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What Drives India's Exports and What Explains the Recent Slowdown? New Evidence and Policy Implications[§]

ABSTRACT The role of exports in India's growth dynamics over the last two decades has been consistently under-appreciated. India's export surge in the mid-2000s was a key driver of the high GDP growth experienced during that time. Conversely, the sharp fall-off in exports growth (both gross exports and domestic value addition) over much of the last six years has been an important driver of India's GDP growth performance in recent years compared to the mid-2000s. So why have Indian exports slumped in recent years? To ascertain this, we analyze the determinants of India's exports and estimate their "income" and "exchange rate" elasticities during 2004–17. We find that (a) both global growth and exchange rates are important determinants of India's export dynamics, (b) these elasticities have attenuated in recent years (consistent with de-globalization and lower domestic value addition in India's export basket), and (c) there is a significant heterogeneity of elasticities across sectors, which explains the changing composition of India's export basket. Against these results, our model explains the significant slowing of exports in recent years. In particular, we find that the sharp 20 percent appreciation of the real exchange rate between 2014 and 2017 has impinged on export competitiveness. We posit that the real appreciation was the inevitable upshot of the large, positive terms-of-trade shock that India experienced from lower oil prices, suggesting that India was afflicted by Dutch disease. Exports began to recover in 2018 in conjunction with some depreciation of India's real effective exchange rate (REER).

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[§] This paper was presented at the India Policy Forum in July 2018. In subsequent months, a back-casted GDP series for the previous decade was released. However, only annual data are available in the back-casted series. Since the analysis in this paper is based on quarterly data, the authors continue to use the old series. To be sure, all recent revisions to the new GDP series have been incorporated. Finally, use of either series does not change the qualitative results and implications of the paper. The authors gratefully acknowledge comments from participants at the NCAER 2018 India Policy Forum, particularly from the discussants, Surjit Bhalla and Kenneth Kletzer.

Assuming oil prices continue rising and the positive terms-of-trade shock continues to reverse, the equilibrium real exchange rate will depreciate further and help improve competitiveness. Policymakers must not fight such a depreciation, but ensure that it is calibrated and not disruptive. Fiscal policy must not become expansive and offset this real depreciation. More fundamentally, India should pursue supply side reforms to improve its current account deficit, and, with export prospects dimming, seek other growth drivers for the foreseeable future.

Keywords: India, Exports, Exchange Rate, Income Elasticity, Price Elasticity, Dutch Disease

JEL Classification: F10, F14, F32

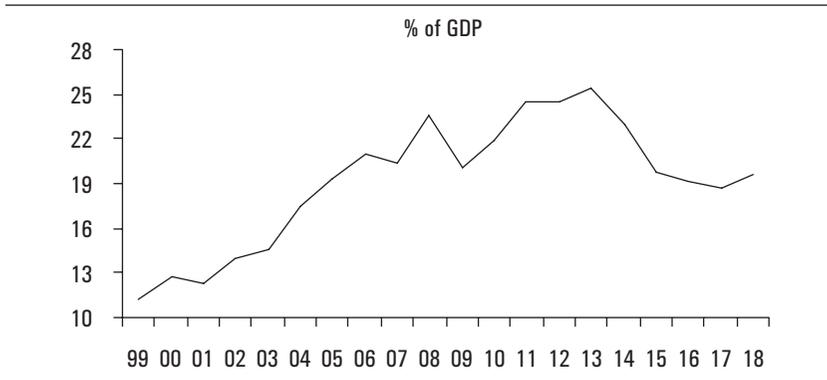
1. Introduction and Motivation

Over the last decade, there has been a growing appreciation of India's financial integration with the rest of the world. Foreign direct investment (FDI) levels have increased in the recent years and are a major source of financing for the economy's current account deficit (CAD). Similarly, foreign portfolio participation into the equity and debt markets has progressively increased and has provided much-needed liquidity and a more diversified investor base. More generally, asset prices in India are increasingly correlated with global asset prices—the ultimate manifestation of India's progressive financial integration.

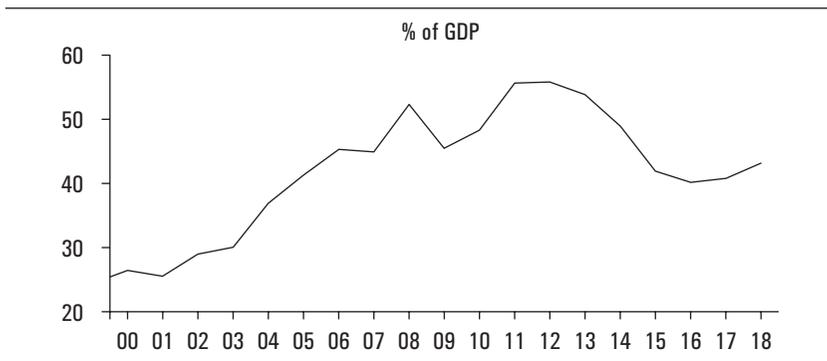
Paradoxically, however, this integration is most often appreciated during adverse shocks. It is in the “sudden stops” or “sudden outflows” of capital that India has episodically witnessed (the Global Financial Crisis in 2008, the European sovereign debt crisis in 2010–11, the taper tantrum in 2013, during each of which the exchange rate came under pressure and domestic financial conditions tightened) that the full extent of India's financial integration with the world has been truly appreciated.

In contrast, there is much less appreciation of India's global integration on the real economy side. There is still a perception that India's economic prospects are governed by its large domestic market, and that trade—both exports and imports—are peripheral to growth prospects. We believe that to harbor this perception, however, is to live in the old reality.

The shares of exports and imports have risen materially as a share of GDP over the last two decades. Total exports/GDP doubled from 11.3 percent of GDP in 1999 to 25.4 percent of GDP by 2013. Since then, exports have slowed against the backdrop of de-globalization witnessed around the world.

FIGURE 1. India Exports Share in GDP

Source: Ministry of Statistics and Programme Implementation (MoSPI).

FIGURE 2. India Total Exports and Imports

Source: MoSPI.

Despite that slowing, however, exports/GDP are currently still at 20 percent of GDP—almost twice the level that existed at the start of the millennium and at a level similar to that of Indonesia (Figure 1).

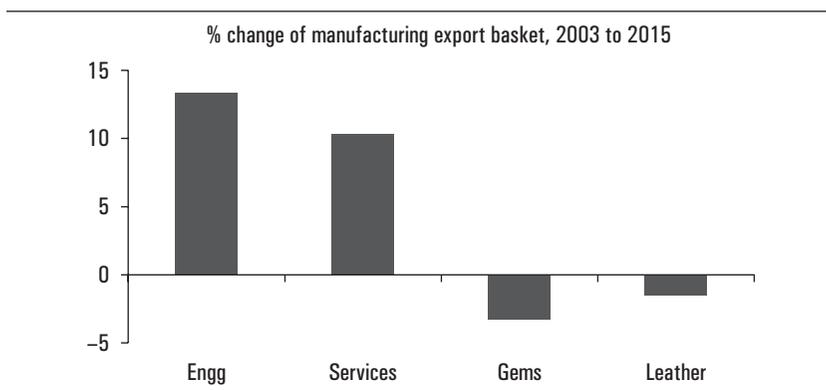
This real integration also extends to the import side. Total imports to GDP increased from 13.1 percent of GDP in 1999 to 28.4 percent of GDP in 2013, before slowing in recent years. Consequently, total trade (exports plus imports) as a percentage of GDP rose from 24.4 percent in 1999 to 54 percent in 2013 before ebbing in recent years (Figure 2). All this has brought welcome exposure to global markets, along with the technological transfer and productivity growth that comes with it.

2. The Quiet Revolution: From Textiles to Auto Parts...

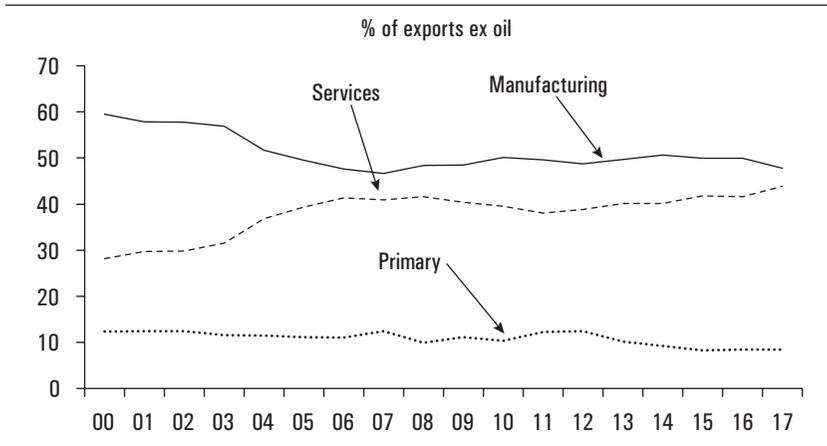
Quite apart from the under-appreciated quantitative role of exports in economic activity, it's important to appreciate the structural change and the two revolutions that have marked this sector over the last two decades. The first, more visible, was the surge in service exports. Back in 2003, service exports constituted 30 percent of the total export basket (Figure 4). But in a matter of just four years, service exports rose to 40 percent of the total basket, reflecting the software and BPO revolution around the world in which India was a major participant. However, after that step jump, service exports have plateaued at 40 percent of the total basket over the last decade.

During this time, there has also been a quiet revolution occurring on the manufacturing side. Back in 2003, textiles, leather, and gems/jewelry, India's traditional exports, constituted nearly 60 percent of the merchandise export basket (ex-petroleum). But their share has fallen secularly, and currently they account for just 40 percent of the basket. In contrast, engineering goods exports, mainly auto parts and capital goods, have grown at an average annual pace of almost 20 percent for 13 years, such that their share of exports in the manufacturing export basket has leapt from 20 percent to 35 percent in just 12 years (Figure 3). In a sense, therefore, India's exports have become much more "high-tech" over the last two decades and also improved in technological content, quality, sophistication, and complexity (Anand et al. 2015). By 2015, engineering goods, electronics, and pharmaceuticals/chemical products constituted almost 60 percent of the non-oil merchandise basket. Equally, however, one could lament that all of this

FIGURE 3. India Sectoral Change in Manufacturing Exports



Source: Ministry of Commerce (MoC), JPMorgan research.

FIGURE 4. India Export Basket

Source: MoC, RBI.

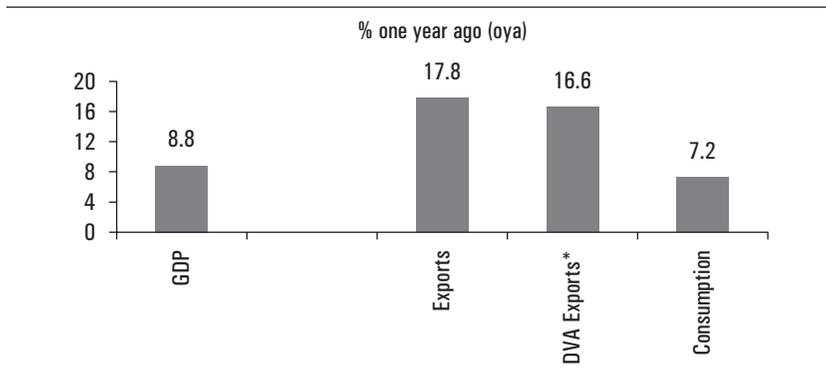
growth has occurred in the capital-intensive sectors, when the need of the hour is job creation in labor-intensive sectors, whose share has reduced in the export basket.

3. Exports Drove the Growth Boom Pre-crisis

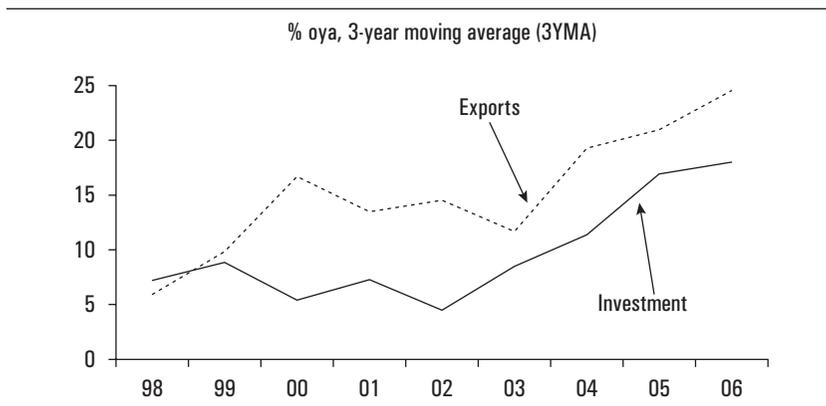
Perhaps the best appreciation of India's increased openness is gleaned by the role that exports have played in India's growth dynamics over the last two decades—both the sharp growth acceleration in the pre-Lehman period and the slowdown post the crisis. India's growth surged in the mid-2000s with GDP growth averaging 8.8 percent between 2003 and 2008.¹ What is less known is that this was achieved largely at the altar of surging export growth during this period of “hyper-globalization” around the world. The domestic value added of India's exports grew at 16.6 percent during this period,² whereas domestic consumption (public and private) averaged less than half of that at 7.2 percent (Figure 5). Consequently, the surge in private investment witnessed at the time (with gross fixed capital formation growing at 16.2 percent a year for 5 years) was largely responding to the buoyancy

1. As discussed earlier, we use the old GDP series for the 2000s since the back-casted series does not have the quarterly data, which are the unit of analysis for our study. Also, the back-casted series is only available from 2005–06 and not before that.

2. The domestic value added is estimated on the basis of the study by Veeramani and Dhir (2017).

FIGURE 5. GDP, Exports, and Consumption Growth (Average for 2003–07)

Source: MoSPI; *Veeramani and Dhir (2017) for Domestic Value Addition in Exports average for the period 1999 to 2012.

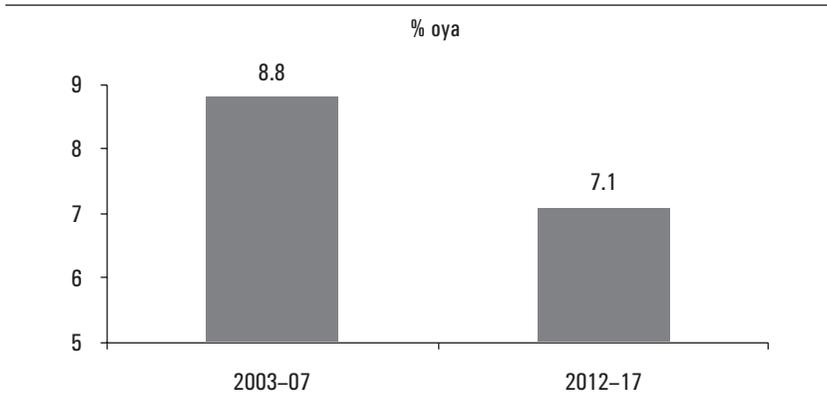
FIGURE 6. Investment and Exports Growth

Source: MoSPI.

of external demand rather than domestic demand. Exports were driving investment, and this is also seen in the close correlation between exports and investment during those years (Figure 6). India had briefly turned East Asian.

4. Slowing Exports Explain the Bulk of the Slowdown

The slump in exports over much of the last six years explains a large fraction of India's growth slowdown vis-à-vis the mid-2000s. Between 2012 and 2018, for example, GDP growth has averaged 7.1 percent versus 8.8 percent

FIGURE 7. GDP Growth

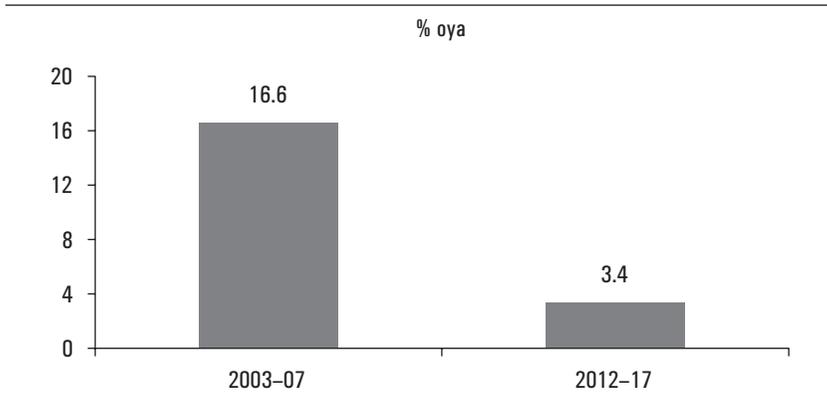
Source: MoSPI.

in the boom years of 2003–07³ (Figure 7). Between these periods, however, exports have suffered a double whammy. Not only has the growth of gross exports abated sharply but the growth of domestic value added in India's exports has progressively fallen over the last decade (Figure 8). According to Veeramani and Dhir (2017), the domestic value content has fallen from about 86 percent in FY2000 to about 65 percent in FY2013 (Figure 9). This should not be unexpected. As India integrates with the global economy, and starts getting absorbed into global value chains, the domestic content per unit of exports should be expected to fall. Normally, this is more than offset by the scale benefit of integrating further into global value chains. But India has still not benefitted from the latter.

In India's case, therefore, not only has gross export growth slowed but the domestic value content per unit of exports has progressively declined. Consequently, the domestic value content of exports grew at 16.6 percent between 2003 and 2007, but at just 3.4 percent between 2012 and 2017 (Figure 8). Given its share in GDP, slowing exports account for a 200 bps slowing of headline GDP growth across the 2003–07 and 2012–17 periods. In other words, slowing exports alone (a slowdown in gross exports and the progressively lower domestic value added) can account for the entire slowdown in growth across these two time periods.

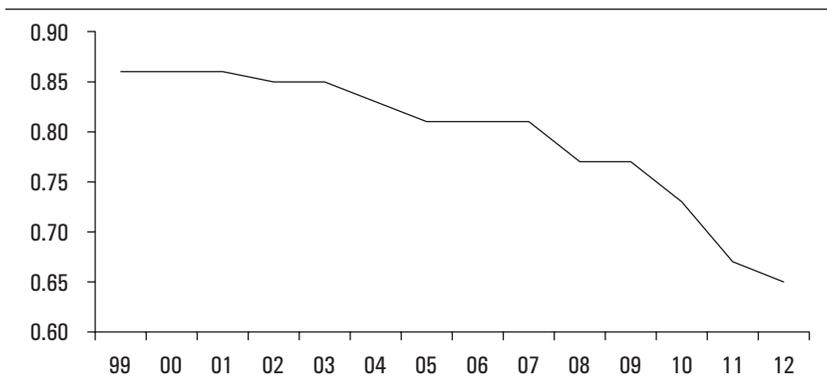
3. The figure of 8.8 percent is based on the old GDP series because the back-casted series is only available from 2005–06. But even if one were to combine the two series—use the earlier one up to 2005–06 and then the back-casted thereafter, average GDP growth in that period is almost 8 percent—which is still higher than growth over the last seven years, when exports have slowed materially.

FIGURE 8. Exports Value Added Growth



Source: Veeramani and Dhir (2017).

FIGURE 9. Ratio of Domestic Value Added to Gross Exports



Source: Veeramani and Dhir (2017).

5. Scope of the Study: Three Questions

The natural question to ask, therefore, is: What has contributed to the sharp slowdown in Indian exports? Disentangling different impulses is important because there are different proximate factors at play. First, global growth has slowed and trade linkages have become more tenuous. Second, India's broad, trade-weighted exchange rate (the 36-country real effective exchange rate) appreciated almost 20 percent between 2014 and 2017. Third, India witnessed successive (but presumably transient) supply shocks in the form

of demonetization and GST in 2016 and 2017, respectively. All these factors have potentially contributed to the export slowdown.

We attempt to answer three questions in this paper. First, what are the determinants of India's exports and, in particular, what are the income and price (exchange rate) elasticities of exports, and how have they changed over time? This first question is important in light of the varied and inconclusive findings of income and price elasticities in the extant literature and the role of other factors (e.g., supply bottlenecks) that some have identified.

Our second question is: How heterogeneous are these elasticities across different sectors, given the dynamism and changing composition of India's export basket? The latter is important because previous work (Chinoy and Aziz 2010) has found that the elasticities vary sharply across sectors.

Our third question is: How much of the recent export slowdown can our empirical exercise explain? In particular, can the recent disappointment be explained just by external demand and price factors? Or are they explained by factors outside the model, which would suggest transient shocks from demonetization and GST? Disentangling the slowdown is important because it can throw light on the durability of the export slump and also inform the policy response.

6. Price and Income Elasticities: Review of the Literature

The literature analyzing the determinants of India's exports is relatively sparse, which is not unsurprising given the unappreciated role of exports in India's growth dynamics. For the literature that does exist, studies try and estimate the price (exchange rate) and income elasticities of India's exports—consistent with the approach found in cross-country studies. “Income elasticities” are measured by estimating the sensitivity of real exports to external demand (proxied differently in different studies through global growth, partner country growth, and global exports), while “price” elasticities are measured by estimating the impact on real exports from movements in the real exchange rate.

Raissi and Tulin (2015) is the most recent study that estimates both income and price elasticities at an industry level from 1990 to 2013, and it finds a statistically and economically significant role for both income (1.3 percent) and price (−0.99) elasticities. The study also finds that supply constraints are a determinant of exports and have constituted a drag in the case of India. However, their analysis ends in 2013 and has, therefore, missed the bulk of the export slowing over the last six years. It also does not focus

on whether these elasticities have changed over time and the impact of de-globalization on India.

In contrast, IMF (2012) finds a much lower price elasticity. The long-run elasticity is estimated at -0.1 for the full sample period (1982–2011) and somewhat higher at -0.2 for the post-1990s period, but much lower than what Raissi and Tulin find for about the same time period. The corresponding long-run elasticities on external demand are found to be 2.9 and 2.2 for the respective periods.

Kapur and Mohan (2014) get very different results in their 2013 IPF paper. Using annual data for 1980–81 to 2007–08, they find a long-run income elasticity of 1.1–1.4 and a price elasticity of -0.2 to -0.6 —which is in between both the earlier studies. However, when they use the quarterly data to estimate the same elasticities post the reform period (presuming a structural break after the reforms), they find much higher elasticities, with that of external demand rising to 1.6–1.9 (when proxied through world exports) and to 2.6–3.6 (when proxied through world GDP). Similarly, REER elasticities rise significantly to -1.1 to -1.5 in the post-reform period. Importantly, however, the analysis stops in 2008, so we don't know if these elasticities still hold and how they have changed over time.

Chinoy and Aziz (2010), using quarterly data for 1996–2008, find a positive and statistically significant impact of external demand (real GDP growth in partner countries) on exports, with the estimated coefficient even larger at 4.6. However, the coefficient on the REER, while correctly signed (-0.6), is statistically insignificant at the aggregate level, even though it is economically and statistically significant for some sectors.

All this suggests that there is a pressing need for updated work in this area. First, even the most recent of these studies uses data only up to 2013. So there are no estimated export elasticities over the last five years, precisely when forces of de-globalization were in the ascendancy. It is important, therefore, to ascertain whether and how these elasticities have held up and how they have evolved over time.

Second, the extant literature is inconclusive on the role of the exchange rate and price elasticities. Some studies find a strong impact and other studies find a minimal impact. Ascertaining the role of the exchange rate is particularly important in recent years, given the sharp appreciation of India's trade-weighted exchange rate between 2014 and 2017.

All this makes a compelling case for new work in this area to analyze what has contributed to India's export performance in the recent years and how much of the recent export slowdown can be explained by traditional determinants (global demand, exchange rate), and what fraction cannot

be explained, and is therefore potentially attributable to idiosyncratic, and presumably transient, forces related to GST and demonetization.

7. The Approach

We use the quarterly time series data from 4Q2004 to 4Q2017 to estimate the sensitivity of India's non-oil exports to both global demand and the trade-weighted real exchange rate, controlling for potential bottlenecks, since supply constraints are also found to be a determinant in some earlier work (Raissi and Tulin 2015). Our sample period starts from 2004 because the RBI's 36-country, CPI-based REER that we use in our baseline model, as well as the export unit value indices from the IMF, date back only to 2004.⁴

We estimate the standard equation (Aziz and Li 2007; Hooper, Johnson, and Marquez 2000) linking real exports to global demand and the REER, and augment it to control for commodity prices (just in case the unit value deflators do not fully deflate out commodity price effects in the dependent variable), the global financial crisis, supply constraints at home, proxied through quarterly data on stalled projects, and the cost of capital. This log-linear model has been the dominant and empirically successful specification in the literature, given its relatively undemanding data requirements and straightforward interpretation.

In particular, we estimate the following equation:

$$\ln(X) = \alpha + \beta \ln(GG) + \pi \ln(\text{REER}) + \mu \ln(\text{CRB}) + \lambda(\text{STALLED}) + \theta(\text{GFC}) + \varphi(\text{GSec}) + \varepsilon \quad (1)$$

In our baseline equation, the dependent variable X is real non-oil exports (the sum of quarterly real merchandise and service exports), GG = real global GDP, REER is the 36-country, broad, trade-weighted REER produced by the RBI,⁵ CRB is the global commodity price index, GFC is a dummy for

4. We use the quarterly data, as do many other studies, since the use of annual data, as suggested by our discussant, would severely limit our data points, degrees of freedom, and the power of the model.

5. As a robustness test, we also use the BIS REER, as suggested by our discussant. This does not change our results at all. Also, if REER movements were simply reflecting productivity changes in the economy, productivity-adjusted exchange rates would not be changing. These, in turn, would result in the measured REER having little or no impact on export volumes. But this is precisely what we want to test in our analysis. The fact that measured REER has a significant impact on export volumes, *ceteris paribus*, suggests that actual REER changes are not moving in tandem with productivity changes, that is, the actual and equilibrium REER deviate, which is exactly what one would expect, and a plethora of other studies find.

the global financial crisis, STALLED is a measure of stalled projects—our proxy for binding supply constraints—and GSec are real government bond yields, which are our proxy for the cost of capital.

As part of our robustness checks, we replace global growth by: (a) global exports and (b) India's trade-weighted partner country growth. As noted above, we also replace RBI's 36-country REER with the REER created by the Bank for International Settlements (BIS).

8. Estimation Methodology

We find that our key variables X, GG, and REER are non-stationary I(1) (Table 1), we run both the Engel–Granger and Johansen–Juselius maximum eigenvalue cointegration tests and find that the variables are cointegrated at order 1 (Table 2). Consequently, we estimate the aforementioned equation using both a dynamic ordinary least squares (DOLS) model and a vector error correction model (VECM) to estimate the long-run price and income elasticities of exports.

The DOLS approach is a robust, single-equation approach which corrects for regressor endogeneity by the inclusion of leads and lags of first differences of the regressors, and for serially correlated errors by a generalized least squares (GLS) procedure. This is important because exports and the real exchange rate are both simultaneously determined, and DOLS controls for this endogeneity. DOLS is the preferred estimation technique for small sample sizes, given its efficiency and robustness properties. Furthermore,

TABLE 1. Unit Root Tests

Null Hypothesis: Global growth has a unit root		
	<i>t-Statistic</i>	<i>Prob</i>
Augmented Dickey–Fuller test statistic	1.11	1.00
Null Hypothesis: Real exports (ex-oil) has a unit root		
	<i>t-Statistic</i>	<i>Prob</i>
Augmented Dickey–Fuller test statistic	-1.66	0.45
Null Hypothesis: REER RBI has a unit root		
	<i>t-Statistic</i>	<i>Prob</i>
Augmented Dickey–Fuller test statistic	-2.46	0.13

Source: Authors' calculations.

TABLE 2. Cointegration Tests**1) Engle–Granger**

Variables: X, REER, GG

	<i>Value</i>	<i>Prob.</i>
Engle–Granger <i>t</i> -statistic	–3.5	0.04
Engle–Granger <i>z</i> -statistic	–17.0	0.09

2) Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Variables: X, REER, GG

<i>No. of CE(s)</i>	<i>Eigenvalue</i>	<i>Prob.</i>
None*	0.4	0.0
At most 1	0.2	0.1
At most 2	0.0	0.2

Source: Authors' calculations.

Note:* Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level.

Monte Carlo experiments show that with a finite sample, DOLS performs well relative to six other asymptotically efficient estimators, including Johansen's (1988) vector error correction maximum likelihood estimator (Stock and Watson 1993). Lag length for leads and lag has been chosen using the Akaike Information Criteria (AIC), subject to a maximum of four leads and lags given the limited length of the dataset.

As a robustness check, we also estimate the exports equation using the VECM approach

$$\begin{aligned} \Delta L(X_t) = & a_1 + a_2(\text{ECM}_{t-1}) + \sum a_3 \Delta L(X_{t-i}) + \sum a_4 \Delta L(\text{GG}_{t-i}) \\ & + \sum a_4 \Delta L(\text{REER}_{t-i}) + \text{GFC} + u_t \end{aligned} \quad (2)$$

where ECM term captures the deviation of exports from the long-run equilibrium ($L(X) - c_1 L(\text{GG}) - c_2 L(\text{REER})$).

9. Empirical Results

9.1. Income Elasticity

Our baseline results find a strong and statistically significant impact of global growth on India's real exports. It is important to caveat, however, that because the variables are cointegrated, the estimated coefficients should be interpreted as long-run elasticities between these variables. As our baseline estimation reveals (Column 1 in Table 3), a 1 percent increase

TABLE 3. Estimation of Income and Price Elasticity (Using Customs Data)*Dependent variable: Log Real Nonoil (Customs Data Deflated)**Method: Dynamic Least Squares (DOLS)**Sample Period: December 2004 to December 2017**Results using 4 leads and 4 lags*

	Baseline		Robustness check			
	1	2	3	4	5	6
Cointegration regressors						
LN(REER)–RBI	-1.44***	-2.0***	-2.3***		-1.4***	-1.4***
LN(GG)	2.6***	2.9***		3.3***	2.6***	2.6***
LN(WE)			3.4***			
LN(REER)–BIS				-2.2***		
Deterministic regressors						
GFC	0.3**	0.3***	0.4***	0.2*	0.3**	0.1
LN(CRB)		0.2**	0.2	0.1		
STALLED					-0.004	
G-Sec real rates						-0.01
Adjusted R-squared	0.81	0.84	0.81	0.73	0.80	0.82

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

in global growth increases India's real exports by 2.6 percent. The result is robust to how external demand is proxied. If instead of global GDP growth GG, we use global real export growth (WE) from the World Bank's World Integrated Trade Solutions (WITS) database, the elasticity increases from 2.6 to 3.4 (Column 3 in in Table 3). Therefore, no matter what the definition of external demand, the income elasticity estimates are economically and statistically significant.

The result is also robust to different measures of exports (i.e., dependent variable). If we use real export growth from the GDP accounts, the elasticity of global growth increases from 2.6 to 3.2 in the baseline model and remains very statistically significant (Table 4). Similarly, all the different definitions of global growth continue to remain economically and statistically significant under the alternative dependent variable choice. So the result is robust across different definitions of the dependent and independent variable.

How does this magnitude compare to earlier studies? Our estimated coefficient is at the lower range than found by Kapur and Mohan (2.6–3.6) and much lower than found by Chinoy and Aziz (4.6). Recall, however, that both those studies ended in 2008. In comparison, Raissi and Tulin (2015) find

TABLE 4. Estimation of Income and Price Elasticity (Using GDP Data)*Dependent variable: Log Real exports (GDP)**Sample Period: December 2004 to December 2017**Results using 4 leads and 4 lags*

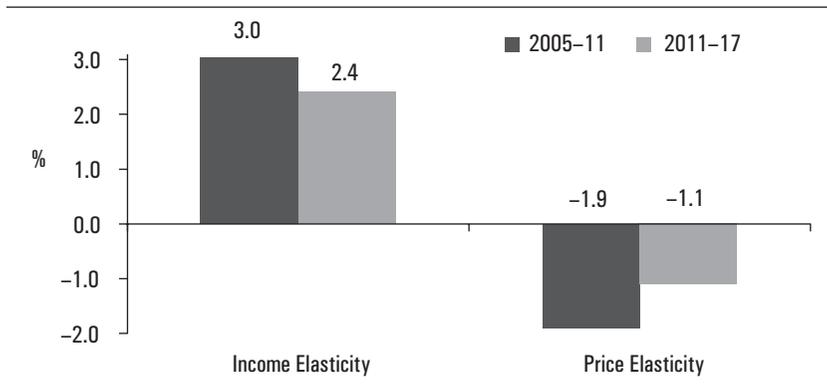
	<i>Robustness check</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
<i>Cointegration regressors</i>						
LN(REER)–RBI	–1.6***	–2.2***	–2.2***		–1.6***	–1.5***
LN(GG)	3.2***	3.5***		4.2***	3.2***	3.1***
LN(WE)			3.6***			
LN(REER)–BIS				–2.8***		
<i>Deterministic regressors</i>						
GFC	0.2**	0.2***	0.3***	0.2**	0.3**	0.1
LN(CRB)		0.2***	0.2**	0.2		
G-Sec real rates						–0.01
Adjusted R-squared	0.89	0.92	0.91	0.86	0.88	0.89

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

an income elasticity of 1.6, but their analysis extends till 2013. Prima facie, therefore, this suggests that income elasticities have potentially declined over the last decade, consistent with the de-globalization hypothesis.

To test this, we divide our sample into two sub-samples from 2005–11 and 2011–17 and estimate the coefficients separately in each sample period to ascertain if the former have changed over time. We do find that income elasticities have declined over the last decade (Figure 10). The income elasticity for the 2005–11 period is estimated at 3, while that for 2011–17 falls to 2.4. This pattern is robust to how external demand is proxied (world exports, partner country growth) and confirms the hypothesis that India has not escaped the de-globalization bug, in that any level of global growth translates into correspondingly lower export growth over the last six years. The IMF (2013) estimates that the decline in trade growth globally (manifested in lower income elasticities) is attributable to weaker investment growth in developed economies (on account of the changing composition of growth) and the fact that investment growth suffered sharply in commodity-exporting developing countries on the back of the fall in commodity prices. All that said, while the elasticity has reduced from 3 to 2.4, the decline is not as large as commonly presumed. Global growth still has a significant bearing on India's exports.

FIGURE 10. Export Elasticities

Source: Authors' calculations.

9.2. Price Elasticity

Apart from ascertaining whether income elasticities have fallen over the last decade, a key question of interest is whether, and to what extent, price (exchange rate) elasticities matter for Indian exports, particularly given the heterogeneous and dated findings of this phenomenon in the extant literature.

As our baseline result reveals [Column 1 of Table 3], we find a strong and statistically significant impact of the exchange rate on non-oil exports between 2004 and 2017. Every 1 percent appreciation of India's 36-country REER reduces real exports by 1.4 percent. Furthermore, the result is robust to the choice of REER, how the dependent variable is proxied, and the time period under consideration.

In the baseline model, we use the RBI's 36-country CPI-based REER. If, however, the RBI REER model is replaced with the BIS REER, the elasticity actually increases to 2. Both versions of the REER (RBI and BIS) also remain economically and statistically significant if the dependent variable is proxied by GDP-exports instead. Finally, the statistical significance is not an artifact of this particular time period. If one were to start the sample a year or two later and/or end a year or two earlier, the result is significant.

This is a salient finding because the literature thus far has been very mixed on the role that exchange rates have played in impacting exports. Some studies (IMF 2012) find a very muted impact of the REER on exports. Others (e.g., Kapur and Mohan 2014) find a much larger elasticity (1.1–1.5) but their study ends in 2008. IMF's (2015) analysis extends to 2013, but they find a smaller elasticity at 0.9.

All this has led to the perennial questions of: How much do exchange rates matter for Indian exports? And how has this relationship changed over time? Our results hope to end that debate. We find a large and significant relationship between the broad, trade-weighted exchange rate and non-oil exports using data all the way till 2017.

The next question, however, is whether these elasticities have changed over time. As in the case of external demand, we estimate the coefficient across two sub-samples: 2005–11 and 2011–17. As in the case of income elasticities, we find that price elasticities have also come down in recent years. The estimated price elasticity between 2005 and 2011 is 1.9 but falls meaningfully to 1.1 between 2011 and 2017 (Figure 10). But this, too, should not be a surprise. As noted earlier, the domestic value added of India's exports has progressively fallen over the last decade (Figure 9, Veeramani and Dhir 2017). This is to be expected. As India integrates with the global economy, and starts getting absorbed into global value chains, the domestic content per unit of exports should be expected to fall. The implication, however, is that the role of the exchange rate should be expected to attenuate over time as exporters become more naturally hedged at the margin.

9.3. Other Controls

As a robustness check, we also control for other factors such as global commodity prices to account for the possibility that real exports have not been fully deflated. In particular, we run the DOLS regression controlling for commodity prices—using the global commodity price CRB index—as a deterministic regressor. We find that the results do not materially alter with the inclusion of commodity prices. However, as commodity prices are statistically significant only in certain cases, they are not part of the baseline model.

Some studies find that supply constraints matter for exports. Consequently, we test this hypothesis by including a proxy of supply constraints, the number of stalled projects (STALLED) as a fraction of projects under implementation, in our equation. However, we do not find STALLED to be a statistically significant determinant of exports, even though it is correctly signed. Finally, real government bond yields—our proxy for the cost of capital—are statistically insignificant.

9.4. Fitted Value

The baseline DOLS model estimates the cointegration equation well with an adjusted R^2 of 81 percent (Table 3). The model captures both actual real non-oil exports and the model's fitted value.

9.5. Vector Error Correction Model

As a robustness check, we also estimate the long-run trade elasticities on the basis of a VECM. The results are presented below. Lags of the model are based on the AIC criteria with maximum four lags given the short sample size. The estimates based on the VECM approach are broadly in line with the estimates based on DOLS. In particular, the full sample income elasticity is estimated at 3.1 and the price elasticity is estimated at 2.2 (Table 5).

10. Sectoral Results

Having estimated the income and price elasticities, and examined how they have evolved over time, we move to our second question: How different are these elasticities across sectors?

We find that India's new-age exports-like services (which are mainly software services), engineering goods, and pharmaceuticals are found to have the highest "income elasticities" over the full sample period (Table 6 and Figure 11). In particular, the elasticity of pharmaceuticals and engineering

TABLE 5. Vector Error Correction Estimates (VECM)

Sample Period: December 2004 to December 2017

Cointegration Equation with Log (real exports ex oil)

LOG(GG)	3.1***
LOG(REER)	-2.2***

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

TABLE 6. Sectoral Elasticity Estimates

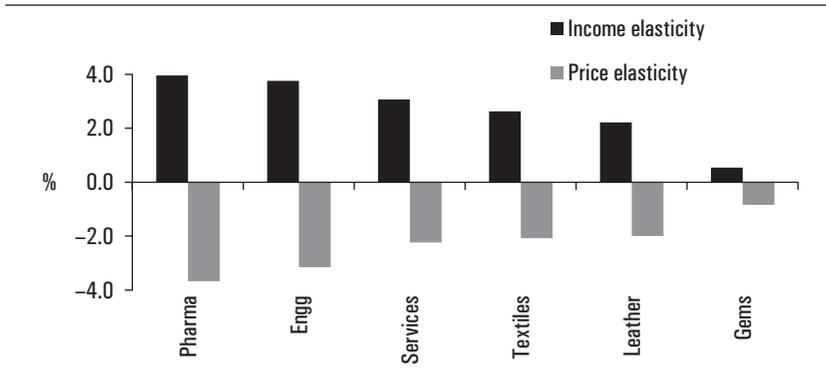
Method: Dynamic Least Squares (DOLS)

Sample Period: December 2004 to December 2017

	<i>Sectoral</i>					
	<i>Pharma</i>	<i>Engg</i>	<i>Services</i>	<i>Textile</i>	<i>Leather</i>	<i>Gems</i>
Cointegration regressors						
LOG(GG)	4.0***	3.7***	3.1***	2.6***	2.2***	0.5
LOG(REER)-RBI	-3.7***	-3.1***	-2.2***	-2.1***	-2.0***	-0.8**
Adjusted R-squared	0.89	0.75	0.82	0.90	0.90	0.84

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

FIGURE 11. Export Elasticities (2004–17)

Source: Authors' calculations.

goods is estimated at 4 and 3.7, respectively. Services follows suit with an elasticity of 3.1.

In contrast, India's traditional exports (textiles, leather, gems, and jewelry) are found to be much less sensitive to global growth. Textiles' elasticity is estimated at 2.6, that of leather at 2.2, and that of gems and jewelry is just 0.5 (and not statistically significant), suggesting that it is not "cyclical" in nature. Instead, we find that gold prices are a bigger determinant of gems and jewelry exports.

Similarly, price elasticities of India's new-age exports are also correspondingly higher than the traditional exports. In particular, the price elasticity is found to be the highest for pharmaceuticals (3.7), followed by engineering goods (3.1), and services (2.2). Price elasticities for textiles (2.1), leather (2.0), and gems and jewelry (0.8) are all lower and statistically significant. Interestingly, while gems and jewelry are not elastic to global growth, they are sensitive to price changes.

High income and price elasticities for India's new-age exports suggest they are both discretionary (reflected in their cyclical) as well as in highly competitive sectors (reflected in their high price elasticities).

As in the case of the overall basket, we break down each sector into two sub-samples to assess how these sectoral elasticities have changed over time. Tables 7 and 8 show our main findings.

- Income and price elasticities for all sectors declined in the period 2011–17 versus the period 2004–11 period, consistent with the findings of the overall basket (Tables 7 and 8).
- The new-age sectors (pharma, engineering goods, and services) have seen a much sharper decline than India's traditional exports. This has

TABLE 7. Sectoral Elasticity Estimates (2004–11)

Method: Dynamic Least Squares (DOLS)
 Sample Period: Dec 2004 to Dec 2012

	<i>Sectoral</i>			
	<i>Engg</i>	<i>Pharma</i>	<i>Services</i>	<i>Textile</i>
<i>Cointegration regressors</i>				
LOG(GG)	5.4***	4.7***	3.1***	1.6***
LOG(REER)–RBI	–4.9***	–4.5***	–2.3***	–1.0***
Adjusted R-squared	0.52	0.64	0.78	0.71

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

TABLE 8. Sectoral Elasticity Estimates (2011–17)

Method: Dynamic Least Squares (DOLS)
 Sample Period: Dec 2011 to Dec 2017

	<i>Sectoral</i>			
	<i>Engg</i>	<i>Textile</i>	<i>Services</i>	<i>Pharma</i>
<i>Cointegration regressors</i>				
LOG(GG)	2.4***	1.1***	0.8**	0.3
LOG(REER)–RBI	–1.3***	–0.4**	0.2	0.7
Adjusted R-squared	0.99	0.99	0.73	0.88

Source: Authors' calculations.

Note: *, **, and *** indicate statistical significance at 15%, 10%, and 5%, respectively.

meant a greater convergence for both price and income elasticities across sectors in the latest period.

- However, some coefficients are statistically insignificant and per-versely signed. We believe this is due to a very small sample size, which is unsuitable for the long-run relationship implicit in the DOLS and VECM models. We therefore have slightly lesser conviction when breaking the dataset into sub-samples.

11. Can the Model Explain the Sharp, Recent Slowdown in Exports?

We turn to our third and final question, which is, whether, and to what extent, these factors can explain the recent slowdown of exports. As discussed earlier, an important recent macroeconomic puzzle is why India's exports

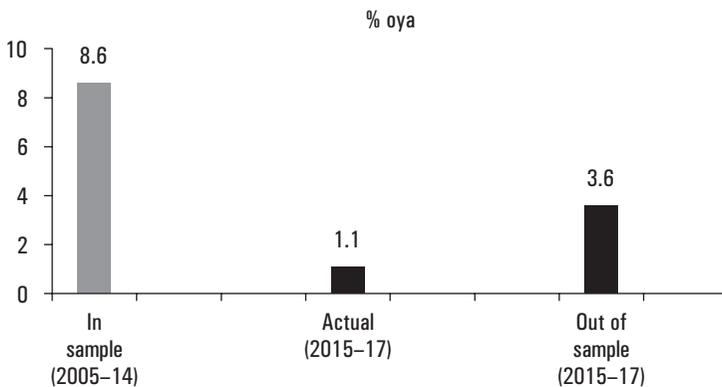
have slowed so sharply in recent years. It is important to analyze the recent slowdown because there are several proximate factors at play.

First, notwithstanding the recent volatility, average global growth in recent years is still meaningfully lower than the pre-crisis period and should have had a depressing effect on export volume growth. Second, India's broad 36-country REER appreciated almost 20 percent between 2014 and 2017 (discussed in more detail below) and should have posed a headwind to exports. Third, India was buffeted by back-to-back adverse supply shocks in the form of demonetization and GST that are hypothesized to have adversely impacted exports by disrupting domestic supply chains.

Our objective here is to try and disentangle these effects. First, how much of the slowdown can our model explain? The more we can explain, the less the recent slowdown is ostensibly attributable to supply shocks associated with demonetization and GST. Second, within the model itself, how much is attributable to weaker global growth versus a more appreciated real exchange rate?

Our approach involves using the conventional "out-of-sample" testing. In particular, we run the model from 2004 to 2014 and then compare the model's "out-of-sample" forecasts with the actual out-turn from 2015 to 2017. What we find is that the model comes close to explaining the actual outturn. In particular, between 2015 and 2017, real exports averaged just 1.1 percent, versus an average export growth of 8.6 percent within the sample. The model's "out-of-sample" forecasts show a substantial deceleration of growth to 3.6 percent (Figure 12). So global growth and REER dynamics were themselves able to explain a significant deceleration of

FIGURE 12. Export Growth: In and Out-of-sample



Source: Authors' calculations.

export growth, with exports forecasted to less than half of their in-sample growth.

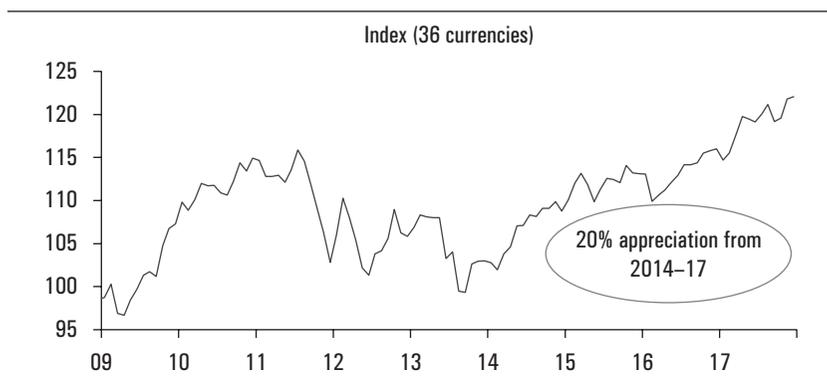
That said, the model does not capture the full slowdown in the period 2015–17. This suggests that factors outside the model (e.g., demonetization/GST) were temporarily responsible for depressing export growth below what global growth and exchange rate dynamics would have suggested.

All told, therefore, the model is able to explain a substantial deceleration in export growth between 2015 and 2017. Part of this has to do with the sustained appreciation of the REER during that time. From 2015 to 2017, the REER appreciated, on average, by 4.4 percent a year. Using the estimated elasticities, the real appreciation pulled down export growth by 7.7 percent per year, which is an appreciable drag on export growth the last few years.

12. Role of REER: Dutch Disease

What all this suggests is that (a) slowing global growth is not the only reason why India's export growth slumped between 2015 and 2017, and (b) the exchange rate has been an important determinant of India's exports with the cumulative 20 percent real appreciation between the start of 2014 (when the exchange rate had stabilized after the taper tantrum) and the end of 2017, posing a significant headwind to exports (Figure 13). From a policy perspective, it is important to ascertain what factors underpinned this large real appreciation.

FIGURE 13. 36-Country Trade-Weighted Real Effective Exchange Rate (REER)



Source: RBI.

We would argue that this real appreciation was inevitable. How so? The collapse in oil prices in 2014 served as a large, positive terms-of-trade shock for India. Economic theory would argue that a positive terms-of-trade shock should manifest itself in a more appreciated real exchange rate. The intuition is straightforward. To the extent that windfall gains from a positive terms-of-trade shock (either higher export prices or lower import prices) are spent, the price of non-tradables should rise vis-à-vis the price of tradables and drive some real appreciation. We have previously estimated that India witnessed large windfall gains from the collapse in oil prices (3.1 percent of GDP across FY15 and FY16, of which two-thirds was estimated to have been spent—Table 9).

So the collapse in oil prices should have put upward pressure on actual and equilibrium real exchange rates in India. The only choice Indian policymakers had was whether to accommodate this real appreciation through nominal appreciation or relatively higher inflation. Operationally, this manifested itself in a collapse of the CAD (because of oil) and, therefore, a larger balance of payments surplus that was putting upward pressure on the rupee. This was compounded by FDI flows almost doubling after the new government came to power in 2014. All this exacerbated the terms-of-trade shock such that the CAD collapsed from 2014 to 2017 exerting sharp and sustained appreciation pressures.

In a sense, this is akin to the “Dutch Disease” problem, a term developed to describe the situation in the Netherlands in the 1960s where a discovery of gas deposits in the North Sea, and the income boom that followed, led to a real appreciation of the exchange rate that crowded out manufacturing exports. The “Dutch Disease” phenomenon has since been broadened to include the effects of positive terms-of-trade shocks, something that appears to have afflicted India over the last four years: the collapse in oil prices resulted in a large, positive terms-of-trade shock that drove up the actual

TABLE 9. Estimated Impact of Oil on Indian Growth

	<i>Oil Prices (\$/barrel)</i>	<i>ToT Shock (% of GDP)</i>	<i>Boost to Growth (% of GDP)</i>
FY14	105		
FY15	85	1.0	0.7
FY16	46	2.1	1.3
FY17	47	0.0	0.0
FY18F	58	-0.6	-0.4

Source: Authors' calculations.

and equilibrium real exchange rate which, in turn, has likely reduced the competitiveness of India's exporting sector.

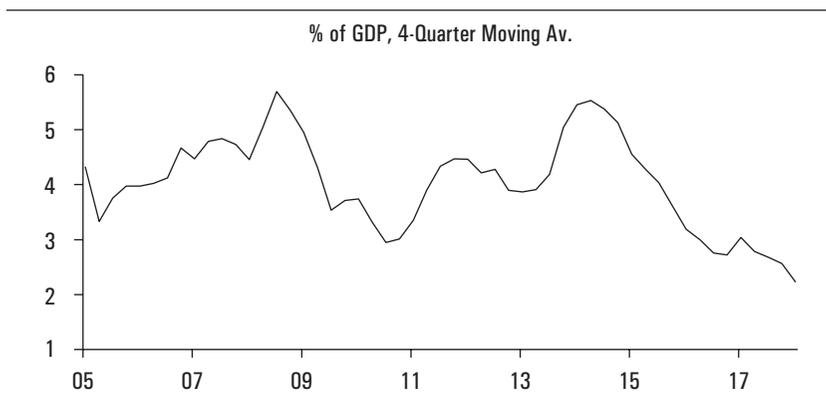
12.1. *Still Waters Run Deep*

The slowdown in India's non-oil exports has meant that India's underlying external imbalance has deteriorated far more than the headline numbers suggest. On the surface, India's CAD looks relatively benign at 1.9 percent of GDP in 2017–18, and expected to widen, but to less than 2.5 percent of GDP in 2018–19—only half the level of the CAD of 4.8 percent of GDP in 2012–13 that pre-dated the taper tantrum.

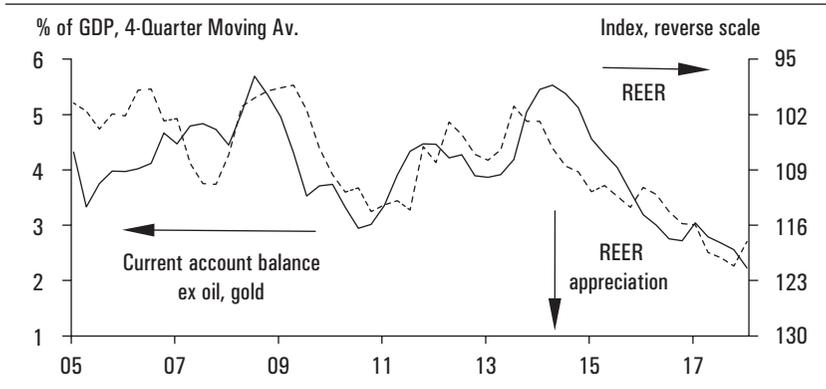
But the real story lies below the surface: that the fall in oil and gold imports is masking a sharp and sustained deterioration in India's underlying external imbalances. If one excludes net oil and gold imports, India runs a sizeable current account surplus. But that current account surplus has seen a sharp and sustained deterioration, declining by almost 3 percentage points of GDP between 2014 (when the economy had stabilized post the taper tantrum) and 2017 (Figure 14). Underlying imbalances have, therefore, markedly widened and, in 2017, were at their weakest level in more than a decade.

This starkly confirms that India's underlying competitiveness has reduced in recent years, and the sharp real appreciation from 2014 to 2017 likely played a part (Figure 15). That appreciation, however, was an inevitable consequence of the large, positive terms-of-trade shock that India was the beneficiary of, suggesting that India was, indeed, afflicted by the Dutch Disease phenomenon.

FIGURE 14. Current Account Ex Oil and Gold



Source: RBI.

FIGURE 15. Current Account Ex Oil, Gold, and REER

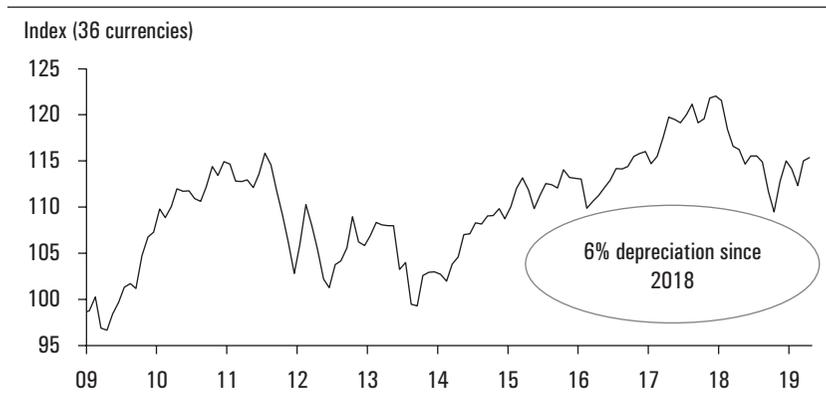
Source: RBI.

13. Policy Implications

At least four crucial policy implications follow from this discussion—two short-run and two long run.

First, the 50 percent increase in crude prices over the last 18 months will have the symmetrically opposite impact on the equilibrium real exchange rate. It partially reverses the earlier positive terms-of-trade shock and will thereby induce some actual and equilibrium real exchange rate depreciation. This should help mitigate some of the pressures on India's tradable sector, thereby reversing the Dutch Disease. It is important, therefore, that policymakers do not fight this real depreciation or attempt to change the endpoint (since this is an equilibrium phenomenon), but simply use reserves to ensure that the new equilibrium is reached in a calibrated and non-disruptive manner, so as to avoid self-fulfilling panic and overshooting. Policymakers seem to be doing that. Since the start of 2018, the 36-country REER has depreciated by 6 percent (Figure 16). So the first implication is to let the real exchange rate gradually depreciate as the terms-of-trade shock reverses. Interestingly, since the start of 2018, coincident with the real depreciation, exports have re-accelerated, but this has also been helped by the temporary disruptions associated with the adoption of the GST likely fading.

Second, it is crucial that fiscal policy (at both the central and state levels) does not become more expansive. Already, the total public sector borrowing requirement has widened over the last two years. The more expansive fiscal policy is in India, the more real appreciation it will induce, and thereby offset the real depreciation that will naturally occur from the positive

FIGURE 16. 36-Country Trade-Weighted Real Effective Exchange Rate (REER)

Source: RBI.

terms-of-trade shock reversing. Fiscal expansiveness will, therefore, indirectly contribute to impinging on tradable sector competitiveness.

These are, however, short-term policy implications. The broader policy implications are more important and medium-term in nature. First, India needs to dramatically improve underlying trade competitiveness, quite apart from exchange rate dynamics, by boosting infrastructure and total factor productivity, and assimilating into global value chains.

Second, India will need to look for new “growth drivers.” Exports boosted growth in the mid-2000s during the period of hyper-globalization. But with global growth softening (compared to that era), growing fears of protectionism around the world, and “income elasticities” reducing in recent years, the global economy is unlikely to provide the tailwinds it did in the mid-2000s. As such, either India will need to improve its competitiveness to the point that it increases its market share in the exports arena, thereby capturing a bigger slice of a stagnant/shrinking pie, or look for new growth engines domestically. Either which way, Indian policymakers have their work cut out.

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Comments and Discussion*

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PM's Economic Advisory Council and NCAER

The paper is rich and one shouldn't expect less from the authors. The major claims in the paper relate to the questions of why Indian exports have slumped in recent years and, relatedly, why export growth has not responded to faster global growth over the last year. The long-term nature of currency depreciation and its relationship with export growth means that we are talking about a phenomenon occurring over the last decade post-GFC. The paper suggests that its empirical model can explain the significant slowing down of exports; that global demand and exchange rate dynamics have posed meaningful headwinds for Indian exports in recent years; and that temporary factors such as demonetization and GST may have had little role to play.

Their model is a straightforward one: real, non-oil exports are a function of prices, proxied by the real exchange rate, and global GDP and our trade growth. I have no problem with this specification, except the definition of the real effective exchange rate (REER) because it does not control for Balassa–Samuelson productivity effects. Several important pieces of evidence presented in the paper are for the golden era of 2003–07, when export growth went up to double digits upward of 20 percent per annum, and the bronze era of the last 4–5 years, when exports slowed down to less than 8–10 percent. The reason I am emphasizing the incorporation of productivity effects is that during 2003–07, the Indian rupee was a lot more undervalued than today, and this can explain part of the divergence between then and now. Further, I will show that the earlier period does not quite stand up to scrutiny as having been that glorious time for export growth.

* To preserve the sense of the discussions at the India Policy Forum, these discussants' comments reflect the views expressed at the IPF and do not necessarily take into account revisions to the conference version of the paper in response to these and other comments in preparing the final, revised version published in this volume. The original conference version of the paper is available on www.ncaer.org.

In addition, I have a serious problem with the use of quarterly data for explaining long-term performance. It can lead to confounding and surprising results, one of which is the large price elasticity found by the paper. In general, very different results are often reached by authors with a minor increase or decrease in the sample size of the quarterly data. On the basis of the quarterly data for 12 years, 2005–16, the RBI’s monthly “Monetary Policy Report” for April 2018 reported that a consolidated fiscal deficit increase of 100 basis points would lead to a rise in inflation by 50 basis points in the same year. In a note on the RBI paper, I show how adding one extra year of 2004 quarterly data reduces statistical significance, and if more years are added all the way till 1996 (the start of the quarterly data), significance completely disappears. Just the addition of four quarters changed the entire conclusion.

A similar problem may be plaguing this paper. Real exchange rate data for a large cross-section of countries is available on the BIS website; these data are monthly, and this hypothesis can easily be tested. A lot can be learnt from the use of just annual data before deep diving into the econometric complications of small sample size and dynamic least squares.

The use of quarterly data is fraught with difficulties and the results can be fragile. I did not have their full model specification, which the paper now provides; but in their draft paper, I had problems in obtaining a negative elasticity for REER, and instead obtained a *positive* elasticity of REER with export growth using annual data. The dependent variable was the same, non-oil exports, and the independent variables were global growth and REER, as measured by BIS (see Table 1 for the underlying data).

There may be good reasons for my getting the opposite empirical result as the paper. This has to do with deflators. I’ll illustrate this by investment. The share of investment in GDP declined from something like 38 percent at its peak to something like 27 percent today, a decline of 11 percentage points (Figure 1). However, the share of real investment to real GDP (CSO data) is only about 4 percentage points. So are we really talking about investment going from 34 to 30 percent, which has caused the entire slump in GDP growth (and maybe even caused export growth to decline)? I think we need to worry about that result.

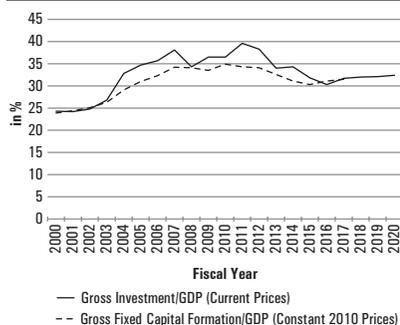
In contrast to the paper, I find that Indian exports have performed really well. This pertains to the trends in Indian goods and services exports as a percentage of our GDP and notice that the REER very correctly goes up, and that trade in goods and services peaked at something like 17 percent per annum and then declined (Figure 2). This confirms what the paper is saying—the REER goes up in the recent period, and export growth declines.

TABLE 1. Indian Exports and REER: 1998–2017

Year	Non-oil Export Growth		REER	
	Real	Dollar	REER36	BIS
	(Y-o-Y in %)			
1998	4.3	-4.5	-	91.5
1999	13.4	8.9	-	90
2000	15.5	15	-	94.2
2001	0.5	-2.4	-	96.2
2002	19.7	17.5	-	92.8
2003	6.8	16.7	-	92.7
2004	25.9	24.3	-	93.6
2005	20.9	19.5	102	96.6
2006	15.6	16.2	100.7	95.8
2007	5.7	20.6	108	102.1
2008	19.3	22.3	101.8	97.1
2009	-13.4	-11.5	101.1	91.6
2010	24	34.2	111.7	102.3
2011	17.3	21.4	111.6	102.4
2012	-0.1	-5.2	105.6	95.9
2013	5.3	6.2	104.5	91.4
2014	-0.7	-2.1	106.7	92.8
2015	-3.7	-7.1	112.2	100
2016	4.8	2.9	113.3	101
2017	1.5	7.5	119.2	105.4

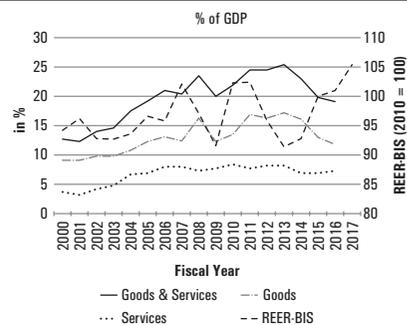
Source: Official data and author's computations.

FIGURE 1. Investment Leads Capital Formation!



Source: Official data and author's computations.

FIGURE 2. Trends in Indian Goods and Services Exports



Source: Official data and author's computations.

However, what is not quite so apparent is that the period 2000–07, the period of the largest increase in India’s trade shares, was also a period that witnessed a 10 percentage point increase in the REER!

During the boom time for Indian exports, you obtain a 10-percentage point increase in the REER and strong double-digit export growth. I would be very, very worried, with this “perverse” result. In addition, I want to show what has happened to the deflator for world manufacturing (Table 2). The price deflator for that has not moved at all. This is only available from 2007 onward and has not moved at all from 2007 to 2017.

Then I want to show how the rest of the world is performing in terms of real exports in constant 2010 US dollars using World Bank data. As

TABLE 2. Basic Statistics on Export Growth

Year	<i>Non-oil Export Growth</i>		<i>World Manufacturing Deflator</i>	<i>ΔManufacturing Deflator</i>	
	<i>Real</i>	<i>Dollar</i>		<i>India</i>	<i>World</i>
	<i>(Y-o-Y in %)</i>				
1998	4.3	-4.5	-	5.2	-
1999	13.4	8.9	-	3.3	-
2000	15.5	15	-	4.3	-
2001	0.5	-2.4	-	3.9	-
2002	19.7	17.5	-	1.9	-
2003	6.8	16.7	-	4.7	-
2004	25.9	24.3	-	6.7	-
2005	20.9	19.5	-	4.8	-
2006	15.6	16.2	-	5.6	82.8
2007	5.7	20.6	89.1	5	7.6
2008	19.3	22.3	96	7.5	7.8
2009	-13.4	-11.5	90.8	1.1	-5.2
2010	24	34.2	92.5	6	1.9
2011	17.3	21.4	99.9	7.6	8.1
2012	-0.1	-5.2	97.8	6.2	-2.1
2013	5.3	6.2	98.6	3.7	0.8
2014	-0.7	-2.1	98.4	3	-0.2
2015	-3.7	-7.1	88.8	-0.3	-9.7
2016	4.8	2.9	87.8	1	-1.1
2017	1.5	7.5	91.1	2.9	3.8

Source: Official data and author’s computations.

regards how the rest of the world is working, you find that the Indian trade share as a percentage of world trades has constantly gone up. Let us look at what happened to our trade shares between 2000 and 2007 as compared to other countries in the world. I am only looking at Asian countries and Latin America, and taking out sub-Saharan Africa, Communist Russia, and the advanced countries. I am looking at the change in our shares in world export, change in our export shares, and world shares. The highest improvement between 2000 and 2007 was recorded by India at 0.8 percentage points (from 0.93 to 1.77 percent) and slightly behind India was Korea, also at 0.8 percentage points. Now let us look at the period 2007–16, when we did disastrously, whereas the country that registered the highest increase in trade shares was Korea again at 0.8. Which country had the second highest increase in trade shares in this sample of all countries (mind you I took out countries with populations of less than 5 million)? It was India, which saw an increase in share of 0.7 percentage points (from 1.77 to 2.43 percent). What about Vietnam that has done so well in export growth—it had an increase in share of 0.5 percentage points; Mexico had 0.3, Chile -0.1 , and so on and so forth. My point is that between 2007 and 2017, our share of exports in world exports was the second highest, and we think that our share declined because of price elasticities. I don't buy that and I don't think that the data substantially support that.

Now if you are looking for what has caused this, look at Table 3. It has the exports-to-GDP share in 2016 for various countries. It has a change in exports share for 2007–16, and the last column is from the World Bank's Ease of Doing Business Tables, which shows the taxation level. In other words, how much of the profits are retained by the firm after payment of taxes and wages? Vietnam does very, very well. They have taken over the textile world, and their share is 61. The shares of Korea, Bangladesh, and India are 67, 66, and 45, respectively. If you were to have 10 percent depreciation, we will go from 45 to 50; but your competitors change as well, so the relative real exchange rate (the one which matters for competitiveness) does not change much. On the other hand, just a 5 percentage point change in overall taxes, and corporate taxes, among others, will bring about a much larger change in export growth because of a large improvement in competitiveness (assuming that other countries do not change their rates of taxation).

Now the big takeaways. A small sample size yields dangerous results, and REER movements behave perversely. The decline in export shares is not much of an indicator for export performance between 2007 and 2016. The decline in most of the investment share can be explained by

TABLE 3. Exports-to-GDP Share of Various Countries

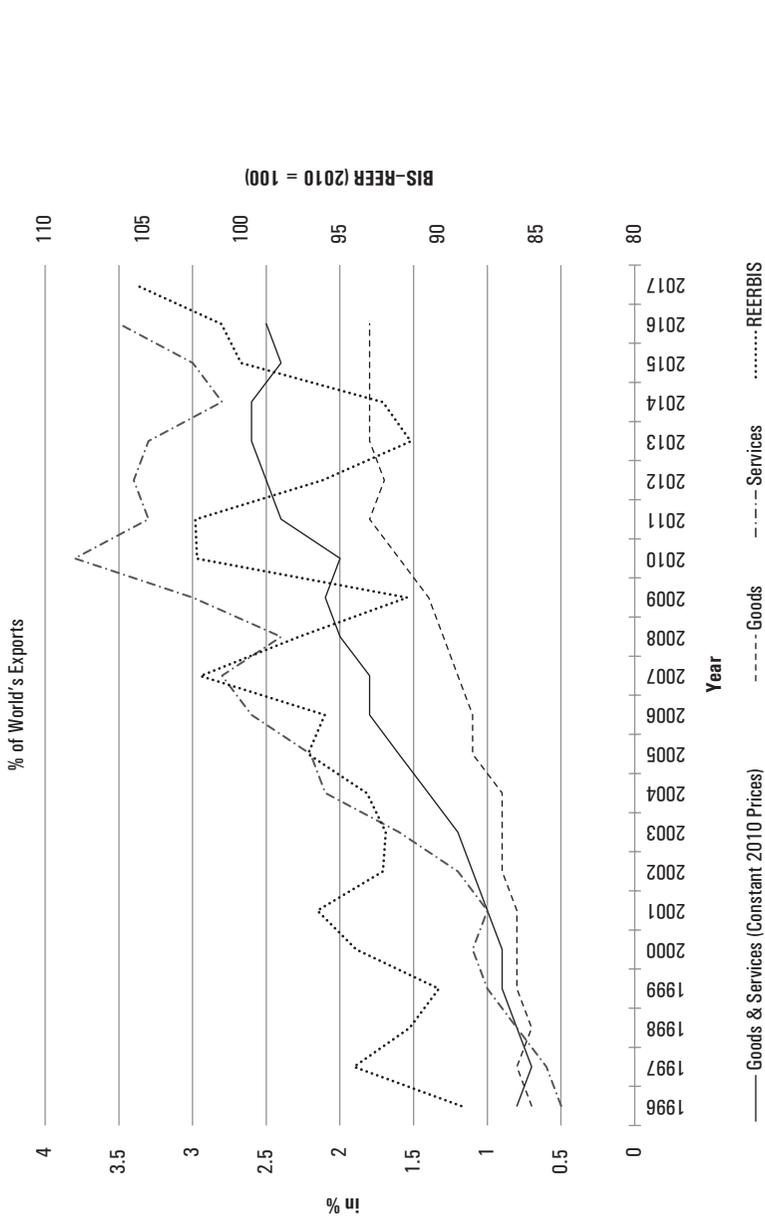
<i>Country</i>	<i>Exports/GDP (2016)</i>		Δ (<i>Exports/GDP</i> <i>(2007–16)</i>)		<i>Profit Retained (after Taxes & Wages in %)</i>	
	<i>Share</i>	<i>Rank</i>	<i>Share</i>	<i>Rank</i>	<i>Share</i>	<i>Rank</i>
Vietnam	94.1	7	22.2	2	60.6	40
Cambodia	66.4	12	10.9	8	79	74
Korea	44.5	24	2.1	19	66.8	54
Lao P.D.R.	27.1	52	1	21	74.7	71
Bangladesh	16	75	-0.7	25	65.6	52
India	19.6	69	-0.8	26	44.5	13
Thailand	70	11	-1.1	29	73.2	70
Hong Kong	238.2	1	-3	36	77.2	72
Nepal	12.2	79	-3.9	37	70.5	65
Myanmar	21	64	-4.4	38	66.9	55
Sri Lanka	21.7	61	-4.9	39	44.8	14
Pakistan	9.9	81	-5.4	40	67.1	57
Indonesia	18.4	71	-8.3	45	70.3	63
Philippines	27.4	51	-8.6	46	57.1	31
China	21.6	62	-15.9	56	32.1	7
Papua New Guinea	36.9	35	-17.6	59	60.7	41
Malaysia	71.5	10	-37	62	60	38

Source: Official data and author's computations.

low increases in the investment deflator versus the overall. India's share in real world exports is today at its peak, at 2.6 percent versus 1.8 percent in 2007 (Figure 3).

The problem is low share. What is the cause? We are looking for an explanation of bad export performance in all the wrong places. If you want to look at what determines GDP growth, it is very simple. This was done as part of the great demonetization exercise which, people keep repeating, has done a lot of things. I am simply looking at what happened to growth in India. The demonetization effect is defined as GDP minus mining, minus manufacturing, minus public administration and defense. Manufacturing is taken out because of what is called the "twin balance sheet problem." These data go all the way back to 1980, and this is the real interest rate as defined by the SBI lending rate and deflated by the CPI. There is a close negative relationship between the two—high real rates mean lower GDP growth. If

FIGURE 3. Trends in Indian Goods and Services Exports



Source: Official data and author's computations.

you are looking for exports performance, look at taxation—high rates of taxation lead to lower export growth.

Kenneth Kletzer

University of California, Santa Cruz

I plan to talk about this paper a bit differently than Sajjid did in his presentation. I want to talk less about the subject and more about the paper with a focus on revisions and future research. First, this is a really nice paper. It is an interesting and important subject for India. One thing I particularly liked about the presentation was that it shows that the authors have already made a lot of progress in revising the paper. Sajjid offered quite a lot more material in the presentation than there is in the draft. The additions are very useful, and I had already planned to suggest some of them here.

Let me begin with the motivation for the paper. In his discussant's comments, Surjit Bhalla noted that we saw a real boom in exports between 2003 and 2008. The paper concentrates on two periods, 2003–08 and 2012–17. The rapid growth of India's exports in the first period and the slowdown in the second have been discussed several times already. An important observation is that while India grew more rapidly than other emerging markets during 2003–08, exports growth was even higher, outperforming output growth.

The authors focus on how India's share of world exports fell as the global export growth rate declined by 3 percent following the global financial crisis. The share of exports in India's GDP fell from 25 percent to 19 percent between 2013 and 2017. India's share of global exports rose again to 2 percent. The improvement in the terms of trade and real exchange rate appreciation over the four-year period from about 2014 to 2018 is particularly important for the main policy implications raised by the authors in the paper. This is the reverse of the real exchange depreciation that took place during the boom years of 2003 to 2008. In addition to showing the effect of a boom in global demand on India's export share, the data in the paper suggest that the depreciation of the real exchange rate made a major contribution to the rise in export growth.

The first part of the paper shows that the decline in the growth rate of GDP happens to equal the decrease in the growth rate of value added in exports between the periods 2003–08 period and 2012–17. However, this does not mean that the decline in export growth explains that decrease. That doesn't mean that I disagree with Sajjid's emphasis on the importance of

the boom in export growth in the years before the financial crisis either. Rather, they are doing a partial accounting exercise and even if you do a complete accounting exercise as Poonam Gupta presented in her paper on *India's Growth Story* yesterday, you may not be able to infer causality. The argument that a drop in export growth explains the drop in output growth requires a more systematic analysis, however important the fall in global demand for Indian goods and services may have been.

Another point worth noting is that imports are not mentioned in the comparison of growth between the two periods. Imports were not constant, and net exports grew between 2012 and 2017 (as shown in Anand et al. 2015). An increase in net exports should contribute to output growth. The authors link the substantial decline in investment to the fall in export growth, but I think that the accounting needs to be more thorough. After the financial crisis, both investment and imports began to rise as export growth remained slow. The figures in the paper illustrate a significant increase in consumption between 2003–08 and 2012–17, while the shares of investment and exports in output fell.

Turning to the empirical analysis, I have a different take on the empirical analysis than did Surjit. In particular, I appreciate the authors' efforts to work with as many data points as possible by using quarterly data. This is especially helpful because they want to compare export growth across sub-periods of a 15-year full period. The estimates show how the elasticities of exports with respect to global output growth and the relative prices of tradable goods vary across industries. The estimates show that exports are fairly responsive to real exchange rate movements. Compared to the cited papers, the data here provide significantly more variation in relative prices and in global income over the period. This is an important contribution.

Let's turn to how the authors interpret the slowdown. Their interpretation wasn't emphasized in the presentation, but it is emphasized in the paper. They focus on the relationship between oil prices and the real exchange rate for India. Just graphing the data, and not even running a regression, shows that India's real exchange rate and the price of oil have been closely related since 2000. The real exchange rate depreciated in the years before the global financial crisis as the price of oil rose more than threefold in current dollars from 2003 to 2008. The rupee steadily appreciated in real terms after 2012 as the price of oil fell. In his presentation, Sajjid raised a new question: whether the sensitivity of India's trade flows to the terms of trade has changed as Indian industries became more integrated with global value chains. In particular, he suggested that the decrease in export value added might contribute to an increasing response of exports to the terms of

trade. Looking at just the two time periods for India, one in which the terms of trade improve and the other in which they deteriorate does not provide sufficient data to consider the effects of global value chain integration, that is, across the two time periods, there may be a progressive or a sporadic change in the underlying character of trade. We really cannot tell whether the effects of real exchange rates or the terms of trade on export value added are asymmetric or symmetric in the sample.

The core argument in the paper is that the large drop in oil prices is analogous to a capital inflow and the outcomes can be interpreted in terms of the Dutch disease. The post-2012 decrease in oil prices provided an exogenous positive shock to net exports. As India was paying less for oil imports, the current account balance net of oil and gold also improved. The authors point out that the improvement in the current account over this period is similar to a surge in capital inflows. Falling oil prices improved the terms of trade vis-à-vis oil exporters and increased value added in non-petroleum traded goods industries. As a consequence of the rise in the value of output net of oil input, domestic demand should rise for both traded and non-traded goods. Like a capital inflow surge, the sharp fall in oil prices starting in 2012 ought to have caused a rise in the demand for non-traded goods requiring a rise in non-traded output. The appreciation of the real exchange rate follows from the necessary increases in equilibrium relative prices of non-traded goods.

Thus, as the terms of trade improve and the real exchange rate appreciates, production moves from import-competing industries toward export industries and non-traded goods production. The Dutch disease concerns the net decline in exports that can occur because traded goods production as a whole decreases. The authors adopt this explanation for the reduction in Indian export growth in the global recovery. The behavior of the current account is consistent. As shown in the presentation, the non-oil and gold current account surplus falls as the real exchange rate appreciates. I would like to see more direct evidence that the production of non-traded goods increased, while overall traded goods production or employment contracted. On balance, however, I think that the emphasis on global demand and relative prices, that is, slower global export growth and real exchange rate appreciation, to try to explain India's export growth after the crisis, is well placed. It is also consistent with the elasticity estimates.

A substantive question I have concerns the importance of this interpretation for macroeconomic policy. In his presentation, Sajjid said very little about monetary policy, but the paper highlights the monetary policy implications. The regression results do suggest that real exchange rate movements significantly affect export growth and, as well, net exports. The

observation that falling oil prices and capital inflow surges have parallel effects suggests that the RBI should intervene in the foreign exchange market or perhaps accumulate reserves to promote export growth. The authors raise the possibility that monetary policymakers were resistant to depreciation of the nominal exchange rate. That should not have necessarily happened in an inflation-targeting regime. At a first pass, open economy new Keynesian models show that the central bank of a small open economy should target domestic inflation. This prescription might be modified in the presence of incomplete exchange rate pass through or when the country can influence its terms of trade. And if the country can manipulate its terms of trade, an inflation-targeting central bank can use monetary policy to influence the nominal exchange rate, hence the real exchange rate and terms of trade. The point most relevant here is that foreign exchange intervention, or accumulating reserves, does not need to be in conflict with a domestic inflation-targeting regime. However, real appreciation can occur under a given inflation target, so that changing the inflation target, as suggested in the paper, might be warranted.

I think we could learn more about what is going on in the export industries by looking to micro data. Although it is not in the paper, in his presentation, Sajjid talked about using micro data to understand export growth better. The macro data do not tell us much about how the real appreciation or fluctuations in global demand affected exporters; firm-level data might. The contraction in global economic growth after the financial crisis, the subsequent recovery of global export demand, and the real exchange rate could have affected exporting at either the extensive or intensive margins at the firm level. The effect of the real appreciation at the extensive margin of firm entry into exporting is probably very important. As we learn from the trade literature, firms encounter fixed costs entering export markets, more productive firms enter these markets, and productivity growth can be higher for exporting firms. How producer dynamics in export industries varied across industries would help us to understand the importance of the decline in export growth rates for policy intervention.

Going back to the Dutch disease interpretation reminds us that a concern about real appreciation in newly resource export-abundant countries led to persistent declines in manufacturing employment. An episode of real appreciation that reduces industry growth temporarily might have persistent effects on productivity growth. The primary mechanism for temporary movements in the terms of trade or global demand to impact productivity growth in the new export industries for India could well be a decrease in the rate of entry into exporting. If as entry falls, industries realize fewer dynamic

economies of scale, then macroeconomic responses to real appreciation could be quite important.

Another hypothesis that could be addressed using micro data was made in the presentation. This is the observation that India's move toward a greater integration in global value chains is reducing domestic value added in exporting. It would be good to know how productivity and value added evolved during the period of rapid growth, 2003–08, and after 2012–17. More detailed data might also help us to understand what is happening at the firm level during the exporting boom as well as recently. A related question is whether the allocation of foreign direct investment across export industries has changed.

My last bullet point is that the macro analysis indicates the slowdown is concentrated in certain industries—pharmaceuticals are one, engineering is another, services less so. It cannot tell us why. We are aware that India is facing a lot of competitive pressure in pharmaceuticals, particularly from China, and this may also be occurring in some of the engineering industries. This could be a reason for the observed sensitivity to relative prices in these sectors. The price sensitivity in pharmaceuticals suggests that maybe it is a particularly competitive industry.

General Discussion

Chaired by Anup Wadhawan
Commerce Secretary, Government of India

Vijay Joshi identified two problems with the single equation model—one econometric, and the other substantive. What is called the price elasticity is actually not: it is the exchange rate elasticity of exports. He argued that on the economic side, the single equation model mixes up the demand and supply. A simultaneous equation model with a demand equation for exports and a supply equation for exports would strengthen the results, as it would help estimate a foreign price elasticity of exports and a home supply elasticity of exports. On the econometric side, this exercise could be repeated with a different concept of the real exchange rate, that is, the price of tradables to non-tradables. If the paper could construct such a series, that would then accord better with the second half of the paper.

On policy, the paper rightly says that real exchange rate appreciation is an equilibrium appreciation, and we should therefore also not resist a real exchange rate depreciation. So should the government have done something

about the real exchange rate appreciation? There is a debate on this in India. Joshi felt that the lag between exchange rates and exports is long and variable, which necessitates having a competitive real exchange rate in place for some time before getting an export response. Therefore, the objective of the authorities should have been to keep the real exchange rate reasonably stable in the period when it appreciated very rapidly. This would have been possible through a traditional mixture of sterilized intervention and targeted capital controls, implying that India has gone too far in the direction of liberalizing capital controls.

Purna Prabhakar wondered why, since the model used in the paper had established a positive income elasticity, the impact of the global financial crisis was actually opposite to what one would expect. Her second query was whether the analysis for out-of-sample forecasting done in the paper could help in assessing a possible impact of demonetization on the decline in export growth.

Sudipto Mundle sought two clarifications. One pertained to the argument raised in the paper that exports completely explained the growth story. In this context, the earlier discussion on the paper in this IPF on “India’s Growth Story” (Gupta et al. 2018–19) had also flagged investment, and he wondered if investment behavior could also be explained by exports. The second question was about looking for new drivers of growth. It would be useful for the paper to dig deeper into the role of global value chains and how India could be more of a central player there.

Anup Wadhawan (Chair) concluded by thanking everyone for a most interesting session in which he had learnt a lot. He suggested that the main instrument available to a policymaker is domestic competitiveness, a policy environment that encourages investment and entrepreneurship, and state-of-the-art, cost-effective infrastructure, leading to a low-cost economy.

Reference

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