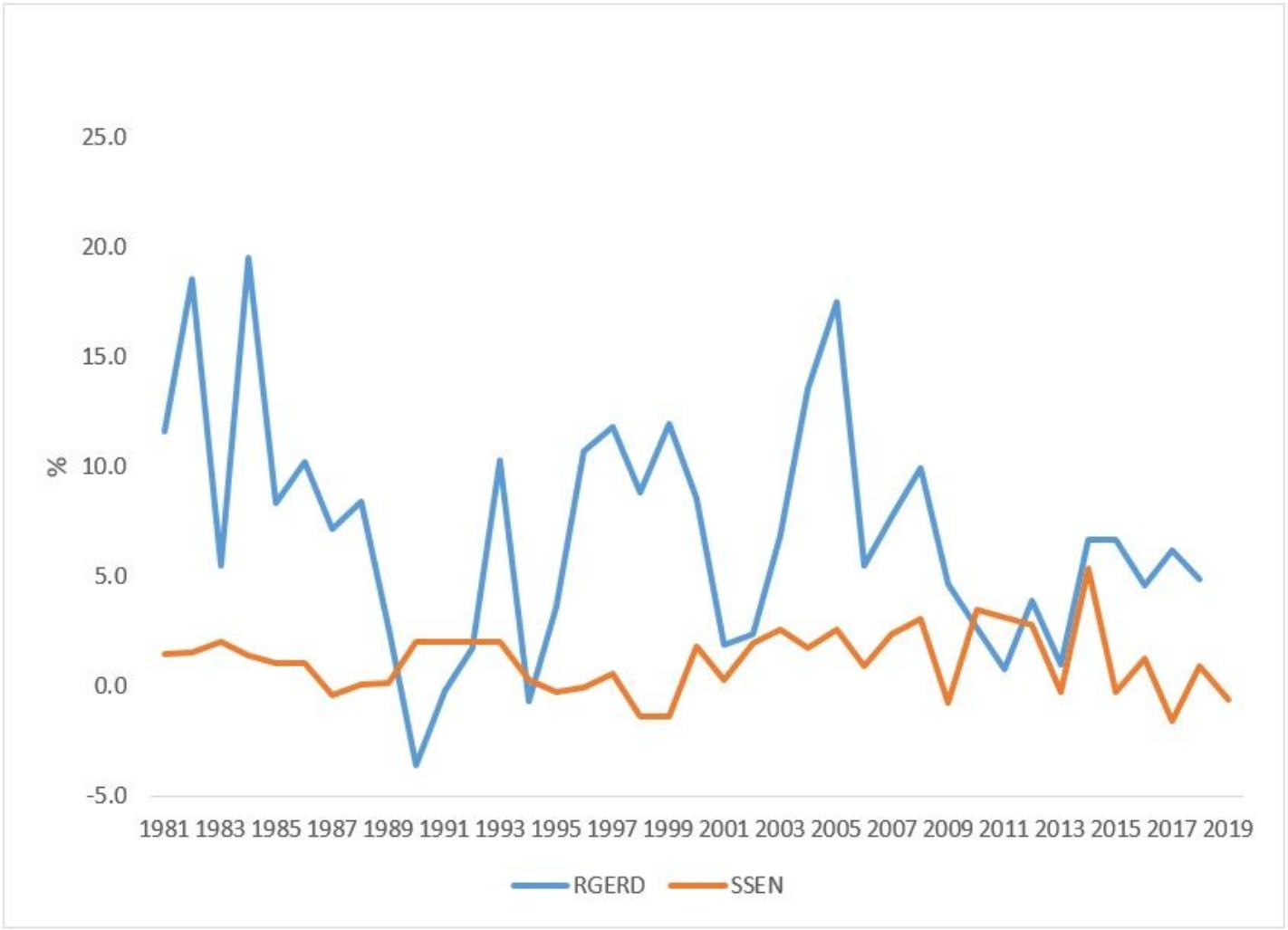

Figure 5

Changes in Real Gross Research & Development Expenditure and Gross Secondary School Enrolment, India

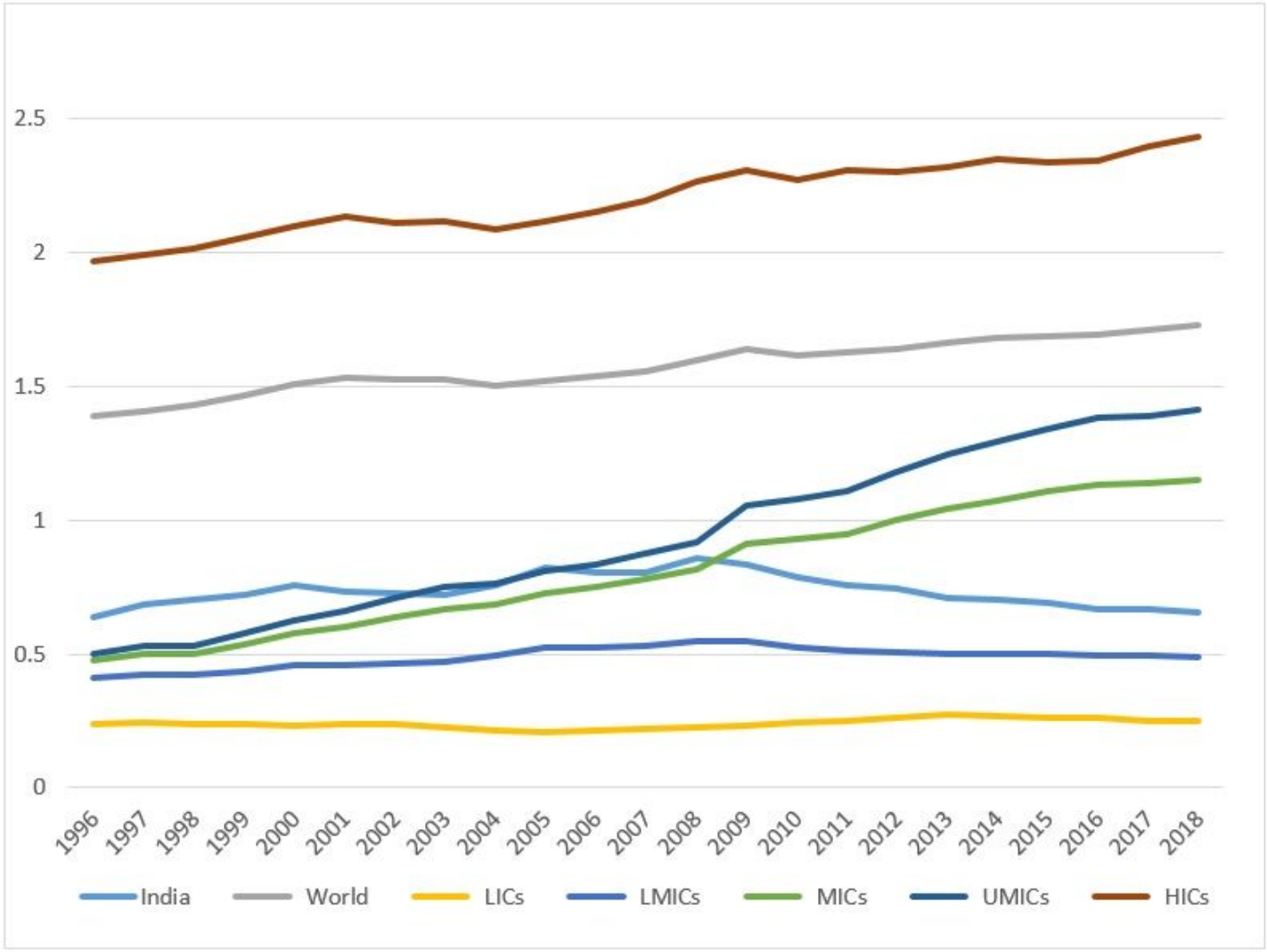

Figure 6

R&D expenditure (% of GDP), India and Select Country Groups

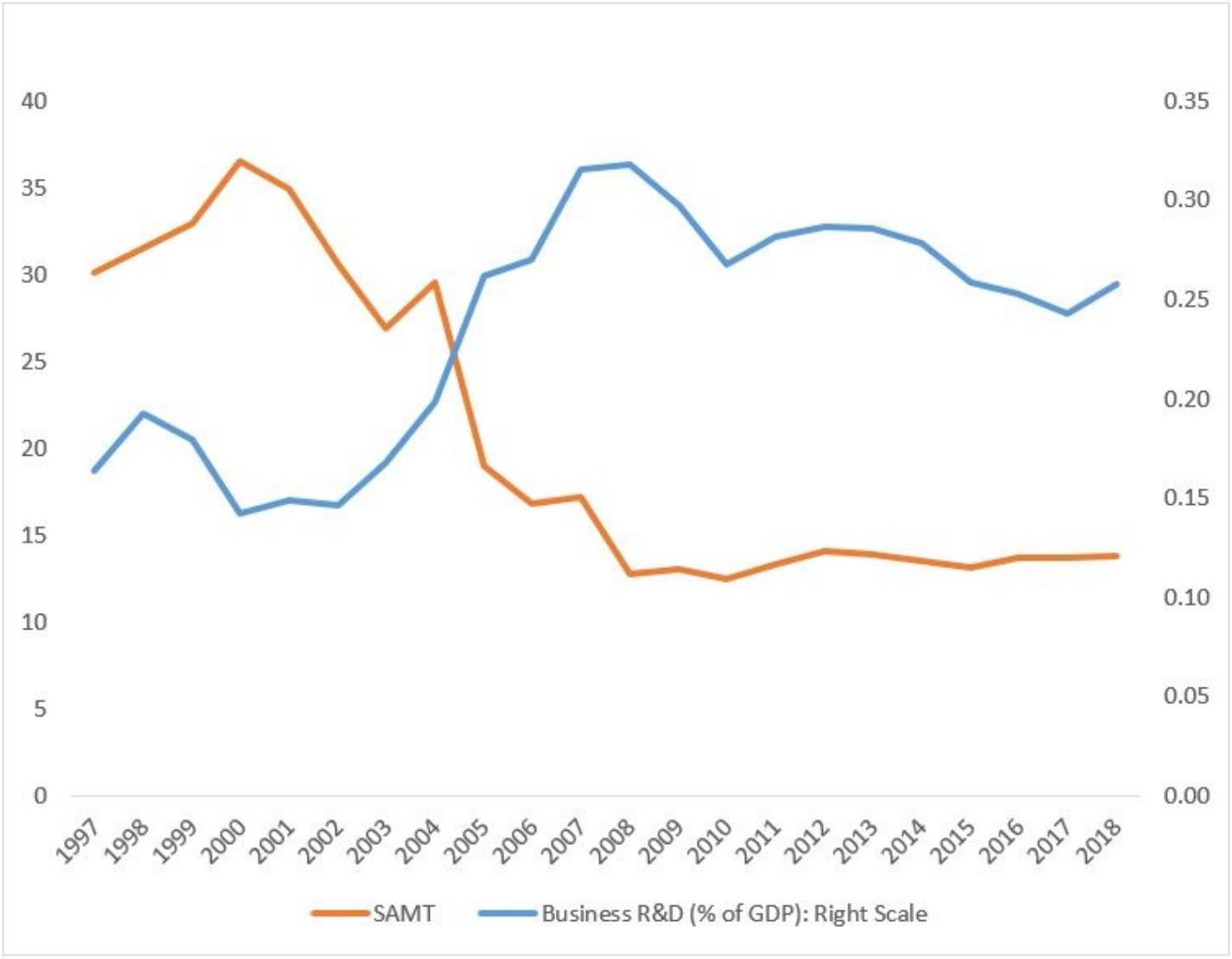

Figure 7

Customs Tariff and Business R&D Expenditure

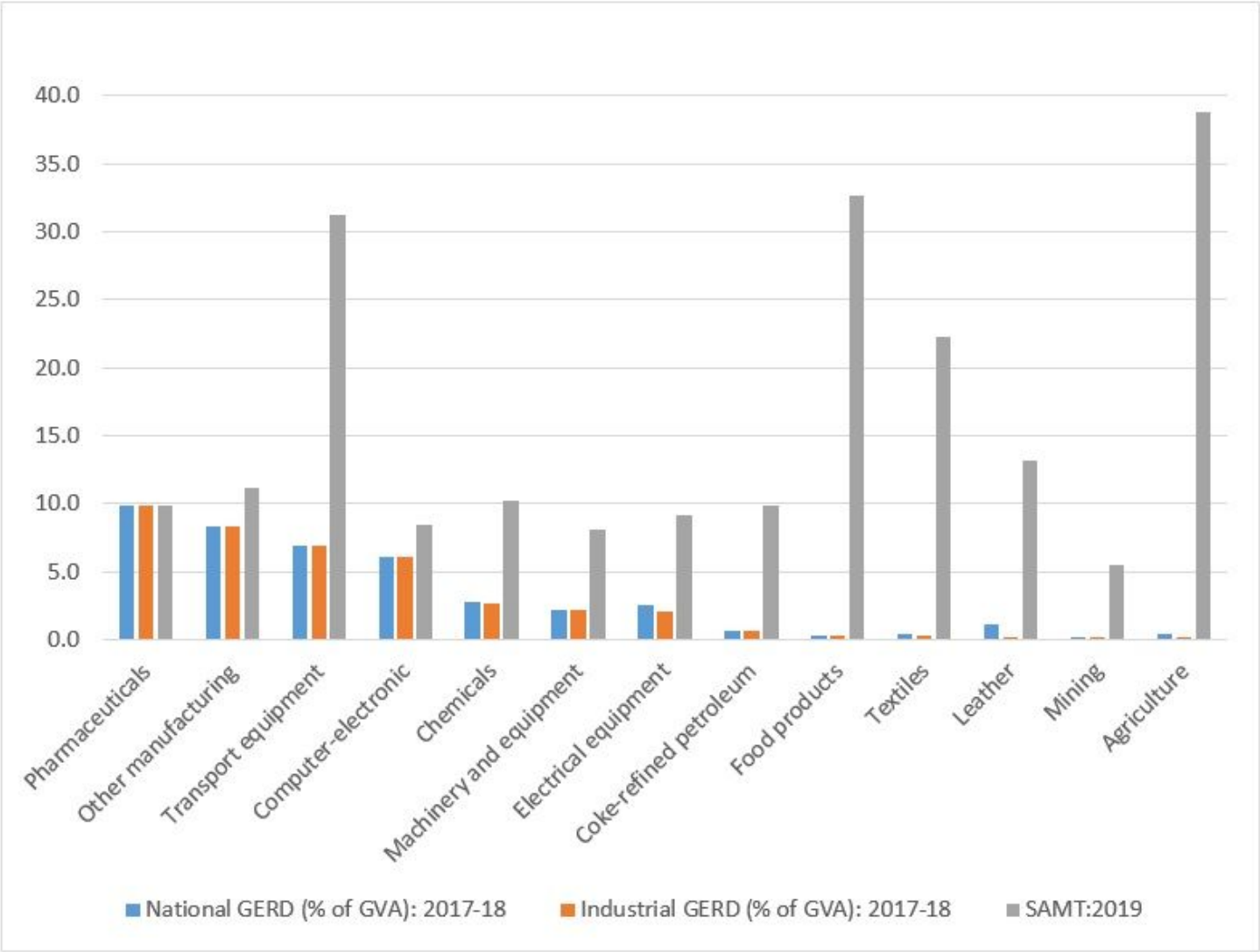

Figure 8

Activity-wise R&D Intensity and Tariff, India

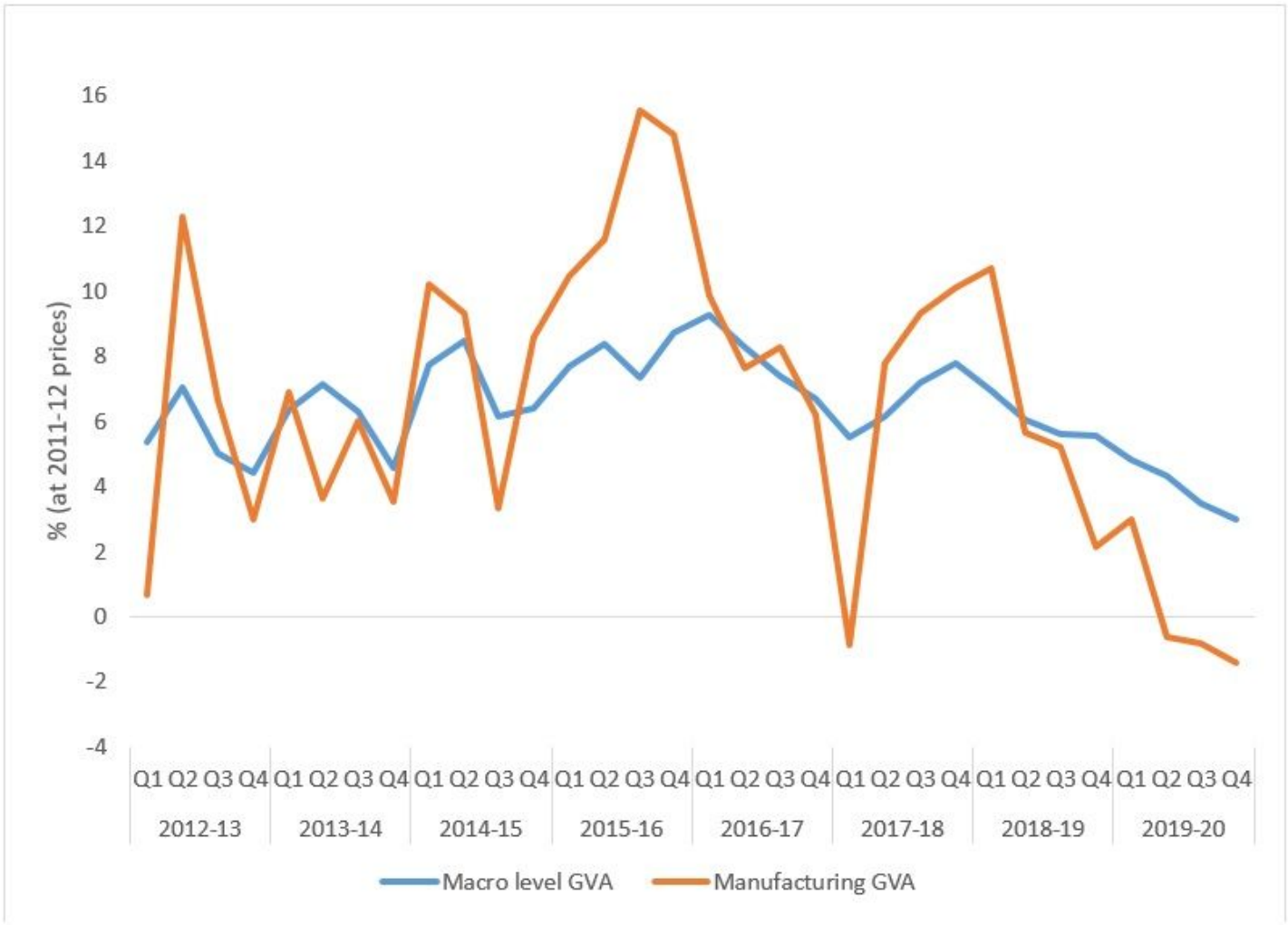

Figure 9

Growth Cycles in Quarterly Data, India

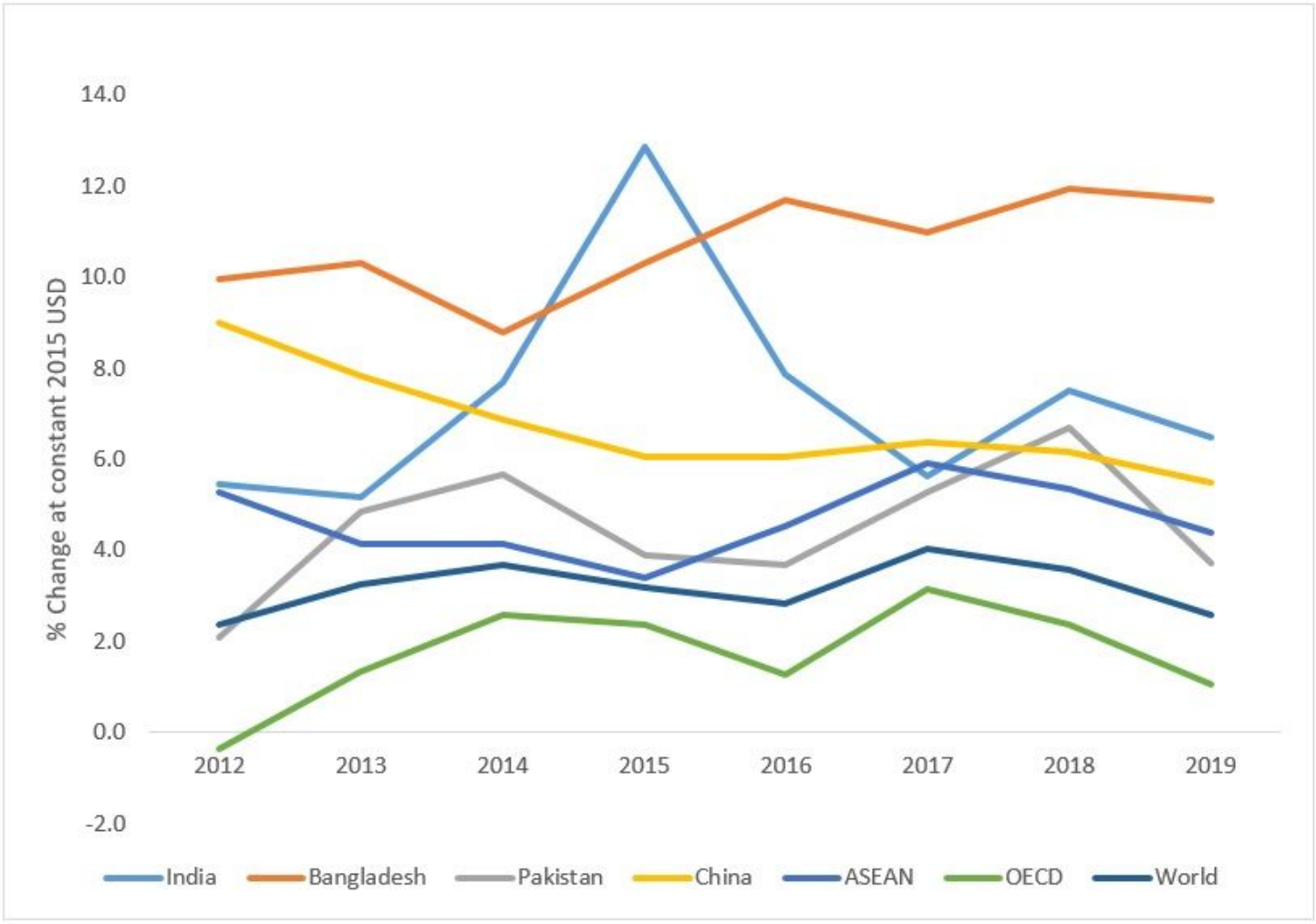

Figure 10

Changes in MVA, India and Select Countries/Groups

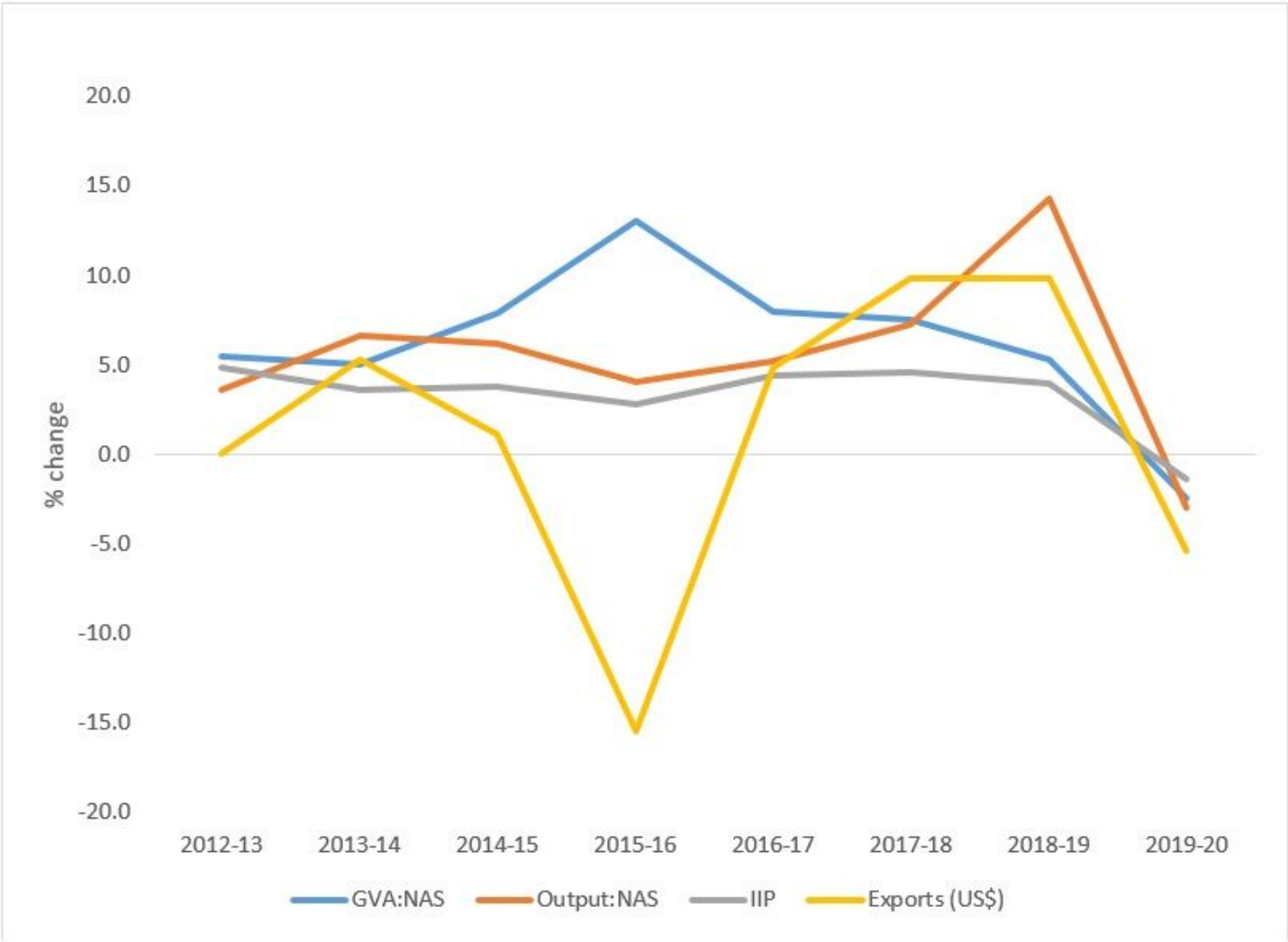

Figure 11

Alternative Growth Cycles in Manufacturing, India

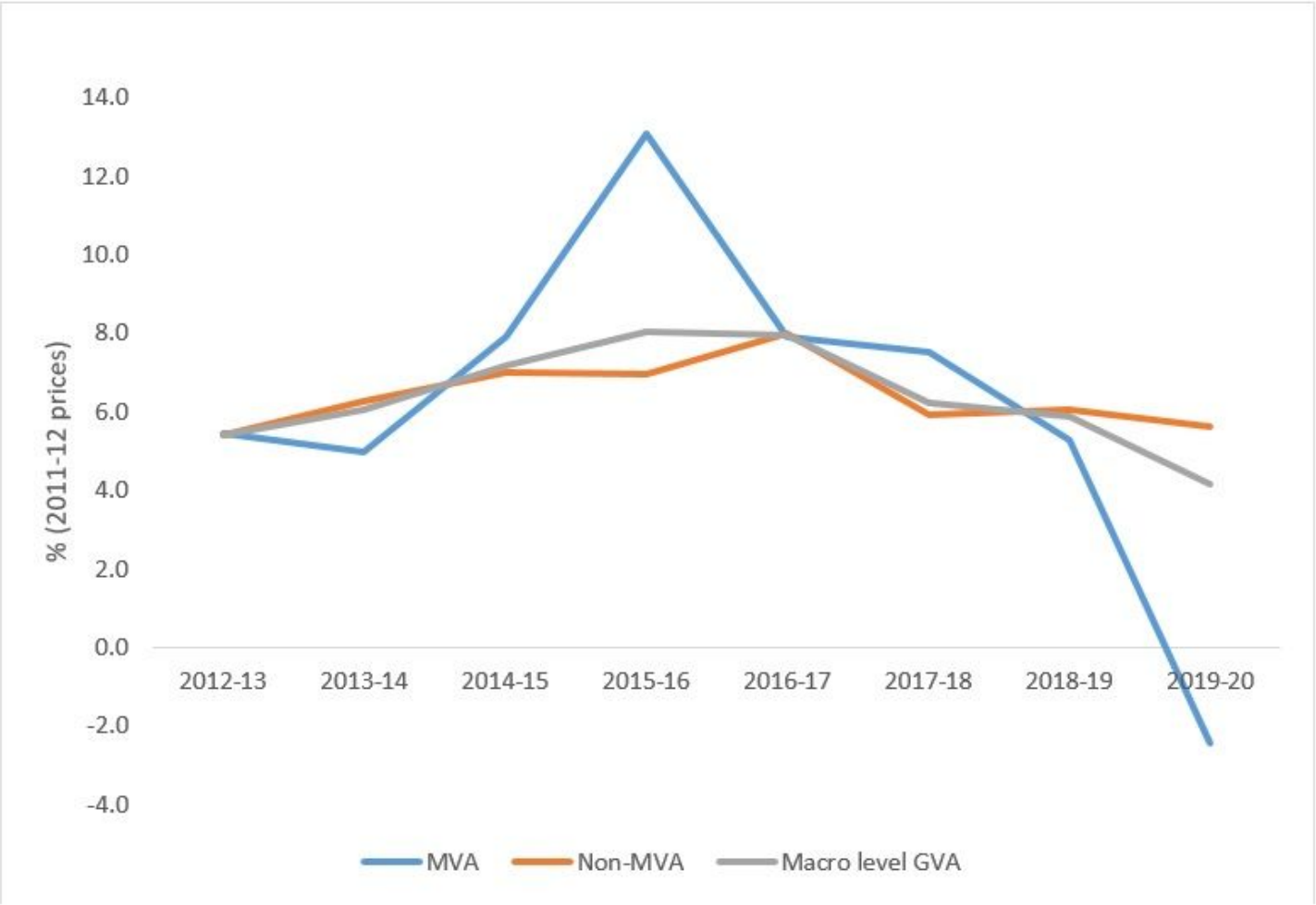

Figure 12

Changes in MVA, Non-MVA and Macro Level GVA, India

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Supplementarydoc.docx
- Tables.docx