BESART AVDIU[*]
World Bank

KARAN SINGH BAGAVATHINATHAN[†]
University of Göttingen and German Development Institute

RITAM CHAUREY[‡]
Johns Hopkins University

GAURAV NAYYAR[#]
World Bank

India's Services Sector Growth: The Impact of Services Trade on Non-tradable Services[§]

ABSTRACT This paper examines the effect of tradable services growth on non-tradable services across Indian districts. We use a shift-share "Bartik-type" instrumental variable, that relies on changes in foreign demand shocks for tradable services, weighted by the initial district employment shares in tradable services. Using multiple rounds of the Indian Economic Censuses, we find that an increase in tradable services employment leads to an increase in non-tradable services employment and increases the number of firms in non-tradable services. Our evidence suggests that this positive impact is due to an increase in consumer demand for local non-tradable services that results from the growth in tradable services employment, and not due to sectoral linkages between tradable and non-tradable services sectors. The employment impact is much larger for female workers compared to male workers, and for the number of female-owned firms relative to male-owned firms. Further, the employment impact is only significant for small non-tradable service firms.

Keywords: *Service Sector, Employment, Female Employment*

JEL Classification: *O1, O14, O19*

[*] *bavdiu@worldbank.org*
[†] *k.bagavathinathan@stud.uni-goettingen.de*
[‡] *rchaurey@jhu.edu (Corresponding author)*
[#] *gnayyar@worldbank.org*
[§] The authors would like to thank Banu Demir, Indermit Gill, Robert Z. Lawrence, Denis Medvedev, Sebastien Miroudot, Dilip Mookherjee, participants at the India Policy Forum 2022, and participants at the World Bank's 8th South Asia Economic Policy Network Conference. The opinions expressed in the paper are those of the authors and do not necessarily reflect the views of the World Bank Group or its Board of Executive Directors.

1. Introduction

The peak shares of manufacturing in value added and employment across a range of developing economies, since the 1980s, occurred at lower levels of per capita income than in their high-income, early industrializer precursors (Rodrik 2016). This "premature" deindustrialization reflects a structural transformation where the services sector has grown relatively faster. Much like manufacturing (Rodrik 2013), this services growth has been characterized by unconditional convergence of productivity to the frontier: countries starting from lower labor productivity in the services sector grew faster between 1975 and 2012 than those with higher initial labor productivity in that sector (Kinfemichael and Morshed 2019).

Much of this catch-up is attributable to tradable services, such as ICT (information and communications technology), business, and financial services, that are offshorable just like goods. Digital technologies have boosted trade in these services (Freund and Weinhold 2002), many of which now have trade costs comparable to manufacturing industries (Gervais and Jensen 2019). Tradable services have also had broader productivity impacts because they enable trade in goods. There is evidence, for instance, which finds that the liberalization of telecommunications and transportation services has improved the productivity of downstream manufacturing firms (Arnold et al. 2016; Bas 2014).

However, many of these tradable services are also typically skill-intensive (Nayyar et al. 2021a; Amirapu and Subramanian 2015; Nayyar 2012a). Large numbers of low-skilled workers are often employed in services, such as retail and hospitality, that are associated with a high intensity of face-to-face interaction between consumers and services providers. And while there is some evidence to suggest that these non-tradable services have contributed to productivity growth (Fan et al. 2021), demand is typically constrained by the size of the local market. This reduces workers' opportunities to benefit from international trade. The question therefore is whether less traded services that often account for the lion's share of services employment in developing economies can benefit from services trade.

In this paper, we study the effect of the growth of employment in tradable services on the growth of employment in non-traded services, across Indian districts, between 1998 and 2013. India provides the relevant context given the rapid growth of its export-oriented services, such as software and business process outsourcing, since the 1990s (Eichengreen and Gupta 2011; Nayyar 2012a). In documenting two waves of services-sector growth, Eichengreen and Gupta (2013) show that the share of modern services in output began to rise in a second wave at a level of per capita income of about US $4,000 [in year 2000 US purchasing-power-parity (PPP) dollars terms] before 1990. However, this wave started at lower levels of per capita income after 1990 than in the preceding four decades. India—which experienced a dramatic growth of its

software and business services sector during the decades since 1980—had a per capita income level of about US $3,300 (in year 2000 PPP dollars terms) in as late as 2009. However, evidence also shows that the export of these services has benefited skilled workers more than unskilled workers in India (Mehta and Hasan 2012). As a result, there are concerns that a labor-abundant economy, such as India, cannot rely on information technology-related services to facilitate structural transformation. These concerns can be alleviated, at least in part, to the extent that the growth of tradable services boosts job creation in non-tradable services.

The main challenge in analyzing the question is that time-varying unobservable district-level characteristics may be correlated with district-level changes in employment in both tradable and non-traded services. This would preclude us from making any policy-relevant causal conclusions on the strength of the relationship between growth in tradable and non-traded services. Ideally, we would like to generate exogenous variation in the growth in tradable services employment and the current proportion of workers in the district that are affected by the growth in tradable services. We rely on changes in foreign demand shocks (world import demand changes) for these services that are otherwise unrelated to increases in employment in non-traded services, to obtain exogenous variation in employment growth in tradable services sectors ("shift"). This exogenous employment growth in tradable services common to all districts, however, would have differential effects across districts, depending on their current employment shares in these services. We rely on the initial district-level employment shares in traded services ("share") to obtain exogenous variation in the current district-level employment shares in these services. We therefore use a district-specific shift-share "Bartik-type" instrumental variable, following Hummels et al. (2014), that is the average change in world import demand – excluding India – for tradable services weighted by the initial employment shares of these services across districts. Using the instrumental variable strategy, we find that a 10 percent increase in tradable services employment leads to a 4.2 percent increase in non-traded services employment. Furthermore, such an increase in tradable services employment increases the number of firms in non-tradable services by 2.8 percent.

Although we find a positive impact of the growth in tradable services on non-traded services in Indian districts, it is important to understand the potential mechanisms driving this relationship. Both the demand-side factors and sectoral linkages may have played a role. On the one hand, the growth in tradable services employment may have raised income levels in the district, in turn leading to higher consumer demand for local non-traded services (demand-side channel). On the other hand, the growth in tradable services may have led to the growth in those non-tradable services that have strong input-output linkages (sectoral-linkages channel). We find stronger suggestive evidence that demand-side factors rather than the supply-side factors explain the relationship between

the growth in tradable and non-tradable services in Indian districts. First, we find that non-traded services that benefit the most from tradable service growth have very low input-output linkages. Next, we find that household expenditure on key non-tradable services increased in districts that were exposed to larger increases in employment among tradable services.

Studying the consequences of services trade on non-tradable services is also important given that women might be disproportionately affected. This is because of their comparative advantage in non-traded pink-collar services occupations, such as teaching, residential care, social work, nursing, and personal services – as they were in the United States between 1950 and 1970 (Goldin 2006). The literature also finds that female entrepreneurs tend to be predominantly in non-tradable services, such as retail (Bank 2022; Bardasi and Terrell 2011). Assessing the effects on non-tradable services, where women are more likely to work, becomes especially critical in the Indian setting where women's labor force participation remains low (Chiplunkar and Goldberg 2021).

Furthermore, services establishments tend to be significantly smaller than manufacturing establishments, especially those in non-tradable services, such as retail trade. This observed gap in establishment size can be explained, at least in part, by the extent of informality. Non-tradable services, such as retail and personal services, comprise a large part of the informal sector in developing economies (Nayyar et al. 2021b). Informality plays a role in explaining size differences between services firms across developing and developed economies. Based on evidence from Latin America, Alfaro and Eslava (2020) show that the exclusion of the informal sector, which is more pervasive in developing economies, reduces the size gap between services firms across countries at different levels of per capita income. Therefore, analyzing the heterogeneous effects of the growth in non-tradable services by firm size is also important, especially in the Indian context where informality pervades the services sector. There are also overlaps between gender and firm size. Women are more likely than men to operate in informal firms that are typically smaller (Hallward-Driemeier 2013).

We, therefore, look at gender and firm size as two important margins of heterogeneity. We find that magnitude of the impact is much larger for female workers; a 10 percent increase in tradable services employment leads to a 9.1 percent increase in non-traded services employment for women compared to 4.2 percent for men. We find even larger differences between female-owned and male-owned firms. A 10 percent increase in tradable services employment leads to a 13.7 percent increase in female-owned firms in non-traded services for women compared to a statistically insignificant 1.6 percent increase for male-owned firms. Finally, we find that the effects are only significant for small non-tradable service firms (for firms between 1–10 workers).

Our paper contributes to several strands of literature. First and foremost, our paper is related to the literature on structural transformation into the services sector. Eichengreen and Gupta (2013) find that the growth of modern, tradable services—finance, ICT, and business services—started at lower levels of per capita income after 1990 than in the preceding four decades, thereby benefiting developing economies relatively early in their structural transformation process. Furthermore, the growth of these services has improved educational outcomes. Oster and Steinberg 2013 show that the IT revolution in India boosted the enrollment of girls and boys, equally, in schools with English as the language of instruction. Nano et al. (2021) find that employment growth in telecommunications and financial services, boosted by liberalization in these sub-sectors, increased school enrollment rates. As a result, the increase in the skill premium was also less pronounced in India (Shastry 2012). Using data from India, Fan et al. (2021) show that even traditional, non-tradable services have contributed to productivity growth, albeit benefiting consumers at the top of the income ladder more.

Our paper also contributes to the literature on how linkages between the services and manufacturing sectors benefit overall economic growth. A substantial body of evidence across countries shows that the services "embodied" in manufactured goods have a significant impact on manufacturing productivity (Arnold et al. 2016; Arnold et al. 2011; Bas and Causa 2013; Francois and Woerz 2008). Services used as inputs in the manufacturing sector have benefited from growth in the latter too. Evidence from India shows that growth in manufacturing has accelerated growth in value added and worker productivity in services firms within the same geographic region (Dehejia and Panagariya 2016).

We also contribute to the literature on the effects of globalization on non-tradable services. Munoz (2021) analyzes the impact of "posting" policies in the European Union (EU) that enables firms in one country to send ("post") their workers to perform non-tradable services jobs, such as plumbers or drivers, in another country. She finds that firms in previously "non-tradable" services increase their sales, profits and wages when accessing foreign markets through the movement of workers across national boundaries. Such exports of services are less prevalent outside the EU where the movement of labor is constrained by regulatory barriers. Non-tradable services can also benefit from globalization indirectly through greater demand resulting from the growth of knowledge-intensive tradable services, such as ICT and professional services. Frocrain and Giraud (2017) investigate the evolution of employment in the tradable and non-tradable sectors in France and find that 80 additional non-tradable jobs were created for every 100 tradable jobs created in a local employment area between 2008 and 2016. However, they do not distinguish between the services and manufacturing sectors in their analysis.

Last, but not least, our paper contributes to the literature on how services growth is reducing gender gaps. Ngai and Petrongolo (2017) show that the expansion of the services sector, driven by structural transformation and marketization of home production, has raised women's relative wages and market hours in the United States. Ben Yahmed and Bombarda (2019) find that trade liberalization increases the probability of informal employment in the services sector among low-skilled women that is linked – at least in part – to women entering the labor force. Jensen (2012) finds that an increase in labor market opportunities in the business process outsourcing industry increased education and health outcomes of girls, boosted career aspirations, and delayed marriage and fertility decisions of young women. On the consumption side, Atkin et al. (2018) show that female-headed households are likely to benefit more from imports of consumer services because they tend to spend a larger share of their income on, for example, food and retail.

Our paper provides new evidence on a dimension of structural transformation that is often ignored by policymakers who are most concerned with the movement of labor from agriculture to manufacturing. In India, the positive contribution of structural change to economic growth after the 1990s was largely attributable to the expansion of tradable service activities: finance, IT, business process outsourcing (BPO), and other business services (McMillan et al., 2017). The skill-intensity of these services, relative to manufacturing, has raised concerns that large-scale job creation, especially for low-skilled workers, is not as forthcoming. We find that the growth of employment in tradable services has a positive impact on growth of employment in non-tradable services. This impact magnifies the magnitude of employment creation associated with the growth of tradable services.

The rest of this paper is structured as follows. Section 2 discusses the empirical strategy and data, Section 3 presents the results, while Section 4 concludes.

2. Empirical Strategy and Data

2.1. Data

Our main data sources include multiple rounds of the Economic Censuses in India, namely the 3rd (1990), 4th (1998), 5th (2005), and 6th (2013) rounds. The census covers all economic enterprises in the country, except those engaged in crop production and plantations, and provides information on the number of workers hired by each enterprise, number of enterprises, as well as ownership (male/female) of enterprises. We aggregate this information at the district level. However, after 1990 several new districts were created in India. As a result, the administrative boundaries of many districts changed between the various

Economic Census rounds. Therefore, we reclassify the newly formed districts to their original district administrative boundary in 1990. In total, therefore, we have 433 districts in our data.

We also use National Sample Survey Consumer Expenditure (NSS CES) rounds 55 (1999–2000), 61 (2004–05), and 68 (2011–12), for household expenditure data. To explore linkages between tradable and non-traded services sectors, we use the Indian Input Output Transactions (IOT) Table from 2006–2007. Lastly, the trade data for world import demand for services sector comes from the World Input-Output Database (WIOD) database, as described in Timmer et al. (2015).

2.2. Classifying Tradability

Our discussion of tradable and non-tradable services first requires a classification. To classify sectors into tradable and non-tradable, a popular approach is to analyze the geographic dispersion of industries, following Jensen and Kletzer (2006). However, Gervais and Jensen (2019) have recently improved upon this approach by constructing a classification based on implied trade costs.

Due to data limitations, we cannot estimate trade costs in the same way as Gervais and Jensen (2019). Instead, we follow the approach proposed by Head and Ries (2001) and then adapted by Chen and Novy (2011) using data from the WIOD.

In this sense, implied bilateral trade costs can be expressed as a ratio of intra-national to international trade flows:

$$\theta_{ij}^{k} = \left(\frac{X_{ii}^{k} X_{jj}^{k}}{X_{ij}^{k} X_{ji}^{k}} \right)^{\frac{1}{2\sigma_k - 1}} \tag{1}$$

Here X_{ii}^{k} and X_{jj}^{k} represent domestic trade of industry k for countries i and j respectively, whereas X_{ij}^{k} are bilateral imports from country i's industry k to country j and σ_k is the elasticity of substitution for industry k.

The more two countries trade with each other (i.e., the higher is X_{ij}^{k} X_{ji}) the lower is the measure of relative trade costs, ceteris paribus. Conversely, if domestic consumption becomes relatively more important in either country, this would indicate larger international trade frictions or lower tradability. Then, sectors with high tradability (low trade costs) are considered tradable, while the rest are classified as non-tradable. Since we are not able to (causally) estimate σ by industry, we follow Chen and Novy (2011) and WTO (2018) in assuming a value of eight across sectors. Note that, as long as we assume a constant value across sectors, the value itself does not change the ranking of trade costs and therefore cannot affect the tradability classification. We then average the bilateral trade costs for India across partner countries. For a few sectors, there is no data on Indian trade available, in which case we take the global average trade costs instead.

Lastly, as in any classification, we must set a threshold for tradability. Since the tradability of manufacturing is well known, we set the threshold for trade costs equal to the highest level for manufacturing, such that all manufacturing is just tradable. This approach has also been applied, for example, in Frocrain and Giraud (2017) and Eliasson et al. (2012). As a result, our tradable service sectors are those that are just as tradable as manufacturing.

Our sample contains 35 broad service sectors, of which 17 are classified as non-tradable. The list of non-tradable and tradable service sectors is shown in Table 2. This classification is fairly similar to a closely related paper on France by Frocrain and Giraud (2017), despite different methodologies.[1] While modern technology is rapidly changing the tradability of services, it is worth noting that our classification intends to be representative for our sample period of 1998–2013, during which time many services were in part not as easily tradable as today.

TABLE 1. Summary Statistics

	1998	*2005*	*2013*
a) Non-tradable Services			
Share of non-tradable in total non-agri employment (%)	55.03	59.80	64.54
Share of women employment (%)	14.19	16.96	22.58
Share of women ownership (%)	4.18	4.72	8.92
Average employment (No.)	2.14	2.04	2.12
% Share of employment in small firm (1–10)	80.09	82.52	81.13
% Share of employment in large firm ($>$ 10)	19.91	17.48	18.87
b) Tradable Services			
Share of tradable in total non-agri employment (%)	2.20	2.41	3.56
Share of women employment (%)	7.38	8.13	11.70
Share of women ownership (%)	2.58	2.38	6.10
Average employment (No.)	2.95	2.55	2.48
% Share of employment in small firm (1–10)	71.60	81.57	84.96
% Share of employment in large firm ($>$ 10)	28.40	18.43	15.04

Source: Using Economic Censuses, 1998, 2005, 2013.

1. Only two of our non-tradable sectors are tradable, according to Frocrain and Giraud (2017). These are rental and leasing activities and travel agencies, with the difference likely due to the older time period which we examine, i.e., when physically going to a travel agency may have largely been necessary.

Some relevant summary statistics are presented in Table 1. The share of non-tradable services in total non-agricultural employment was overwhelmingly large, increasing from 55 percent in 1998 to 65 percent in 2013. The corresponding share of tradable services was as low as 4 percent in 2013. Women workers comprised 14 percent of total employment in non-tradable services in 1998 and this increased to 23 percent by 2013. The share of women-owned firms in non-tradable services similarly increased, albeit from a lower base. The corresponding shares of women workers and women-owned firms was lower in tradable services. Furthermore, the share of employment among small firms (less than workers) in non-tradable services, at more than three-fourths, was consistently large between 1998 and 2013.

TABLE 2. List of Tradable and Non-tradable Services

Tradable Services	*Non-tradable Services*
Sea and coastal water transport	Wholesale trade
Inland water transport	Retail trade
Air transport	Land transportation activities
Warehousing	Postal and courier activities
Support activities for transportation	Accommodation and food service
IT services	Financial and insurance activities
Picture, video and television program	Real estate activities
Broadcasting and programming activities	Legal and accounting activities
Architectural and engineering activities	Rental and leasing activities
Technical testing and analysis	Employment activities
Scientific research and development	Travel agency, other reservation services
Advertising	Education
Photographic activities	Health
Creative, arts and entertainment activities	Residential care activities
Libraries, archives, museums and cultural	Personal service activities
Sports activities	Repair of computers, personal and household goods
Other amusement and recreation activities	Veterinary activities
Activities of business, employers, professional member organizations	

Source: Authors' classification following Frocrain and Giraud (2017).

2.3. Estimation and Identification

We are interested in the effects of district-level changes in tradable service employment on non-tradable services employment. Hence, the baseline equation we estimate is given by:

$$\ln NT_{rt} = \beta_1 \ln T_{rt} + X_{rt} + \varepsilon_{rt} \quad (2)$$

Here $\ln NT_{rt}$ and $\ln T_{rt}$ respectively denote the log annual employment of non-tradable and tradable services in district r in time t, where $t \in \{1998,2005,2013\}$, while X_{rt} is a vector of various controls, including fixed effects. As an extension, we also estimate the effect on firm creation, where $\ln NT_{rt}$ represents the log number of non-tradable firms. To avoid observations with a zero value from dropping out due to logs, we also take a hyperbolic sine transformation. However, the results are also robust without it.

The parameter of interest β_1 captures the effect of local tradable service employment on the employment of non-tradable services in region r. Nevertheless, β_1 might still be biased, for instance, because unobserved time-varying district-level demand and supply shocks could affect both tradable and non-tradable service employment in districts.

We aim to establish a causal link by exploiting plausibly exogenous variation in tradable service activity, which does not have a direct effect on non-tradable services. As an instrument, we make use of world service import demand, excluding India. An increase in world demand for imports would create an exogenous demand increase for tradable services but not directly for Indian non-tradable service firms. We then construct region-specific Bartik shocks that reflect exposure to world import demand changes following Hummels et al. (2014).

Hence, $\ln T_{rt}$ will be instrumented by a shift-share Bartik-type instrument Z_{rt} based on the weighted average of foreign demand shocks faced by local tradable service firms in region r. The instrument is constructed as follows:

$$Z_{rt} = \Sigma_k \alpha_{rk} \ln X_{kt} \quad (3)$$

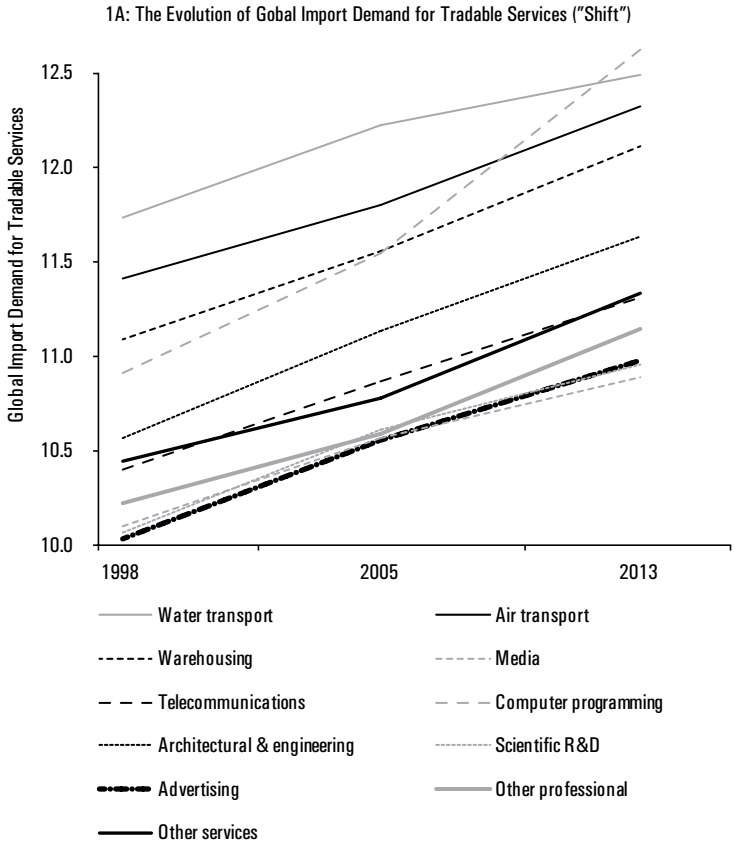
where $\ln X_{kt}$ denotes the log world imports excluding India of tradable service sector k at time t, and α_{rk} captures the employment share of tradable service industry k of region r in aggregate tradable service employment in that region in the base year 1990. We have:

$$\alpha_{rk} = \frac{T_{rk}}{\Sigma_K T_{rk}} \quad (4)$$

In short, Z_{rt} supposedly captures an exogeneous component (namely foreign demand) of the growth in the tradable service sector, by district.

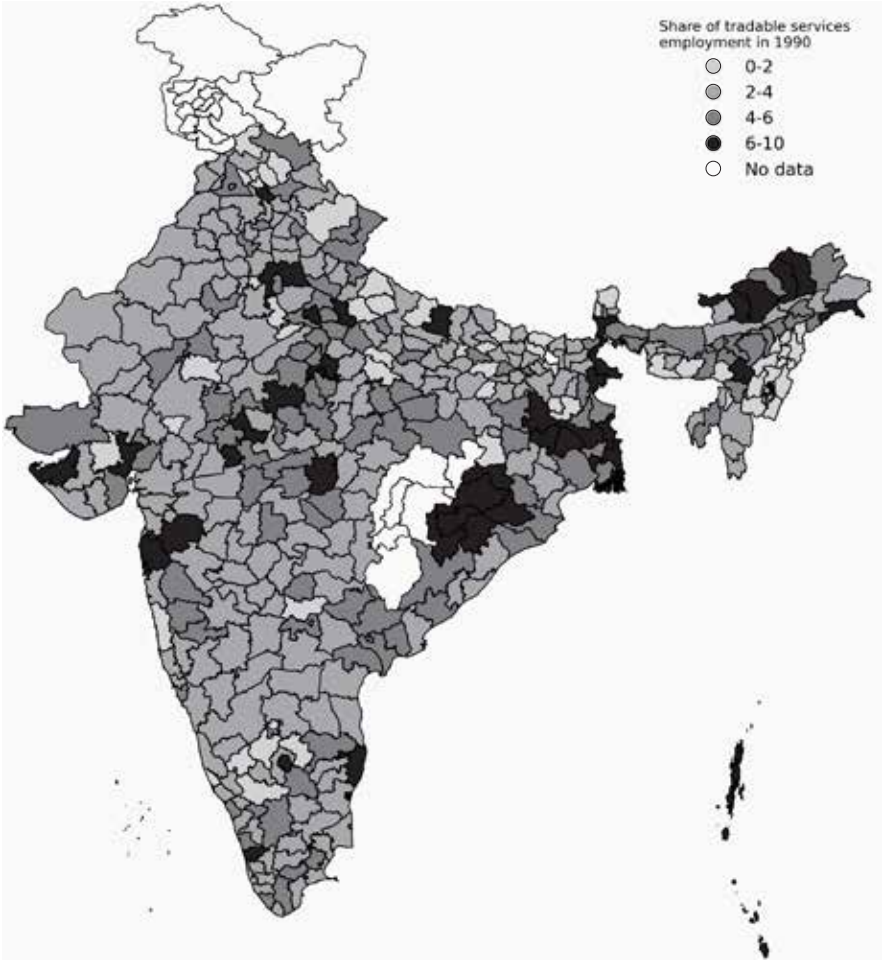
Figure 1 visually depicts the instrumental variable. Figure 1A depicts our "shift" component, i.e., log global import demand (excluding India) for tradable services. As can be seen, global demand for all tradable services has been growing strongly in the time frame of our sample. Figure 1B shows the share of tradable service employment by district in India, i.e., the "share" component of the instrument. The districts with a higher share would have a stronger exposure to services trade and therefore be more affected by the increase in global demand.

FIGURE 1. Visual Depiction of the Shift-Share Instrumental Variable



Source: Using WIOD data.

1B: Tradable Service Employment Share in 1990 ("Share")



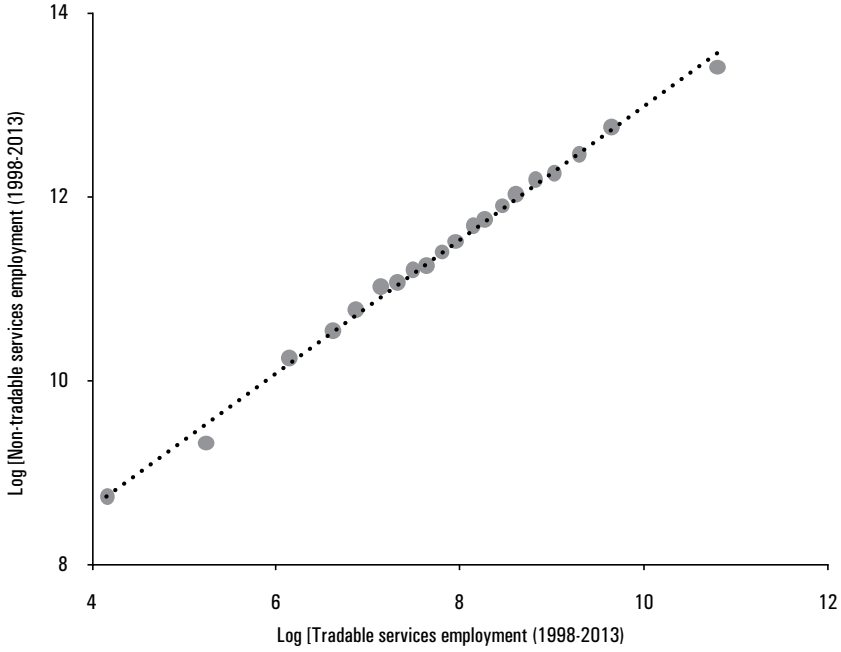
Source: Using Economic Census 1990.

3. Results

3.1. Baseline Results

Before discussing the regression results, we first visually plot the OLS relationship between district-level log (non-tradable services employment) and log (tradable services employment) between 1998–2013 in Figure 2. As is visually clear, there is a strong positive correlation between the tradable and non-tradable services sector employment.

FIGURE 2. Binscatter Plot of the Relationship between Log (Non-tradable Services Employment) and Log (Tradable Services Employment)



Source: Using Economic Censuses, 1998, 2005, 2013.

Table 3 shows the corresponding regression results from estimating our baseline equation 2. Our main explanatory variable is the district-level log of tradable service employment. We make use of two dependent variables. Columns (1)–(3) show the effects on the district-level log of non-tradable service employment, while columns (4)–(5) use the log number of firms in non-tradable services. In both cases, OLS coefficients in columns (1) and (4) are positive and statistically significant.

To address endogeneity concerns, we now turn to the instrumental variables approach.[2] According to our main IV specification in column (2), we see that a 10 percent increase in tradable services employment leads to a 4.23 percent increase in non-tradable employment. This implies that approximately 7.6 non-tradable services jobs are created for each new tradable service job, considering the average total non-tradable employment in our sample is 40,054, compared to 2,221 for tradables. Such an increase in tradable employment increases the number of firms in non-tradable services by 2.85 percent, as shown in column (5), though the coefficient is now only significant at the 10 percent level. Given

2. The first stages of our baseline have an F-statistic value of 10.9, above the rule of thumb value of 10 for weak instruments.

the smaller coefficient and lower significance of the effect on the number of firms, it seems likely that the positive employment spillovers are more due to the expansion of existing firms (the intensive margin), rather than new firm creation (the extensive margin). Notably, the IV coefficients are larger than OLS, possibly due to measurement error related attenuation bias in the OLS regressions.

Furthermore, Goldsmith-Pinkham et al. (2020) have recently raised concerns that Bartik instruments may suffer from endogeneity of the lagged shares and recommend using control variables that help ensure that the initial distributions of tradable and non-tradable services are not biased. A natural candidate in our case is the level of education by district, which we proxy by the literacy rate. These results are shown in columns (3) and (6). Overall, the coefficients remain rather similar in statistical significance and magnitude compared to the baseline, but the effect on the number of firms is no longer significant.

Our employment estimate of 0.42 is larger, but comparable to Moretti (2010), who finds a coefficient of 0.33 in the US, but includes only manufacturing in the tradable sector. Our estimates are also higher than Frocrain and Giraud (2017), however, who find an elasticity of 0.23 for France for tradable services on non-tradable services.

TABLE 3. Impact of Tradable Services on Non-tradable Services

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
		Employment			*No. of Firms*	
	OLS	*IV*	*IV*	*OLS*	*IV*	*IV*
Log tradable services	0.098***	0.423**	0.418**	0.079***	0.285*	0.279
	(0.017)	(0.190)	(0.203)	(0.017)	(0.170)	(0.181)
Education			0.001			0.001
			(0.007)			(0.005)
Observations	1,173	1,173	1,173	1,173	1,173	1,173
District FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Source: Using 1) Economics Censuses, 1990, 1998, 2005, 2013; 2) National Sample Survey Consumer Expenditure (NSS CES), Rounds 55 (1999-2000), 61 (2004-05), and 68 (2011-12); and 3) WIOD data.
Note: Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.2. Mechanisms

There are two main channels through which an increase in tradable activity can generate growth in non-tradable services. First, the effect could come from sectoral linkages. The growth in tradable services may lead to growth in input-supplying non-tradable services, or conversely, growth in tradable services

could make tradable service inputs into non-tradable services cheaper or of higher quality. This in turn could spur non-tradable service growth in input-receiving sectors. Alternately, on the demand-side, tradable service growth may increase local income, which in turn increases consumer demand for non-traded services. Whether the sectoral linkages or demand-side mechanisms explain our main results is ultimately an empirical question.

We consider the sectoral linkages channel first. To explore this, we use the Indian input-output tables from 2006–07, that shows the linkages of non-tradable service sectors to and from tradable services, as a share of inputs to/from all the sectors in the economy. We use this to categorize non-tradable service sectors into four categories: (i) sectors that provide a below median (low) share of inputs to tradable services, (ii) sectors that provide an above median (high) share of inputs to tradable services, (iii) sectors that receive a below median (low) share of inputs from tradable services, and (iv) sectors that receive an above median (high) share of inputs from tradable services.

To test for the sectoral linkages channel, in Table 4, we estimate separate regressions for district-level employment in each of these 4 categories in response to an increase in tradable services employment. In column 1, we find that district-level employment increased in non-tradable services sectors that provide a low share of inputs to tradable sectors, but there is no statistically significant change in the employment in non-tradable sectors that provide a high share of inputs to tradable sectors (column 2). Similarly, in columns 3 and 4, we find that district-level employment increases in non-tradable services sectors that receive a low share of inputs from tradable sectors, but there is no statistically significant change in the employment in non-tradable sectors that receive a high share of inputs from tradable sectors. Taken together, we find that in response to increased district-level employment growth in tradable services, there is an increase in district-level employment in non-tradable service sectors that have low input-output linkages with the tradable services sector.

Next, we consider the consumer demand channel. Following Fan et al. (2021), we analyze the group of non-tradable consumer services, which are largely demanded by local consumers and not used as inputs. As they discuss in their application to India, the expenditure share of consumer services increases with income, but is virtually unrelated to demand from producers. In our case, consumer services following Fan et al. (2021) correspond to: (i) retail trade, except of motor vehicles and motorcycles, (ii) personal services, (iii) human health, (iv) residential care, and (v) accommodation and food services, which were largely drivers of the baseline results. We consider all other non-tradable services to be non-consumer services.

TABLE 4. Sectoral Linkages Channel: Impact of Tradable Services on Employment in Non-tradable Services

	(1)	*(2)*	*(3)*	*(4)*
	Input to		*Input from*	
	Low	*High*	*Low*	*High*
Log tradable services	0.0711**	0.0118	0.0574*	0.0450
	(0.0314)	(0.0212)	(0.0331)	(0.0318)
Observations	1,173	1,173	1,173	1,173
District FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes

Source: Using 1) Economic Censuses, 1990, 1998, 2005, 2013, and 2) WIOD data.
Note: Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Column 1 includes district-level employment in health, education, accommodation and food services, legal and accounting activities. Column 2 includes district-level employment in veterinary, repair, residential care, wholesale and retail, transport, postal, finance, real estate activities and rental leasing, employment activities, and travel agency. Column 3 includes district-level employment in health, education, real estate activities and rental leasing services, and legal and accounting activities. Finally, column 4 includes district level employment in veterinary, repair, personal and residential care, wholesale and retail, transport, postal, finance, real estate activities and rental leasing, employment activities, and travel agency, and accommodation and food services.

As shown in Table 5, the effects of tradable services on non-tradables are indeed driven by consumer services. The coefficients on employment and firms are statistically significant, with coefficients of 0.51 and 0.39, respectively. Conversely, the effects on non-consumer services are smaller and insignificant. As consumer services tend to not have input-output linkages with tradable services, this provides additional suggestive evidence for the consumer demand channel.

TABLE 5. Impact of Tradable Service on (Non-tradable) Consumer Services

	(1)	*(2)*	*(3)*	*(4)*
	Consumer Services		*Non-consumer Services*	
	Employment	*No. of Firms*	*Employment*	*No. of Firms*
Log tradable services	0.511**	0.386*	0.340	0.103
	(0.250)	(0.215)	(0.221)	(0.204)
Education	-0.003	0.003	0.011	0.005
	(0.009)	(0.007)	(0.009)	(0.006)
Observations	1,173	1,173	1,173	1,173
District FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes

Source: Using 1) Economic Censuses, 1990, 1998, 2005, 2013, 2) National Sample Survey Consumer Expenditure (NSS CES) Rounds 55 (1999-2000), 61 (2004-05), and 68 (2011-12), and 3) WIOD data.
Note: Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Consumer services are: (i) retail trade, except of motor vehicles and motorcycles, (ii) personal services, (iii) human health, (iv) residential care, and (v) accommodation and food services. Non-consumer services are all other non-tradable services.

Finally, to further assess the consumer demand channel, we examine the impact of tradable service employment on consumption expenditure by category, at the household level in Table 6. To be consistent with previous literature, following the analysis on district-level household expenditure in India in Fan et al. (2021), we use state fixed effects instead of district fixed effects. Column (1) shows that a 10 percent increase in tradable service employment leads to a 3.6 percent increase of household expenditures on education, which is significant at the 1 percent level. This is consistent with the argument that spillovers from tradable service growth on education are due to increases in local final demand from consumers. We find similar effects for other important non-tradable services, although differences in sector classifications do not allow us to test each of the sectors driving our results separately. Column (2) analyzes medical services, but these are insignificant. Column (3) shows a highly significant coefficient of 0.53 for entertainment. Similarly, the effects on consumer services and the total of these services are also large (at 0.26 and 0.29, respectively) and statistically significant. Lastly, column (6) shows positive and significant effects on the overall monthly per capita expenditure (MPCE) of households.

In sum, we find suggestive evidence that the consumer demand channel rather than the sectoral linkages channel, plays a larger role in explaining the relationship between the district-level growth in non-tradable and tradable services employment.

TABLE 6. Impact of Tradable Services on Consumption Expenditure

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	Education	*Medical*	*Entertainment*	*Consumer*	*Total Services*	*MPCE*
Log of tradable services	0.360***	0.114	0.532***	0.257***	0.287***	0.149***
	(0.0793)	(0.105)	(0.107)	(0.0859)	(0.0764)	(0.0300)
Education	0.0268***	0.00712	-0.00774	0.0115*	0.0173***	0.00469**
	(0.00605)	(0.00808)	(0.00742)	(0.00631)	(0.00561)	(0.00213)
Observations	330,915	330,915	330,915	330,915	330,915	330,915
State FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes

Source: Using 1) Economic Censuses, 1990, 1998, 2005, 2013, 2) National Sample Survey Consumer Expenditure (NSS CES), Rounds 55 (1999-2000), 61 (2004-05), and 68 (2011-12), and 3) WIOD data.

Notes: Includes controls at household level for owning land (to proxy wealth) and household size, to normalize expenditures per person. Dependent variables and land owned are transformed using the inverse hyperbolic sine function. Observations are weighted by the sample multiplier. Education expenditure comprises library charges, tuition and related fees, private tutor/coaching and other educational expenses. Medical expenditure includes all medical expenditure, except medicine. Entertainment expense includes: i) cinema and theatre, ii) *mela*, fair, picnic, iii) club fees, iv) goods for recreation and hobbies, v) photography, and vi) other entertainment. Consumer services are comprised of i) domestic servant, cooks sweeper, ii) barber, beautician and related, iii) washerman, laundry, ironing, iv) tailor, v) priest, vi) legal expenses, vii) postage telegram, viii) telephone charges, and ix) repair charges for non-durables and other consumer services excluding conveyance. Total services are the total of education, medical, entertainment, and consumer services.

Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

3.3. Heterogeneous Effects

Women's labor force participation may have benefited disproportionately from structural transformation into the services sector. On the one hand, this is attributable to their comparative disadvantage in performing manual labor-intensive tasks associated with the manufacturing sector.[3] On the other hand, large numbers of women in developing economies are employed in non-traded services, such as teaching, residential care, social work, nursing, and personal services, and may have gained through increased consumer demand resulting from the growth in tradable services (as we show earlier). Therefore, analyzing the heterogeneous effects of the growth in non-tradable services by gender is critical, especially in the Indian setting where women face substantial barriers to labor force participation (Chiplunkar and Goldberg, 2021).

TABLE 7. Impact of Tradable Services on Non-tradable Services, by Gender

	(1)	*(2)*	*(3)*	*(4)*
	Employment		*No. of Firms*	
	Women	*Men*	*Women*	*Men*
Log tradable services	0.910**	0.425**	1.376*	0.160
	(0.411)	(0.206)	(0.709)	(0.193)
Education	0.012	0.001	0.027	0.001
	(0.013)	(0.007)	(0.019)	(0.006)
Observations	1,173	1,173	1,173	1,173
District FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes

Source: Using 1) Economic Censuses, 1990, 1998, 2005, 2013, 2) National Sample Survey Consumer Expenditure (NSS CES), Rounds 55 (1999-2000), 61 (2004-05), and 68 (2011-12), and 3) WIOD data.
Note: Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In Table 7, we analyze the effects of district-level increases of employment in tradable services on employment and number of firms in non-tradable services sector for women and men separately. To this end, in columns (1) and

3. For example, Pitt et al. (2012) show that men in Bangladesh obtain less schooling and sort into production occupations with lower returns to skill (and higher rewards for brawn), while the average payoffs to schooling are higher for women who specialize in skill-intensive activities. Similarly, Munshi and Rosenzweig (2006) find that lower-caste networks in India continue to channel boys into local language schools that lead to traditional blue-collar occupations, while lower-caste girls who did not benefit from these networks owing to low labor market participation rates switched rapidly to English schools that have become more widespread. Juhn et al. (2013) find that the adoption of computerized production processes – induced by trade liberalization associated with the North American Free Trade Agreement (NAFTA) – among Mexican establishments raised the relative wage and employment of women by lowering the need for physically demanding skills.

(2) respectively, we only keep either female employees or male employees in the sample, before aggregating at the district level. For the number of firms in columns (3) and (4), we only keep either female-owned or male-owned businesses. Overall, the effects for women are much stronger. Column (1) shows a coefficient on non-tradable employment of 0.91, compared to 0.43 for men, as shown in column (2). The gender difference is even more pronounced when analyzing the number of firms in columns (3)–(4), with a coefficient of 1.38 for female-owned business, albeit only significant at the 10 percent level. Conversely, the coefficient for male-owned businesses is close to zero and insignificant. These results suggest that district-level growth in tradable services employment increases both female employment and female owned firms (entrepreneurship). This is important because Chiplunkar and Goldberg (2021) show that promoting female entrepreneurship can in turn lead to higher female labor force participation because women entrepreneurs hire more females.

Lastly, we now turn to the heterogeneous effects by firm size. The average size of establishments in tradable services, such as ICT, is comparable to the manufacturing sector across countries at different levels of per capita income. However, the average services establishment in non-traded services is relatively small. In developing economies, informality plays an important role here because many services firms across, for example, small-scale retail and personal services are unregistered. Even when the analysis is restricted to formal firms, non-tradable services, such as retail, vehicles trade, real estate, have the smallest average firm size, which is about four to five times smaller than a manufacturing firm in the same country (Nayyar et al., 2021b). Therefore, analyzing the heterogeneous effects by firm size is important, especially in the Indian context where informal establishments constitute a large share of value added in non-traded services, such as retail, real estate, and personal services (Nayyar, 2012b).

TABLE 8. Impact of Tradable Services on Non-tradable Employment by Size

	(1)	*(2)*	*(3)*	*(4)*
	1-10	*11-30*	*31-50*	*> 50*
Log of tradable services	0.391**	0.284	0.512	0.413
	(0.177)	(0.297)	(0.424)	(0.700)
Observations	1,173	1,173	1,173	1,173
District FE	yes	yes	yes	yes
Year FE	yes	yes	yes	yes

Source: Using 1) Economic Censuses, 1990, 1998, 2005, 2013, and 2) WIOD data.
Note: Standard errors (in parentheses) are clustered at the district level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In Table 8, we examine a sub-sample analysis for the employment effects by firm size. In doing so, we consider four size groups, non-tradable service sector firms with 1–10 employees (column 1), 11–30 employees (column 2), 31–50 employees (column 3) and more than 50 employees (column 4). As can be seen, the only significant effects are among the smallest group of firms, with a coefficient of 0.39. Hence, the employment effects from tradable service growth are most relevant for the smaller non-tradable service firms.

4. Conclusion

Structural transformation toward high-end services and increased trade have been important growth drivers in India and beyond. However, tradable services growth can also have positive spillover effects on non-tradable services, which cannot benefit directly from globalization and trade-enhancing technological advances. In particular, these effects may have important distributional outcomes between men and women. While similar linkages between manufacturing and services have been well explored, spillovers between tradable and non-tradable services have been understudied.

We find that a 10 percent increase in tradable services employment leads to a 4.2 percent increase in non-tradable services employment. There is also an increase in the number of firms in non-tradable services by 2.8 percent, but this result is less statistically significant. The employment impact is much larger for female workers; a 10 percent increase in tradable services employment leads to a 9.1 percent increase in non-traded services employment for women compared to 4.2 percent for men. Similarly, we also find larger effects on the number of female-owned firms, compared to male-owned firms. Further, we find that the effects are only significant for small non-tradable service firms. Our evidence also suggests that this positive impact is likely due to an increase in consumer demand for local non-tradable services that results from the growth in tradable services employment.

Our paper makes an important contribution to the literature by showing that international trade can benefit non-tradable services. This is enabled through increased household demand for non-tradable services, resulting from the growth of tradable services. The result does not preclude other ways in which non-tradable services can benefit from international trade. For instance, employment in non-tradable services can benefit from increased household demand resulting from the growth of other traded sectors, such as manufacturing or agriculture. Non-tradable services can also be indirectly exported through forward linkages with these goods-producing sectors. Future research on the role of the services sector in India's structural transformation can assess these relationships.

An avenue for future research can also examine the impact of growth in tradable services on non-tradable services in terms of output and productivity.

However, this would require moving beyond the Economic Census data that only contain information on the number of workers. Services firms, however, are not covered adequately in India's official statistics. The absence of good and comprehensive data for services firms, especially in a panel format, poses difficulties to estimate the technical efficiency or total factor productivity. The absence of regular data on informal firms is also particularly problematic for the services sector. Informal firms are, by definition, excluded from administrative data sources, such as tax records or business registers. Further, the informal sector surveys conducted by the National Sample Survey Organization are few and far between. These issues are symptomatic of gaps in the coverage and reporting of data on services firms in other countries too. Better and more complete data are crucial to fully grasp the growing contribution of the services sector to growth and structural transformation.

References

Alfaro, L. and M. Eslava. 2020. "Development and the Comparative Advantage of Services", Unpublished manuscript, Harvard Business School and University of the Andes (Uniandes), Bogotá', Colombia.

Amirapu, A. and A. Subramanian. 2015. "Manufacturing or Services? An Indian Illustration of a Development Dilemma", *Working Papers*, eSocialSciences.

Arnold, J., B. Javorcik, and A. Mattoo. 2011. "Does Services Liberalization Benefit Manufacturing Firms? Evidence from the Czech Republic", *Journal of International Economics*, 85(1): 136–146.

Arnold, J.M., B. Javorcik, M. Lipscomb, and A. Mattoo. 2016. "Services Reform and Manufacturing Performance: Evidence from India", *The Economic Journal*, 126(590): 1–39.

Atkin, D., B. Faber, and M. Gonzales-Navarro. 2018. "Retail Globalization and Household Welfare: Evidence from Mexico", *Journal of Political Economy*, 126(1): 1–73.

Bank, W. 2022. *Breaking Barriers: Female Entrepreneurs Who Cross Over to Male Dominated Sectors*. The World Bank.

Bardasi, Elena, S. Sabarwal, and K. Terrell. 2011. "How do Female Entrepreneurs Perform? Evidence from Three Developing Regions", *Small Business Economics*, 37(4): 417–441.

Bas, M. 2014. "Does Services Liberalization Affect Manufacturing Firms' Export Performance? Evidence from India", *Journal of Comparative Economics*, 42(3): 569–589.

Bas, M. and O. Causa. 2013. "Trade and Product Market Policies in Upstream Sectors and Productivity in Downstream Sectors: Firm-level Evidence from China", *Journal of Comparative Economics*, 41(3): 843–862.

Ben Yahmed, S. and P. Bombarda. 2019. "Gender, Informal Employment and Trade Liberalization in Mexico", *The World Bank Economic Review*, 34(2): 259–283.

Chen, N. and D. Novy. 2011. "Gravity, Trade Integration, and Heterogeneity across Industries", *Journal of International Economics*, 85(2): 206–221.

Chiplunkar, G. and P.K. Goldberg. 2021. "Aggregate Implications of Barriers to Female Entrepreneurship", Technical Report, National Bureau of Economic Research.

Dehejia, R. and A. Panagariya. 2016. "The Link between Manufacturing Growth and Accelerated Services Growth in India", *Economic Development and Cultural Change*, 64(2): 221–264.

Eichengreen, B. and P. Gupta. 2011. "The Service Sector as India's Road to Economic Growth?", *India Policy Forum*, 7: 1–42, New Delhi: National Council of Applied Economic Research.

———. 2013. "The Two Waves of Service-Sector Growth", *Oxford Economic Papers*, 65(1): 96–123.

Eliasson, K., P. Hansson, and M. Lindvert. 2012. "Jobs and Exposure to International Trade within the Service Sector in Sweden", *The World Economy*, 35(5): 578–608.

Fan, T., M. Peters, and F. Zilibotti. 2021. "Service-led or Service-biased Growth? Equilibrium Development Accounting across Indian Districts", *Working Paper 28551*, Cambridge, Massachusetts: National Bureau of Economic Research.

Francois, J. and J. Woerz. 2008. "Producer Services, Manufacturing Linkages, and Trade", *Journal of Industry, Competition and Trade*, 8(3): 199–229.

Freund, C. and D. Weinhold. 2002. "The Internet and International Trade in Services", *American Economic Review*, 92(2): 236–240.

Frocrain, P. and P. Giraud. 2017. "The Evolution of Tradable and Non-tradable Employment: Evidence from France", *Institute interdisciplinaire de l'innovation Working Paper 17-CER04*.

Gervais, A. and J.B. Jensen. 2019. "The Tradability of Services: Geographic Concentration and Trade Costs", *Journal of International Economics*, 118(C): 331–350.

Goldin, C. 2006. "The Quiet Revolution that Transformed Women's Employment, Education, and Family", *American Economic Review*, 96(2): 1–21.

Goldsmith-Pinkham, P., I. Sorkin, and H. Swift. 2020. "Bartik Instruments: What, When, Why, and How", *American Economic Review*, 110(8): 2586–2624.

Hallward-Driemeier, M. 2013. *Enterprising Women: Expanding Economic Opportunities in Africa*. World Bank Publications.

Head, K. and J. Ries. 2001. "Increasing Returns versus National Product Differentiation as an Explanation for the Pattern of U.S.-Canada Trade", *American Economic Review*, 91(4): 858–876.

Hummels, D., R. Jørgensen, J. Munch, and C. Xiang. 2014. "The Wage Effects of Offshoring: Evidence from Danish Matched Worker-firm Data", *American Economic Review*, 104(6): 1597–1629.

Jensen, J. and L. Kletzer. 2006. "Tradable Services: Understanding the Scope and Impact of Services Offshoring", In S.M. Collins and L. Brainard (eds.), *Brookings Trade Forum 2005: Offshoring White-Collar Work, The Issues and Implications*. Washington, D.C.: Brookings Institution Press.

Jensen, R. 2012. "Do Labor Market Opportunities Affect Young Women's Work and Family Decisions? Experimental Evidence from India", *The Quarterly Journal of Economics*, 127(2): 753–792.

Juhn, C., G. Ujhelyi, and C. Villegas-Sanchez. 2013. "Trade Liberalization and Gender Inequality", *American Economic Review*, 103(3): 269–273.

Kinfemichael, B. and A. Morshed. 2019. "Convergence of Labor Productivity across the U.S. States", *Economic Modelling*, 76(C): 270–280.

McMillan, M., D. Rodrik, and C. Sepulveda. 2017. "Structural Change, Fundamentals and Growth: A Framework and Case Studies", Technical Report, Cambridge, Massachusetts: National Bureau of Economic Research.

Mehta, A. and R. Hasan. 2012. "Effects of Trade and Services Liberalization on Wage Inequality in India", *ADB Economics Working Paper Series, No. 268.* Manila, Philippines: Asian Development Bank.

Moretti, E. 2010. "Local Multipliers", *American Economic Review*, 100(2): 373–377.

Muñoz, M. 2021. "Trading Non-tradables: The Implications of Europe's Job Posting Policy", *Working Paper*.

Munshi, K. and M. Rosenzweig. 2006. "Traditional Institutions Meet the Modern World: Caste, Gender, and Schooling Choice in a Globalizing Economy", *American Economic Review*, 96(4): 1225–1252.

Nano, E., G. Nayyar, S. Rubinova, and V. Stolzenburg. 2021. "The Impact of Services Liberalization on Education: Evidence from India", *WTO Staff Working Paper ERSD-202110*. Geneva, Switzerland: World Trade Organization.

Nayyar, G. 2012a. "Inside the Black Box of Services: Evidence from India", *Cambridge Journal of Economics*, 37(1): 143–170.

———. 2012b. *The Service Sector in India's Development*. New York, USA: Cambridge University Press.

Nayyar, G., M. Cruz, and L. Zhu. 2021a. "Does Premature Deindustrialization Matter? The Role of Manufacturing versus Services in Development", *Journal of Globalization and Development*, November 15. Published by De Gruyter.

Nayyar, G., M. Hallward-Driemeier, and E. Davies. 2021b. *At Your Service?: The Promise of Services-Led Development.* Washington, D.C.: World Bank.

Ngai, L.R. and B. Petrongolo. 2017. "Gender Gaps and the Rise of the Service Economy", *American Economic Journal: Macroeconomics*, 9(4): 1–44.

Oster, E. and B.M. Steinberg. 2013. "Do IT Service Centers Promote School Enrollment? Evidence from India" *Journal of Development Economics*, 104(C): 123–135.

Pitt, M.M., M.R. Rosenzweig, and M.N. Hassan. 2012. "Human Capital Investment and the Gender Division of Labor in a Brawn-based Economy", *American Economic Review*, 102(7): 3531–3560.

Rodrik, D. 2013. "Unconditional Convergence in Manufacturing", *Quarterly Journal of Economics*, 128(1): 165–204.

———. 2016. "Premature Deindustrialization", *Journal of Economic Growth*, 21(1): 1–33.

Shastry, G. 2012. "Human Capital Response to Globalization: Education and Information Technology in India", *Journal of Human Resources*, 47(2): 282–330.

Timmer, M.P., E. Dietzenbacher, B. Los, R. Stehrer, and G.J. de Vries. 2015. "An Illustrated User Guide to the World Input–Output Database: The Case of Global Automotive Production", *Review of International Economics*, 23(3): 575–605.

WTO. 2018. "World Trade Report 2018: The Future of World Trade: How Digital Technologies Are Transforming Global Commerce. Geneva, Switzerland: World Trade Organization.

To view the entire video of this IPF session and the General Discussion that ended the session, please scan this QR code or use the following URL
https://youtu.be/LNxk4d-a1SU

Comments and Discussion*

Chair: **Indermit Gill**
World Bank

Robert Z. Lawrence
Harvard Kennedy School

This paper makes an important contribution to the current Indian debate over the implications of services export-led growth. Indirectly, it could also contribute to an understanding of the regional effects in many countries of enhanced opportunities for providing services and remote work that have emerged as a result of the Covid experience.

The paper's results should also offer pause to those who believe that the only path for Indian development is to emulate the model of the Asian tigers and use labor-intensive manufactured goods exports to drive economic growth. Proponents of this view believe that this strategy not only fits India's pattern of factor endowments, in particular its large labor pool of unskilled workers, but also leads to more inclusive growth by providing opportunities for these workers with low levels of education to leave agriculture and raise their incomes by working in manufacturing. Another reason often given for favoring manufacturing growth is that it generates forward and backward linkages to other sectors.

Yet despite the promise of such growth, India has a low and fairly constant share of manufacturing employment and runs perennial deficits in manufactured goods trade. Instead, the growing share of overall employment and the most dynamic part of its export sector consists of services. This is seen as a problem by those advocating an approach that emphasizes manufacturing because services exports are relatively intensive in the use of skilled labor and because those who favor manufacturing doubt that services exports will generate the kinds of linkages to other sectors that are associated with manufacturing. Partly in response to such concerns, India has increased its emphasis on policies that emphasize manufacturing employment and has recently implemented an ambitious policy to increase manufacturing output by providing Production Linked Incentives. (PLIs).

* 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 NCAER's website at the links provided at the end of this section.

However, this paper suggests that it may be necessary to revise views of services export-led growth as non-inclusive and not generating significant spillovers to other sectors. The paper finds that though tradeable exports are skill-intensive, these exports also generate spillover effects that increase the demand for non-tradeable services. These spillovers provide opportunities for greater inclusion both through increasing employment opportunities for less skilled workers and by raising the profits of female-owned firms.

The paper reminds us of the importance of taking a general equilibrium view of structural change rather than a view that focuses only on a sector of concern. As the authors note, growth in a sector can impact growth in other sectors: (a) on the supply side by generating increased demand for inputs and offering opportunities for output distribution, and (b) on the demand side, by raising incomes and stimulating spending on the output of other sectors. An important result of the paper is that the spillover impacts of tradable exports operate primarily through the demand channel. This link between growth in one sector and its spillover effects operating through demand is a vital property of structural change that is often overlooked. It seems natural, for example, that industrial policies that stimulate production directly in a sector (such as through Production-Linked Incentive Schemes or PLIs) are the right way to increase sector output and employment but two examples are worthy of note.

First, in many countries, the most important source of growing demand for workers in manufacturing are the spillovers that come from greater productivity in agriculture. This is because productivity growth reduces agricultural prices and substitution elasticities are less than one increases the demand for manufactured goods. Thus, agriculture and manufacturing are complements. In addition, when income elasticities are less than one for agriculture (Engel's law), higher income generated by productivity improvements in agriculture will increase spending on manufactured goods and services.

Second, it is commonly claimed that the introduction of robots will reduce employment and relative skill premiums by displacing unskilled workers. However, in an insightful paper on the impact of automation in the manufacturing sector, Autor and Dorn (2013) show that though skill-biased technical change can reduce the employment of unskilled workers in manufacturing, the enhanced productivity generated by such technical change can raise incomes and spending on services and thus raise the demand for these same workers in services. Indeed, they find that under plausible assumptions, it is possible that skill-biased technical change in manufacturing can actually raise the relative wages of unskilled workers (Autor and Dorn 2013)! There is evidence in support of this theory. Gregory et al. (2018) examine technological progress in manufacturing on the overall demand for labor when it is biased against routine labor. Using data from 27 European countries between 1999 and 2010, they find that though the direct impact of automation that substituted for routine workers resulted in substantial labor displacement, this was outweighed

by a combination of increased product demand from the sectors experiencing the productivity improvements and the spillovers in increased demand for the output of the non-traded sector (Gregory et al. 2021).

The paper's results could also have predictive power for developments in both India and the United States in response to the increased use of Internet technologies such as Zoom in facilitating remote work. In the United States, over the past two decades, regional growth has become increasingly unequal. On the one hand, "superstar cities" such as San Francisco, Seattle Washington, D.C., and Boston, have grown rapidly. On the other hand, a large number of semi-rural towns which were once manufacturing hubs, have experienced stagnation. Generally, the advice given to these forsaken places is either to allow their people to leave or to adopt policies that attract companies that produce tradable goods and services. However, there is now another option for these places: attract high wage workers who still work in the superstar cities by offering them cheaper and better housing and the ability to avoid commuting by working at home. Once they relocate, as the work of Moretti shows, these workers are likely to spend significant amount of their incomes on local non-traded services.[1] They are also likely to pay local taxes and allow their communities to offer better amenities such as schools and parks. Thus, there is a new channel for more equitable growth that could reduce regional disparities. Similar forces could allow Indians who are skilled to work in the US and other high-income countries, but live and spend in India. The findings in this in this paper, therefore, could be used to support the view that services could become a far more important generator of economic growth and inclusion than has thus far been possible.

The implications of this paper are thus very important for prediction and policies. But are they credible? Actually, the results finding positive employment creation in sectors besides tradable services could be understated for two reasons. Firstly, some of the spending generated by tradable exports could also create jobs in other tradeable sectors such as manufacturing which are not considered in the paper. In addition, because the statistical techniques employ district level data, the spending on non-tradable services that is generated outside each districts is ignored. It is, however, likely that additional jobs would be created by such spending in other districts.

But there is also a potential problem with the central findings of the paper that needs more clarification. As reported in Table 3, the key result is that "a

1. "My research, based on an analysis of 11 million American workers in 320 metropolitan areas, shows that for each new high-tech job in a metropolitan area, five additional local jobs are created outside of high tech in the long run. These five jobs benefit a diverse set of workers. Two of the jobs created by the multiplier effect are professional jobs—doctors and lawyers—while the other three benefit workers in non-professional occupations—waiters and store clerks." (See Moretti 2010; 2013.)

10 percent increase in tradables employment leads to a 4.23 percent increase in non-tradables employment." However, since the employment share in tradable services is very small, —on the order of between 2.2 and 3.56 percent, whereas the share of employment in non-tradable services much larger—between 55 and 64 percent—the effects-attributed to the employment growth in such a small sector on employment in a sector that is between twenty and thirty times larger, are implausibly large! I would find the paper more convincing if in addition to giving the results in terms of sector employment percentages, the authors translated these percentages into number of jobs or even into monetary equivalents. My preference would be to use monetary equivalents, because it is possible that typical incomes in tradeable services which are mainly earned by professionals could be a significant multiple of the typical incomes earned by those who work in non-tradable services. But it would be good to have these numbers. If indeed the orders of magnitude of wages in rupees could offset the differences in employment, the results would be more plausible.

In sum, this has the potential to be a very important paper. It asks, and gives answers to, very important questions. But the analysis of its findings needs to be elaborated and strengthened, if they are to be truly convincing.

References

Autor, David and David Dorn. 2013. "The Growth of Low-skill Service Jobs and the Polarization of the U.S. Labor Market", *American Economic Review*, 103(5): 1553–1597.

Gregory, Terry, Anna Salomons, and Ulrich Zierahn. 2021. "Racing with or against the Machine? Evidence from Europe", *Journal of the European Economic Association*, October.

Moretti, E. 2010. Local Multipliers. *American Economic Review*, 100(2): 373–377.

——— 2013. *The New Geography of Jobs*, New York: Houghton, Mifflin Harcourt.

Dilip Mookherjee

Boston University

This paper studies an important question about economic growth in India. Going back to a paper presented in an early IPF volume by Bosworth, Collins, and Virmani (2006-07), the service sector accounted for the largest fraction of India's growth between 1999 and 2004. But within the service sector, the bulk of the contribution came from `traditional' services such as trade, transportation, public and personal services. While the business services and communications sector registered the highest rates of growth, their overall share of sectoral

output was small (5 and 11 percent, respectively in 2004-05, compared to 44 percent for trade and transportation services). What this means is that the true sources of the growth acceleration in India occurring since the 1990s are poorly understood. While technological change and globalization could account for fast growth of the IT sector, how do we explain the sources of growth in traditional `non-traded' services such as trade and transportation which are mostly non-traded and did not experience comparable technical change?

This paper explores the possibility that forward and backward linkages from 'traded service' sectors might explain an indirect but important component of the growth in non-traded services. In other words, growth in business services and communication (IT, hereafter for the sake of brevity) driven by fast growth in export demand and technology may have generated a stimulus to the traditional non-traded service sector. One channel may be the role of the latter in supplying essential inputs to the IT sector. Another could be increasing demand for non-traded consumer services arising from changes in household incomes. Maybe each job created in the IT sector has a multiplier effect—generating three to four jobs in non-traded services? If this were the case, maybe the IT sector was really a 'leading sector' allowing the Indian economy to finally 'take-off'?

An alternative hypothesis has been recently proposed in a working paper by Fan, Peters, and Zilibotti (2022), that fast productivity growth in non-traded consumer services was the driving force behind the growth of this sector. However, no new technology or organizational reforms in transportation, retail or food services in the informal sector have been visibly manifested over the past fifty years. I find the hypothesis advanced by Adviu et al. far more plausible.

This question has important implications for the 'premature deindustrialization' dilemma faced by India among many other developing countries since the 1980s (Rodrik 2016). Should Indian policymakers nevertheless continue to try to revive productivity and jobs in manufacturing with suitable subsidies or by investing more in physical infrastructure that is particularly important for manufacturing success? Can they emulate and surpass the Chinese and Koreans in manufacturing competitiveness? Or should they give up on such a goal as hopelessly utopian, and rely instead on the IT sector where they have a global comparative advantage, which continues to witness fast productivity growth? A common objection to the latter strategy is that IT-sector driven growth may not be inclusive enough as manufacturing growth used to be. If the IT sector did generate large spillovers to traditional services, a subsequent question then pertains to the distributive implications of such spillovers.

The paper addresses all these questions. Answering them is far from straightforward. Estimating spillovers from one sector to another creates challenges for econometric identification: how can one estimate the causal impact of growth in traded services on subsequent growth in non-traded services? Is it possible to dismiss alternative explanations such as local

improvements in supply of skilled workers, credit, de-regulation, government support or infrastructure that may have jointly driven growth in both sets of sectors at the same times and places?

The approach they take is eminently sensible. It is plausible that the domain of indirect forward and backward spillovers to non-traded services will be spatially concentrated in the vicinity of where the bulk of the fast growing IT firms are located, for one would expect firms supplying key inputs to the IT firms would locate close to the latter. And IT sector workers would tend to spend their rising incomes on food, clothing and entertainment near where they live. So if IT was indeed a 'leading sector', we would expect to see faster growth subsequently in non-traded services in districts close to where most of the fast-growing traded service sector firms were located. Moreover, one would require most of the latter growth to be driven by 'external' factors such as technical change or patterns of export demand, rather than changes in local conditions.

For the latter purpose, the authors construct a 'Bartik' instrument, which extracts the effect of growth in traded sectors that were driven by changes in global trade and technology. Applying this methodology requires merging of a panel district-level dataset (based on the Economic Census of Indian firms) for sectoral employment and firm entry for various traded and non-traded services, with data on corresponding world trade volumes for traded services using the same sectoral classification. As is well known, this amounts to an instrumental variable difference-in-difference estimation methodology which washes out effects of variations in levels of unobserved local characteristics.

Data Questions: Sector Classification

Let me start posing some questions about assembly of the dataset. I could not clearly identify how the telecom sector is classified: is it a traded or non-traded sector? This may really matter in the analysis, given the strong role of technological change and growth in this sector during the last three decades. Figure 1 suggests it is treated as a tradable sector, but I wonder if the volume of international transactions in this sector is large enough to merit this classification. Moreover, the sector classifications used in the analysis need to be clarified, as Figure 1 and Table 2 appear to employ a different classification. Figure 1 shows 'computer programming' to have displayed particularly fast growth, but it does not appear in Table 2: is it part of IT services? Moreover, the econometric analysis aggregates all traded sectors and treats it as a homogenous category, and non-traded sectors into a different homogenous category. One would expect the effects to be quite heterogenous, and it would be helpful to understand the role of specific services (such as IT) within the tradable sector, and their impact on specific non-traded services such as transportation and

trade that are known to have grown particularly fast. This would help readers assess whether the hypothesis passes a reasonable 'smell' test.

In a similar vein, I was puzzled by the spatial patterns shown in the map in Figure 1 wherein the largest employment shares for tradeable services appear in States like Assam, Meghalaya, Odisha, East Andhra Pradesh, and parts of central India. At the same time, well known IT and R&D hubs such as Bengaluru or Hyderabad do not appear to be important. One wonders which traded services are driving the quantitative results.

Identification Strategy

As mentioned above, the principal challenge in the empirical strategy is to find a way of isolating the role of external export-cum-technology shocks on the growth of traded services, from improvements in local 'business climate' encompassing infrastructure, supply of skills, credit and local regulations which could have driven growth in both sets of sectors. The standard 'Bartik' instrument uses employment shares in some base year to weight global changes in sector shares, as a proxy for exposure to external shocks. As Goldsmith-Pinkham, Sorkin, and Swift (2020) amongst others have shown, this is essentially a difference-in-difference (DID) identification strategy, resting on an underlying assumption that levels of base year shares in specific regions were uncorrelated with the subsequent growth in these shares. To illustrate what this assumption means: the growth of the IT sector in Bengaluru until 1990 was driven by local policy/infrastructure factors (such as government R&D investments) that played no subsequent role in the growth of this sector after 1998 (besides its role in increasing the exposure of Bengaluru to the post-1998 surge in global demand for outsourcing of IT services).

However, the exact instrument used by the authors appears to deviate from a classic Bartik instrument, insofar as they use lagged employment shares rather than shares in a base period (see Equation (4) in the paper). This means that the growth in the instrument incorporates growth in lagged employment shares. This quasi-Bartik instrument then requires a more demanding assumption: that current growth rates of specific traded services are uncorrelated with lagged growth rates. In other words, every seven years, there is an entirely new and independent source of global trade or technology shock that provides the underlying growth stimulus. It would be useful to see how robust the results would be if they were to revert to the standard Bartik instrument, e.g., where they use the 1990 employment shares as weights through all succeeding periods.

As Goldsmith-Pinkham, Sorkin and Swift (2020) urge, the Bartik instrument should be subjected to a variety of plausibility and robustness checks. For instance, a variance decomposition of the instrument would reveal what the

bulk of the changes in the instrument are driven by external shocks rather than the internal weights. The authors could check whether pre-1998 growth rates were uncorrelated with levels of the 1998 employment shares, as required by the underlying assumption of parallel pre-trends. The most demanding robustness check would involve an over-identification test, given the multiplicity of underlying instruments (the employment shares of specific traded services): would dropping some of them would change the results materially.

Primary Results and Possible Supplemental Analyses

The scatterplot in Figure 2 shows a strong positive correlation of both the actual and predicted changes in traded services with corresponding changes in non-traded service employment. This figure helps convince us of a robust connection between district level growth in the two sets of sectors. And the subsequent regressions show this pattern remains robust to inclusion of time dummies, location dummies, and controls for education. Following these results which pertain to aggregate employment in the two sets of sectors, the authors examine heterogeneity of these effects across various sub-sectors in order to better understand the underlying channels of causation. The evidence indicates that demand (forward) linkages driven by income effects on consumer spending were the key, with little evidence of supply (backward) linkages. This is an important insight.

They also find evidence of benign distributive impacts, in favor of small firms employing less than ten workers, and those with women entrepreneurs and employees. It would be helpful to translate the estimates in terms of implied formal-informal employment multiplier: the number of non-traded jobs generated by one traded sector job.

I think there is scope for expanding the analysis of distributive implications in a variety of directions. First, the authors could explore impacts on households of varying levels of prosperity, e.g. as proxied by different deciles or quartiles of the household expenditure distribution. Moreover, they could examine the role of local inequality in the multiplier process e.g., if the marginal propensity to spend is higher among poorer groups then districts with lower inequality would be associated with a higher multiplier.

Finally, they could use the labor force surveys of the NSS to examine whether the employment generated in the non-traded sector was associated with particularly low wages and productivity. This is necessary to address the concern that the non-traded sector employment generated did not correspond to much wage growth in the economy.

References

Bosworth, Barry, Susan Collins, and Arvind Virmani. 2006–07. "Sources of Growth in the Indian Economy," *India Policy Forum*, 3: 1–68. New Delhi: National Council of Applied Economic Research.

Fan, Tainyu, Michael Peters, and Fabrizio Zilibotti. 2022. "Growing Like India: The Unequal Effects on Service-Led Growth," *NBER Working Paper 28551*, Cambridge, Massachusetts: National Bureau of Economic Research.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift. 2020. "Bartik Instruments: What, When, Why and How", *American Economic Review*, 110(8): 2586–2624.

Rodrik, Dani. 2016. "Premature Deindustrialization", *Journal of Economic Growth*, 21(1), March.

General Discussion

The discussion was initiated by Arvind Panagariya, who asked if 'good jobs' were being created in the services sector to tackle unemployment. There is sufficient National Sample Survey (NSS) data to support research on this issue. The Chair, Indermit Gill, averred that as a labor economist, he perceived the term 'good jobs' as an ambivalent concept as it ostensibly focuses only on wages whereas there is a need to consider productivity too, and it is important to create services jobs that are both inclusive and ensure high productivity. However, in view of the large size of the services sector, some jobs in it could focus on productivity while others could ensure inclusiveness. In this context, there is a need to assess the relationship and analyse the complementarity between tradable and non-tradable jobs.

Anup Malani asked that since the paper has indicated a higher employment of females in the services sector, does this also reflect income inequality? It would be interesting to characterize households by income and examine how household income is related to employment in services, that is, whether the rich tend to work in the services sector more than those with lesser household incomes. Further, if there is a self-limiting effect on income inequality in services sector employment, how much of this is on the intensive or extensive margins in terms of the number of jobs, reflected in the creation of a higher number of jobs but a proliferation of low-wage jobs?

Prachi Mishra said that Economic Surveys in the past have shown that 80-90 percent of the population is engaged in jobs characterized by low productivity whereas the high-productivity jobs in the services sector employ a very small proportion of the population. It would thus be advisable to regurgitate these findings in research and highlight the concomitant variations in productivity.

Rana Hasan highlighted the need to look at the change in the firm size of distribution, to determine if the employers in the non-tradable sector are going

from two or three-size establishments to say ten-plus establishments, which could be an indicator of growth in productivity.

Surjit Bhalla endorsed the comments of both the discussants, and also cited some ballpark figures for the kinds of jobs available in the services sector in India. According to the Periodic Labour Force Survey (PLFS), 25 percent of the jobs are salaried jobs, 25 percent are casual worker jobs, and the remaining 50 percent of the workers are self-employed. It is difficult to estimate the wages of the self-employed firms and workers, and one can only get an idea of the total income of the family or the household. The PLFS is a rich source of data for salaried versus non-salaried workers, whereas the Consumer Pyramids Household Survey (CPHS) indicates that the proportion of female employment is much lower than that of male employment. It is important to determine and analyse these figures, which, in turn, will give rise to hypotheses that can be tested.

Sudipto Mundle remarked that the PLFS data can be supplemented by high-frequency data from the Centre for Monitoring Indian Economy (CMIE), and the two databases can also be compared to arrive at unemployment and wage rates for the sector. There are huge islands of very high-paying jobs that are spreading mainly through the demand channel to very low-paid jobs, which can be captured by using the PLFS data in conjunction with the CMIE data.

Ruchir Agarwal pointed to the need for producing welfare-relevant metrics, especially for quantifying the differential wages for different levels of jobs. Moreover, one must determine how far migration of workers is responsible for both job creation and job displacement in the sector.

Sam Asher noted the huge frictions associated with migration in India and stressed the need for more work on this issue. It is well known that there is extensive migration across the country, that is, 15 percent of the men in the active workforce migrate for work over the course of their lifetime. In the context of concentrated growth, this incidence of large and persistent migration is a pointer for equalizing wages across space. However, the time horizon for migration is critical. There may not be much migration in the short-run but over the long-run, a bunch of laborers are going to flow out, and wages would consequently shoot up with an increase in the demand for labor.

Indermit Gill concluded the discussion by flagging the high-productivity features of the services sector, which makes it more inclusive relative to both agriculture and manufacturing. This also implies that the sector can be more female labor-intensive as well as spatially more inclusive as compared to the other higher-productivity activities. Another feature is that services can also be tradable and the paper aptly defines tradability relative to manufacturing, especially because we think of manufactured goods as completely tradable. Thus, we can ensure a finer distribution of services, essentially those associated with transport, tourism, and technology, among other things.

We also need to explore whether or not the advent of new technologies can facilitate greater inclusiveness in employment in the services sector. Even if these technologies are applied at the high end, their benefits accrue to the lower end of the employment spectrum in services. It would also be interesting to examine which sectors within tradable services would drive business growth. Services-led growth can be more inclusive and can augment productivity. There is a high degree of complementarity between tradable and non-tradable services. Hence, the higher productivity part of services may actually represent a smaller share of total employment, but favorable policies can lead to growth in those services and can also have positive spillover effects, making the sector more spatially and socially inclusive. Further, breaking down 'good jobs' in terms of skills and wages would be a meaningful and rigorous way of assessing the productivity of jobs. It would also aid in devising a services-led development strategy, and in the creation of more 'quality' jobs. Policy for the sector should therefore take into account varied issues, including backward and forward linkages, and consumption-related spillovers versus supply-side spillovers.

The session video and all slide presentations for this IPF session are hyperlinked on the IPF Program available by scanning this QR code or going to
https://www.ncaer.org/IPF2022/agenda.pdf