

DISSERTATION

INTERNATIONAL PRODUCTION, INTERNATIONAL FINANCE, AND DEVELOPMENT:
A STUDY OF INTEGRATION INTO GLOBAL VALUE CHAINS

Submitted by

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ABSTRACT

INTERNATIONAL PRODUCTION, INTERNATIONAL FINANCE, AND DEVELOPMENT: A STUDY OF INTEGRATION INTO GLOBAL VALUE CHAINS

This dissertation studies the exploitation of labor and accumulation of capital in developing and developed countries with their integration into global value chains (GVCs). The three chapters analyze the distribution of income between labor and capital in manufacturing GVCs, the integration of countries through GVC participation and international finance, and the competitiveness from squeezing labor in export-oriented manufacturing firms in India. Chapter 1 examines the association between declining labor shares and rising participation rates in manufacturing GVCs for developing and developed countries. It finds that a rise in a country's participation rate index in manufacturing GVCs is associated with a decline in its labor share for manufacturing workers in both developing countries and developed countries. Chapter 2 investigates the co-integration of the globalization of production in GVCs and financialization in private capital. It finds significant evidence of co-integration between increased participation in GVCs and increased integration with financial capital for developing and developed countries. Further, an increase in international financial integration is associated with an increase in backward linkages for developing countries and an increase in forward linkages for developed countries, thus providing evidence of the double subordination of developing countries in networks of global production and global finance. Chapter 3 explores the export competitiveness of Indian manufacturing firms and their association with labor shares and labor productivity. It finds manufacturing firms, especially in export-oriented enclaves, expand their competitiveness in export markets by suppressing labor shares and boosting labor productivity.

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DEDICATION

To my father.

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INTRODUCTION

In this dissertation, I present three essays on international production, international finance, and development. I apply analytical frameworks from Marxian political economy and provide empirical evidence on international inequalities between labor and capital as well as between developing and developed countries. The first essay analyzes the distribution of income between labor and capital in global value chains and finds labor to lose in the distribution of income in both developing and developed countries. Developing and developed countries' integration into global value chains and international financial systems is examined in the second essay, and developing countries are found to be doubly subordinated in production and financial systems. The third essay investigates the export competitiveness of manufacturing firms in India as it relates to labor share and labor productivity, with a focus on export-oriented enclaves of production. All three essays contribute to the literature on global value chains from the fields of international economics and macroeconomic development with a framework that draws out power, exploitation, and accumulation.

Chapter 1, "Outsourcing and the Globalization of Exploitation: An Analysis of Declining Labor Shares in Global Value Chains", empirically investigates the association between outsourcing production through global value chains (GVCs) and the globalization of exploitation in developing and developed countries. To this aim, I use the circuit of capital to assess the impact of higher participation rates in manufacturing GVCs on labor shares of value added. I find that a rise in a country's participation rate index in manufacturing GVCs is associated with a decline in its labor share of value added for manufacturing workers in both developing and developed countries. GVCs subsume labor across borders to global capital in the pursuit of profits with an increase in the overall rate of exploitation. I also construct two indices of GVC participation and find the

decline in labor shares to be significantly associated with the market share, or the importance of the country, in the GVC. Workers in both developing and developed countries are squeezed by global capital for profits regardless of value addition which highlights the monopsony power that controls production with cost mark-ups. Lastly, I find that countries compete at low levels of participation with highly disaggregated production across borders and race to the bottom in their provisioning of cheap labor to attract global capital.

Chapter 2, “GVC Integration and Financial Openness: Empirical Evidence on the Interlinkages between Global Production and Global Finance”, investigates the interlinkages between international financial integration and the restructuring of the global division of labor through GVCs. It explores the co-integration of the globalization of production with countries’ participation in GVCs and their financial integration with international capital flows. It finds significant evidence of co-movements between international trade through GVCs and private investments through debt and equity flows. Further, an increase in international financial integration is associated with an increase in backward linkages for developing countries and an increase in forward linkages for developed countries. This suggests a double subordination of developing countries in networks of global production and global finance.

Chapter 3, “The Race to the Bottom in Export-Oriented Production in India: An Analysis of Labor Share, Labor Productivity, and Enclaves”, examines how export-oriented manufacturing firms in enclaves of production have advanced their competitiveness by squeezing labor. I find that manufacturing firms boost their competitiveness in export markets by suppressing labor shares and boosting labor productivity. Export-oriented manufacturing firms compete in a race to the bottom with a suppression of labor costs and expansion of productivity with technology. Enclave manufacturing firms further intensify the process of squeezing labor to expand competitiveness in

export markets with the government provisioning of looser labor laws and ease of access to international production networks with tax and tariff breaks. Indian manufacturing firms in export-oriented enclaves then have a competitive edge to convert lower labor shares into higher export sales relative to other firms in the industry. Lastly, the negative relationship between competitiveness in export markets and labor shares is strongly significant for manufacturing firms in low-technology industries. Firms with low-technology activities and low value addition employ low-skilled labor which is squeezed in its labor share of gross output from the circumvention of labor laws and fewer inspections.

The dissertation seeks to understand structures of international inequalities between and within developing and developed countries with increased integration into global value chains. Ultimately, the increased interconnectedness of global capital and global production networks heightens its vulnerability to upheavals that can disrupt accumulation. This returns the focus of class struggle to the point of production, highlighting strategic points for revolutionary action in praxis.

CHAPTER 1

OUTSOURCING AND THE GLOBALIZATION OF EXPLOITATION: AN ANALYSIS OF DECLINING LABOR SHARES IN GLOBAL VALUE CHAINS

1.1 INTRODUCTION

The collapse of Rana Plaza in Bangladesh in 2013 resulted in the death and injury of thousands of workers. It highlighted the exploitation of workers in sweatshops for an international production network and brought into focus the power structure of the global capitalist economy in discussions on Global Value Chains (GVCs). GVCs are systems of globally disaggregated production that are embedded in the asymmetric architecture of institutions. Intangible assets that are abundant in Global North economies are protected via intellectual property rights but labor and natural resources that are abundant in Global South economies are subordinated to global capital (Roy, 2019; Bair et al, 2023). This structure feeds the unequal distribution of income between labor and capital with rising labor exploitation and declining labor share of income in GVCs.

The internationally disaggregated production process of GVCs is controlled by Transnational Corporations (TNCs) and Multinational Corporations (MNCs) and can take two basic forms. It can be based on an in-house relation through FDI from the parent company to its offshore subsidiaries or it can be based on an arms-length relation with the parent company outsourcing production to independent supplier firms. The neoliberal globalization of production is characterized by the latter form of outsourcing segments of the production process to supplier firms (Milberg & Winkler 2011; Smith 2016). This pattern of outsourced production has shifted the dynamic of competition from being between firms across countries to now a monopsonistic TNC

or MNC that controls production in GVCs and enforces competition between subcontracted supplier firms to attract global capital. The increased competition amongst small supplier firms triggers a race to the bottom to remain competitive for global capital with an overall increase in the rate of exploitation. MNCs and TNCs dynamically concentrate and centralize global capital to integrate workers in both the North and the South into its control of the production process (Vasudevan, 2019).

In this paper, I ask what is the impact of higher participation rates in manufacturing GVCs by developing and developed countries on their labor shares of value added? Labor is understood to be the source of surplus value creation and yet there is a noted decline in the labor share of income across countries in GVCs. Timmer et al (2014) illustrate the international fragmentation of production along with a shift in value added from developing countries with low-skilled labor towards developed countries with capital and high-skilled labor. Their decomposition analysis sets a foundation to empirically explore the consequences of increased integration in GVCs. My contributions to the literature are two. First, I empirically analyze the impact of increased integration in GVCs on the labor share of value added for both developing and developed countries. Milberg and Winkler (2013) focus their analysis to the US and find labor losing to capital with increased offshoring intensity in manufacturing. Guschanski and Onaran (2022, 2023) focus their analysis on fourteen OECD countries or seven emerging economies and find medium-skilled labor to primarily lose in the distribution of income with GVC integration due to lower bargaining power. I combine an empirical analysis of manufacturing labor in both developing and developed countries with an expanded dataset to find that increasing GVC participation by countries over time contributes to their declining labor share across stages of development. Second, I construct two indices of participation - a backward linkages index and a forward linkages index. The indices

capture the market importance of the country in the GVC or, in other words, the share of value added absorbed or contributed by the country in the GVC. Roy (2020) measures the net gains of a country from GVC participation from the ratio of the domestic value added contribution to the foreign value added absorption. He finds that increased GVC participation results in lower net gains for developing countries and higher net gains for developed countries. I center my analysis on the labor in GVCs, rather than the net gains for the country, and I explain the decline in labor share with an increased index of integration in GVCs.

I use a linear fixed effects model to answer how higher participation rates in manufacturing GVCs impacts labor shares of value added among manufacturing workers in developing and developed countries. Using the 2021 edition of the OECD datasets on Trade in Value Added (TiVA) and Trade in Employment (TiM), I construct a panel of 64 developing and developed countries for the period of 1995-2018. I then separately test for the effect of the participation rate index, the backward linkages index, and the forward linkages index on the labor share. Across the analysis, I test for the set of all countries, as well as separately for developing and developed countries. My paper has three main findings.

First, a rise in a country's participation rate index in manufacturing GVCs is associated with a decline in its labor share of value added. The participation rate index accounts for both the domestic value added in foreign exports and the foreign value added in domestic exports in total GVC participation by all countries. As a country increases its integration in a manufacturing GVC, the labor share in value added declines for its workers. This happens in both developing and developed countries, indicating a rise in the overall rate of exploitation and a trend of labor being subordinated to global capital. Further, the finding holds for countries increasing their foreign value added absorption (backward linkage index) or their domestic value added contribution

(forward linkage index) relative to the rest of the world. In other words, an increase in market shares of backward linkages or forward linkages are associated with a decline in labor share. Contrary to the argument that increased economic integration would lead to better bargaining power and labor share, I note a social degradation from the race to the bottom with a decline in the labor share.

Second, the decline in labor share is associated more significantly with the indexed measures of GVC participation which captures the importance of the country to the GVC than with the direct measures which conversely captures the importance of the GVC to the country. Simply put, the market shares of the countries in the GVC explain the decline in labor shares to a greater extent than the shares of GVC production in the countries' domestic economies. Both developing and developed countries experience a decline in labor share even as they become a larger player in the international production network. The empirical evidence supports the argument that MNCs and TNCs control the production process in GVCs such that a country, whether developing or developed, could level up participation but still experience a fall in its labor share as its workers are subjugated to the monopsony power of global capital.

Third, countries are clustered at lower levels of participation by value added in GVCs as production is disaggregated across many competing countries and, in the race to the bottom, countries experience a fall in labor share with rises to higher quartiles of GVC participation. The decline of labor shares is greater from an increase in the backward linkages index when upgrading from the first to the second quartile for developing countries and throughout higher quartiles for developed countries. This is further evidence of the race to the bottom that is driven by the exploitation of labor in not only developing countries at lower levels of value addition but also developed countries at higher levels of value addition. Developing countries compete with each

other by driving down unit labor costs that adversely impacts their labor share, and the competitive dynamic also holds for developed countries that compete with outsourced wages. Labor is losing out to capital in different ways for developing and developing countries but similarly in competition under the control of MNCs and TNCs.

The rest of the paper is structured as follows. Section 2 reviews the literature on declining labor shares and rising participation rates in GVCs. Section 3 outlines the analytical framework of the paper with the circuit of capital and the system of unequal exchange. Section 4 details the data and descriptive statistics, Section 5 the empirical framework, and Section 6 the results and discussion. Section 7 concludes.

1.2 INTEGRATION AND LABOR SHARE IN GVCs

In the history of globalization, global commodity chains underwent two stages of unbundling (Roy, 2020; Baldwin, 2012). The first unbundling was catalyzed by steam power and made profitable by scale economies and absolute cost reductions. Then, spaces of production and consumption were separated by competitive advantages that were derived from the matching of the abundance of a factor in a region to its particular factor intensity. The development of railways and steamships with steam power essentially led to a fall in transportation costs that resulted in increased global trade and migration as well as the concentration of production in certain regions. Concentrated production necessitated more efficient and cost-effective coordination across distances. The second unbundling was then catalyzed by the information and communication technology revolution that allowed networks of production to no longer be fixed in space but instead span across borders with a system of transactions (Baldwin 2012; Roy 2020). Improved

information and communication technology essentially led to a fall in coordination costs that resulted in disaggregated production with different stages in different countries according to factor intensities, competitive advantages, and unequal exchange (Roy 2020; Smith 2016).

Advances in information and communication technology induced firms to substitute labor for capital to the extent that it caused a decline in the aggregate labor share of income. Karabarbounis and Neiman (2014) illustrate a decline in the global labor share from the early 1980s across most countries and industries with a decline in the relative price of investment goods due to advances in information and communication technology. The spread of the trend of declining labor shares is contextualized in a system of globalization of production that concurrently began in the 1980s through offshoring and subcontracting productive activities across borders (Milberg & Winkler, 2013). Particularly indicative of the trend is the increase in trade of intermediate inputs and rise in shares of foreign value added as a proportion of gross exports (Caraballo & and Jiang, 2016). Figure 1.1 illustrates the expanding foreign value added in gross exports for a sample of three developing countries and three developed countries. A country's expanding foreign value added in gross exports is depicted by the shaded area from the gap between its gross exports and its domestic value added in gross exports.

[Figure 1.1]

Empirically, much research has been done on connecting economic upgrading with economic growth and trade, but not on the interlinkages between economic and social upgrading (Milberg & Winkler 2011). Economic upgrading is “the possibility of (developing country) producers to move up the value chain, either by shifting to more rewarding functional positions or by making products that have more [domestic] value added invested in them and that can provide better returns to producers” (Gibbon and Ponte, 2005). It can be achieved by upgrading capital with investments in

new machinery/technology or by upgrading labor with investments in labor-enhancing technology. Social upgrading includes improvements in wages, working conditions, workers' protections and rights and do not necessarily follow from economic upgrading (Milberg & Winkler, 2011).

Contributions to the literature on the lack of social upgrading emphasize the declining labor share and point to increased integration in GVCs but decreased bargaining power as explanatory factors. Figure 1.2 illustrates the trends of labor shares in value added and GVC participation rates for a sample of three developing and developed countries each. The largest three developing countries by GDP – China, India, and Brazil – all display broad trends of declining labor shares and rising GVC participation rates. The largest three developed countries – the US, Japan, and Germany – also display declining labor shares along with declining GVC participation rates. The difference between the GVC participation rates of developing and developed countries essentially illustrates the competitive dynamic of labor. While manufacturing labor in developing countries are competing with each other to attract global capital, manufacturing labor in developed countries are competing with offshored and outsourced labor to remain attractive for MNCs and TNCs. Milberg and Winkler (2013) analyze the parallel trend of increasing offshoring and increasing profit share in the US. They examine the effect of offshoring intensity on labor share for the US and find that increased offshoring leads to a decrease in the labor share. Guschanski and Onaran (2023) analyze the effect of GVC participation on the labor share for seven emerging economies and find that integration into GVCs with advanced economies reduces the labor share in emerging economies in manufacturing and service industries, particularly for medium-skilled workers. They find the fall in wage share to be explained more significantly by the fall in bargaining power due to offshoring than by a rise in technological change. Kumar (2020) explains the association of bargaining power and income distribution with the degree of monopoly power and levels of

unemployment. A higher degree of monopoly power increases a firm's bargaining power, and a higher level of unemployment decreases workers' bargaining power. Together, the two factors explain the falling labor share or rising profit share. Barrientos, Gereffi, and Rossi (2011) also argue that social upgrading in a GVC typically results from a complex bargaining process. Pahl and Timmer (2019) employ a long view in their study of GVC participation and upgrading in the manufacturing sector. They find strong evidence for positive effects on productivity growth, and economic upgrading, but no evidence for employment generation or social upgrading. To sum up, increased offshoring and outsourcing through GVCs are associated with decreased labor shares. The mechanisms that drive the decreasing labor shares are increasing exploitation rates and cost mark-ups from monopsony power.

[Figure 1.2]

In GVCs, the declining labor share from higher rates of exploitation and higher degrees of monopsony power can be analytically framed in the circuit of capital. The circuit of capital outlines the cyclical and expansionary process of capital accumulation that is controlled by MNCs and TNCs. The drive to accumulate global capital squeezes global labor in the distribution of income across developing and developed countries.

1.3 ANALYTICAL FRAMEWORK

Marx (Capital II) formulated the circuit of capital to explain the cyclical and expansionary process of value circulation and capital accumulation. The circuit of money capital ($M - C \dots P \dots C' - M'$) represents the objective of an individual capitalist in investing money capital (M) through production (P) of commodities from C to C' to obtain a greater magnitude of money capital

(M') in return. Money is reinvested in subsequent cycles to expand production and accumulate capital. In the global market, MNCs and TNCs are the sites of power that invest capital and coordinate production across stages in different countries (Smith, 2016). MNCs and TNCs outsource the employment of workers for production but appropriate the surplus value that is created in circulation. In the system of international production, they suppress wages to remain competitive and counter the tendency of the rate of profit to fall (Smith, 2016). The suppression of wages and, consequently, the lower labor share is based on an intensification of the rate of exploitation to drive the accumulation of capital on the global scale.

The internationalization of capital through production in GVCs raises global competition and necessitates capital accumulation by firms and countries to remain competitive. This plays out differently in developing and developed countries but with the same result of suppressing wage rates for the expansion of global capital. Coveri and Zanfei (2022) provide empirical support of a functional division of labor of intangible-intensive activities in the Global North and production in the Global South. The functional division of labor further feeds the value capture from the production process later along the smile curve in intangible-intensive activities. Basu and Vasudevan (2021) also argue that the monopoly power of lead firms in the Global North from the ownership and control of intangible assets, along with competition amongst supplier firms, results in an asymmetry in value capture. Labor in supplier firms loses to global capital with intangible assets (Vasudevan, 2019; Roy, 2020).

In developed countries, offshoring and outsourcing production to low-wage low-cost supplier firms in the Global South reduces bargaining power and labor share. In developing countries, loose labor laws to attract foreign capital again reduces bargaining power and labor share. Moreover, limiting labor mobility while allowing capital mobility across the globe further contributes to the

transfer of surplus value from developing countries to developed countries. The limited labor mobility, on one hand, keeps developing countries competitive in their endowments of abundant labor by increased offshoring and subcontracting. The free capital mobility, on the other, allows for greater flows through the circuit of capital for expanded production and reproduction that is coordinated by MNCs and TNCs. The control of the circuit of capital with the monopsony power of MNCs and TNCs along with capital mobility further enforces labor competition amongst supplier firms while keeping labor segregated across political borders.

Palloix (1977) argues that the international self-expansion of capital supports the tendency towards the equalization of profit rates, but the tendency towards equalization is immediately checked by the differentiation of conditions of production and exchange. He defines internationalization as “the spatial extension of the capitalist mode of production” with the movement of industrial branches overseas (p.3) – an early recognition of the prevalence of GVCs. The tendency towards the equalization of profit rates occurs with the movement of surplus value from industries with a lower organic composition to those with a higher organic composition. In GVCs, this registers as a movement of surplus value from low-cost low-wage manufacturing to high-cost high-wage research, development, advertising, etc. However, Palloix (1977) emphasizes the movement of offshoring and subcontracting production denotes not a tendency to equalization but a tendency to differentiation. The internationalization process implies a shifting of industrial activities to developing economies from developed economies due to differential conditions. Differentiation refers to the differences in resource availability, labor productivity, and technological progress that attract capital and perpetuate an uneven development. The differential conditions direct the transfer of value within a sector of production, such as manufacturing, with many competing supplier firms and one or a few monopsonistic buyer firm. Hence, the differential

conditions for the extraction of absolute and relative surplus value from productive activities are ensured, and these differential conditions form the basis for unequal exchange between social classes in the production process.

Emmanuel (1972) highlighted the flexibility in sourcing decisions from the core as the effect of capital mobility and a characteristic of unequal exchange that is reflected in global trade networks. With capital mobility, competitive pressures amongst subcontractors in the periphery limit the scope of raising production costs as it would consequently trigger a loss of output and profits. Emmanuel (1972), however, centers the “labor aristocracy” in developed countries as the beneficiaries of unequal exchange from differential conditions of workers in different industries in different countries. Ricci (2019) challenges Emmanuel’s notion of a labor aristocracy in developed countries that benefits off the exploitation of the labor in developing countries. He shows that globalization induces greater intra-industry transfers relative to inter-industry transfers. The persistence of unequal exchange in the modern capitalist global economy contests the neoliberal belief that trade is mutually beneficial for all partners (Ricci, 2019). There is an expanding pattern of intra-industry transfers with globally disaggregated production and a social distribution of gains and losses from unequal exchange between wages and profits rather than between developed countries and developing countries. Heintz (2006) focuses on buyer-driven commodity chains to illustrate the distributive consequences of expanding production of globalized manufactures on the economic welfare of the workers who produce manufactures for exports. In highly competitive conditions, subcontractors and production workers are unable to capture the benefits of productivity enhancements that instead accrue to brand-name MNCs and final consumers. The MNCs and TNCs possessing higher degrees of market power determine the distribution of productivity gains (Heintz, 2006). In the next three sections, I empirically analyze the distribution

of value added between labor and capital from increased integration in GVCs by developing and developed countries.

1.4 DATA AND DESCRIPTIVE STATISTICS

1.4.1 SOURCES OF DATA

I use the 2021 edition of the OECD TiVA and TiM indicators for my analysis that provides insights on value added, employment, and compensation of employees by GVCs. Indicators are available for 66 economies, 17 regions and country groups, and 25 industry aggregates for the years 1995 to 2018. I focus my analysis to 64 countries and the industry aggregate of total manufactures. To balance the panel, I drop Chinese Taipei and Saudi Arabia due to lack of data. I source the data on population from the database on World Development Indicators by the World Bank and the data on exchange rates from the database on the External Wealth of Nations by the Brookings Institution for the 64 countries over the years 1995 to 2018. For my analysis of developing and developed countries, I categorize the countries in accordance with the UNCTAD classification. The UNCTAD classification of developing and developed countries is based on structural economic conditions and countries do not change their classification by development status over time. For the analysis in this paper, the countries in the sets of developing and developed countries are listed in Appendix A.

1.4.2 VARIABLES

I analyze variables of labor share of value added, gross exports, and components of value added. Horvát et al (2020) describe the sources and methods used to produce the indicator of labor share for the TiM database. The compensation of employees includes wages and salaries of

employees paid by employers, along with contributions to social security, private pensions, health insurance, life insurance, etc.

Martins et al (2022) describe the indicators in the TiVA database. A country's total gross exports are measured as the sum of exports in intermediate and final goods and services adjusted for re-exports. It includes cross-border flows and direct expenditures by non-residents within its domestic boundary. The integration of the country in the GVC is captured more closely by value-added and the contribution of the country to the production of global commodities in manufacturing. The domestic value added content of gross exports represents the exported value added generated in the domestic economy. The foreign value added content of gross exports represents the value of imported intermediate goods and services embodied in a domestic industry's exports. It includes re-imported foreign value added previously exported by the domestic industry, i.e. the foreign value added could originate from any upstream industry in the value chain. Domestic value added content of foreign exports represents the domestic value addition in the gross exports of an industry in foreign countries. The foreign value added share of gross exports becomes the country's backward linkages in the GVC and the domestic value added share of foreign exports becomes the country's forward linkages in the GVC.

$$Backward Linkages_{ct} = \frac{Foreign Value Added Content of Gross Exports_{ct}}{Gross Exports_{ct}} \quad (1)$$

$$Forward Linkages_{ct} = \frac{Domestic Value Added Content of Foreign Exports_{ct}}{Gross Exports_{ct}} \quad (2)$$

I construct the participation index from the data, as defined in Roy (2020) and Banga (2014), as a measure of a country's integration in the GVC. It captures the share of a country's backward participation (foreign value added content of gross exports) and forward participation (domestic value added content of foreign exports) in the total created value added of the world. That is, for

each country, its backward and forward participation are added, and the share of that country in the aggregate of individual sums of countries is computed.

$$Participation Index_{ct} = \frac{(Domestic VA in Foreign Exports + Foreign VA in Gross Exports)_{ct}}{\sum_c (Domestic VA in Foreign Exports + Foreign VA in Gross Exports)_t} \quad (3)$$

I also construct indices of backward linkages and forward linkages, in my contribution to the literature, as a measure of the importance of the country downstream or upstream in the GVC. The index of backward linkages captures the significance of the country in manufacturing GVCs through its foreign value added content of gross exports or its imports of intermediate inputs, relative to other countries' absorption of foreign inputs. It is constructed as the share of a country's backward participation in the total of backward participation across all countries in a year.

$$Backward Linkages Index_{ct} = \frac{(Foreign Value Added Content of Gross Exports)_{ct}}{\sum_c (Foreign Value Added Content of Gross Exports)_t} \quad (4)$$

The index of forward linkages similarly captures the significance of the country in manufacturing GVCs through its domestic value added content of foreign exports, relative to other countries' contribution of value added as intermediate inputs to the GVC. It is constructed as the share of a country's forward participation in the total of forward participation across all countries in a year.

$$Forward Linkages Index_{ct} = \frac{(Domestic Value Added Content of Foreign Exports)_{ct}}{\sum_c (Domestic Value Added Content of Foreign Exports)_t} \quad (5)$$

I construct the indices of backward and forward linkages to capture the significance of the country in manufacturing GVCs whereas the direct measures of backward linkages (foreign value added share of gross exports) and forward linkages (domestic value added share of foreign exports) conversely capture the significance of manufacturing GVCs in the country. The direct measure shows the reliance on GVCs to access international markets while the indexed measure shows the

supplier firms competing down unit labor costs to command a greater market share (Basu & Vasudevan, 2021; Suwandi, 2019). GDP per capita, employment per capita, and the exchange rate serve as control variables for the size of the country and its competitiveness in international trade. GDP per capita captures production excluding intermediate inputs. Employment per capita measures the number of people engaged in production activity within the domestic territory, including both employees and the self-employed, relative to the population of the country. The exchange rate is taken to measure the relative value of the domestic currency and capture the competitiveness of the country through its impact on relative prices.

1.4.3 DESCRIPTIVE STATISTICS

The sample consists of 64 countries of which 28 are developing and 36 are developed, according to the UNCTAD classification of countries (Table 1.1). There is a stark difference in the averages of employment and labor shares of workers in GVCs between developing and developed economies. Developing countries employed more workers in manufacturing GVCs per capita (13 per thousand population) with a lower labor share (34.7%), on average, than developed countries with fewer workers per capita (2 per thousand population) and a higher labor share (49.8%). The gross exports, total value added, domestic value added content, and foreign value added content are all higher for developed countries than for developing countries implying a greater value addition concentration in the Global North. The higher participation index in developed countries along with the higher employment but lower labor share in developing countries suggests that value is created by workers in the Global South but is realized with big markups on production costs at the point of consumption in the Global North. Developing countries have a higher index of backward linkages than of forward linkages while developed countries conversely have a higher index of forward linkages than of backward linkages. Further, developed countries have a higher

index of both forward and backward linkages than developing countries. A higher backward linkages index for developing countries implies their integration through backward participation and, similarly, a higher forward linkages index for developed countries implies their integration through forward participation. All indices, nonetheless, being higher for developed countries illustrates their dominance in manufacturing GVCs through forward and backward participation. Both developing and developed countries, however, have higher backward participation (foreign value added in domestic exports) than forward participation (domestic value added in foreign exports), indicating greater integration into manufacturing GVCs through foreign value added or foreign intermediate inputs.

[Table 1.1]

1.5 EMPIRICAL FRAMEWORK

I analyze the impact of GVC participation on the labor share of value added while controlling for GDP per capita, employment per capita, and the exchange rate for countries across time. The variables are transformed with their natural log transformations to normalize skewed data and to account for the multiplicative relationship between GVC participation and labor share. I use a linear fixed effects model such as the one outlined in Milberg and Winkler (2013). The equation estimated is:

$$\begin{aligned} \ln(Labour\ Share)_{ct} = & \beta_0 + \beta_1 \ln(Index\ of\ Participation)_{ct} \\ & + \beta_2 \ln(Employment\ per\ capita)_{ct} + \beta_3 \ln(GDP\ per\ capita)_{ct} \\ & + \beta_4 \ln(ExchangeRate)_{ct} + \theta_c + \theta_t + \varepsilon_{ct} \end{aligned} \quad (6)$$

For the index of participation, I separately test for the effect of the participation index, the backward linkages index, and the forward linkages index on the labor share of income. I also test for the set of all countries, as well as separately for developing and developed countries. All regressions control for country and year fixed effects (θ_c and θ_t) and incorporate an error term (ε_{ct}). I expect that the greater participation by a country in a GVC would be associated with an adverse impact on its labor share ($\beta_1 < 0$). A positive coefficient on the log of employment per capita (β_2) would imply that a 1% increase in the employment per capita of manufacturing workers of a country would also be associated with an increase the labor share of income of manufacturing workers by 1%. Similarly, a positive coefficient on the log of GDP per capita (β_3) would mean that an increase in the GDP per capita would be associated with an increase the labor share of workers in manufacturing. Lastly, an increase in the log of the exchange rate (β_4) would mean that an appreciation of a country's exchange rate would be associated with an increase its labor share of manufacturing workers.

I further test the effect of shifting up quartiles of the participation index, the backward linkages index, and the forward linkages index on the labor share in value added of the country with the same set of control variables. The equation estimated is:

$$\begin{aligned} \ln(\text{Labour Share})_{ct} = & \delta_0 + \delta_1(Q2 \text{ of Participation})_{ct} + \delta_2(Q3 \text{ of Participation})_{ct} \\ & + \delta_3(Q4 \text{ of Participation})_{ct} + \delta_4 \ln(\text{Employment per capita})_{ct} \\ & + \delta_5 \ln(\text{GDP per capita})_{ct} + \delta_6 \ln(\text{ExchangeRate})_{ct} + \theta_c + \theta_t \\ & + \varepsilon_{ct} \end{aligned} \quad (7)$$

For quartiles of participation, I separately test for quartiles of the participation rate index, backward linkages index, and forward linkages index with the first quartile taken to be the

reference category. Quartiles are held constant when shifting the analysis from all countries to separately for developing and developed countries, so developing countries are still concentrated in lower quartiles of participation. As before, I test for all countries and separately for developing and developed countries. All regressions control for country and year fixed effects (θ_c and θ_t) and incorporate an error term (ε_{ct}). I expect that the difference between participation by a country in the first quartile and in a higher quartile would be associated with a lower labor share ($\delta_1 < 0$). The coefficients are interpreted as follows: δ_1 captures the difference between a country in the first quartile and a country in second quartile of participation on its labor share of income; δ_2 captures the difference between the first and third quartile; δ_3 captures the difference in the lowest and highest quartile. The coefficients of the logs of employment per capita, GDP per capita, and exchange rate are interpreted as previously explained.

1.6 RESULTS AND DISCUSSION

1.6.1 IMPACT OF INDEXED MEASURES OF PARTICIPATION ON LABOR SHARES

A rise in the participation rate index adversely impacts the labor share for all countries, both developing and developed, as does a rise in the indices of backward linkages and forward linkages. Table 1.2 reports the regression results for labor share of value added on the participation rate index (columns 1-3), the backward linkages index (columns 4-6), and the forward linkages index (columns 7-9). A 1% increase in the participation rate index is associated with a 0.1% decrease in labor share on average for all countries, statistically significant at the 1% level. The result is negative and significant for both developing countries (0.03% fall) and for developed countries (0.23% fall). All results are jointly significant at the 1% level. Increasing either or both of backward

linkages and forward linkages, the domestic value added contribution or the foreign value added absorption, in the GVC is adversely associated with a fall in the labor share of workers in the manufacturing sector of a country – whether developing or developed.

[Table 1.2]

The participation rate index accounts for both the domestic value added in foreign exports, or forward linkages, and the foreign value added in domestic exports, or backward linkages, in total GVC participation by all countries. The constructed indices test the impact of a country's increased backward linkages (and forward linkages) relative to the total of all countries' backward linkages (and forward linkages) on its labor share of value added. I find that a country's increased GVC dominance with backward linkages is negatively associated with its labor share but so is its increased GVC dominance with forward linkages. The fall in labor share is explained to a greater magnitude from increasing the GVC market share with forward linkages than with backward linkages. From Table 1.2, a country experiences a greater fall in its labor share by expanding its forward linkages index (0.09% fall in labor share) than by expanding backward linkages index (0.08% fall in labor share). This is evidence of increased market domination in GVCs not resulting in a more equitable distribution of income; rather being driven by a high rate of exploitation for greater profit shares. Squeezing global labor in the drive for greater profits occurs in both developing and developed countries.

1.6.2 IMPACT OF DIRECT MEASURES OF PARTICIPATION ON LABOR SHARE

Table 1.3 reports the regression results for labor shares of value added on direct measures of backward linkages (columns 1-3) and forward linkages (columns 4-6). Testing backward linkages, an increase in a country's backward linkages is negatively associated with its labor share, on

average, for all countries. The result is negative and statistically significant for developed countries and negative but statistically insignificant for developing countries. Testing for forward linkages, an increase in a country's forward linkages is negatively associated with its labor share but the result is statistically insignificant, on average, for all countries. For developing countries an increase in their forward linkages by 1% is associated with a decrease in their labor share by 0.08%, statistically significant at the 1% level. This implies that developing countries could increase their value contribution to the GVC, relative to their exports, but their labor share still declines. For developed countries an increase in their forward linkages by 1% is associated with an increase in their labor share by 0.09%, statistically significant at the 5% level. This implies that an increase in developed countries' contribution to value added in manufacturing GVCs indeed increases the labor share for domestic manufacturing workers. All results are jointly significant at the 1% level.

[Table 1.3]

From Tables 1.2 and 1.3, I note that the importance of the country to the GVC (from the indexed measures) explains the variation in labor shares of manufacturing income more significantly than the importance of the GVC to the country (from the direct measures). The models with the indices to capture the importance of the country in the GVC exhibit a higher R-squared than the models with the direct measures of backward and forward participation that capture the importance of the GVC to the country. Recall that the direct measures of participation show the reliance of the country on the GVC while the indexed measures show the reliance of the GVC on the country. For developing countries, an increase in the direct measure of backward linkages does not impact labor share with statistical significance but an increase in the indexed measure is associated with a decrease in the labor share. Both direct and indexed measures of forward linkages adversely impact the labor share in manufacturing, indicating the command of greater market share through

competitively reduced labor shares. For developed countries, an increase in both direct and indexed measures of backward linkages decreases labor share but there are differing results for forward linkages. An increase in the direct measure positively impacts labor share whereas an increase in the indexed measure negatively impacts labor share. Therefore, manufacturing labor shares in GVCs generally declined in both developing and developed countries despite a rise in integration and market share as measured by the GVC participation rate index. This indicates a concentration of monopsony power amongst MNCs and TNCs that coordinate the GVC and mark up costs for profits while suppressing labor shares.

1.6.3 THE RACE TO THE BOTTOM

The smaller magnitude of fall in labor shares for developing countries requires further exploration considering the greater employment and smaller labor share compared to developed countries (Table 1.1). It is likely due to the lower level of labor incomes in developing countries that contributes to their cost competitiveness. The kernel density estimates also indicate that the countries are clustered around the lower levels of participation indices in manufacturing GVCs; most sharply in backward participation among developing countries (Figure 1.3). This leads to the hypothesis that most countries, especially developing countries, are competing at lower levels of participation and the decline in labor share is experienced more significantly by increasing participation at lower levels of value added.

[Figure 1.3]

An increase in a country's participation rate index from the first quartile to a higher quartile of integration adversely impacts its labor share of income. Table 1.4 reports the regression results for the labor share of value added on quartiles of the participation rate index (columns 1-3), forward

linkages index (columns 4-6), and backward linkages index (columns 7-9). An increase in a country's participation rate index to the second quartile decreases its labor share by 0.10%, to the third quartile by 0.07% and to the fourth quartile by 0.10%, statistically significant at the 1% level. The adverse result for labor shares holds for both developing and developed countries with the larger decreases in the jumps to the second and fourth quartiles. Along with the observation from the kernel density estimates that most countries are clustered around the lower quartiles of participation (Figure 1.3), the reduction in labor share from increasing participation to the second quartile holds economically significantly.

[Table 1.4]

Next testing separately for indices of backward and forward linkages, I find a negative impact of an increase in both backward and forward linkage indices on the labor share across developing and developed countries. However, countries are concentrated at lower levels of participation and strongly compete to upgrade to the second quartile. For developing countries, an increase in the backward linkages index from the first to second quartiles decreases labor share by 0.09% and an increase in the forward linkages index from the first to second quartile decreases labor share by 0.08%, statistically significant at the 1% level. For developed countries, an increase in the backward linkages index from the first to second quartile decreases labor share by 0.14% and an increase in the forward linkages index from the first to second quartile decreases labor share by 0.13%. Hence, the fall in the labor share is greater from an increase in the backward linkages index than from an increase in forward linkages index when upgrading from the first to the second quartile for developing countries and throughout higher quartiles for developed countries. The results are jointly significant at the 1% level.

Table 1.5 reports the regression results for labor share of value added on the quartiles of backward linkages (columns 1-3) and quartiles of forward linkages (columns 4-6). For all countries, an increase in a country's backward linkages from the first quartile to the second quartile, on average, negatively impacts the labor share but the result is statistically insignificant. An increase in a country's forward linkages from the first to second quartile adversely impacts the labor share, statistically significant at the 1% level. For developing countries, increasing backward linkages decreases labor share but not statistically significantly till the highest quartile and increasing forward linkages also decreases labor share, statistically significantly, from the first to second quartile. With most developing countries competing at low levels of participation, this suggests that integrating with absorptions of value from foreign intermediate inputs does not significantly impact the country's labor share but scaling up contributions of value to foreign exports significantly decreases labor share. For developed countries, increasing backward linkages decreases labor share with statistical significance only jumping to the fourth quartile, and increasing forward linkages significantly decreases labor share only jumping to higher quartiles of integration. This suggests that developed countries experience a greater fall in their labor share through forward participation than backward participation and command greater market power at higher quartiles of integration.

[Table 1.5]

From Tables 1.4 and 1.5, I note a higher R-squared for the models with indexed measures of quartiles of participation. The direct measure of backward linkages does not have a statistically significant result to explain the variation in labor share until countries in the highest quartile of participation. The indexed measure, however, consistently shows a negative impact of increased participation on labor share across quartiles of backward linkages. The indexed measure of forward

linkages also shows a consistently negative result on labor share across quartiles of participation while the direct measure has mixed results for developing and developed countries. Developing countries experience a fall in labor share with increased forward linkages, statistically significant for the jump from the first to second quartile but not significant for higher quartiles. Developed countries conversely experience the fall statistically significantly not in the jump to the second quartile but in jumps to higher quartiles. For developing countries, the fall in labor share is explained less by increased contribution relative to their gross exports (forward linkages) and more by increased market share (forward linkages index). Developing countries are clustered in the lower levels of participation and compete with each other by driving down unit labor costs that also impacts their labor share. The competitive dynamic also holds for developed countries but at higher levels of participation. Labor is losing out to capital at different levels of participation but in similar ways across development sets of countries.

Lastly, the export of manufactured goods from South to North must be seen as the globalization of production, rather than simply trade, and as the evolution of the social relation of exploitation of labor by capital (Smith, 2016). As a robustness check for the impact of GVC participation on labor shares, I test for the impact of trade openness on labor share of value added (Appendix A.1). I use the ratio of trade-to-GDP as an indicator of trade openness and I find that a 1% increase in trade openness explains a 0.05% decrease in labor share for all countries, statistically significant at the 1% level, with an R-squared of 0.07 for the model. The explanation of falling labor share from trade openness holds less explanatory power than from the GVC participation index (an R-square of 0.13), and a lower magnitude of impact as compared to the participation index (recall an impact of a fall by 0.1%). Moreover, while the negative and statistically significant result holds for developed countries, it does not hold for developing countries which show an insignificant

impact of a rise in labor share by 0.01%. Hence, the trade of manufactures must be analyzed not in trade volumes but with the disaggregation of value addition in GVCs to capture the unequal social distribution between labor and capital within a sector in different countries.

1.7 CONCLUSION

Neoliberal policy has constructed export-oriented industrialization and economic upgrading in GVCs as the strategy for developing economies to be internationally competitive. However, the asymmetric structure of global production, with competition among sellers of inputs and monopolies of buyers, forms the basis of hierarchies and inequalities between labor and capital (Roy, 2020). The relocation of global production towards developing economies, essentially in the pursuit of profits, was instigated by the difference between costs and markups due to the global labor arbitrage (Kumar, 2020).

In my paper, I find that increased integration into GVCs is negatively associated with labor shares of value added. The fall in labor shares of value added across countries, both developing and developed, is further explained by the international integration of countries into GVCs significantly more so by their index of participation or their market importance in the GVC than by their direct linkages of participation or the domestic importance of the GVC to the country. The globalization of production, beyond the globalization of trade, extends the system of unequal exchange from between industries and countries to between labor and capital within an industry across countries. GVCs are structured to subsume labor under global capital with an increase in the overall rate of exploitation. MNCs and TNCs control the process of production in GVCs with

their monopsony power that drives the race to the bottom amongst countries to produce manufactured commodities with cheap exploited labor.

Vasudevan (2019) points to the increased interconnectedness of global capital as heightened vulnerability to upheavals that can disrupt the accumulation of capital. GVCs deepen the embeddedness of buyer and supplier firms through the concentration and centralization of capital. Kumar (2020) also argues this leads to a change in the relationship between buyers and sellers as well as a rise in the bargaining power of workers towards negotiating a larger share of value from their now value-laden employer. Hence, the dynamics of rising costs, state interventions, and commodity chain consolidation eventually returns the struggle to the point of production with the worker at the center with scope for workers and unions to bargain for better wage shares of income.

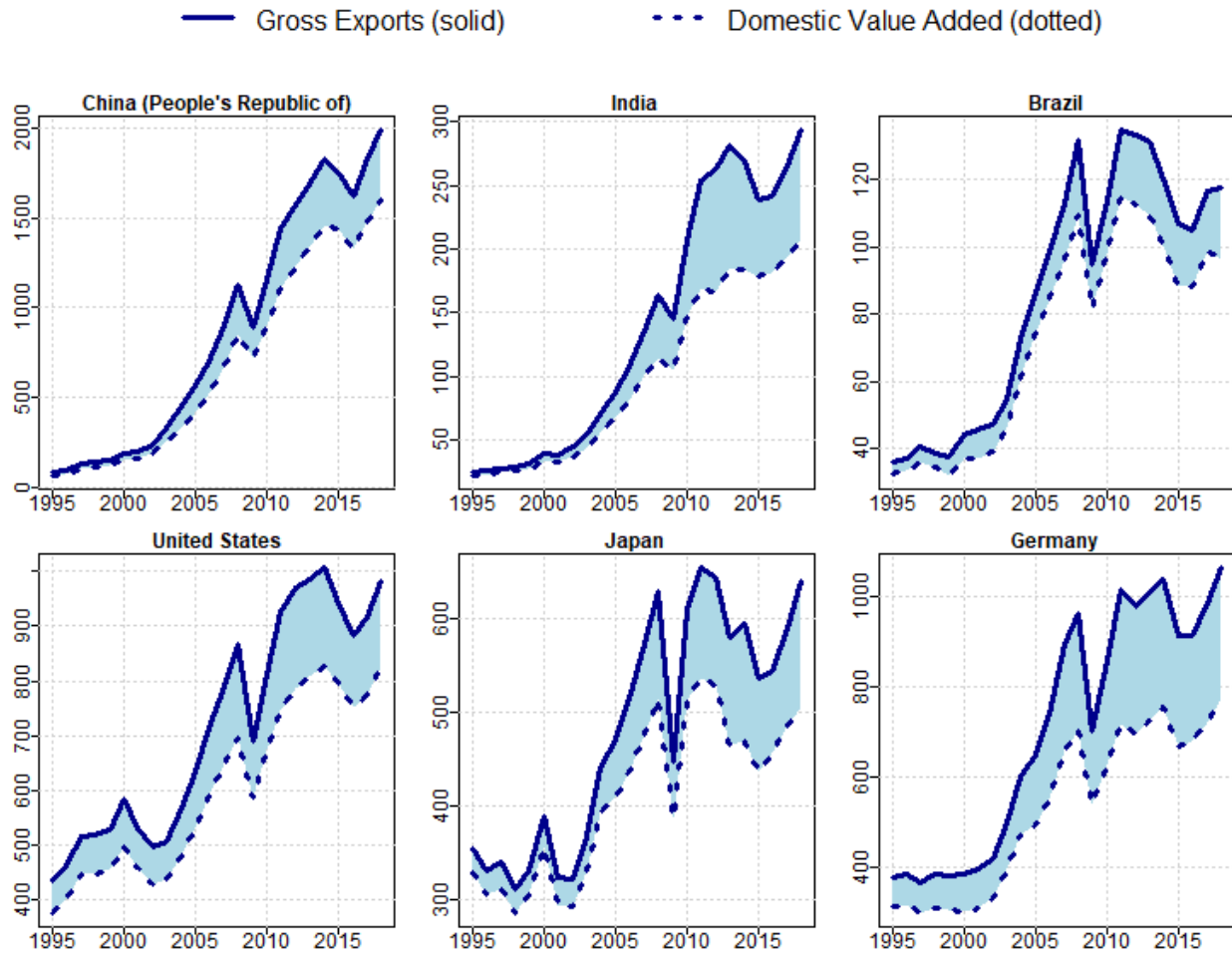
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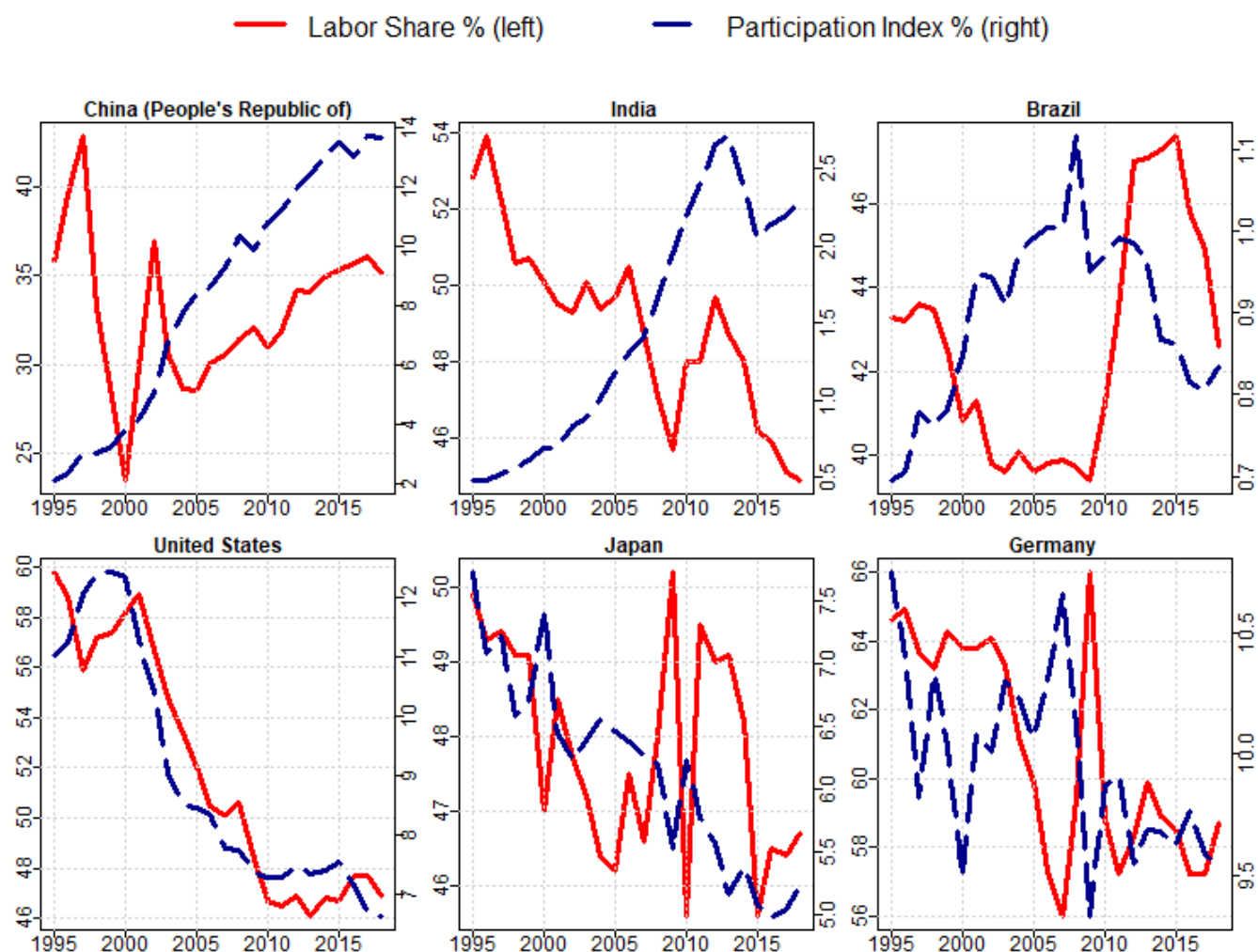
FIGURES

Figure 1.1: Expanding Foreign Value Added in Gross Exports for a Sample of Developing and Developed Countries, 1995-2018



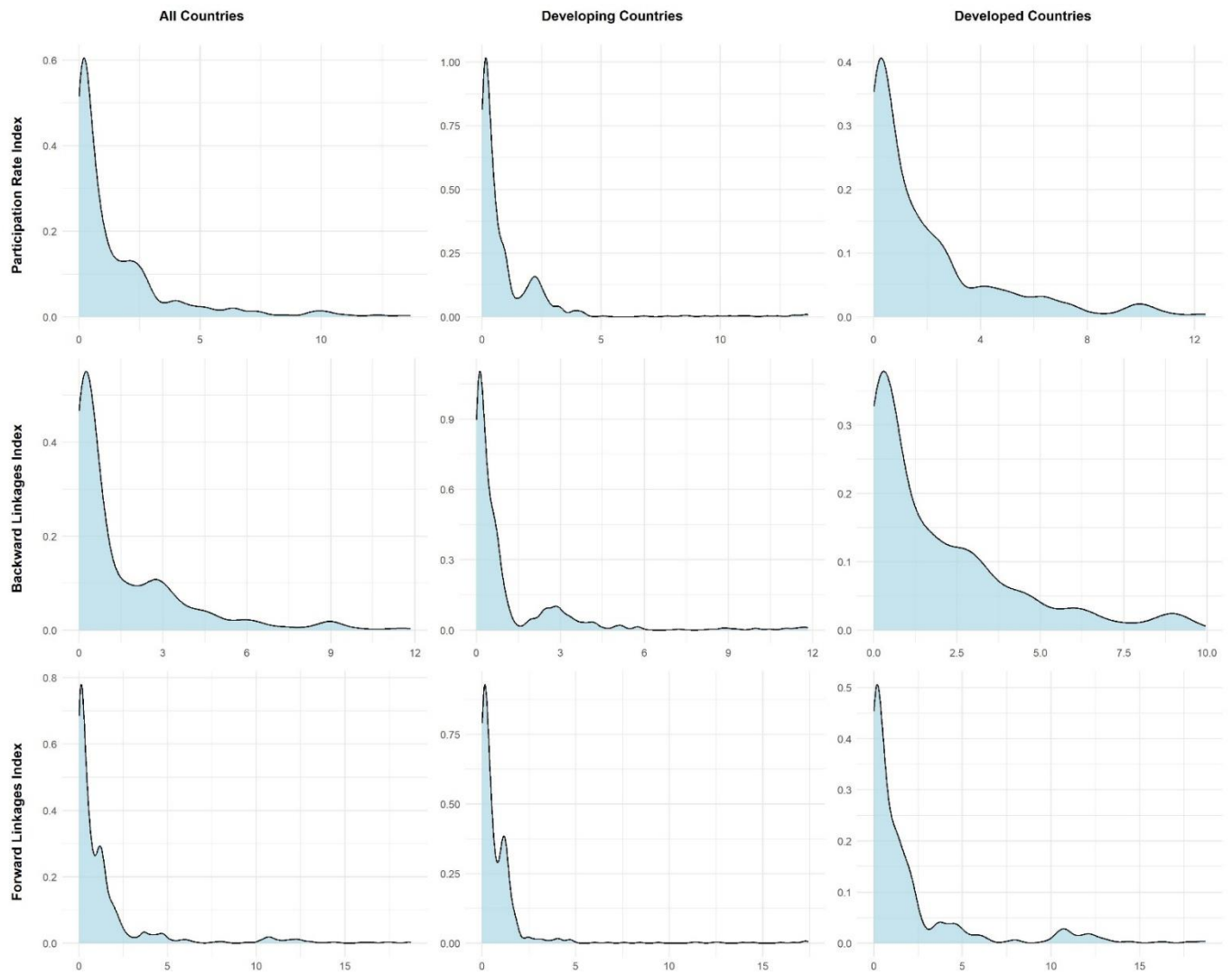
Note: The figure illustrates the expanding foreign value added in gross exports with the gap between gross exports (solid blue line) and domestic value added in gross exports (dotted blue line) for a sample of six countries. The six countries are the top three developing countries and the top three developed countries by GDP. The countries are categorized as developing or developed by the UNCTAD classification and are detailed in Appendix A.2.

Figure 1.2: Labor Share and GVC Participation Index for a Sample of Developing and Developed Countries, 1995-2018



Note: The figure illustrates the labor share in value added (solid red line) and GVC participation index (dotted blue line) for a sample of six countries. The six countries are the top three developing countries and the top three developed countries by GDP. The countries are categorized as developing or developed by the UNCTAD classification and are detailed in Appendix A.2.

Figure 1.3: Distribution of Countries in Indices of Participation for All Countries, Developing Countries, and Developed Countries



Note: The figure illustrates the kernel density estimates or the distribution of countries across the range of indices of GVC participation for all countries, developing countries, and developed countries. It uses the Gaussian kernel with a selected bandwidth from Silverman's rule of thumb.

TABLES

Table 1.1: Descriptive Statistics

	All			Developing			Developed		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Labor Share (percent)	1536	43.224	0.296	672	34.740	0.375	864	49.822	0.276
Employment per thousand capita	1536	6.911	44.592	672	13.348	65.866	864	1.905	10.308
Participation Index	1536	1.563	0.059	672	1.025	0.071	864	1.980	0.086
Backward Linkages Index	1536	1.563	0.054	672	1.074	0.072	864	1.943	0.076
Forward Linkages Index	1536	1.563	0.074	672	0.941	0.079	864	2.046	0.113
Foreign VA Content of GX (billion USD)	1536	30.244	1.236	672	22.153	1.823	864	36.538	1.648
Foreign VA Share of GX (percent)	1536	32.183	0.320	672	29.707	0.541	864	34.108	0.370
Domestic VA Content of GX (billion USD)	1536	76.675	4.038	672	55.642	6.364	864	93.034	5.134
Domestic VA Share of GX (percent)	1536	67.828	0.320	672	70.305	0.541	864	65.902	0.370
Domestic VA Content of FX (billion USD)	1536	15.923	0.817	672	10.790	1.126	864	19.915	1.141
Domestic VA Share of FX (percent)	1536	13.786	0.146	672	14.835	0.270	864	12.969	0.147
Gross Output (billion USD)	1536	442.381	32.565	672	411.123	61.504	864	466.693	32.622
GDP per capita (million USD per capita)	1536	0.021	0.021	672	0.009	0.011	864	0.031	0.021
Value Added (VA) (billion USD)	1536	106.920	5.159	672	77.796	8.053	864	129.573	6.603
Gross Exports (GX) (billion USD)	1536	139.108	9.262	672	109.150	14.479	864	162.409	11.960
Exchange Rate	1536	0.406	0.024	672	0.310	0.046	864	0.481	0.023

Note: Data is sourced from OECD TiVA and TiM (2021 edition). Developing and developed countries are categorized by the UNCTAD classification and are detailed in Appendix A.2.

Table 1.2: Impact of Indices of Participation by Countries in GVCs on Labor Share over 1995-2018

Dependent Variable:	All	Developing	Developed	All	Developing	Developed	All	Developing	Developed
ln (Labor Share)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ln (Participation Index)	-0.0955*** -0.0084	-0.0294*** (0.0104)	-0.232*** (0.0137)						
ln (Backward Linkages Index)				-0.0754*** -0.0076	-0.0163* -0.0091	-0.204*** (0.0128)			
ln (Forward Linkages Index)							-0.0928*** -0.0088	-0.0388*** (0.0112)	-0.222*** (0.0154)
ln (Per Capita Employment)	0.0278 (0.0172)	0.0127 (0.0198)	0.197*** (0.0328)	0.0250 (0.0174)	0.0151 (0.0199)	0.192*** (0.0334)	0.0102 (0.0172)	0.0017 (0.0202)	0.154*** (0.0336)
ln (Per Capita GDP)	0.0729*** (0.0112)	0.0139 (0.0140)	0.137*** (0.0183)	0.0498*** (0.0105)	0.0026 (0.0131)	0.0919*** (0.0174)	0.0812*** (0.0120)	0.0238 (0.0148)	0.158*** (0.0207)
ln (Exchange Rate)	0.0118** -0.0054	0.0128** -0.0056	-0.106*** (0.0159)	0.0124** -0.0054	0.0132** -0.0057	-0.109*** (0.0162)	0.0099* -0.0054	0.0114** -0.0056	-0.0996*** (0.0166)
Constant	4.286*** (0.166)	3.668*** (0.211)	6.466*** (0.298)	4.162*** (0.167)	3.641*** (0.211)	6.261*** (0.300)	4.145*** (0.165)	3.602*** (0.209)	6.083*** (0.307)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	672	864	1,536	672	864	1,536	672	864
Countries	64	28	36	64	28	36	64	28	36
Joint Significance	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000
R-squared	0.134	0.102	0.361	0.116	0.095	0.342	0.124	0.107	0.311

Note: Standard errors in parenthesis. *** denotes significant at $p < 10\%$, ** denotes significant at $p < 5\%$, * denotes significant at $p < 1\%$.

Table 1.3: Impact of Backward and Forward Linkages of Countries in GVCs on Labor Share over 1995-2018

Dependent Variable:	All	Developing	Developed	All	Developing	Developed
ln (Labor Share)	(1)	(2)	(3)	(4)	(5)	(6)
ln (Backward Linkages)	-0.0469*** (0.0180)	-0.0012 (0.0190)	-0.177*** (0.0364)			
ln (Forward Linkages)				-0.0197 (0.0216)	-0.0778*** (0.0264)	0.0872** (0.0343)
ln (Per Capita Employment)	0.0131 (0.0181)	0.0176 (0.0202)	0.0225 (0.0361)	0.0034 (0.0178)	0.0116 (0.0198)	-0.0372 (0.0347)
ln (Per Capita GDP)	-0.0085 (0.0101)	-0.0079 (0.0122)	-0.0667*** (0.0194)	0.0007 (0.0096)	-0.0059 (0.0117)	-0.0316* (0.0180)
ln (Exchange Rate)	0.0085 (0.0056)	0.0123** (0.0058)	-0.110*** (0.0183)	0.0064 (0.0056)	0.0110* (0.0057)	-0.118*** (0.0186)
Constant	3.974*** (0.182)	3.632*** (0.224)	4.671*** (0.344)	3.831*** (0.175)	3.771*** (0.215)	3.505*** (0.308)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	672	864	1,536	672	864
Countries	64	28	36	64	28	36
Joint Significance	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000
R-squared	0.061	0.090	0.158	0.057	0.103	0.140

Note: Standard errors in parenthesis. *** denotes significant at $p < 10\%$, ** denotes significant at $p < 5\%$, * denotes significant at $p < 1\%$.

Table 1.4: Impact of Indices of Participation by Quartiles on Labor Share

Dependent Variable: ln (Labor Share)	Participation Index			Backward Linkages Index			Forward Linkages Index		
	All	Developing	Developed	All	Developing	Developed	All	Developing	Developed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2nd Quartile	-0.102*** (0.0143)	-0.0565*** (0.0164)	-0.182*** (0.0249)	-0.116*** (0.0167)	-0.0922*** (0.0235)	-0.136*** (0.0229)	-0.0864*** (0.0155)	-0.0797*** (0.0162)	-0.127*** (0.0329)
3rd Quartile	-0.0667*** (0.0187)	-0.0158 (0.0228)	-0.148*** (0.0302)	-0.111*** (0.0202)	-0.0783*** (0.0272)	-0.141*** (0.0293)	-0.0759*** (0.0202)	-0.0932*** (0.0242)	-0.106*** (0.0374)
4th Quartile	-0.0988*** (0.0228)	-0.0624** (0.0273)	-0.173*** (0.0371)	-0.146*** (0.0242)	-0.107*** (0.0320)	-0.191*** (0.0357)	-0.0976*** (0.0242)	-0.134*** (0.0304)	-0.119*** (0.0423)
ln (Per Capita Employment)	0.0058 (0.0174)	0.0256 (0.0196)	-0.0583* (0.0340)	0.0163 (0.0176)	0.0288 (0.0200)	-0.0303 (0.0343)	-0.0154 (0.0182)	-0.0066 (0.0207)	-0.0444 (0.0353)
ln (Per Capita GDP)	0.0110 -0.0098	0.0016 (0.0121)	-0.0098 (0.0181)	0.008 -0.0096	-0.008 (0.0118)	0.0009 (0.0184)	0.0113 -0.0098	0.0055 (0.0119)	-0.0214 (0.0182)
ln (Exchange Rate)	0.0043 -0.0054	0.0082 -0.0056	-0.110*** (0.0180)	0.0073 -0.0055	0.0121** -0.0057	-0.117*** (0.0181)	0.0064 -0.0055	0.0106* -0.0056	-0.113*** (0.0184)
Constant	3.931*** (0.167)	3.805*** (0.212)	3.734*** (0.292)	4.032*** (0.168)	3.796*** (0.213)	4.044*** (0.296)	3.725*** (0.173)	3.535*** (0.218)	3.777*** (0.306)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	672	864	1,536	672	864	1,536	672	864
Countries	64	28	36	64	28	36	64	28	36
Joint Significance	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000
R-squared	0.098	0.127	0.194	0.091	0.117	0.176	0.078	0.131	0.151

Note: Standard errors in parenthesis. *** denotes significant at $p < 10\%$, ** denotes significant at $p < 5\%$, * denotes significant at $p < 1\%$.

Table 1.5: Impact of Backward and Forward Linkages by Quartiles on Labor Share

Dependent Variable: ln (Labor Share)	Backward Linkages			Forward Linkages		
	All (1)	Developing (2)	Developed (3)	All (4)	Developing (5)	Developed (6)
2nd Quartile	-0.0034 (0.0118)	-0.0120 (0.0138)	0.0119 (0.0196)	-0.0263*** -0.0091	-0.0285*** (0.0108)	-0.0180 (0.0152)
3rd Quartile	-0.0174 (0.0149)	-0.0092 (0.0197)	-0.0073 (0.0237)	-0.0341*** (0.0125)	-0.0031 (0.0148)	-0.0361* (0.0210)
4th Quartile	-0.0782*** (0.0180)	-0.0450* (0.0237)	-0.0841*** (0.0278)	-0.0718*** (0.0163)	0.0168 (0.0204)	-0.102*** (0.0265)
ln (Per Capita Employment)	0.0195 (0.0177)	0.0241 (0.0200)	0.0002 (0.0349)	0.002 (0.0177)	0.0192 (0.0199)	-0.0122 (0.0347)
ln (Per Capita GDP)	-0.0033 -0.0095	-0.0102 (0.0118)	-0.0263 (0.0182)	-0.0001 -0.0095	-0.0121 (0.0118)	-0.0268 (0.0181)
ln (Exchange Rate)	0.0047 -0.0055	0.0120** -0.0057	-0.120*** (0.0181)	0.0065 -0.0055	0.0147*** -0.0057	-0.0994*** (0.0190)
Constant	3.932*** (0.167)	3.689*** (0.213)	4.086*** (0.294)	3.788*** (0.166)	3.612*** (0.211)	3.943*** (0.292)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,536	672	864	1,536	672	864
Countries	64	28	36	64	28	36
Joint Significance	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000	p>F=0.0000
R-squared	0.084	0.101	0.175	0.070	0.108	0.157

Note: Standard errors in parenthesis. *** denotes significant at $p < 10\%$, ** denotes significant at $p < 5\%$, * denotes significant at $p < 1\%$.

APPENDIX A

Table A.1: Impact of Trade Openness of Countries on Labor Share over 1995-2018

Dependent Variable	(1)	(2)	(3)
ln(Labour Share)	All	Developing	Developed
ln(Trade/GDP)	-0.0539*** (0.0109)	0.0068 (0.0143)	-0.0914*** (0.0159)
ln (Per Capita Employment)	0.0115 (0.0177)	0.0170 (0.0199)	-0.0107 (0.0343)
ln (Per Capita GDP)	-0.0273** (0.0110)	-0.004 (0.0141)	-0.0642*** (0.0187)
ln (Exchange Rate)	0.0068 -0.0055	0.0121** -0.0057	-0.107*** (0.0182)
Constant	3.682*** (0.167)	3.650*** (0.217)	3.732*** (0.287)
Country Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Countries	64	28	36
Observations	1,536	672	864
Joint Significance	p>F=0.0000	p>F=0.0000	p>F=0.0000
R-squared	0.072	0.090	0.167

Note: Standard errors in parenthesis. *** denotes significant at $p < 10\%$, ** denotes significant at $p < 5\%$, * denotes significant at $p < 1\%$.

Table A.2: Classification of Countries by Development Status

Developing	Argentina, Brazil, Brunei Darussalam, Bulgaria, Cambodia, Chile, China (People's Republic of), Colombia, Costa Rica, Hong Kong (China), India, Indonesia, Israel, Kazakhstan, Lao People's Democratic Rep, Malaysia, Mexico, Morocco, Myanmar, Peru, Philippines, Russian Federation, Singapore, South Africa, Thailand, Tunisia, Turkey, Viet Nam
Developed	Australia, Austria, Belgium, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Malta, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States

Note: This table lists the countries contained in the dataset for the analysis in this paper by development status. The countries are classified as developing or developed by the UNCTAD classification (n.d.).

CHAPTER 2

GVC INTEGRATION AND FINANCIAL OPENNESS: EMPIRICAL EVIDENCE ON THE INTERLINKAGES BETWEEN GLOBAL PRODUCTION AND GLOBAL FINANCE

2.1 INTRODUCTION

The contemporary period is characterized as a stage of financialized capitalism. The defining features of this stage are the pervasive spread of the market-based international financial system hinged on the US dollar and the organization of production through global production networks or global value chains (Bonizzi, Kaltenbrunner, and Powell 2020; 2022).

Global value chains (GVCs) or global production networks have emerged in recent decades as a significant mode of organizing the global division of labor under the aegis of dominant global corporations.¹ The growing significance of a cross-border organization of production is imbricated in the growth of world trade — specifically intra-firm trade within different units of these GVCs. The pervasive spread of production through GVCs is also interlinked with the liberalization of finance internationally. The tremendous growth of cross-border capital flows in recent decades is enmeshed in the restructuring and relocation of production globally.

The evolution of the contemporary stage of financialized capitalism, therefore, needs to comprehend the central role of finance in the internationalization of production. There is a significant literature on financialization and the distinct patterns of financial subordination as

¹ We will use GVCs in the rest of the paper as encompassing both conceptions of chains and networks in the literature.

emerging markets and developing economies (EMDEs) are drawn into the fold of global finance (Bonizzi, Kaltenbrunner, and Powell 2020; Bonizzi, 2013; Bonizzi, Kaltenbrunner, and Powell 2022; Alami et al., 2022). There is also an extensive literature exploring the uneven distributional impacts of the organization of production in corporate-led GVCs (Selwyn and Leyden, 2022; Carballa Smichowski, Durand, and Knauss, 2021; Timmer et al., 2014; Milberg and Winkler, 2013; Coe and Yeung, 2015, Medeiros and Trebat, 2017). However, the interlinkages of financialization, the tremendous growth of capital flows to EMDEs, and the restructuring of the global division of labor through GVCs has received less attention.

EMDEs are structurally locked into subordinate positions in GVCs which mediate the extraction and transfer of value from workers in the South to the lead firms in the North. At the same time, they are also subject to the process of financial subordination. Asymmetric integration into global financial markets imposes constraints on domestic policy autonomy and mediates the mobilization and capture of value extracted from the EMDEs (Powell, 2018; Bonizzi, Kaltenbrunner, and Powell, 2020, 2022). Global finance plays a critical role in enabling and enforcing the exploitation of labor in EMDEs through GVCs.

In this paper, our focus is not on mapping the precise path and pace of value transfers from the Global South to the Global North. It instead focuses on investigating the interlinkages between the twin mechanisms that integrate EMDEs into the circuits of international production and finance. We ask the question of whether increased production integration into GVCs is associated with increased financial integration through debt and equity capital flows. The contribution of this paper is to demonstrate these interlinkages between the financialization and globalization of production with a panel of 65 countries over 1995-2018.

Section 2 explains the dialectical linkages between the financialization and the organization of production through GVCs. The data and empirical framework are presented in Section 3, followed by a discussion of the results in Section 4. Section 5 concludes.

2.2 FINANCE AND GLOBAL VALUE CHAINS

Writing in the seventies, Hymer (1972) argued, with tremendous prescience and insight, that the rise of the multinational corporation and the growth of international capital markets should be seen as ‘parallel symbiotic processes’. Palloix (1977) also viewed multinational corporations as reflecting the internationalization of the self-expansion of capital and the social relations of capital on a world scale. With this development, the stages of metamorphoses of capital through the successive forms of money capital, productive capital, and commodity capital now occur across national borders. Historically, this internationalization began with trade and the internationalization of the circuit of commodity capital and money capital (finance). However, with the emergence of multinational corporations, the circuit of production too was internationalized.

GVCs represent a further extension of this process of internationalization of the productive circuits of capital in the contemporary period of financialized capitalism. At the same time, finance is a critical driver of the restructuring of global production through GVCs. This constitutive role of finance in GVCs has to do with both the flows of funding and the imposition of financial logics as a mode of governance and discipline (Coe, Lai, and Wójcik, 2014). Financial markets are crucial to the construction of GVCs, as well as the capture and circulation of value created within these networks. Finance is thus indispensable to the analysis of value creation, value capture, and value transfer within the structure of GVCs.

Milberg (2008) and Milberg and Winkler (2010, 2013) brought the analyses of GVCs into the discussion of financialization of non-financial corporations in the US. They highlight how the relocation of production across borders supported higher mark-ups and profit shares in US lead firms as the source of profits shifted from domestic product markets to foreign input markets. Instead of being invested in building productive capacity in the US, the profits extracted from GVCs supported financialization through higher dividends, share buyback to drive up stock prices, and the pursuit of mergers and acquisition (Milberg 2008; Milberg and Winkler, 2010). The globalization of production sustained higher levels of financialization of US non-financial corporate sectors. Financialization also reinforced the incentives for offshoring to capitalize on cost reduction and the greater flexibility provided by the expansion of GVCs. Auvray and Rabinovich (2019) present further evidence that financialization is more likely to occur among US firms in sectors that are associated with offshoring.

Underscoring the organic linkage of financialization with global production, Fiebigler (2016) finds that even though US non-financial corporations reduced their reinvestment of profits in domestic production, they did not reduce investments in international production. Production is relocated overseas to export back to the advanced core economies, while minimizing labor costs and funneling equity capital overseas through non-bank holding companies. Rabinovich (2019) argues that the structural transformations of this period are better understood as a strategic reorientation by US-led global corporations rather than simply as a financial turn to accumulation leading to a crowding out of investment. US-led global corporations have been internationalizing their productive activities through GVCs, alongside the strategies of financial accumulation, to focus core activities within the lead center and off-shore lower valued-added segments of production to the periphery.

The uneven development of finance is thus imbricated in the global reorganization of production. Marxist analyses of financialization have underscored the need to interrogate the processes mediating the relation between finance and production if the concept is to have explanatory power (Lapavistas, 2011; Powell, 2018). The term financialization is also critiqued for placing too much emphasis on finance and too little on production (Rotta and Teixeira, 2016). Far from being marginalized by financialization, labor and the labor process remains a vital and indispensable focus for value creation and extraction (Cushen and Thompson, 2016). Bernards (2024) underscores how unveiling the connection between the evolving pattern and pace of financial accumulation, the proliferation of new financial innovations, and the concrete restructuring of production unfolding on an international scale is essential to understanding the internationalized circuits of capital in the contemporary period.

The link between real and financial globalization has also been highlighted by economists at the Bureau of International Settlements. Shin (2017) highlights the cascade of financial relationships and a growing chain of financial claims arising from real trade flows associated with GVCs. Knitting the complex cross-border production process requires significantly greater financial resources. Highlighting how working capital — inventories and receivables — helps bridge mismatches between costs of production and receipts from sales, Kim and Shin (2023) underscore the pivotal role played by funding conditions in determining the length of the supply chain. Easier financial conditions are associated with a higher investment in working capital, longer supply chains, and a larger volume of trade. Longer and more complex chains are, however, more vulnerable to the drying up of global funding.

The reorganization of production across borders and the consequent growth in global trade volumes has exacerbated risks — including currency and counterparty risks. The need to manage

these risks has served as a catalyst for a range of hedging transactions, including derivative trades as a ‘risk management strategy’, by non-financial firms across the GVC. FX forwards and currency swaps are used to hedge international trade and foreign currency bonds that have been issued offshore to take advantage of cheap funding costs (Borio, McCauley, and McGuire, 2017).

The line between hedging and speculation is blurred, and the pro-cyclical build-up of financial excess with easier global funding has consequences for the real economy and GVCs. But what is of significance beyond this greater potential for crises and fragility is the fundamental structural transformation — highlighted in the Marxist framing of this stage of globalized financial capitalism — that these intertwined trends of real and financial globalization reflect. The analytical conception of a global stage of financialized capitalism “clarifies the role of finance in facilitating the exploitation of labor in global production networks, where value is created, and then realizing this value in the sphere of circulation” (Powell, 2018, p. 647).

This dialectical understanding of the interconnection between finance and GVCs informs our empirical analyses.

2.3 DATA AND EMPIRICAL FRAMEWORK

2.3.1 SOURCES

Our dataset comprises variables of GVC integration from the 2021 edition of the OECD Trade in Value Added (TiVA) database and variables of financial integration from the 2023 edition of the Brookings Institution External Wealth of Nations (EWN) database. We focus our analysis on 65 countries over 1995-2018 for a balanced panel. The TiVA indicators are estimated from the OECD publication of Inter-Country Input-Output tables that are based on statistics compiled according to

the 2008 System of National Accounts. Our analysis centers on the indicators of participation rate, backward linkages, and forward linkages in GVCs. The EWN indicators are estimated from the IMF's Balance of Payments Statistics and International Financial Statistics, the WB's World Debt Tables and Global Development Finance, the OECD's statistics on external indebtedness, the BIS' data on banks' assets and liabilities, and Sinn (1990). Our analysis centers on the indicators of FDI, equity, and debt in shares of GDP. Our unit of analysis is the country, and we categorize the countries in accordance with the UNCTAD classification of development for an examination of developing and developed countries.

2.3.2 VARIABLES

We analyze three variables of GVC integration – backward linkages, forward linkages, and participation rate index – and three variables of financial integration – an international financial integration index, debt-to-GDP ratio, and FDI-to-GDP ratio.

Martins et al (2022) define the variables of GVC integration from the TiVA database. A country's total gross exports are measured as the sum of exports in intermediate and final goods and services adjusted for re-exports. It includes cross-border flows and direct expenditures by non-residents within its domestic boundary. The integration of the country into the GVC is captured more closely by value-added contribution or absorption. The domestic value-added content of gross exports represents the exported value added generated in the domestic economy. The foreign value-added content of gross exports represents the value of imported intermediate goods and services embodied in a domestic industry's exports. It includes re-imported foreign value added previously exported by the domestic industry, i.e. the foreign value added could originate from any upstream industry in the value chain. The domestic value-added content of foreign exports represents the domestic value addition in the gross exports of an industry in foreign countries. The

foreign value-added share of gross exports represents the country's backward linkages in the GVC while the domestic value-added share of foreign exports represents the country's forward linkages in the GVC.

$$\text{Backward Linkages}_{ct} = \frac{\text{Foreign Value Added Content of Gross Exports}_{ct}}{\text{Gross Exports}_{ct}} \quad (1)$$

$$\text{Forward Linkages}_{ct} = \frac{\text{Domestic Value Added Content of Foreign Exports}_{ct}}{\text{Gross Exports}_{ct}} \quad (2)$$

We construct the participation rate index, as defined in Roy (2020) and Banga (2014), as a measure of a country's integration in the GVC. The index captures the share of a country's backward participation (foreign value-added content of gross exports) and forward participation (domestic value added content of foreign exports) in the total created value added of the world. That is, for each country, its backward and forward participation is added, and the share of that country in the aggregate of individual sums of countries is computed.

$$\text{Participation Index}_{ct} = \frac{(\text{Domestic VA in Foreign Exports} + \text{Foreign VA in Gross Exports})_{ct}}{\sum_c (\text{Domestic VA in Foreign Exports} + \text{Foreign VA in Gross Exports})_t} \quad (3)$$

Lane and Milesi-Ferretti (2007) define the international financial integration index to be the sum of all external assets and liabilities as a proportion of the GDP of the country. It captures the extent to which a country is integrated in the global financial system with stocks of financial assets and liabilities, including portfolio equity, debt, and FDI. Holdings of assets and liabilities are measured at the end of the year and are converted to USD at year-end exchange rates. The estimates of assets and liabilities are based on stock measures that are adjusted for the effect of changes in market prices and exchange rates. GDP, as a flow variable, is converted to USD at the average exchange rate for the year.

$$\text{Financial Integration Index}_{ct} = \frac{(\text{Total Assets} + \text{Total Liabilities})_{ct}}{\text{GDP}_{ct}} \quad (4)$$

Disaggregating the components of the LMF index, the debt integration index and the FDI integration index take the sum of all assets and liabilities of debt and FDI, respectively, as a proportion of the GDP of the country.

$$Debt\ Integration\ Index_{ct} = \frac{(Debt\ Assets + Debt\ Liabilities)_{ct}}{GDP_{ct}} \quad (5)$$

$$FDI\ Integration\ Index_{ct} = \frac{(FDI\ Assets + FDI\ Liabilities)_{ct}}{GDP_{ct}} \quad (6)$$

All three indices of financial integration, debt integration, and FDI integration essentially measure the meshing of the countries' financial capital with that of the international economy.

2.3.3 DESCRIPTIVE STATISTICS

The sample consists of 65 countries of which 29 are developing and 36 are developed. On average, the gross domestic product and gross exports are both higher for developed countries than for developing countries. Developing countries display a mean positive current account balance, while developed countries display a mean negative current account balance. A higher backward participation (foreign value-added share in domestic exports) than forward participation (domestic value-added share in foreign exports), characterizes both developing and developed countries indicating greater integration into GVCs through foreign value added or foreign intermediate inputs across the chain. Both developing and developed countries also have a greater share of total debt investments as a proportion of their GDP than shares of FDI or portfolio equity, indicating greater financial integration with short-term financial investments. Thus, on average, both developing and developed countries have greater backward participation than forward participation in GVCs and international financial integration largely through short-term debt investments.

[Table 2.1]

2.3.4 EMPIRICAL FRAMEWORK

We investigate whether a long-run cointegration relationship exists between GVC integration and financial integration. We first test for cointegration between GVC integration and financial integration, then estimate the speed of adjustment to a long-run equilibrium with a panel vector error correction model. The two-equation system to be estimated is the following:

$$\Delta Finance_{ct} = \mu_c + \sum_{j=1}^{p-1} \gamma_{c1} \Delta Finance_{c,t-j} + \sum_{j=0}^{q-1} \beta_{c1} \Delta GVC_{c,t-j} + \xi_c ECT + \varepsilon_{ct} \quad (7)$$

$$\Delta GVC_{ct} = \mu_c + \sum_{j=1}^{p-1} \gamma_{c1} \Delta GVC_{c,t-j} + \sum_{j=0}^{q-1} \beta_{c1} \Delta Finance_{c,t-j} + \xi_c ECT + \varepsilon_{ct} \quad (8)$$

Finance is the catch-all term for the three variables of international financial integration and *GVC* is the same for the three variables of GVC integration. *ECT* is the error correction term and ε is the error term. Subscripts c and t denote country and year, respectively, while j denotes the optimal number of lags for the associated variable. The vector error correction model also gives impulse response functions (IRFs) that illustrate the response of a variable to a shock in another variable.

To check for robustness, we also estimate a single-equation error correction model with dynamic fixed effects to test for a long-run relationship between GVC integration and financial integration. We first regress financial integration on GVC integration through backward and forward linkages; then, the other way around, we regress GVC integration on financial integration to show the co-movements of production integration and financial integration.

$$\Delta Finance_{ct} = \alpha_0 + \alpha_1 \Delta GVC_{ct} + \alpha_2 \Delta GDP_{ct} + \alpha_3 \Delta XR_{ct} + \varphi ECT_{c,t-1} + \varepsilon_{ct} \quad (9)$$

$$\Delta GVC_{ct} = \beta_0 + \beta_1 \Delta Finance_{ct} + \beta_2 \Delta GDP_{ct} + \beta_3 \Delta XR_{ct} + \varphi_c ECT_{c,t-1} + \varepsilon_{ct} \quad (10)$$

As before, *Finance* is the catch-all term for the three variables of international financial integration and *GVC* is the same for the three variables of GVC integration. *ECT* is the error correction term and ε is the error term. Subscripts c and t denote country and year, respectively. The two equations, (9) and (10), are separately estimated and separately analyzed to check that the results hold for the panel vector error correction model in which they were simultaneously determined.

2.4 RESULTS AND DISCUSSION

2.4.1 PANEL UNIT ROOT TESTS

A battery of panel unit root tests is reported in Table 2.2. We note that the null hypothesis of the presence of unit roots, or non-stationarity, failed to be rejected in levels but is rejected in first differences of the variables, statistically significant at the 1% level. The variables of interest for GVC integration and financial integration are, therefore, non-stationary in levels but stationary in first differences. They are integrated of order one, or are $I(1)$, which implies that they do not revert to a fixed mean over time but have stable and predictable changes in their stochastic trends. This sets them up for cointegration tests to check for long-run relationships between linear combinations of GVC integration and financial integration.

[Table 2.2]

2.4.2 COINTEGRATION TESTS

The cointegration tests for pairs of GVC integration variables and financial integration variables are reported in Tables 2.3 and 2.4. The two variable series are cointegrated if a linear relationship of two non-stationary, or $I(1)$, variables are integrated of order zero, $I(0)$. We employ

the Pedroni and Westerlund tests and note statistically significant cointegration between the variables of GVC integration and financial integration. Hence, GVC integration and financial integration may drift over time in their individual non-stationary levels but display a stable long-run relationship with each other and any deviations are temporary and mean-reverting. From the Pedroni tests, with ADF and PP statistics being more powerful for interpretation of a heterogeneous panel, we infer significant cointegration between GVC integration and financial integration. The Westerlund tests are estimated from error correction models. Similar to the Pedroni cointegration tests, they also indicate significant cointegration between GVC and financial integration, although weakly so between forward GVC linkages and FDI financial integration.

[Tables 2.3.1-2.3.3 and 2.4]

2.4.3 PANEL VEC RESULTS

2.4.3.1 Relationship between International Financial Integration and GVC Integration

A country's financial integration index, that captures its financial integration with all types of financial instruments, is significantly cointegrated with its GVC participation through backward or forward linkages as well as its participation index (Table 2.5.1). In the long run, a rise in its backward linkages positively co-moves, although not significantly, with financial integration while a rise in forward linkages is accompanied by a significant and positive co-movement of the financial integration index. In the short run, the co-movements are also positive and significant (Figure 2.5.1). Overall, we note greater financial integration by a country is associated with greater forward linkages (statistically significant) and backward linkages (statistically insignificant) and a lower participation index (statistically significant) or a lower market share in the GVC.

[Table 2.5.1; Figure 2.5.1]

Greater financial integration of a developing country is associated with greater backward (statistically insignificant) and forward linkages (statistically significant), on average, and lower participation indices (Table 2.5.2). Together with the impulse response functions (Figure 2.5.2), we infer developing countries' financial openness to be associated with more backward linkages in the short run and more forward linkages in both the short and the long run.

[Table 2.5.2; Figure 2.5.2]

A developed country also experiences greater financial integration along with greater backward and forward linkages, on average, and lower participation indices (Table 2.5.3). The impulse response functions corroborate the evidence for the positive response to a change in financial integration or GVC integration (Figure 2.5.3). Hence, on average, developed countries experienced greater financial integration intertwined with greater GVC integration through backward and forward linkages. The coefficient for backward linkages is lower for developed countries compared to developing countries, while that for forward linkages is higher. This reflects the distinct position of developing and developed countries in the integrated global economy.

[Table 2.5.3; Figure 2.5.3]

2.4.3.2 Relationship between Debt Integration and GVC Integration

Financial integration through private debt co-moves negatively with backward linkages and positively with forward linkages (Table 2.6.1). The error correction term is negative and significant, which implies that debt flows are significantly cointegrated with backward and forward linkages. From the impulse response functions (Figure 2.6.1), we note a positive response of debt integration to backward linkages, and vice-versa. Additionally, we note a persistent positive response of debt integration to forward linkages and vice-versa. The positive coefficient for

cointegration between debt integration and GVC participation index comes with an error correction term that is statistically insignificant and, hence, cannot be conclusively said to be cointegrated.

[Table 2.6.1; Figure 2.6.1]

For developing countries, there is a statistically significant cointegration between debt and backward linkages but not between debt and forward linkages or GVC participation index. A developing country has a negative co-movement between private debt and backward linkages where a 1% increase in backward linkages is accompanied by a 4.07% decrease in its debt-to-GDP ratio (Table 2.6.2). The impulse response functions also illustrate an initially positive response of debt to a one standard deviation shock to backward linkages, but this becomes a negative movement after the third period (Figure 2.6.2).

[Table 2.6.2; Figure 2.6.2]

For developed countries, there is a statistically significant cointegration between debt and GVC integration through backward linkages, forward linkages, and the participation index, although the coefficient of cointegration is not statistically significant for backward linkages. A developed country has a positive co-movement between private debt and its forward linkages with a 1% increase in its forward linkages being accompanied by a 3.59% increase in its debt-to-GDP ratio (Table 2.6.3). The impulse response functions also illustrate a persistent positive response of debt to forward linkages and an initially positive response of forward linkages to debt in the first couple of periods (Figure 2.6.3). Lastly, the relationship between debt and GVC participation index is not statistically significant in the short run with the impulse response functions but positive and statistically significant in the long run. A positive shock to a developed country's GVC participation is associated with a positive co-movement by its debt-to-GDP ratio (Table 2.6.3).

[Table 2.6.3; Figure 2.6.3]

2.4.3.3 Relationship between FDI Integration and GVC Integration

With FDI integration for all countries, there is a negative co-movement of backward linkages, a positive co-movement of forward linkages, and a positive co-movement of GVC participation index – all statistically significant and with an error correction term that indicates cointegration (Table 2.7.1). The impulse response functions corroborate this evidence with significant positive interlinkages of FDI and forward linkages and significant positive interlinkages of FDI and backward linkages (Figure 2.7.1).

[Table 2.7.1; Figure 2.7.1]

Turning to the cointegration between FDI flows and GVC participation for developing countries, we find that backward linkages move inversely, while forward linkages and the participation index move directly with FDI integration (Table 2.7.2). While the negative error correction terms are significant the coefficients for each of these cointegration relations are insignificant. This suggests that these variables are adjusting to maintain the cointegration relationship, but they are not driving the relationship. The impulse response functions also depict weak responses in the first period after a shock to the system (Figure 2.7.2).

[Table 2.7.2; Figure 2.7.2]

A developed country experiences significant cointegration between FDI openness and GVC openness through backward linkages, forward linkages, and the participation index – interpreted from its negative and statistically significant error correction term (Table 2.7.3). Further, its forward linkages and participation index both positively co-move with its FDI openness, statistically significant at the 1% level. Its backward linkages positively co-move as well but are

statistically insignificant. The impulse response functions also show positive responses to a one standard deviation shock to the system (Figure 2.7.3).

[Table 2.7.3; Figure 2.7.3]

2.4.3.4 Summary and Discussion of Results

Table 2.8 offers a summary of the results with significant cointegrating relationships highlighted in cells from negative and significant error correction terms, along with the signs and statistical significance of the coefficients of cointegrating relationships.

[Table 2.8]

Developed countries exhibit significant cointegrating relationships, on average, between their financial openness and GVC openness. On one hand, a higher index of financial integration, that accounts for all financial instruments, is associated with greater GVC integration through backward and forward linkages. On the other, it is associated with a lower GVC participation index or a lower market share of the developed country in the international production network. Hence, greater financial integration for developed countries is related to greater GVC integration through backward and forward linkages but with a lower participation index as each country also becomes a smaller contributor in globally disaggregated production. This expands on the contributions of Milberg (2008) and Auvray and Rabinovich (2019) that find financialization to be interlinked with increased offshoring and outsourcing through global value chains for US corporations. It is here shown to apply to developed countries more generally. Further, developed countries exhibit positive and significant cointegrated relationships between financial integration through private debt and FDI and GVC integration through forward linkages. In other words, greater openness to debt and FDI is associated with greater forward linkages or value contributions to the GVC. This

illustrates the argument by Durand and Milberg (2020) that global north economies employ intellectual property rights to expand their value addition in GVCs, endogenously generating asymmetric market structures that favor R&D in GVCs and financialization in developed economies.

Developing countries also exhibit significant cointegrating relationships between their financial openness and GVC openness, but the direction and extent to which they do so differs from developed countries. They similarly experience a lower GVC participation index along with a higher financial integration index, as they become smaller contributors in a globally disaggregated production process. We note, however, that the degree of positive cointegration between financial openness and forward linkages is smaller in magnitude and less statistically significance than for developed countries. Moreover, the significant positive relationship between financial openness and backward linkages is cointegrated only in the short-term and comes with a drift in the long-term. Hence, developing countries experience greater backward linkages along with greater financial integration, and lesser forward linkages, as compared to developed countries. Financial integration is associated with a higher foreign value-added content in developing countries' exports.

This provides evidence to the framework of Bonizzi, Kaltenbrunner, and Powell (2020) that financialization and GVC integration by EMDEs essentially cements their subordinate position in the global structure of production and finance. Our findings indicate that international financial integration of developing countries is positively associated with backward linkages. The subordinate position of developing countries in the international financial system and global production networks reinforce each other, as financial integration engenders greater value creation

in the advanced core countries while it propels a more pronounced value absorption in the periphery.

Although we find significant cointegrating relationships for developing countries between FDI integration and GVC integration, backward and forward linkages, the coefficients themselves are not significant, suggesting that FDI flows are not being driven significantly by integration. What is significantly cointegrated and with a significant coefficient, however, is the negative relationship between debt openness and backward linkages. A developing country, on average, experiences significant cointegration between debt integration and backward linkages but with negative co-movements. This indicates that while developing countries' financial integration is cointegrated with their GVC participation it takes the form of equity rather than debt flows and would therefore tend to be more volatile.

2.4.4 ROBUSTNESS TESTS

To check that the relationships between financial integration and GVC integration are indeed cointegrating, we estimate single-equation error correction models both with financial integration variables as the explained outcome and GVC integration variables as the explained outcome for different pairs of variables.

The financial integration index is positively and significantly associated with backward and forward linkages for all countries, on average, with a negative and significant error correction term (Table B.1). The index is significantly positively related to backward linkages for developing countries and significantly positively related to forward linkages for developed countries. Assessing the impact of financial integration on backward linkages (Table B.2), we note a positive relationship for developed countries. Similarly assessing the impact on forward linkages (Table B.2), we note a positive relationship for developing countries. Therefore, opening up to financial

integration also brings backward linkages to developed countries and forward linkages to developing countries.

We find that debt integration is positively associated with both backward and forward linkages for all countries (Table B.3). Greater debt integration is associated with greater backward linkages for developing countries and greater forward linkages for developed countries. When testing the other way around, the positive association holds for debt integration in all countries (Table B.4), on average, and we also note a strongly significant positive association with backward linkages for developed countries, and a weakly significant positive association with forward linkages for developing countries. The result of a positive association here is different from the negative association with significant cointegration from the vector error correction model and requires further robustness checks. The main result from the vector error correction model jointly determines the association, allowing for feedback effects, whereas the error correction model does not control for endogeneity. This suggests significant feedback effects between debt flows and backward linkages for developing countries that endogenously results in negative co-movements.

We then note FDI integration to be positively associated with backward linkages, statistically significant at the 5% level, and positively but not significantly associated with forward linkages (Table B.5). The result is statistically significant for developing countries and backward linkages but not otherwise. However, testing the other way around, there is a positive and significant association between FDI and backward linkages for developed countries (Table B.6) and the same for FDI and forward linkages for developing countries (Table B.6). Therefore, FDI or debt financial integration are related more to forward linkages in developing countries and backward linkages in developed countries. All in all, these results align with the significantly positive

cointegration between financial integration and GVC integration from the vector error correction model.

[Appendix Tables B.1-B.6]

2.5 CONCLUSION

Neo-liberalism has been linked to globalization and financialization (Fine, 2009). It marks a stage of financialized capitalism in which developing countries are integrated in subordinate positions within the global financial system and GVCs (Bonizzi, Kaltenbrunner, and Powell 2020; 2022). The power of finance has been strengthened over the economy as well as the social and political structures of developing economies (Bonizzi, 2013).

While financialization and the disproportionate growth of cross-border financial flows much beyond the real flows of goods and services is a distinctive feature of this stage, global finance is imbricated in global production networks. It fosters and facilitates the establishment of GVCs and is also fueled by the real accumulation and transfers affected through GVCs.

This investigation of the relationship between financial integration and GVC participation provides evidence not only of this interdependence, but more significantly of the subordinate position of developing countries. This is illustrated in the finding that financial integration for developing countries is more responsive to backward linkages than forward linkages for developing countries when compared to developed countries. Further, while there is a significant cointegration relation between GVC participation and FDI flows in developing countries, participation is not a significant driver of FDI flows. The negative relationship between debt

integration and backward linkages in developing countries suggests that greater foreign content in the value added of exports might be financed increasingly through equity flows rather than debt.

These findings confirm the subordinate position of the developed countries (and conversely the dominant position of the developed countries) in GVCs. Global South economies are, in a sense, doubly free in a globalized economy: free to offer low-skill low-wage labor power to global capital seeking profits and free to global finance seeking high-return financial investments. The international circuits of finance and production together cement the subordination of the South within the global economy.

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TABLES

Table 2.1: Descriptive Statistics

	All			Developing			Developed		
	N	Mean	SE	N	Mean	SE	N	Mean	SE
Gross Domestic Product	1560	786313	51415.8	696	486518	47669.7	864	1027814	83647.8
Current Account Balance	1557	230.074	1867.23	693	6294.86	1577.26	864	-4634.4	3109.14
Capital Account Balance	1439	50.7132	91.7448	594	-22.823	90.5488	845	102.406	142.706
Gross Exports	1560	184049	7736.95	696	128638	9870.09	864	228686	11263.8
Domestic Value Added Share of Gross Exports	1560	75.0098	0.29086	696	78.1385	0.42951	864	72.4895	0.37385
Foreign Value Added Share of Gross Exports	1560	24.9937	0.29083	696	21.8646	0.42945	864	27.5144	0.37382
Domestic Value Added Share of Foreign Exports	1560	19.0911	0.17633	696	20.0585	0.32577	864	18.3118	0.17605
Foreign Direct Investment Share of GDP	1559	2.57752	0.32149	696	0.78573	0.06039	863	4.02259	0.57417
Portfolio Equity Investment Share of GDP	1552	1.50934	0.20759	689	0.3203	0.02608	863	2.45863	0.36967
Total Debt Investment Share of GDP	1559	3.03764	0.24814	696	1.16709	0.07586	863	4.54622	0.43747
Portfolio Debt Investment Share of GDP	1547	1.12917	0.11808	684	0.2064	0.01243	863	1.86055	0.20815
Other Debt Investments Share of GDP	1559	1.91694	0.13688	696	0.96376	0.06504	863	2.68567	0.23851
Financial Derivatives Share of GDP	1535	0.14102	0.0139	672	0.03009	0.00481	863	0.2274	0.02404
Financial Stocks Share of GDP	1559	7.4163	0.756	696	2.52254	0.16276	863	11.3631	1.34478

Table 2.2: Panel Unit Root Tests for Financial Integration Variables and GVC Integration Variables

Financial Integration	Debt/GDP	FDI/GDP	Total Finances/GDP	Δ Debt/GDP	Δ FDI/GDP	Δ Total Finances/GDP
Levin-Lin-Chu	-0.91677	-5.2819***	3.74147	-24.1094***	-27.7281***	-21.6057***
Breitung	5.92086	1.10415	5.80849	-11.15***	-13.536***	-16.0733***
Im-Pesaran-Shin	5.01481	-1.01069	8.00544	-17.6877***	-23.877***	-17.6606***
ADF Fisher	91.023	177.059***	52.6444	576.578***	717.775***	512.142***
PP Fisher	132.512	231.921***	40.4419	1620.31***	2880.22***	571.487***
GVC Integration	Participation Index	Backward Linkages	Forward Linkages	Δ Participation Index	Δ Backward Linkages	Δ Forward Linkages
Levin-Lin-Chu	1.96731	-2.39643***	-3.18276***	-18.8043***	-26.2649***	-29.9835***
Breitung	-0.90974	-3.4902***	-1.98012**	-13.914***	-16.7987**	-19.584***
Im-Pesaran-Shin	3.98235	1.08306	1.12732	-14.0778***	-21.3687***	-23.8415***
ADF Fisher	88.7807	118.747	124.154	457.675***	642.246***	705.35***
PP Fisher	141.434	144.644	150.966	1154.11***	1336.49***	2072.84***

Note: The Levin-Lin-Chu test and Breitung test assume common unit processes while the Im-Pesaran-Shin test and Fisher test assume individual unit processes. The null hypothesis for the Im-Pesaran-Shin test is that all panels contain unit-roots, and their alternative hypothesis is that some panels are stationary. The null hypothesis for the Fisher tests is that all panels contain unit-roots, and their alternative hypothesis is that at least one panel is stationary. I test for the individual intercept and trend with the modified Schwarz criterion for lag length. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 2.3.1: Pedroni Cointegration Tests for Debt Integration and GVC Integration

Debt/GDP	Specification	Backward Linkages	Forward Linkages	Participation Index
Deterministic	Modified Phillips–Perron t	2.1388**	0.7522	1.4303*
	Phillips–Perron t	-2.8775***	-3.1405***	-4.2171***
	Augmented Dickey–Fuller t	-2.7428***	-2.9067***	-4.0532***
AR(Same)	Modified variance ratio	-3.9964***	-3.25***	-3.7797***
	Modified Phillips–Perron t	0.4053	-0.6338	0.9731
	Phillips–Perron t	-2.8152***	-3.1695***	-2.6428***
Trend	Augmented Dickey–Fuller t	-3.2477***	-2.6463***	-2.4755***
	Modified Phillips–Perron t	4.0538***	3.4914***	4.3366***
	Phillips–Perron t	-0.3471	-1.2528	-0.3416
No Constant	Augmented Dickey–Fuller t	0.7152	-0.8584	0.3701
	Modified Phillips–Perron t	4.2112***	4.3639***	5.5573***
	Phillips–Perron t	-7.5001***	-7.2584***	-3.3183***
Lags	Augmented Dickey–Fuller t	-6.5828***	-6.6488***	-2.1151**
	Modified Phillips–Perron t	2.1388**	0.7522	1.4303*
	Phillips–Perron t	-2.8775***	-3.1405***	-4.2171***
Kernel	Augmented Dickey–Fuller t	-2.7428***	-2.9067***	-4.0532***
	Modified Phillips–Perron t	2.1388**	0.7522	1.4303*
	Phillips–Perron t	-2.8775***	-3.1405***	-4.2171***
Demean	Augmented Dickey–Fuller t	-2.7428***	-2.9067***	-4.0532***
	Modified Phillips–Perron t	3.331***	2.7179***	2.3641***
	Phillips–Perron t	-0.978	-1.5358*	-2.0909**
	Augmented Dickey–Fuller t	-0.2108	-1.5733*	-1.6383*

Table 2.3.2: Pedroni Cointegration Tests for FDI Integration and GVC Integration

FDI/GDP	Specification	Backward Linkages	Forward Linkages	Participation Index
Deterministic	Modified Phillips–Perron t	1.1836	-1.7755**	0.9542
	Phillips–Perron t	-7.2811***	-8.091***	-6.7436***
	Augmented Dickey–Fuller t	-5.7043***	-6.5223***	-5.5997***
AR(Same)	Modified variance ratio	-6.3561***	-6.3259***	-5.8001***
	Modified Phillips–Perron t	0.6434	-0.4057	0.0222
	Phillips–Perron t	-3.2856***	-3.707***	-4.7464***
Trend	Augmented Dickey–Fuller t	-3.1481***	-3.0861***	-4.469***
	Modified Phillips–Perron t	1.1405	1.1676	2.2911**
	Phillips–Perron t	-6.031***	-6.7327***	-4.4911***
No Constant	Augmented Dickey–Fuller t	-5.6947***	-5.0544***	-4.3708***
	Modified Phillips–Perron t	5.5674***	1.1676	5.299***
	Phillips–Perron t	-14.5174***	-6.7327***	-9.1576***
Lags	Augmented Dickey–Fuller t	-9.6559***	-5.0544***	-7.4312***
	Modified Phillips–Perron t	1.1836	-1.7755**	0.9542
	Phillips–Perron t	-7.2811***	-8.091***	-6.7436***
Kernel	Augmented Dickey–Fuller t	-5.7043***	-6.5223***	-5.5997***
	Modified Phillips–Perron t	1.1836	-1.7755**	0.9542
	Phillips–Perron t	-7.2811***	-8.091***	-6.7436***
Demean	Augmented Dickey–Fuller t	-5.7043***	-6.5223***	-5.5997***
	Modified Phillips–Perron t	0.6736	1.1703	0.0604
	Phillips–Perron t	-4.5943***	-4.0343***	-6.1395***
	Augmented Dickey–Fuller t	-4.2168***	-3.9145***	-5.5319***

Table 2.3.3: Pedroni Cointegration Tests for Financial Integration and GVC Integration

Finance/GDP	Specification	Backward Linkages	Forward Linkages	Participation Index
Deterministic	Modified Phillips–Perron t	3.8172***	2.1608**	3.2713***
	Phillips–Perron t	0.7655	-0.1924	-1.1302
	Augmented Dickey–Fuller t	1.4986*	0.6815	-0.4109
AR(Same)	Modified variance ratio	-7.9294***	-7.7171***	-7.6238***
	Modified Phillips–Perron t	3.9466***	2.2597**	2.9812***
	Phillips–Perron t	1.805**	0.0609	0.4739
Trend	Augmented Dickey–Fuller t	2.7514***	0.2917	1.4126*
	Modified Phillips–Perron t	5.5998***	5.8239***	5.9501***
	Phillips–Perron t	3.3182***	3.9658***	3.951***
No Constant	Augmented Dickey–Fuller t	4.8516***	5.292***	4.8254***
	Modified Phillips–Perron t	4.1511***	3.7596***	7.2196***
	Phillips–Perron t	-2.0228**	-2.0615**	3.0018***
Lags	Augmented Dickey–Fuller t	-1.5363*	-1.7757**	4.799***
	Modified Phillips–Perron t	3.8172***	2.1608**	3.2713***
	Phillips–Perron t	0.7655	-0.1924	-1.1302
Kernel	Augmented Dickey–Fuller t	1.4986*	0.6815	-0.4109
	Modified Phillips–Perron t	3.8172***	2.1608**	3.2713***
	Phillips–Perron t	0.7655	-0.1924	-1.1302
Demean	Augmented Dickey–Fuller t	1.4986*	0.6815	-0.4109
	Modified Phillips–Perron t	2.8484***	4.4367***	2.6765***
	Phillips–Perron t	-1.0041	1.7429**	-0.8806
	Augmented Dickey–Fuller t	-0.455	1.1945	0.0582

Table 2.4: Westerlund Cointegration Tests

Debt/GDP	Backward Linkages	Forward Linkages	Participation Index
Some Panels	0.7558	-0.8602	-1.7431**
All Panels	1.4799*	-0.8802	-1.0207
Trend	5.8786***	4.6741***	6.3963***
Demean	2.3597***	1.9957**	-1.5233**
FDI/GDP	Backward Linkages	Forward Linkages	Participation Index
Some Panels	4.0825***	0.7383	0.5254
All Panels	3.1852***	-0.0774	-0.8256
Trend	2.0581**	2.5758***	3.5226***
Demean	-0.5175	0.6925	-3.0685***
Finance/GDP	Backward Linkages	Forward Linkages	Participation Index
Some Panels	7.4714***	4.0323***	2.9132***
All Panels	5.6521***	3.1978***	1.6327*
Trend	6.7351***	7.1288***	7.3996***
Demean	1.0763	2.8556***	-2.1765**

Table 2.5.1: Panel VEC Results for Financial Integration and GVC Integration – All Countries

All Finances/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	1.026495 (-0.6696)	4.598764*** (-1.35571)	-1.002916*** (-0.06638)
Error Correction Term	-0.011877*** (-0.0021)	-0.00847*** (-0.00155)	-0.041478*** (-0.00457)
Short-Run			
$\Delta(\text{GVC})t-1$	0.088997* (-0.05194)	0.124708* (-0.07547)	0.164198*** (-0.05136)
$\Delta(\text{GVC})t-2$	0.071906 (-0.05144)	0.186246** (-0.07429)	-0.008347 (-0.05112)
$\Delta(\text{GVC})t-3$	0.068071 (-0.04966)	0.149667** (-0.06804)	-0.093202** (-0.04753)
$\Delta(\text{GVC})t-4$	-0.096754** (-0.0491)	0.02457 (-0.06891)	-0.114527** (-0.04834)
$\Delta(\text{GVC})t-5$	-0.0093 (-0.04849)	0.067729 (-0.06845)	0.046235 (-0.04595)
$\Delta(\text{GVC})t-6$	0.155762*** (-0.0487)	0.501582*** (-0.06602)	-0.055624 (-0.04499)
$\Delta(\text{GVC})t-7$	0.119507** (-0.04717)	0.314322*** (-0.06577)	-0.155975*** (-0.04385)
$\Delta(\text{Finance})t-1$	0.234168*** (-0.03081)	0.21225*** (-0.03066)	0.20497*** (-0.03032)
$\Delta(\text{Finance})t-2$	0.045714 (-0.032)	0.045006 (-0.03286)	0.036861 (-0.03107)
$\Delta(\text{Finance})t-3$	0.189844*** (-0.03186)	0.164696*** (-0.03377)	0.188535*** (-0.03096)
$\Delta(\text{Finance})t-4$	0.011642 (-0.03238)	0.00631 (-0.03348)	0.040337 (-0.03162)
$\Delta(\text{Finance})t-5$	-0.019689 (-0.03185)	-0.015219 (-0.03293)	0.002155 (-0.03112)
$\Delta(\text{Finance})t-6$	-0.044423 (-0.03137)	-0.027207 (-0.0325)	-0.03036 (-0.03068)
$\Delta(\text{Finance})t-7$	0.008491 (-0.03005)	-0.012835 (-0.03096)	0.046581 (-0.02935)
Constant	0.049649*** (-0.00773)	0.040747*** (-0.00777)	0.049541*** (-0.00741)

Table 2.5.2: VEC Results for Financial Integration and GVC Integration – Developing Countries

All Finances/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	5.109929*** (-157.049)	3.058499* (-1.6376)	-0.879901*** (-0.1404)
Error Correction Term	0.0000156 (-0.000015)	-0.006804*** (-0.00228)	-0.018348*** (-0.00534)
Short-Run			
$\Delta(\text{GVC})t-1$	0.04384 (-0.0437)	0.07116 (-0.0818)	0.200911*** (-0.04271)
$\Delta(\text{GVC})t-2$	0.02472 (-0.04367)	0.102531 (-0.08048)	0.092857** (-0.04285)
$\Delta(\text{GVC})t-3$	0.081353* (-0.04235)	0.098095 (-0.07355)	0.032719 (-0.04167)
$\Delta(\text{GVC})t-4$		-0.063837 (-0.07539)	
$\Delta(\text{GVC})t-5$		-0.030949 (-0.0747)	
$\Delta(\text{GVC})t-6$		0.316407*** (-0.07197)	
$\Delta(\text{GVC})t-7$		0.306243*** (-0.0712)	
$\Delta(\text{Finance})t-1$	0.135738*** (-0.04098)	0.076998* (-0.04599)	0.082498** (-0.04059)
$\Delta(\text{Finance})t-2$	0.017024 (-0.04086)	0.076898 (-0.04763)	-0.026673 (-0.04025)
$\Delta(\text{Finance})t-3$	0.183403*** (-0.04023)	0.221176*** (-0.04857)	0.15388*** (-0.03884)
$\Delta(\text{Finance})t-4$		-0.0534 (-0.04835)	
$\Delta(\text{Finance})t-5$		-0.036772 (-0.04657)	
$\Delta(\text{Finance})t-6$		-0.037195 (-0.04545)	
$\Delta(\text{Finance})t-7$		0.072789 (-0.04592)	
Constant	0.058836*** (-0.00743)	0.058175*** (-0.01125)	0.066033*** (-0.00717)

Table 2.5.3: VEC Results for Financial Integration and GVC Integration – Developed Countries

All Finances/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	2.142079** (-0.97202)	7.455983*** (-2.32374)	-0.994022*** (-0.09305)
Error Correction Term	-0.016123*** (-0.00344)	-0.009614*** (-0.00205)	-0.048686*** (-0.00671)
Short-Run			
$\Delta(\text{GVC})t-1$	0.044911 (-0.10039)	0.231956* (-0.1299)	0.033364 (-0.09288)
$\Delta(\text{GVC})t-2$	0.083202 (-0.09991)	0.317654** (-0.12881)	-0.078141 (-0.08965)
$\Delta(\text{GVC})t-3$	0.082395 (-0.09612)	0.277015** (-0.11737)	-0.111354 (-0.08458)
$\Delta(\text{GVC})t-4$	-0.255476*** (-0.09847)	0.204769* (-0.11709)	-0.130218 (-0.08352)
$\Delta(\text{GVC})t-5$	-0.088363 (-0.0974)	0.201471* (-0.11597)	0.117807 (-0.0812)
$\Delta(\text{GVC})t-6$	0.324599*** (-0.09607)	0.719744*** (-0.11173)	-0.049602 (-0.08093)
$\Delta(\text{GVC})t-7$	0.221221** (-0.09518)	0.362107*** (-0.11192)	-0.364175*** (-0.07989)
$\Delta(\text{Finance})t-1$	0.274596*** (-0.0415)	0.242936*** (-0.04168)	0.269861*** (-0.04049)
$\Delta(\text{Finance})t-2$	0.058566 (-0.0438)	0.012169 (-0.04505)	0.04808 (-0.04255)
$\Delta(\text{Finance})t-3$	0.174658*** (-0.04336)	0.133853*** (-0.04644)	0.165966*** (-0.04233)
$\Delta(\text{Finance})t-4$	0.036725 (-0.04387)	0.035 (-0.046)	0.06544 (-0.04338)
$\Delta(\text{Finance})t-5$	-0.017974 (-0.04389)	-0.024145 (-0.04598)	-0.011048 (-0.04315)
$\Delta(\text{Finance})t-6$	-0.042077 (-0.04337)	-0.023183 (-0.04546)	-0.01591 (-0.04289)
$\Delta(\text{Finance})t-7$	-0.051349 (-0.0404)	-0.057318 (-0.04229)	0.034267 (-0.04056)
Constant	0.043259*** (-0.01135)	0.03423*** (-0.01117)	0.034685*** (-0.01087)

Table 2.6.2: Panel VEC Results for Debt Integration and GVC Integration – All Countries

Debt/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	-3.239566*** (-0.73765)	3.453409*** (-1.2824)	1.24784*** (-0.27703)
Error Correction Term	-0.0062*** (-0.00237)	-0.00496* (-0.00264)	-0.000378 (-0.00162)
Short-Run			
$\Delta(\text{GVC})t-1$	0.068788 (-0.04871)	0.029663 (-0.07055)	0.010247 (-0.04077)
$\Delta(\text{GVC})t-2$	0.070585 (-0.04828)	0.332407*** (-0.06977)	0.003656 (-0.04061)
$\Delta(\text{GVC})t-3$	-0.099328** (-0.04675)	-0.01029 (-0.06552)	0.032007 (-0.03931)
$\Delta(\text{GVC})t-4$	-0.124806*** (-0.04645)	0.080469 (-0.0659)	
$\Delta(\text{GVC})t-5$	-0.083917* (-0.04611)	0.035235 (-0.06498)	
$\Delta(\text{GVC})t-6$	0.030915 (-0.04623)	0.046631 (-0.06484)	
$\Delta(\text{GVC})t-7$	0.040786 (-0.04444)	0.041263 (-0.06392)	
$\Delta(\text{Debt})t-1$	0.055636* (-0.03069)	0.069416** (-0.03167)	0.070291*** (-0.02592)
$\Delta(\text{Debt})t-2$	0.058629* (-0.03078)	0.092063*** (-0.0323)	0.036185 (-0.0255)
$\Delta(\text{Debt})t-3$	0.241436*** (-0.03034)	0.203647*** (-0.0321)	0.167197*** (-0.02482)
$\Delta(\text{Debt})t-4$	-0.028635 (-0.03191)	-0.027032 (-0.03302)	
$\Delta(\text{Debt})t-5$	0.021588 (-0.02818)	0.017098 (-0.02919)	
$\Delta(\text{Debt})t-6$	-0.016337 (-0.0273)	-0.013727 (-0.02816)	
$\Delta(\text{Debt})t-7$	0.000963 (-0.02637)	0.004846 (-0.02725)	
Constant	0.004749 (-0.00442)	-0.002263 (-0.00493)	0.007088* (-0.00388)

Table 2.6.2: Panel VEC Results for Debt Integration and GVC Integration
– Developing Countries

Debt/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	-4.074901*** (-1.16091)	-2.234495 (-1.90055)	4.547514** (-1.96808)
Error Correction Term	-0.005144** (-0.0022)	-0.003983 (-0.00459)	0.001223 (-0.00082)
Short-Run			
$\Delta(\text{GVC})t-1$	0.069693 (-0.05595)	-0.097657 (-0.08672)	0.015095 (-0.05984)
$\Delta(\text{GVC})t-2$	0.043517 (-0.05522)	0.127694 (-0.08544)	0.042605 (-0.06004)
$\Delta(\text{GVC})t-3$	-0.076066 (-0.05367)	-0.139682* (-0.0806)	0.005387 (-0.05542)
$\Delta(\text{GVC})t-4$	-0.086631 (-0.05306)	-0.085718 (-0.08194)	-0.0017 (-0.05714)
$\Delta(\text{GVC})t-5$	-0.113607** (-0.05269)	-0.106343 (-0.08008)	0.047643 (-0.05386)
$\Delta(\text{GVC})t-6$	0.009899 (-0.05296)	-0.167887** (-0.07977)	-0.129929** (-0.05223)
$\Delta(\text{GVC})t-7$	0.021113 (-0.05045)	-0.052284 (-0.0786)	0.081759 (-0.05056)
$\Delta(\text{Debt})t-1$	0.02509 (-0.04373)	0.035404 (-0.04562)	0.058279 (-0.04475)
$\Delta(\text{Debt})t-2$	0.050535 (-0.04352)	0.082337* (-0.0455)	0.060468 (-0.04422)
$\Delta(\text{Debt})t-3$	0.116104*** (-0.043)	0.074672 (-0.04577)	0.109648** (-0.04402)
$\Delta(\text{Debt})t-4$	-0.07056 (-0.04307)	-0.084042* (-0.04463)	-0.089991** (-0.04311)
$\Delta(\text{Debt})t-5$	-0.032618 (-0.03526)	-0.040612 (-0.0361)	-0.039106 (-0.03537)
$\Delta(\text{Debt})t-6$	-0.047253 (-0.03409)	-0.054363 (-0.03479)	-0.067982** (-0.03427)
$\Delta(\text{Debt})t-7$	-0.007807 (-0.03404)	0.004901 (-0.03471)	0.001953 (-0.03381)
Constant	-0.005036 (-0.00566)	0.001397 (-0.00646)	-0.008406 (-0.0061)

Table 2.6.3: Panel VEC Results for Debt Integration and GVC Integration
– Developed Countries

Debt/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	-0.371743 (-0.72371)	3.585052*** (-1.04845)	1.08094*** (-0.28675)
Error Correction Term	-0.01938*** (-0.00564)	-0.011524** (-0.00451)	-0.005626** (-0.00254)
Short-Run			
$\Delta(\text{GVC})_{t-1}$	0.067267 (-0.08813)	0.200753* (-0.1107)	0.027571 (-0.06541)
$\Delta(\text{GVC})_{t-2}$	0.136717 (-0.08753)	0.566082*** (-0.11073)	-0.069675 (-0.06478)
$\Delta(\text{GVC})_{t-3}$	-0.064399 (-0.08505)	0.13842 (-0.10452)	0.059296 (-0.06338)
$\Delta(\text{GVC})_{t-4}$	-0.132091 (-0.0872)	0.262337** (-0.10406)	
$\Delta(\text{GVC})_{t-5}$	0.021911 (-0.08583)	0.159518 (-0.10289)	
$\Delta(\text{GVC})_{t-6}$	0.080301 (-0.08471)	0.291282*** (-0.10241)	
$\Delta(\text{GVC})_{t-7}$	0.067774 (-0.08339)	0.128481 (-0.1011)	
$\Delta(\text{Debt})_{t-1}$	0.05897 (-0.04287)	0.039921 (-0.04369)	0.066203* (-0.0367)
$\Delta(\text{Debt})_{t-2}$	0.043829 (-0.04368)	0.036012 (-0.04539)	0.066048* (-0.0362)
$\Delta(\text{Debt})_{t-3}$	0.30037*** (-0.04335)	0.234895*** (-0.04502)	0.219111*** (-0.03507)
$\Delta(\text{Debt})_{t-4}$	-0.013663 (-0.04728)	-0.014661 (-0.0479)	
$\Delta(\text{Debt})_{t-5}$	0.085749* (-0.0459)	0.063408 (-0.04716)	
$\Delta(\text{Debt})_{t-6}$	0.007345 (-0.04488)	0.023595 (-0.04498)	
$\Delta(\text{Debt})_{t-7}$	0.000817 (-0.04194)	-0.005411 (-0.04222)	
Constant	0.0000613 (-0.00801)	-0.011142 (-0.0077)	0.015697*** (-0.00554)

Table 2.7.1: Panel VEC Results for FDI Integration and GVC Integration – All Countries

FDI/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	-3.465493*** (-0.75011)	3.676344*** (-0.98881)	0.764712*** (-0.24291)
Error Correction Term	-0.013283*** (-0.00387)	-0.011795*** (-0.00409)	-0.008475** (-0.00387)
Short-Run			
$\Delta(\text{GVC})t-1$	0.130846 (-0.07747)	0.01378 (-0.11169)	0.14282* (-0.07865)
$\Delta(\text{GVC})t-2$	0.095822 (-0.07691)	0.431074*** (-0.11015)	-0.004806 (-0.07842)
$\Delta(\text{GVC})t-3$	0.17086 (-0.07438)	0.054873 (-0.10392)	-0.147096** (-0.07344)
$\Delta(\text{GVC})t-4$	-0.13123 (-0.07364)	-0.068643 (-0.10421)	0.016792 (-0.0738)
$\Delta(\text{GVC})t-5$	0.007499 (-0.0729)	0.277292*** (-0.10354)	0.028835 (-0.07009)
$\Delta(\text{GVC})t-6$	-0.102559 (-0.0731)	0.195028* (-0.10305)	-0.102885 (-0.06873)
$\Delta(\text{GVC})t-7$	0.060755 (-0.07076)	0.084345 (-0.10115)	-0.091582 (-0.06681)
$\Delta(\text{FDI})t-1$	-0.046552 (-0.03111)	-0.046302 (-0.03217)	-0.040982 (-0.03138)
$\Delta(\text{FDI})t-2$	0.047395 (-0.03099)	0.095525*** (-0.03234)	0.066087** (-0.03112)
$\Delta(\text{FDI})t-3$	0.117669 (-0.03041)	0.093937*** (-0.03185)	0.1075*** (-0.03073)
$\Delta(\text{FDI})t-4$	-0.025361 (-0.02966)	-0.036212 (-0.03078)	-0.026665 (-0.02998)
$\Delta(\text{FDI})t-5$	-0.037114 (-0.02856)	-0.015753 (-0.02971)	-0.029989 (-0.02889)
$\Delta(\text{FDI})t-6$	0.052619 (-0.02818)	0.054253* (-0.0292)	0.06007** (-0.02848)
$\Delta(\text{FDI})t-7$	0.030323 (-0.02961)	0.026726 (-0.0306)	0.04461 (-0.02986)
Constant	0.038637 (-0.00855)	0.026175*** (-0.00914)	0.038676*** (-0.00861)

Table 2.7.2: Panel VEC Results for FDI Integration and GVC Integration
– Developing Countries

FDI/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	-0.0842 (-0.28353)	0.718376 (-0.47478)	0.142853 (-0.12351)
Error Correction Term	-0.041299*** (-0.00863)	-0.040024*** (-0.00801)	-0.038013*** (-0.00823)
Short-Run			
$\Delta(\text{GVC})_{t-1}$	0.163529** (-0.07814)	0.092065 (-0.12324)	0.111201 (-0.07622)
$\Delta(\text{FDI})_{t-1}$	-0.045145 (-0.03854)	-0.033349 (-0.03962)	-0.030542 (-0.03874)
Constant	0.064686*** (-0.0086)	0.063985*** (-0.00893)	0.062818*** (-0.00882)

Table 2.7.3: Panel VEC Results for FDI Integration and GVC Integration – Developed Countries

FDI/GDP	Backward Linkages	Forward Linkages	Participation Index
Long-Run			
GVC Participation	0.556456 (-0.93743)	6.949825*** (-1.58632)	2.506833*** (-0.63432)
Error Correction Term	-0.01419** (-0.0064)	-0.011342** (-0.00448)	-0.004199** (-0.00196)
Short-Run			
$\Delta(\text{GVC})t-1$	0.065229 (-0.13678)	0.239543 (-0.16759)	0.006734 (-0.10106)
$\Delta(\text{GVC})t-2$	0.173867 (-0.13578)	0.758133*** (-0.16704)	0.00841 (-0.10014)
$\Delta(\text{GVC})t-3$	-0.012791 (-0.1325)	0.095896 (-0.1601)	-0.11444 (-0.09778)
$\Delta(\text{GVC})t-4$	-0.250226* (-0.134)	0.108091 (-0.15705)	
$\Delta(\text{GVC})t-5$	0.012568 (-0.13293)	0.538262*** (-0.1552)	
$\Delta(\text{GVC})t-6$	-0.002897 (-0.13079)	0.300779* (-0.15364)	
$\Delta(\text{GVC})t-7$	0.053954 (-0.12882)	0.292069* (-0.15121)	
$\Delta(\text{FDI})t-1$	0.019161 (-0.04314)	0.000339 (-0.04317)	0.040668 (-0.03706)
$\Delta(\text{FDI})t-2$	0.080774* (-0.04369)	0.084223* (-0.04388)	0.061891* (-0.03692)
$\Delta(\text{FDI})t-3$	0.180824*** (-0.04252)	0.1308*** (-0.04258)	0.16384*** (-0.03651)
$\Delta(\text{FDI})t-4$	0.016094 (-0.0415)	0.014937 (-0.04129)	
$\Delta(\text{FDI})t-5$	0.004495 (-0.04104)	0.005881 (-0.04099)	
$\Delta(\text{FDI})t-6$	0.086208** (-0.0405)	0.059163 (-0.04002)	
$\Delta(\text{FDI})t-7$	0.026559 (-0.03973)	0.039208 (-0.03919)	
Constant	0.020144 (-0.01309)	0.002229 (-0.01262)	0.04649*** (-0.00938)

Table 2.8: Summary of Results

IFI/GDP	All	Developing	Developed
Backward Linkages	+	***	**
Forward Linkages	***	+	***
Participation Index	***	***	***

Debt/GDP	All	Developing	Developed
Backward Linkages	***	***	-
Forward Linkages	***	-	***
Participation Index	***	**	***

FDI/GDP	All	Developing	Developed
Backward Linkages	***	-	+
Forward Linkages	***	+	***
Participation Index	***	+	***

FIGURES

Figure 2.5.1: IRFs for Financial Integration and GVC Integration – All Countries

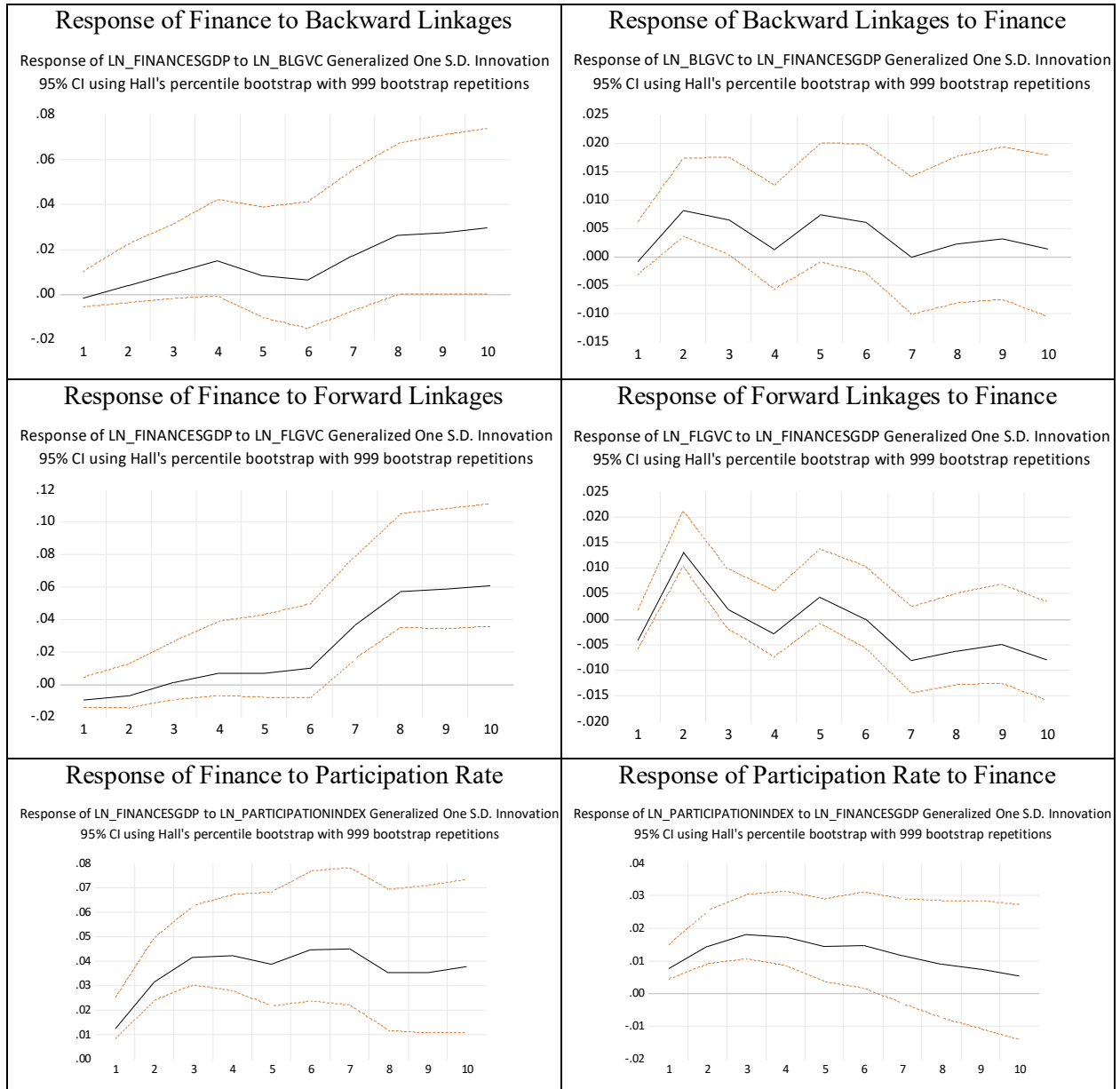


Figure 2.5.2: IRFs for Financial Integration and GVC Integration – Developing Countries

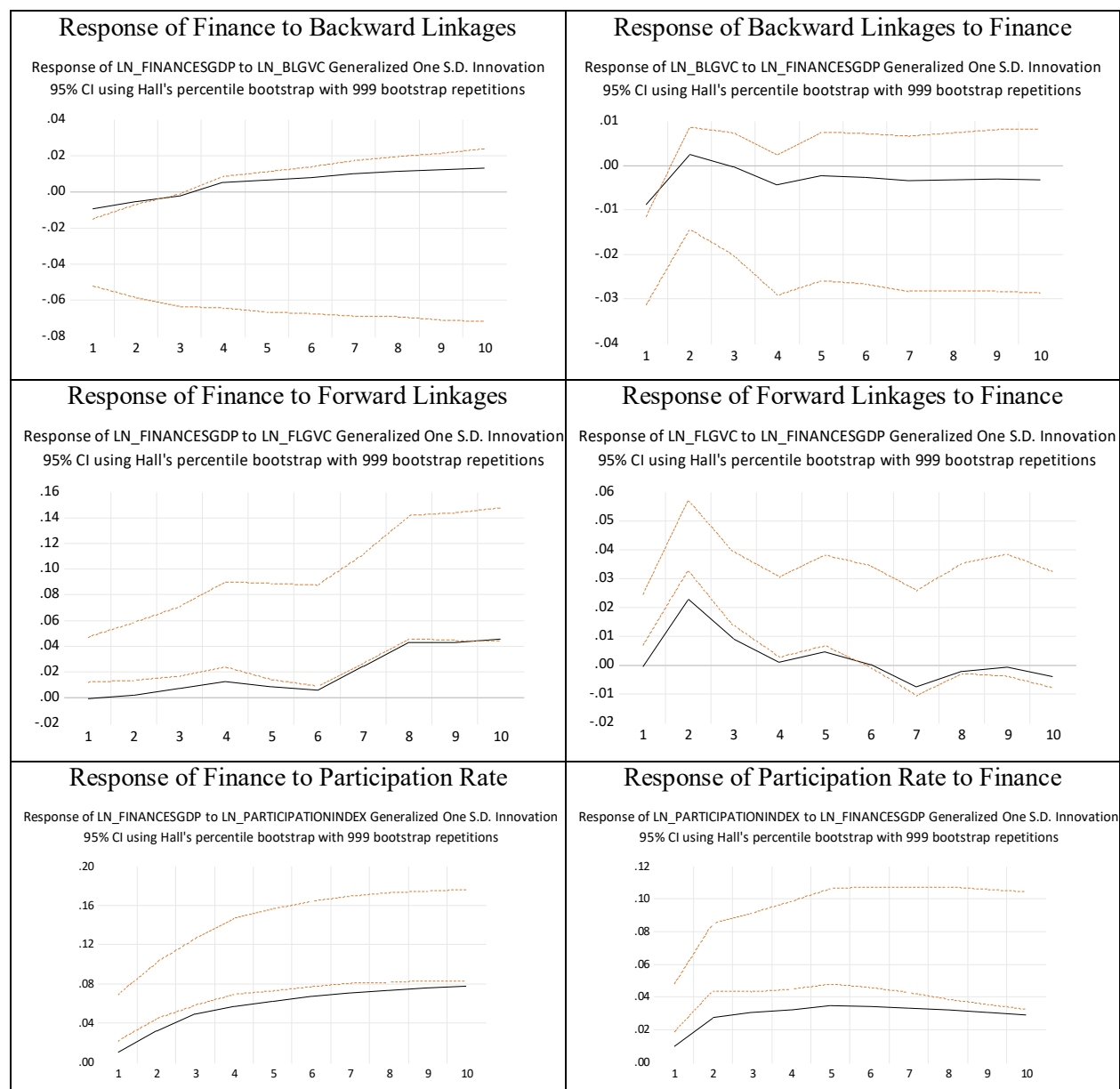


Figure 2.5.3: IRFs for Financial Integration and GVC Integration – Developed Countries

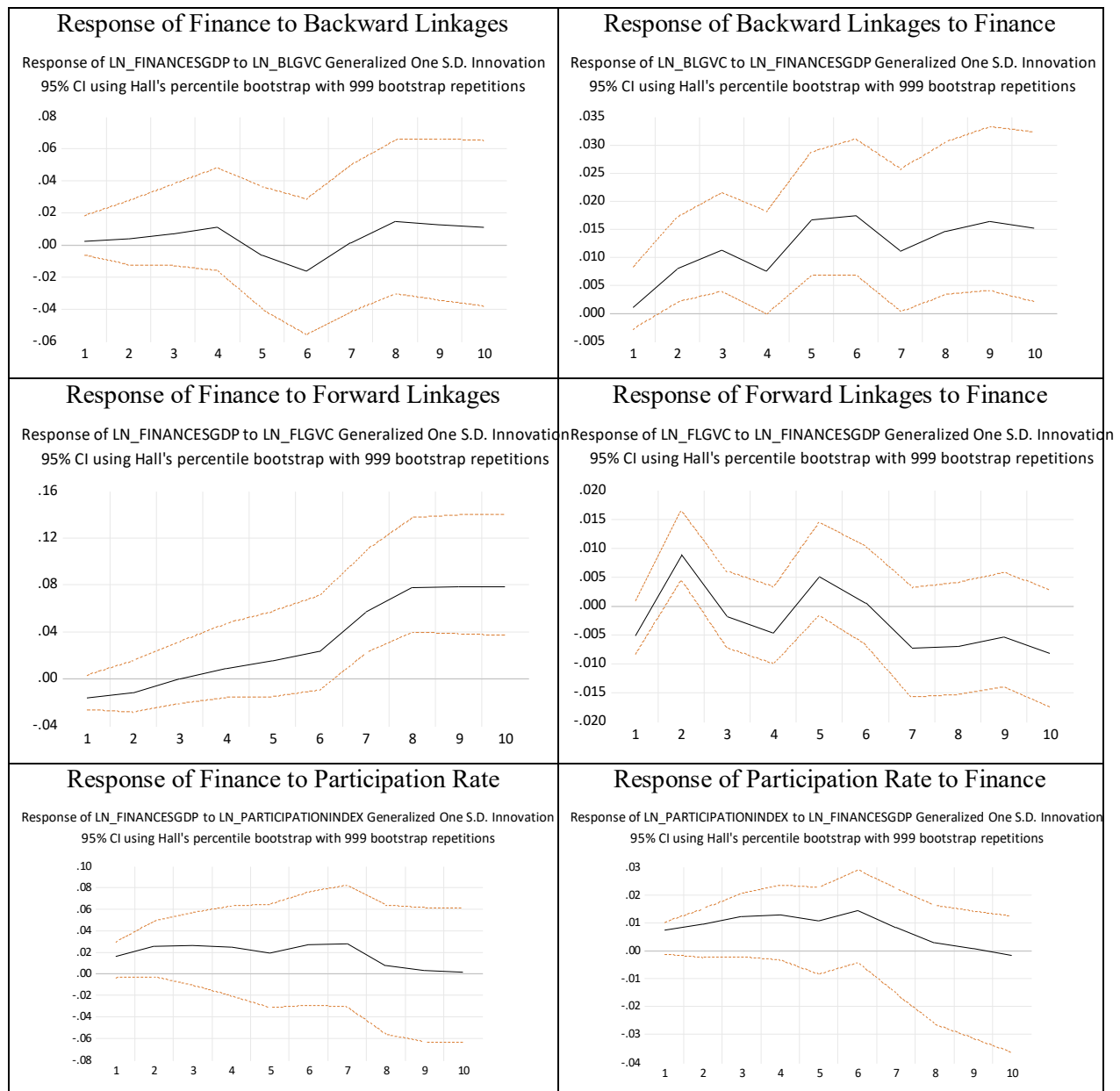


Figure 2.6.1: IRFs for Debt Integration and GVC Integration – All Countries



Figure 2.6.2: IRFs for Debt Integration and GVC Integration – Developing Countries

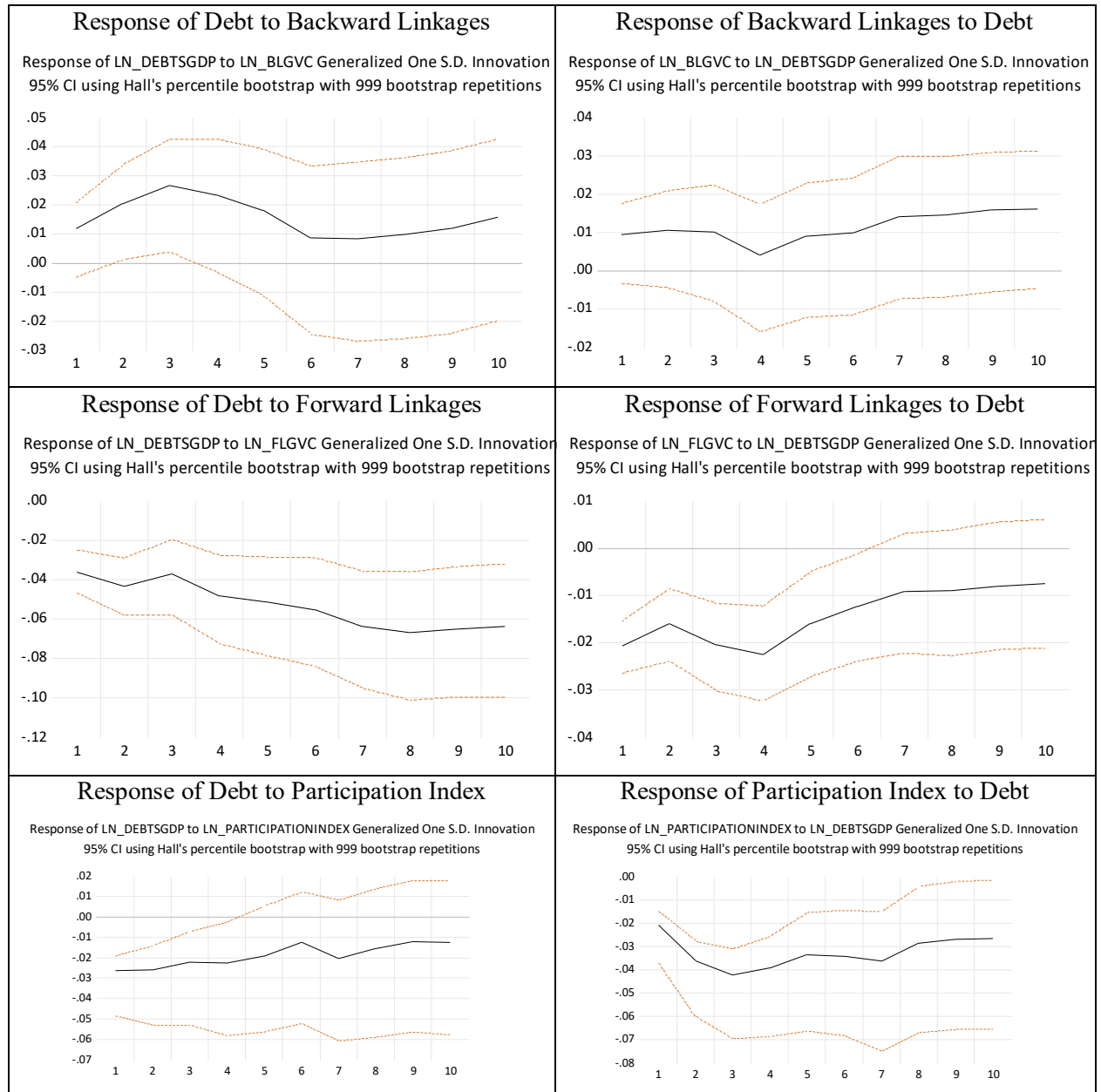


Figure 2.6.3: IRFs for Debt Integration and GVC Integration – Developed Countries



Figure 2.7.1: IRFs for FDI Integration and GVC Integration – All Countries

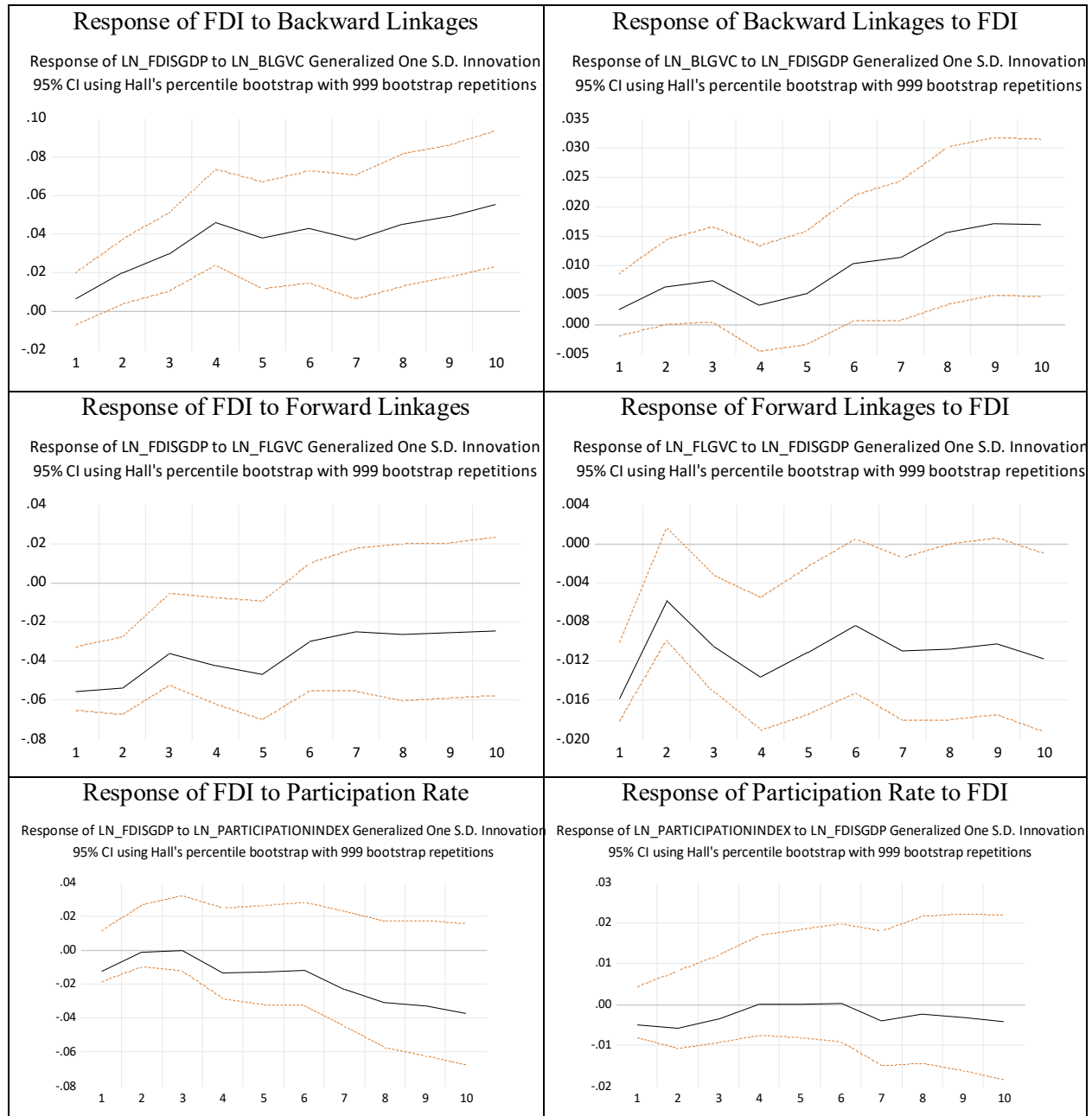


Figure 2.7.2: IRFs for FDI Integration and GVC Integration – Developing Countries

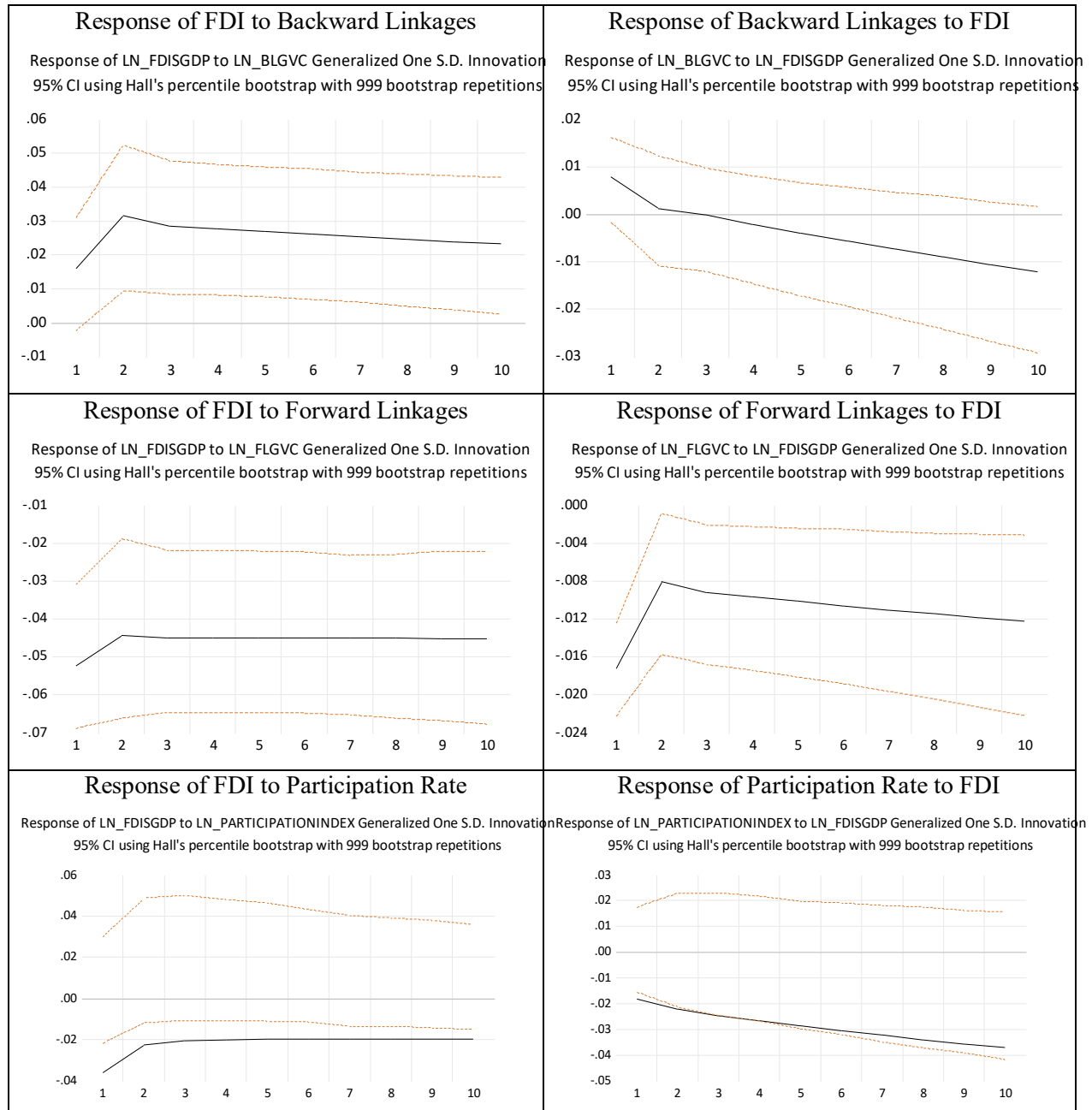
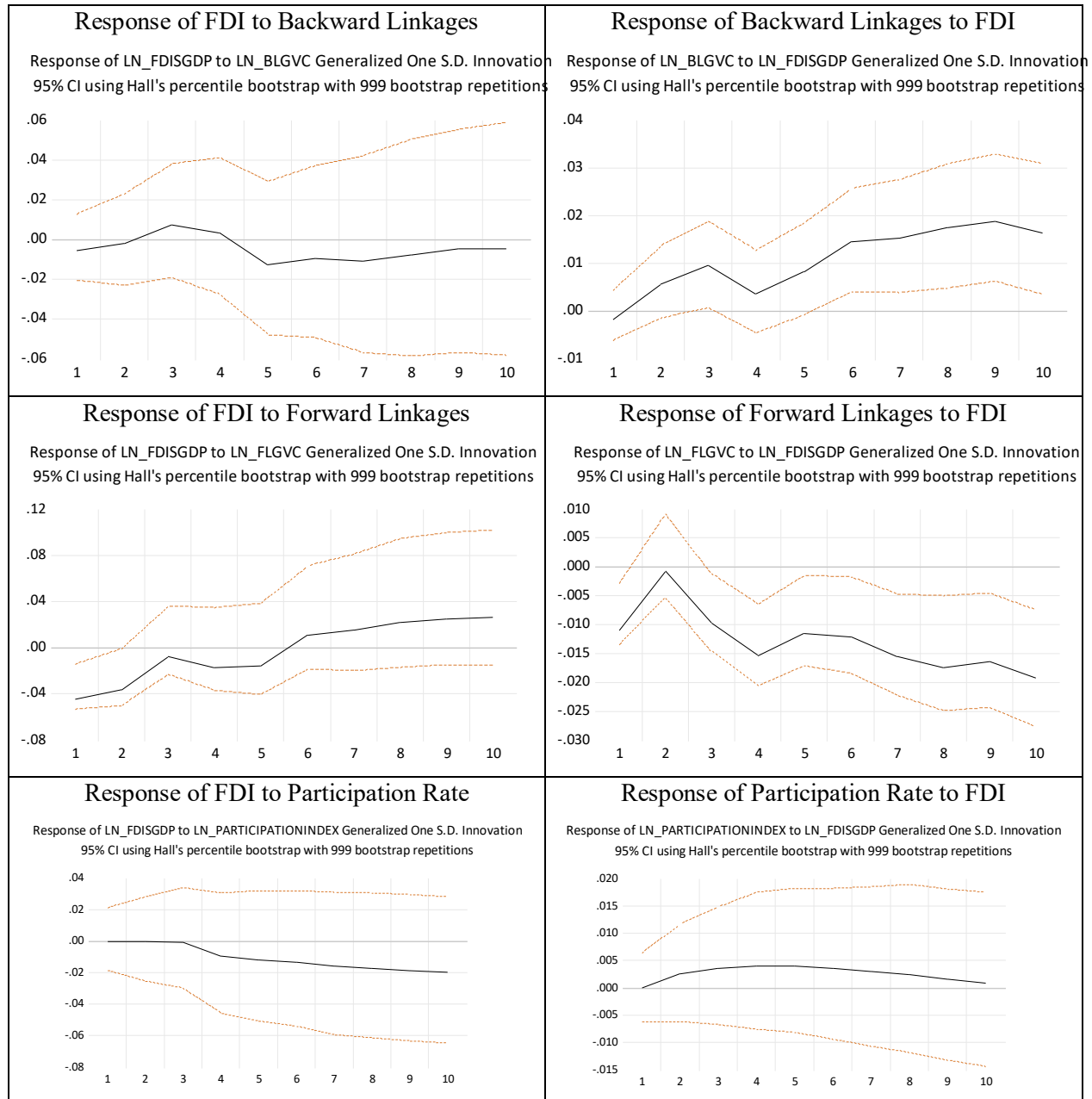


Table 2.7.3: IRFs for FDI Integration and GVC Integration – Developed Countries



APPENDIX B

Table B.1: Error Correction Model for Financial Integration and GVC Integration

Dependent Variable: Finance-to-GDP Ratio	All (1)	Developing (2)	Developed (3)
Long-Run			
ln (Backward Linkages)	0.392* (0.203)	0.515*** (0.154)	-0.183 (0.492)
ln (Forward Linkages)	0.702** (0.287)	0.438* (0.240)	1.412** (0.559)
ln (GDP)	0.865*** (0.0800)	0.958*** (0.0598)	0.889*** (0.211)
ln (Exchange Rate)	-0.0664 (0.0721)	-0.0656 (0.0506)	0.0909 (0.292)
Error Correction Term	-0.108*** (0.00899)	-0.142*** (0.0154)	-0.0960*** (0.0141)
Short-Run			
Δ ln (Backward Linkages)	0.00593 (0.0385)	-0.0719* (0.0389)	0.0559 (0.0737)
Δ ln (Forward Linkages)	-0.322*** (0.0558)	-0.156** (0.0615)	-0.532*** (0.0920)
Δ ln (GDP)	0.362*** (0.0348)	0.138*** (0.0370)	0.773*** (0.0907)
Δ ln (Exchange Rate)	-0.0458** (0.0215)	-0.0632*** (0.0184)	0.149 (0.0945)
Constant	0.0161 (0.116)	-0.156 (0.115)	-0.0374 (0.292)

Table B.2: Error Correction Model for GVC Integration on Financial Integration

Dependent Variable:	ln(Backward Linkages)			ln(Forward Linkages)		
	All	Developing	Developed	All	Developing	Developed
Long-Run						
ln(All Financial Stocks/GDP)	0.128*** (0.0299)	0.0748 (0.0873)	0.133*** (0.0269)	0.0415* (0.0232)	0.155*** (0.0597)	-0.0255 (0.0286)
ln(GDP)	-0.173*** (0.0478)	-0.146 (0.106)	-0.134** (0.0593)	-0.00347 (0.0374)	-0.145* (0.0770)	0.185*** (0.0613)
ln(Exchange Rate)	0.0587** (0.0269)	0.0995** (0.0397)	-0.0804 (0.0572)	-0.0270 (0.0211)	-0.0290 (0.0270)	0.125** (0.0582)
Error Correction Term	-0.195*** (0.0144)	-0.181*** (0.0216)	-0.226*** (0.0196)	-0.172*** (0.0139)	-0.167*** (0.0206)	-0.181*** (0.0190)
Short-Run						
Δ ln(All Financial Stocks/GDP)	-0.000720 (0.0168)	-0.00603 (0.0375)	-0.0222 (0.0161)	-0.0611*** (0.0115)	-0.0686*** (0.0236)	-0.0495*** (0.0129)
Δ ln(GDP)	-0.0432* (0.0230)	-0.114*** (0.0349)	0.171*** (0.0419)	0.191*** (0.0157)	0.212*** (0.0218)	0.230*** (0.0340)
Δ ln(Exchange Rate)	0.00414 (0.0144)	-0.0125 (0.0186)	0.159*** (0.0429)	0.0370*** (0.00984)	0.0361*** (0.0116)	0.122*** (0.0348)
Constant	0.668*** (0.0665)	0.633*** (0.0951)	0.739*** (0.128)	0.431*** (0.0420)	0.475*** (0.0558)	0.122 (0.0966)

Table B.3: Error Correction Model for Debt Integration and GVC Integration

Dependent Variable: Debt-to-GDP Ratio	All (1)	Developing (2)	Developed (3)
Long-Run			
ln (Backward Linkages)	0.485*** (0.167)	0.512*** (0.140)	0.222 (0.329)
ln (Forward Linkages)	0.560** (0.240)	0.0395 (0.215)	1.539*** (0.406)
ln (GDP)	-0.130** (0.0613)	-0.0709 (0.0518)	-0.134 (0.145)
ln (Exchange Rate)	-0.167*** (0.0601)	-0.139*** (0.0471)	-0.148 (0.212)
Error Correction Term	-0.128*** (0.00890)	-0.150*** (0.0133)	-0.131*** (0.0154)
Short-Run			
Δ ln (Backward Linkages)	0.0756** (0.0380)	0.0511 (0.0367)	0.00949 (0.0727)
Δ ln (Forward Linkages)	-0.211*** (0.0552)	0.0123 (0.0584)	-0.464*** (0.0910)
Δ ln (GDP)	-0.549*** (0.0329)	-0.775*** (0.0326)	-0.168* (0.0886)
Δ ln (Exchange Rate)	0.0147 (0.0213)	0.00504 (0.0174)	0.0930 (0.0934)
Constant	-0.0673 (0.102)	-0.0531 (0.0997)	-0.288 (0.264)

Table B.4: Error Correction Model for GVC Integration on Debt Integration

Dependent Variable:	ln(Backward Linkages)			ln(Forward Linkages)		
	All	Developing	Developed	All	Developing	Developed
Long-Run						
ln(Debt/GDP)	0.130*** (0.0322)	0.0998 (0.0819)	0.116*** (0.0331)	0.0473* (0.0243)	0.116* (0.0616)	0.000472 (0.0315)
ln(GDP)	-0.0103 (0.0233)	-0.0531 (0.0397)	0.0470 (0.0371)	0.0580*** (0.0182)	0.0534* (0.0293)	0.143*** (0.0340)
ln(Exchange Rate)	0.0628** (0.0278)	0.109*** (0.0392)	-0.0418 (0.0605)	-0.0288 (0.0212)	-0.0351 (0.0283)	0.112** (0.0554)
Error Correction Term	-0.190*** (0.0142)	-0.183*** (0.0210)	-0.211*** (0.0192)	-0.173*** (0.0138)	-0.161*** (0.0206)	-0.186*** (0.0194)
Short-Run						
Δ ln(Debt/GDP)	0.0401** (0.0166)	0.124*** (0.0381)	-0.0150 (0.0162)	-0.0407*** (0.0115)	-0.0180 (0.0243)	-0.0386*** (0.0130)
Δ ln(GDP)	-0.0207 (0.0237)	-0.0110 (0.0460)	0.154*** (0.0405)	0.142*** (0.0164)	0.178*** (0.0292)	0.183*** (0.0328)
Δ ln(Exchange Rate)	0.00105 (0.0143)	-0.0146 (0.0182)	0.162*** (0.0432)	0.0396*** (0.00986)	0.0372*** (0.0115)	0.118*** (0.0349)
Constant	0.583*** (0.0593)	0.600*** (0.0878)	0.569*** (0.118)	0.395*** (0.0385)	0.395*** (0.0550)	0.161* (0.0920)

Table B.5: Error Correction Model for FDI Integration and GVC Integration

Dependent Variable: FDI-to-GDP Ratio	All (1)	Developing (2)	Developed (3)
Long-Run			
ln (Backward Linkages)	0.581** (0.262)	0.478*** (0.182)	0.345 (0.716)
ln (Forward Linkages)	0.298 (0.375)	0.279 (0.287)	1.242 (0.846)
ln (GDP)	-0.0299 (0.103)	0.162** (0.0698)	-0.166 (0.333)
ln (Exchange Rate)	0.0526 (0.0949)	0.0306 (0.0603)	0.264 (0.504)
Error Correction Term	-0.124*** (0.00924)	-0.188*** (0.0149)	-0.0894*** (0.0136)
Short-Run			
Δ ln (Backward Linkages)	0.00127 (0.0571)	-0.0879 (0.0614)	-0.0132 (0.105)
Δ ln (Forward Linkages)	-0.412*** (0.0825)	-0.217** (0.0964)	-0.675*** (0.131)
Δ ln (GDP)	-0.729*** (0.0492)	-0.958*** (0.0540)	0.147 (0.128)
Δ ln (Exchange Rate)	-0.345*** (0.0320)	-0.427*** (0.0292)	0.484*** (0.135)
Constant	-0.239 (0.191)	-0.821*** (0.218)	-0.228 (0.446)

Table B.6: Error Correction Model for GVC Integration on FDI Integration

Dependent Variable:	ln(Backward Linkages)			ln(Forward Linkages)		
	All	Developing	Developed	All	Developing	Developed
Long-Run						
ln(FDI/GDP)	0.0688*** (0.0218)	-0.00957 (0.0600)	0.0803*** (0.0187)	0.0252 (0.0162)	0.106*** (0.0365)	-0.0261 (0.0192)
ln(GDP)	-0.0407 (0.0277)	-0.0565 (0.0465)	0.0221 (0.0385)	0.0331 (0.0214)	-0.0168 (0.0329)	0.167*** (0.0383)
ln(Exchange Rate)	0.0568** (0.0278)	0.0981** (0.0411)	-0.0531 (0.0661)	-0.0297 (0.0209)	-0.0229 (0.0256)	0.114* (0.0656)
Error Correction Term	-0.190*** (0.0145)	-0.175*** (0.0216)	-0.223*** (0.0197)	-0.175*** (0.0138)	-0.175*** (0.0206)	-0.182*** (0.0187)
Short-Run						
Δ ln(FDI/GDP)	0.00350 (0.0112)	0.00609 (0.0227)	-0.0161 (0.0113)	-0.0420*** (0.00767)	-0.0481*** (0.0142)	-0.0345*** (0.00908)
Δ ln(GDP)	-0.0440* (0.0235)	-0.119*** (0.0410)	0.154*** (0.0402)	0.133*** (0.0160)	0.152*** (0.0255)	0.192*** (0.0325)
Δ ln(Exchange Rate)	0.00945 (0.0151)	-0.0127 (0.0216)	0.170*** (0.0433)	0.0293*** (0.0103)	0.0311** (0.0135)	0.132*** (0.0349)
Constant	0.671*** (0.0758)	0.586*** (0.118)	0.695*** (0.141)	0.459*** (0.0475)	0.578*** (0.0683)	0.102 (0.105)

CHAPTER 3

THE RACE TO THE BOTTOM IN EXPORT-ORIENTED PRODUCTION IN INDIA: AN ANALYSIS OF LABOR SHARE, LABOR PRODUCTIVITY, AND ENCLAVES

3.1 INTRODUCTION

In August 2024, two separate incidents at the Atchutapuram Special Economic Zone in India – an explosion in a pharmaceutical plant and a fire in a chemical factory – killed seventeen workers and injured many more. The Atchutapuram Special Economic Zone is amongst the largest in India and houses the factories of more than 100 companies. The status of Export Processing Zones (EPZs), Special Economic Zones (SEZs), and industrial parks as protected enclaves² with loose labor regulations to promote export-oriented production has limited the study of labor in these enclaves. Few academic investigations of the legal structures that limit labor rights (Cotula & Mouan, 2021; Singh, 2012) and case studies of employment, wages, and working conditions of labor (Kennard & Provost, 2016; Mansingh et al, 2012) have highlighted the circumvention of minimum wage laws and safety inspections. The loose labor regulations and limited activity of trade unions make the enclaves fertile ground for profitable investments from the exploitation of labor.

EPZs, SEZs, and other forms of enclaves are regulatory spaces that offer incentives on taxes, tariffs, and labor regulations to attract export-oriented production (Milberg & Amengual, 2008). Their purpose is to integrate the domestic economy into international markets, to raise industrial

² I use the term “enclave” to encapsulate Export Processing Zones, Special Economic Zones, Free Trade Zones, and industrial parks in this paper.

output, and most importantly for developing countries with a labor surplus, to generate employment. They are taken as opportunities to link into global value chains, circumventing building industrial capacity from ground up (Baldwin, 2013) and instead leveraging policy to attract FDI for export-oriented production (Aggarwal, 2019). Ultimately, they are meant to further development with FDI inflows and raise people's standard of living with employment generation, but the successes are not weighted towards labor (Milberg & Amengual, 2008). In Indian SEZs, total investment increased at a compound annual growth rate of 33% and total employment increased from 135 thousand people after the enactment of the SEZ Rules in 2006 to 3.19 million people in 2024 (Ministry of Commerce and Industry, 2025). Mansingh et al (2012), however, report that the additional acquisitions of land were not matched by the incremental investment or employment by the operational SEZs.

In this paper, I examine how manufacturing firms maintain their competitive advantage in export markets by suppressing labor costs, and whether manufacturing firms in export-oriented enclaves exacerbate labor cost suppression to boost export competitiveness. I investigate the relationship of a manufacturing firm's export competitiveness with its labor share in gross output and its labor productivity; additionally testing for the difference between enclave and non-enclave manufacturing firms. I build on previous descriptive studies that detail labor exploitation in export-oriented production to econometrically establish the relationship between higher export competitiveness and lower labor shares along with higher labor productivity. I further compare the conversion of lower labor shares and higher labor productivities to greater export competitiveness by enclave manufacturing firms to that by non-enclave manufacturing firms. The difference illustrates the exacerbated labor exploitation in enclave environments with fiscal incentives and international ties to foreign buyer firms. Previous studies note factory wages to be similar for labor

within enclaves and for labor doing similar work outside enclaves (Jenkins, 2005; Aggarwal, 2007; Cling et al, 2005). In my analysis, I examine labor share of gross output and labor productivity to highlight the squeeze of labor in an internationally disaggregated production process. I also estimate separate specifications for low, medium, and high technology industries to draw out the relationship between labor suppression and export market competitiveness as differing with capital intensities.

Using data from the World Bank Enterprise Survey (2023), I apply a linear fixed effects model to investigate the association between a manufacturing firm's export competitiveness with their labor share and labor productivity. I further investigate the difference between enclave and non-enclave manufacturing firms in their relationship between export competitiveness, labor shares, and labor productivity with a linear random effects model. My paper has three main findings.

First, manufacturing firms boost their competitiveness in export markets by squeezing their labor with lower labor shares and higher labor productivity. Export-oriented manufacturing firms are competing in a race to the bottom with a suppression of labor shares and expansion of productivity with technology. Labor loses in the distribution of income against capital for a firm to remain competitive in export markets for manufacturing global value chains.

Second, enclave manufacturing firms intensify the process of squeezing labor to expand competitiveness in export markets with special government provisioning of looser labor laws and ease of access to international production networks with tax and tariff breaks. Manufacturing firms in export-oriented enclaves then have a competitive edge to convert lower labor shares into higher export sales relative to other firms in the industry. Higher export competitiveness is built on lower labor shares alongside higher labor productivity with foreign technology adoption and lower average wage rates.

Third, the negative relationship between export competitiveness and labor shares is especially significant for manufacturing firms in low-technology industries. Firms with low-technology activities and low value addition employ low-skilled labor which is squeezed in its labor share of gross output from the circumvention of labor laws and fewer inspections. The more labor-intensive activities in low-technology industries then compete down unit labor costs to remain competitive in export markets with many supplier firms.

The rest of the paper is structured as follows: the second section reviews related literature; the third section outlines the data and empirical framework; the fourth section discusses the results; the fifth section concludes.

3.2 EXPORT-ORIENTED ENCLAVES OF MANUFACTURING PRODUCTION

3.2.1 A BRIEF HISTORY OF INDIAN INDUSTRIAL POLICY FOR EXPORT PRODUCTION

India pursued a process of phased liberalization in industrial policy with Export Processing Zones from 1965, delicensing and deregulating in the 1980s, Liberalization-Privatization-Globalization reforms in the 1990s, Special Economic Zones from 2000, and industrial corridors from the late 2000s. The first three Five Year Plans drew on the role of the state, but the subsequent Plans gave a greater role to market forces supported by pricing, financial and trade policies.

In the period of the first three Five Year Plans (1950-65), India experienced steady growth in its industrial sector. However, there was a decline in the industrial growth rate, beginning from the mid-1960s and continuing up till the mid-1970s. Das Gupta (2017) explains the decade of the 1960s as a tumultuous one for India with its pivot from an import-substitution development strategy to export-oriented production with open markets to bring in foreign exchange. There was

also a withdrawal of international aid from advanced capitalist countries that resulted in a decline of industrial growth rates from 9.3% in 1960-65 to 3.2% in 1965-70. The rupee was devalued, and imports were liberalized to resume the inflow of international aid and rehabilitate the economy. This served as the impetus for the development of India's first Export Processing Zone (EPZ) in Kandla (Gujarat) in 1965, then in Santa Cruz (Maharashtra) soon after in 1973, and six more in the 1980s and the 1990s. Their objective was to develop export-oriented industries and earn foreign exchange to offset the cost of the import-substitution strategy (Aggarwal, 2004; Chibber, 2003; Singh, 2012). They were also expected to stimulate investment and generate employment while creating an environment for internationally competitive exports at low costs. All this ultimately resulted in the slowdown of industrial (excluding construction) growth rates from 6.76% in the period of 1950-65 to 4.53% in 1965-80.

The industrial sector then experienced a recovery with high growth rates in the 1980s brought about by enhanced government spending, debt-financed expenditure, liberalizing licensing, deregulating capital markets, and borrowing from abroad (Chandrasekhar, 2015). The liberalization of markets also led to the inflow of foreign capital that was previously limited but now entered in response to profitable investment opportunities (Chandrasekhar & Ghosh, 2002). EPZs, being characterized as areas with internationally competitive cheap labour as well as relaxations in taxes and labour laws to exploit the available labour, were increased in number and scope to attract foreign investment and foreign exchange.

EPZs in India, although inspired by the economic success of the export-oriented strategies of the East Asian countries, were implemented as an experiment in liberalization in the prevailing political regime of licenses and regulation (Aggarwal, 2004; Gopalkrishnan, 2007; Singh, 2012). The EPZs developed by the central government differed from those in the East Asian economies

and the SEZs in China in that they remained small in size and attracted more domestic than foreign investment (Aggarwal, 2004; Gopalkrishnan, 2007). In terms of their stated objectives, their contribution to exports, employment, and foreign exchange was also low (Aggarwal, 2004; Banumathi, 2010; Kundra, 2000). The foreign exchange from the sectoral activities of the EPZs and liberalized capital markets was outstripped by the government expenditure on import of commodities to rein in inflation (Chandrasekhar, 2015). Additionally, the government financed imports of capital equipment, intermediates and components by debt-financed expenditure and borrowings from abroad (Chandrasekhar, 2015).

Cumulatively, the state's economic activities resulted in a widening of the current account deficit and a doubling of the external debt-GDP ratio even as trade was liberalized and EPZs were promoted. Consequently, a balance of payments crisis was precipitated in 1991. Due to the crisis, the government sought emergency financial assistance from the International Monetary Fund which was provided with the dual condition that India liberalize its policies and regulations relating to trade, foreign direct investment, and portfolio investments as well as actuate a process of fiscal consolidation and reform to curb its deficit (Chandrasekhar, 2015). The neo-liberal economic reforms in 1991 reduced the role of the state and instigated a process of fierce competition between states for private investment, unleashing characteristics of market agents amongst government agencies (Chandrasekhar & Ghosh, 2002; Sharma, 2009; Singh, 2012).

With the progression of liberalization, there was a mutation in the spatial form of industry from the developmentalist regime of dispossession, as embodied in EPZs, to a regime of dispossession for private profits, in the form of Special Economic Zones (SEZs) and other industrial parks (Levien, 2013, p. 395). Aggarwal (2004, 2005) explains that SEZs were essentially born out of the lessons from the experiment with EPZs; with enhanced emphasis on the liberalization of FDI,

greater fiscal incentives, infrastructural facilities, and looser labour laws. The State increasingly acquired land for any economic activity that yielded a higher value land use than agriculture (Levien, 2013). There was also a shift from the promotion of import-substituting manufacturing to primarily attracting external investment and promoting export-oriented manufacturing.

3.2.2 THE SEZ ACT AND LABOR LAWS

The Special Economic Zones Act was passed by the Government of India in 2005 “to provide for the establishment, development and management of the Special Economic Zones for the promotion of exports and for matters connected therewith or incidental thereto” (p.1). SEZs were conceptualized post the Second World War, in Ireland, with the primary objective of attracting foreign capital and generating employment (Kennard & Provost, 2016; Singh, 2012). There are now over 5000 SEZs in 147 countries which employ more than 100 million people (UNCTAD, 2019). They function on incentivized tax and tariff breaks as well as cheap land, water, electricity, and most importantly, labour (Kennard & Provost, 2016).

China established its first SEZ in 1980 with policies to attract foreign capital and incentivize export-oriented production. Since 1984, it also opened several coastal cities and inland areas through ports and river routes to foreign investments to stimulate the import of technology and production for export. Together with its industrial clusters, SEZs account for about 22 percent of China’s GDP, about 46 percent of FDI, about 60 percent of exports, and they have generated over 30 million employment opportunities (Zeng, 2011). Following China and its industrial growth, India announced its intention to establish SEZs in 2000 and institutionalized the SEZ Act in 2005.

The Exim Policy of 2002-07 was implemented to sharpen incentives for SEZs and to attract FDI to these zones (Jenkins et al, 2015). A bundle of incentives was developed, apart from those

by the state governments, which included, but were not limited to, the following: (1) sales of commodities from domestic tariff areas to SEZs to be counted as exports which entitle the domestic suppliers to duty drawback and duty entitlement pass book schemes; (2) sales by SEZs to domestic areas to be exempt from the additional customs duty of 4 percent and also exempt from the 1-year time period for filing remittance of export proceeds; (3) passengers travelling out of the country to be allowed to carry commodities from nationally-located SEZs in order to promote trade.

In the SEZ Act of 2005, single window approvals and self-certification are the dominant modes of transmitting information to simplify compliance procedures and documentation (Singh, 2012). Singh (2012) explains how the legal framework is set up to enable the weakening of labor's bargaining power. The labor laws governing labor relations in SEZs are stated to not be alterable, but there are two loopholes that allow state governments to alter the scope and implementation of labor laws. First, enormous power is vested in the Development Commissioner who is assigned the duties and responsibilities of the ex-officio chairperson of the Approval Committee. The implementation of labor laws, typically deputized to the Labor Commissioner of the state, is officially transferred to the SEZ's Development Commissioner. This results in a conflict of interest in the office, simultaneously having to attract investments from private developers and maintain standards of wages and working conditions (Mansingh et al, 2012; Singh, 2012). Second, a provision in the Industrial Disputes Act enables state governments to account all economic activity in SEZs as a 'public utility service'. The provision effectively curtails the ability of workers to unionize and strike, and lowers their bargaining power (Mansingh et al, 2012; Singh, 2012).

3.2.3 PERFORMANCE REVIEW OF ENCLAVES IN EXPORTS, INVESTMENT, AND EMPLOYMENT:

Sharma (2009) argues that SEZs are being justified not only for the expansion of exports but also as an engine of growth and employment. A spike in exports from SEZs along with a rise of 95 percent in investment and 60 percent in employment was registered after the implementation of the SEZ Act in 2005 (Sharma, 2009). The investment was also largely private domestic investment and the employment, though it initially increased, eventually tapered to less than proportionate increases with additional acquisitions of land (Mansingh et al, 2012). SEZs in India allow 100% FDI in both their development and productive units, but almost all are developed and operated by Indian companies, indicating “their privatization rather than foreignization of space” (Levien, 2013, p. 397). The maturing domestic capitalist class financed its protected enclaves by private financial accruals and domestic bank loans, further availing the inexpensive land acquisitions and tax holidays.

Among SEZs in India, Singh (2012) argues the many complaints are against terrible working conditions as also low wages. Interestingly, a commonality of multi-product manufacturing SEZs across countries is the higher employment of women as workers for the reason that “[w]omen are considered not only to have naturally nimble fingers, but also to be naturally more docile and willing to accept tough work discipline, and naturally less inclined to join trade unions, than men; and to be naturally more suited to tedious, repetitious, monotonous work.” (Elson & Pearson, 1981, p. 93). Cling and Letilly (2001) illustrate a parallel trend of the feminization of employment and the higher intensity of low-skill employment in export-oriented enclaves in developing countries. Mansingh et al (2012) conducted a study on SEZs in India and similarly found a preference for women workers in multi-product zones. Women represented 37% of the total workforce in the multi-product EPZs and SEZs in 2008, and the figure was an underestimation since most women workers were casual or contract workers, and hence, not recorded on the rolls.

3.3 DATA AND EMPIRICAL FRAMEWORK

3.3.1 SOURCES

I use a panel dataset of firms in India in the two years of 2014 and 2022 from the World Bank Enterprise Survey (WBES). The WBES is a nationally representative firm-level survey on topics of business environment, such as firm characteristics, workforce, trade, etc. It collects qualitative and quantitative data through interviews with owners and managers from a representative sample of firms in the non-agricultural formal private economy. It includes small, medium, and large firms in the sectors of manufacturing, services, transportation, and construction. I focus my analysis on manufacturing firms, their export sales, and their labor operations. I also separately analyze the manufacturing firms by technological levels of their industry, with industries classified by their intensity of R&D as low-technology, medium-technology, and high-technology. The classification of industries by technology is drawn from the UNIDO manual on *Industrial Statistics* (2010) and is detailed in Appendix A.1.

3.3.2 VARIABLES

I analyze a manufacturing firm's export sales competitiveness in relation to its labor share in gross output, labor productivity, wage rate, and export-oriented enclave production. The *Enterprise Surveys Indicator Descriptions* (2023) describe the indicators surveyed from firms in the sample.

In my empirical analysis, the explained variable of interest is a firm's export competitiveness which is calculated as the export sales of a firm relative to the average of the industry. The measure of export competitiveness captures the export performance and market power of the firm. A

measure greater than one indicates a firm that exports more than the industry average and a measure less than one indicates a firm that exports less than the industry average.

$$Export\ Competitiveness_{xit} = \frac{Export\ Sales_{xit}}{\frac{\sum_x Export\ Sales_{xit}}{N_{it}}} \quad (1)$$

The key explanatory variables of interest are labor share of gross output, labor productivity, wage rate, and export-oriented enclave status. The labor share of a firm is its labor costs in wages, salaries, bonuses, etc. as a percentage of its annual sales revenue. It is the share in annual sales revenue that compensates labor for manufacturing production. The labor productivity of a firm is its annual revenue divided by labor hours of operation. It is the revenue generated by each hour of labor input. The wage rate is imputed by dividing total labor costs of a firm by its labor hours of operation to obtain the average wage as the nominal cost of each hour of labor input. A manufacturing firm's status as located in an export-oriented enclave is recorded as a binary variable with enclave firms in export-processing zones, special economic zones, or industrial parks.

In my analysis, I also control for whether the enterprise is in a multi-establishment firm, an exporter firm, an importer firm, an adopter of foreign technology, capital-labor ratio, local population size, and firm characteristics such as the firm's age and size.

3.3.3 DESCRIPTIVE STATISTICS

The sample consists of 8,132 observations of manufacturing firms over the two years of 2014 and 2022 in an unbalanced panel. Amongst the firms in the sample, there is a spike in newly exporting firms in 2000 and 2005 (Figure 3.1). Enclaves entered their emergence phase in 2000 with the EXIM Policy that introduced a scheme for the registration and establishment of SEZs and

with the enactment of the SEZ Act in 2005. The tapering in the frequency of newly established and newly exporting firms aligns with the 2008 Global Financial Crisis after which investments declined, and India shifted its policy focus away from low-end manufacturing to low-end services.

[Figure 3.1]

Table 3.1 reports the summary statistics. Of the 8132 observations, 4464 were recorded from enclave firms in export-processing zones, special economic zones, or industrial parks and 3468 from non-enclaves firms. Enclave manufacturing firms record, on average, 290.2 million rupees more in annual sales, 3 percentage points more in export shares of annual sales, and 38 people more in employment. All these differences are statistically significant. Enclave firms also have a greater degree of foreign technology adoption by 6.8 percentage points and a greater degree of export competitiveness (export sales relative to the industry average) by 0.2 percentage points. While the difference between export competitiveness of enclave and non-enclave firms may not be significant, enclave firms have higher wage rates and labor costs than non-enclave firms but lower labor shares.

[Table 3.1]

From 2014 to 2022, the average of a higher export share and lower labor share among enclave manufacturing firms holds (Figure 3.2). The labor share marginally increased amongst non-enclave firms while it stagnated in enclave firms and the export share marginally converged between enclave and non-enclave firms. A manufacturing firm may have a higher share of its sales from its exports but it may still be lower relative to the average of export sales in its industry. The measure of export competitiveness captures the relative export sales of a firm in its industry which also serves as an indicator of competitiveness. Enclave manufacturing firms have a higher degree

of export competitiveness than non-enclave firms, on average, and the gap only widens from 2014 to 2022 (Figure 3.3). Hence, although enclave and non-enclave firms closely compete in export markets for sales, the gap has widened along with lower labor shares among enclave firms. The lower labor shares then indicate a greater degree of labor exploitation to boost export market competitiveness amongst enclave and non-enclave firms which is further explored in the next section.

[Figures 3.2 and 3.3]

3.3.4 EMPIRICAL FRAMEWORK

3.3.4.1 Export Competitiveness and Labor Share

Using a linear fixed effects model, I examine the relationship between a manufacturing firm's export market competitiveness and labor share of gross output. The estimated equation is:

$$\ln(\text{Export Competitiveness})_{xt} = \beta_0 + \beta_1 \ln(\text{Labor Share})_{xt} + \beta_2 \ln(X)_{xt} + \theta_x + \theta_t + \varepsilon_{xt} \quad (2)$$

Here, x and t denote firm and year respectively. I also estimate separate specifications for manufacturing firms in the subsets of low-technology, medium-technology, and high-technology industries to illustrate the association for firms with different capital intensities. The regressions control for a vector (X) of foreign technology adoption, capital-labor ratio, and characteristics such as being a multi-establishment firm, an exporter, an importer, firm age and size, and local population. It also incorporates firm fixed effects (θ_x), year fixed effects (θ_t), and an error term (ε_{xt}). I expect a negative relationship between export competitiveness and labor share, and I expect this negative relationship to significantly hold for low-technology manufacturing firms. Manufacturing subsectors with a low technology intensity (for example: textiles, apparel, leather,

etc.) are more labor-intensive and must compete down labor shares to maintain competitiveness in export markets.

Next, I extend the analysis to compare enclave manufacturing firms that are set up with incentives for export-oriented production with non-enclave manufacturing firms using a linear random effects model. The random effects model allows for the estimation of difference between enclave and non-enclave manufacturing firms with the time-invariant variable of enclave status. I also incorporate an interaction term of enclave status and labor share to assess the deepening of the relationship between enclave manufacturing firms' export competitiveness and labor shares of gross output relative to non-enclave firms. The estimated equation is:

$$\begin{aligned} \ln(\text{Export Competitiveness})_{xt} = & \beta_0 + \beta_1 \ln(\text{Labor Share})_{xt} + \beta_2 (\text{Enclave Status})_{xt} \\ & + \beta_3 (\text{Labor Share} \times \text{Enclave Status})_{xt} + \beta_4 \ln(X)_{xt} \\ & + \mu_x + \theta_t + \varepsilon_{xt} \end{aligned} \quad (3)$$

As before, x and t denote firm and year, and the regression includes the same vector of controls (X) as before along with year fixed effects (θ_t) and an error term (ε_{xt}). It now includes firm random effects (μ_x), rather than fixed effects, for the time-invariant variable of enclave status. Enclaves are set up on publicly acquired land with lower tax and tariff rates and looser labor laws to incentivize export-oriented production for business enterprises. The category of enclave manufacturing firms would have this incentivized environment for export-oriented production and, hence, I expect an enclave firm to have greater export market competitiveness. The interaction between enclave status and labor share is expected to be negative as enclave firms would be able to further convert lower labor shares to export competitiveness with their ties to the government and foreign buyer firms. The suppression of labor share in gross output to maintain

competitiveness could be through an expansion of labor productivity and/or a contraction of wages, both of which are further examined.

3.3.4.2 Export Competitiveness and Labor Productivity

Greater export competitiveness is based on lower unit labor costs which could be achieved from one or a combination of higher labor productivity and lower wage rates. I investigate the relationship between a manufacturing firm's export competitiveness and its labor productivity along with wage rate with the hypothesis that integration into international markets would boost labor productivity and expand export competitiveness. Using a linear fixed effects model, the estimated equation is:

$$\ln(\text{Export Competitiveness})_{xt} = \delta_0 + \delta_1 \ln(\text{Labor Productivity})_{xt} + \delta_2 \ln(\text{Wage Rate})_{xt} + \delta_3 (X)_{xt} + \theta_x + \theta_t + \varepsilon_{xt} \quad (4)$$

x and t denote firm and year respectively. The regression controls for the same vector (X) as before and incorporates firm fixed effects (θ_x), year fixed effects (θ_t), and an error term (ε_{xt}). First, export competitiveness is expected to be positively associated with labor productivity as higher labor productivity would give a manufacturing firm a competitive edge in the export market. Second, export competitiveness should be negatively associated with average wage rates as lower wage rates would drive down labor costs and give a manufacturing firm greater competitiveness in the export market.

I further analyze the difference in the relationship for enclave manufacturing firms using a linear random effects model. The estimated equation is:

$$\ln(\text{Export Competitiveness})_{xt} = \delta_0 + \delta_1 \ln(\text{Labor Productivity})_{xt} + \delta_2 (\text{Enclave Status})_{xt}$$

$$\begin{aligned}
& +\delta_3(Labor\ Productivity\ x\ Enclave\ Status)_{xt} \\
& +\delta_4\ln(Wage\ Rate)_{xt} + \delta_5(X)_{xt} + \mu_x + \theta_t + \varepsilon_{xt} \quad (5)
\end{aligned}$$

As before, x and t denote firm and year respectively. The regression includes the same vector of controls (X) as before with firm random effects (μ_x), year fixed effects (θ_t), and an error term (ε_{xt}). Enclave manufacturing firms are set up with incentives for export-oriented production and I expect them to have export competitiveness with higher labor productivity and lower wage rates than non-enclave manufacturing firms. Loopholes to circumvent labor laws, such as minimum wage, would give enclave manufacturing firms greater export competitiveness than non-enclave manufacturing firms.

3.4 RESULTS AND DISCUSSION

3.4.1 EXPORT COMPETITIVENESS AND LABOR SHARE

Manufacturing firms suppress their labor share to boost their export competitiveness, and this negative relationship is deepened for manufacturing firms in export-oriented enclaves with government incentives and links to global value chains. All manufacturing firms, both inside and outside enclaves, exhibit the negative relationship, on average, of driving down labor costs to expand export sales, but enclave manufacturing firms with stronger ties to the government and international buyer firms exhibit higher export competitiveness and lower labor share. This is especially significant for manufacturing firms in low-technology industries. Table 3.2 reports the regression results for export competitiveness on labor share and the interaction term of labor share and enclave status.

[Table 3.2]

Higher export competitiveness is associated with lower labor share of gross output for manufacturing firms across all technology intensities (Table 3.2). A 1% fall in labor share is related to a 0.05% rise in export competitiveness, on average, statistically significant at the 1% level. The negative relationship holds for manufacturing firms in low-technology industries (-0.04), statistically significant at the 10% level, as well as for medium-technology and high-technology industrial firms although not with statistical significance. Firms with export-oriented manufacturing expand export competitiveness for international markets by suppressing labor costs in gross output.

Although manufacturing firms both within and outside of enclaves exhibit the negative relationship between export competitiveness and labor shares, enclave manufacturing firms show greater export competitiveness and labor cost suppression than non-enclave manufacturing firms (Table 3.2). The greater export competitiveness is accompanied by a lower labor share, especially for manufacturing firms in low-technology industries. A 1% fall in labor share for enclave manufacturing firms is associated with a 0.05% greater rise in their export competitiveness than non-enclave firms, on average, statistically significant at the 1% level. For enclave manufacturing firms in low-technology industries, a 1% fall in labor share is associated with a 0.08% greater rise in their export competitiveness, also statistically significant at the 1% level. The negative relationship holds but not with statistical significance for enclave manufacturing firms in medium-technology and high-technology industries. Enclave manufacturing firms, hence, exhibit a further squeezing of labor shares in the incentivized environment for export-oriented production to maintain cost competitiveness in the international market.

3.4.2 EXPORT COMPETITIVENESS AND LABOR SHARE

Manufacturing firms have a positive relationship, on average, between export competitiveness and labor productivity. Greater export sales relative to the industry average are associated with greater sales per worker, and this relationship is positive and statistically significant for low-technology industrial firms. Enclave manufacturing firms show the positive relationship between export competitiveness and labor productivity with a statistically significant difference from non-enclave manufacturing firms. Table 3.3 reports the results for the regression of export competitiveness on labor productivity and the interaction of labor productivity with enclave status, while controlling for average wage rates.

[Table 3.3]

On average, manufacturing firms exhibit greater export competitiveness in their industries with greater labor productivity (Table 3.3). A 1% rise in labor productivity is associated with a 0.06% rise in export competitiveness, statistically significant at the 1% level, for manufacturing firms across all technological intensities. This positive relationship holds with statistical significance for low technology industrial firms with a 1% rise in labor productivity relating to a 0.05% rise in export competitiveness. Firms in medium and high technology industries also show a positive relationship although without statistical significance. Manufacturing firms, hence, experience greater export market competitiveness with lower labor shares and higher labor productivity.

Enclave manufacturing firms exhibit the same positive relationship between export market competitiveness and labor productivity with statistically significant differences from non-enclave manufacturing firms (Table 3.3). Enclave firms in low-technology manufacturing show a 0.06% greater rise in export market competitiveness with a 1% rise in labor productivity, statistically significant at the 1% level, as compared to non-enclave firms. This indicates that enclave firms

engaging in low-technology industries are converting cost competitiveness and productivity gains to export competitiveness with greater labor exploitation.

Together, the two results from Tables 3.2 and 3.3 suggest that higher competitiveness in export markets is significantly explained by a lower labor share and higher labor productivity of manufacturing workers, especially in export-oriented enclaves. Enclave manufacturing firms engage in a race to the bottom in low-technology industries by suppressing labor costs to maintain competitiveness in the global value chain. The downstream position of the firm in the global value chain forces it to compete for a market share by squeezing the labor share.

3.4.2 ROBUSTNESS CHECK

Table 3.4 presents the regression results of export competitiveness on labor share (columns 1-4), labor productivity (columns 5-8), and the interaction with enclave status with a fixed effects model instead of a random effects model. The fixed effects model drops the time-invariant variable of enclave status, estimating the interaction of enclave status and labor share or labor productivity only with within-firm variation. Hence, within enclave firms, I note a negative relationship (-0.01) between export competitiveness and labor share although the relationship is statistically insignificant. Along with the results from the random effects model (Table 3.2) which depicted a negative and significant relationship between export competitiveness and labor share, it is inferred that the relationship significantly differs by enclave status. In enclave manufacturing firms, decreases in labor shares are associated with a sharper increase in export competitiveness than in non-enclave firms. The same holds for the positive relationship between export competitiveness and labor productivity which was statistically significant in the random effects model (Table 3.3) but loses statistical significance in the fixed effects model. Enclave manufacturing firms more sharply convert higher labor productivity to export competitiveness than non-enclave firms.

[Table 3.4]

3.5 CONCLUSION

This paper analyzed the association between export competitiveness and labor share along with labor productivity among Indian manufacturing firms. It finds manufacturing firms' competitiveness in export markets to relate to lower labor shares and higher labor productivity, especially in low-technology industries. The exploitation of labor with contracting labor shares to gain export competitiveness is exacerbated amongst enclave manufacturing firms that are situated in incentivized environments to establish export market linkages with foreign buyer firms. The competitive race to the bottom by suppressing labor shares for greater export market share of manufacturing exports is especially significant for low-technology industries with labor-intensive activities. Labor, especially those employed in low value added segments of global value chains, is significantly losing to capital in enclaves of export-oriented production in India.

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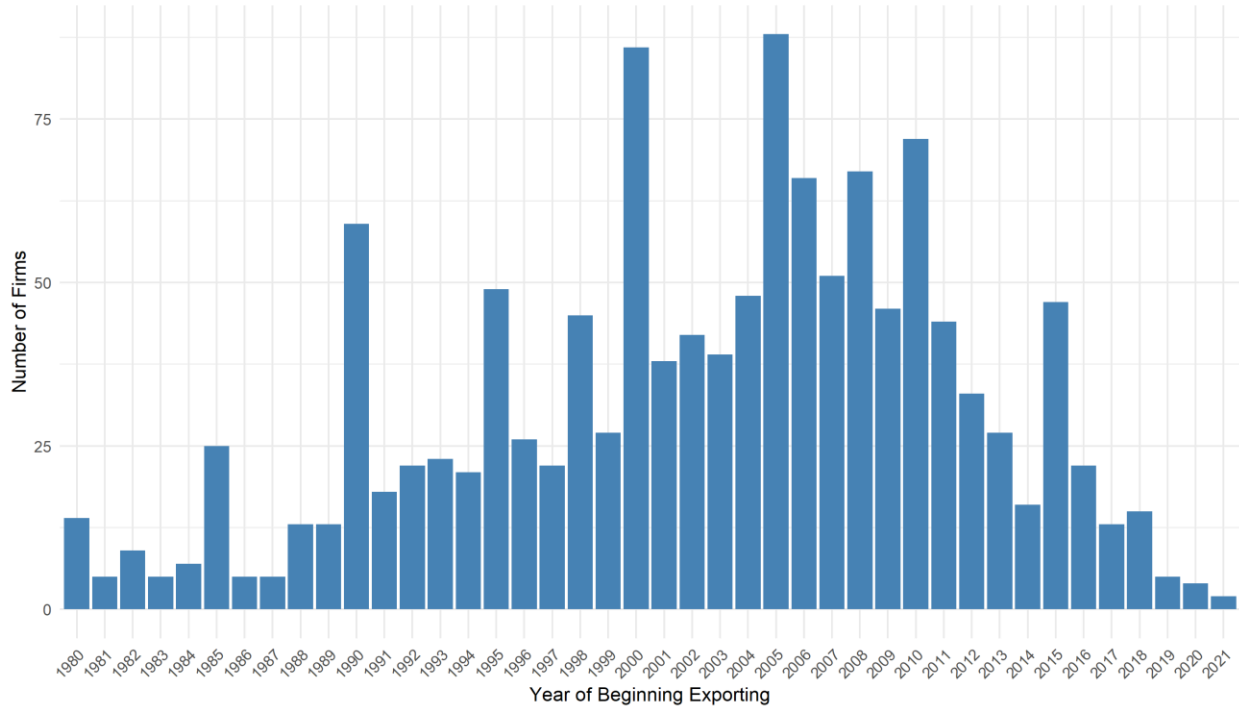
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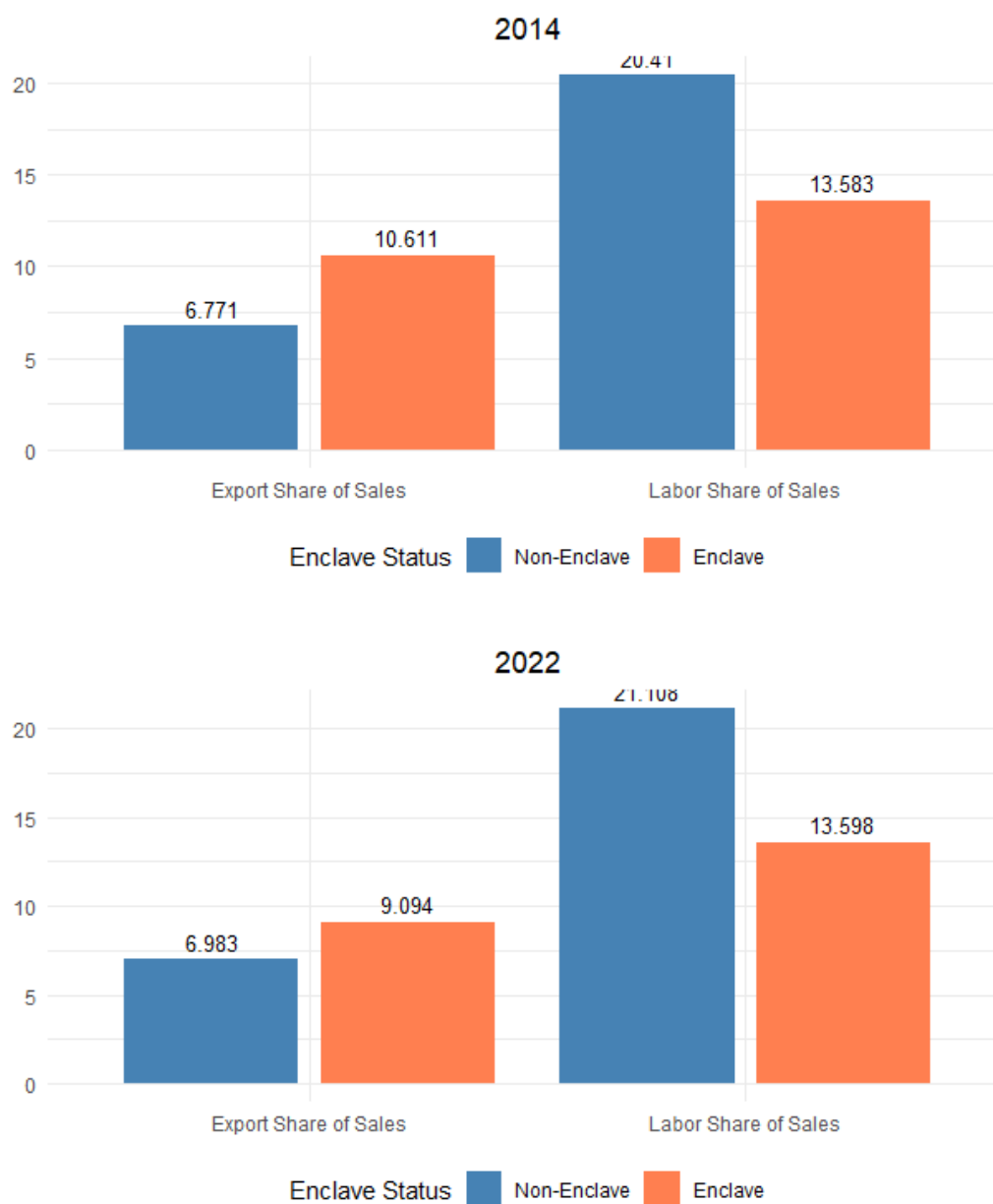
FIGURES

Figure 3.1: Frequency of New Exporters among Manufacturing Firms



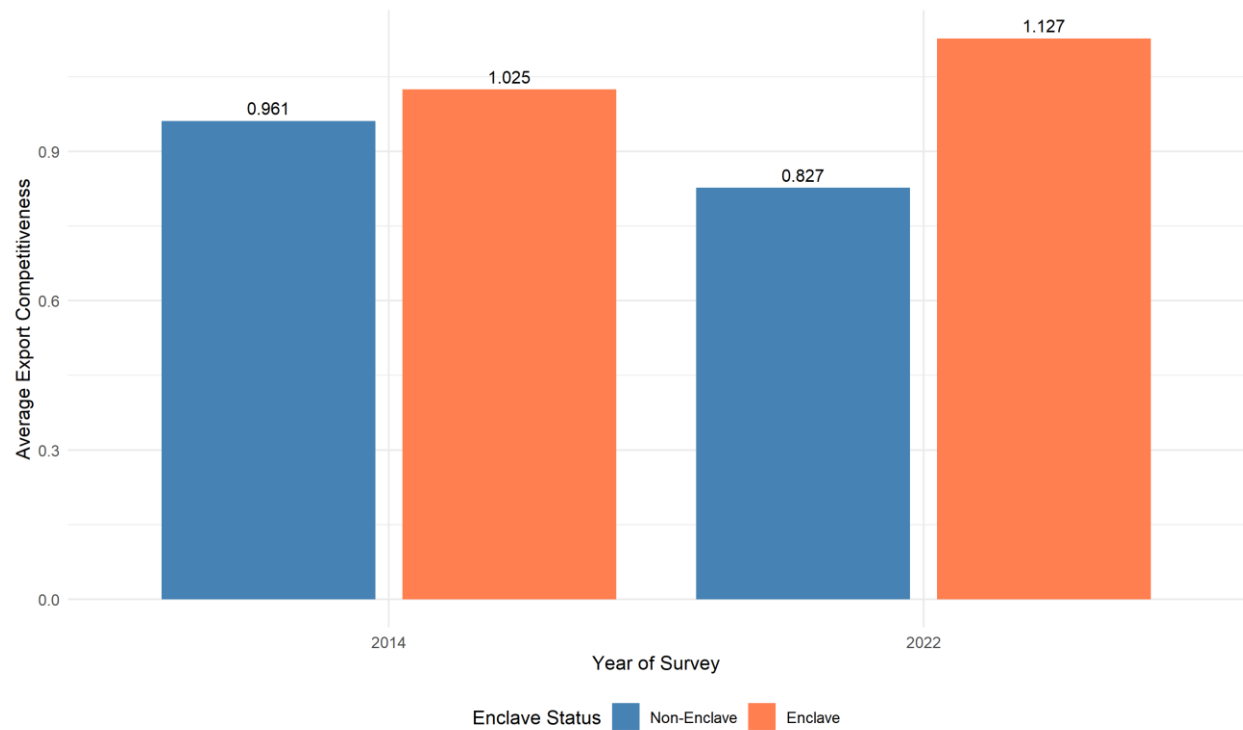
Note: The graph illustrates the frequency of newly exporting manufacturing firms over the period of 1980-2021. The x-axis shows the years from 1980 to 2021, and the y-axis portrays the number of firms that began exporting in that year.

Figure 3.2: Export Share and Labor Share in Manufacturing Firms



Note: The graphs illustrate the averages of export share of sales and labor share of sales for the sample of manufacturing firms in the WBES in 2014 and 2022. The upper panel is for 2014 and the lower panel for 2022. The non-enclave firms are depicted by the blue bars on the left of a pairing, and the enclave firms are depicted by the orange bars on the right of a pairing.

Figure 3.3: Export Competitiveness of Manufacturing Firms by Enclave Status and Year



Note: The graphs illustrate the averages of export competitiveness by enclave status and year for the sample of manufacturing firms in the WBES in 2014 and 2022. The left pair of bars is for 2014 and the right pair of bars for 2022. The non-enclave firms are depicted by the blue bars on the left of a pairing, and the enclave firms are depicted by the orange bars on the right of a pairing.

TABLES

Table 3.1: Descriptive Statistics; WBES 2014 & 2022

	Enclave Manufacturing Firms			Non-Enclave Manufacturing Firms			
	Observations	Mean/Share	Standard Deviation	Observations	Mean/Share	Standard Deviation	Difference
Annual Sales (in million rupees)	4560	596.237	2041.868	3385	306.011	974.006	290.226***
Export Share (%)	4661	9.853	24.991	3453	6.876	21.269	2.976***
Export Competitiveness	4491	1.077	5.558	3082	0.887	5.650	0.19
Foreign Technology Adoption (% of Firms)	4664	11.192	31.530	3468	4.412	20.539	6.780***
Multi-Establishment Firm (% of Firms)	4664	23.263	42.256	3468	19.550	39.664	3.713***
Exporter Firm (% of Firms)	4664	6.797	25.172	3468	2.711	16.241	4.086***
Importer Firm (% of Firms)	4664	6.647	24.912	3468	3.489	18.353	3.158***
Labor Costs (in million rupees)	4502	36.681	156.587	3349	23.815	73.927	12.866***
Labor Share in Total Output (%)	4480	13.591	18.183	3316	20.770	29.375	-7.180***
Labor Productivity (thousand rupees/labor hour)	4013	104.009	238.359	1636	72.124	179.294	31.885***
Wage Rate	3960	62.992	182.191	1614	53.524	142.330	9.468*
Capital-Labor Ratio (thousand rupees/laborer)	2779	2002.516	11200	1231	1206.117	8090.260	796.399**
Total Employment	4590	145.539	342.395	3424	107.712	243.421	37.827***
Permanent Employment (%)	4590	92.768	14.757	3424	90.362	17.467	2.407***
Temporary Employment (%)	4590	7.232	14.757	3424	9.638	17.467	-2.407***
Production in Permanent Employment (%)	4170	78.376	13.580	1695	79.379	13.131	-1.003***
Non-Production in Permanent Employment (%)	4170	21.624	13.580	1695	20.621	13.131	1.003***
Women in Production Employment (%)	3992	10.704	21.858	1627	19.116	29.942	-8.412***
Low-Skilled in Production Employment (%)	4146	28.450	23.879	1674	27.931	25.755	0.519
Firm Age	4661	26.203	13.241	3461	27.018	16.260	-0.815**
Firm Size: Micro	4664	0.000	0.022	3468	0.001	0.024	0.001***
Firm Size: Small	4664	22.341	0.410	3468	33.362	0.459	-11.021***
Firm Size: Medium	4664	40.202	0.491	3468	39.792	0.492	0.410***
Firm Size: Large	4664	37.371	0.486	3468	26.499	0.452	10.872

Note: Data sourced from WBES (2023); *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 3.2: Relationship between Export Competitiveness, Labor Share, and Enclave Status for Manufacturing Firms

Dependent Variable: Export Competitiveness	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Labor Share	-0.0463*** (0.0150)	-0.0416* (0.0232)	-0.0390 (0.0318)	-0.0339 (0.0304)	-0.0235 (0.0149)	-0.0334* (0.0202)	-0.0148 (0.0280)	-0.0292 (0.0333)
Enclave Status					0.178*** (0.0465)	0.249*** (0.0750)	0.140* (0.0794)	0.142 (0.0919)
Labor Share x Enclave Status					-0.0568*** (0.0180)	-0.0898*** (0.0282)	-0.0371 (0.0326)	-0.0519 (0.0367)
Foreign Technology	0.0748* (0.0417)	-0.00576 (0.0627)	0.377*** (0.103)	-0.153** (0.0773)	0.141*** (0.0265)	0.139*** (0.0422)	0.277*** (0.0543)	0.0449 (0.0432)
Multi-Establishment Firm	0.0168 (0.0389)	-0.0102 (0.0606)	-0.0671 (0.0799)	0.0588 (0.0750)	0.110*** (0.0235)	0.151*** (0.0371)	0.0505 (0.0440)	0.102** (0.0406)
Exporter Firm	0.578*** (0.0710)	0.570*** (0.0890)	0.563*** (0.187)	0.654*** (0.161)	0.958*** (0.0418)	0.827*** (0.0541)	1.293*** (0.0905)	0.974*** (0.0841)
Importer Firm	0.414*** (0.0669)	0.141 (0.120)	0.643*** (0.151)	0.586*** (0.115)	0.456*** (0.0390)	0.340*** (0.0715)	0.437*** (0.0798)	0.516*** (0.0577)
Capital-Labor Ratio	0.00671 (0.00779)	-0.00125 (0.0125)	-0.00992 (0.0155)	0.0282* (0.0157)	0.00474 (0.00486)	-0.00523 (0.00790)	-0.00603 (0.00859)	0.0252*** (0.00869)
Firm Age	0.0414 (0.0334)	0.0440 (0.0568)	-0.0151 (0.0651)	0.0987 (0.0613)	0.0504*** (0.0180)	0.0336 (0.0307)	0.0573* (0.0311)	0.0510 (0.0311)
Constant	0.448* (0.244)	0.0402 (0.344)	0.495 (0.759)	-0.534 (0.427)	-0.117 (0.334)	0.0178 (0.531)	-0.0780 (0.641)	0 (0)
Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm Random Effects	N	N	N	N	Y	Y	Y	Y
Firm Fixed Effects	Y	Y	Y	Y	N	N	N	N
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,570	1,097	1,313	1,160	3,570	1,097	1,313	1,160
Firms	2,612	836	994	915	2,612	836	994	915

R-squared	0.169	0.245	0.180	0.250	0.148	0.182	0.133	0.190
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Note: Data sourced from WBES (2023). Industries are categorized into low-technology, medium-technology, and high-technology by the UNIDO classification and are detailed in Appendix C.1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 3.3: Relationship between Export Competitiveness, Labor Productivity, and Enclave Status for Manufacturing Firms

Dependent Variable: Export Competitiveness	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Labor Productivity	0.0560*** (0.0156)	0.0507** (0.0244)	0.0530 (0.0329)	0.0313 (0.0318)	0.0375*** (0.0138)	0.0484** (0.0195)	0.0293 (0.0251)	0.0353 (0.0308)
Enclave Status					-0.354** (0.160)	-0.627*** (0.241)	-0.222 (0.285)	-0.368 (0.344)
Labor Productivity x Enclave Status					0.0383** (0.0150)	0.0635*** (0.0229)	0.0267 (0.0265)	0.0373 (0.0320)
Wage Rate	-0.0208 (0.0193)	-0.0180 (0.0302)	-0.000823 (0.0395)	-0.0415 (0.0401)	-0.0485*** (0.0128)	-0.0549*** (0.0202)	-0.0122 (0.0230)	-0.0859*** (0.0235)
Foreign Technology	0.0803* (0.0417)	-0.00136 (0.0627)	0.382*** (0.103)	-0.156** (0.0782)	0.148*** (0.0264)	0.158*** (0.0418)	0.279*** (0.0542)	0.0435 (0.0433)
Multi-Establishment Firm	0.0170 (0.0388)	-0.00620 (0.0606)	-0.0730 (0.0798)	0.0588 (0.0752)	0.109*** (0.0235)	0.151*** (0.0371)	0.0493 (0.0439)	0.103** (0.0406)
Exporter Firm	0.562*** (0.0713)	0.552*** (0.0901)	0.563*** (0.187)	0.662*** (0.164)	0.947*** (0.0419)	0.809*** (0.0544)	1.283*** (0.0904)	0.982*** (0.0843)
Importer Firm	0.403*** (0.0669)	0.133 (0.120)	0.627*** (0.151)	0.592*** (0.118)	0.458*** (0.0391)	0.336*** (0.0716)	0.430*** (0.0799)	0.523*** (0.0578)
Capital-Labor Ratio	0.00172 (0.00814)	-0.00474 (0.0128)	-0.0188 (0.0164)	0.0291* (0.0160)	0.00407 (0.00495)	-0.00550 (0.00795)	-0.00970 (0.00883)	0.0271*** (0.00881)
Firm Age	0.0437 (0.0334)	0.0497 (0.0569)	-0.0224 (0.0651)	0.0971 (0.0617)	0.0511*** (0.0180)	0.0336 (0.0307)	0.0538* (0.0312)	0.0521* (0.0311)
Constant	-0.123 (0.253)	-0.490 (0.349)	-0.00284 (0.772)	-0.790* (0.452)	-0.405 (0.351)	-0.349 (0.549)	-0.417 (0.669)	-0.482 (0.672)
Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm Random Effects	N	N	N	N	Y	Y	Y	Y
Firm Fixed Effects	Y	Y	Y	Y	N	N	N	N
Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y

Observations	3,570	1,097	1,313	1,160	3,570	1,097	1,313	1,160
Firms	2,612	836	994	915	2,612	836	994	915
R-squared	0.173	0.249	0.187	0.250	0.1502	0.19	0.1382	0.1873

Note: Data sourced from WBES (2023). Industries are categorized into low-technology, medium-technology, and high-technology by the UNIDO classification and are detailed in Appendix C.1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Table 3.4: Relationship between Export Competitiveness, Labor Share, Labor Productivity, and Enclave Status

Dependent Variable: Export Competitiveness	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries	All Firms	Firms in Low-Tech Industries	Firms in Medium-Tech Industries	Firms in High-Tech Industries
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Labor Share	-0.0391* (0.0222)	-0.0420 (0.0281)	-0.0188 (0.0526)	-0.0133 (0.0612)				
Labor Share x Enclave	-0.0126 (0.0286)	0.00125 (0.0476)	-0.0296 (0.0615)	-0.0263 (0.0678)				
Labor Productivity					0.0452** (0.0212)	0.0459 (0.0286)	0.0384 (0.0459)	0.0219 (0.0557)
Labor Productivity x Enclave					0.0173 (0.0229)	0.0115 (0.0356)	0.0208 (0.0458)	0.0117 (0.0572)
Wage Rate					-0.0209 (0.0193)	-0.0183 (0.0302)	-0.000523 (0.0395)	-0.0414 (0.0401)
Foreign Technology	0.0724* (0.0421)	-0.00551 (0.0636)	0.378*** (0.103)	-0.152* (0.0775)	0.0796* (0.0417)	-0.00155 (0.0629)	0.384*** (0.103)	-0.155** (0.0785)
Multi-Establishment Firm	0.0171 (0.0389)	-0.0103 (0.0608)	-0.0676 (0.0800)	0.0585 (0.0752)	0.0173 (0.0388)	-0.00451 (0.0609)	-0.0733 (0.0799)	0.0587 (0.0753)
Exporter Firm	0.582*** (0.0717)	0.569*** (0.0897)	0.574*** (0.189)	0.648*** (0.163)	0.566*** (0.0716)	0.554*** (0.0905)	0.570*** (0.188)	0.660*** (0.165)
Importer Firm	0.413*** (0.0670)	0.141 (0.120)	0.638*** (0.152)	0.585*** (0.116)	0.403*** (0.0670)	0.132 (0.120)	0.627*** (0.151)	0.593*** (0.118)
Capital-Labor Ratio	0.00660 (0.00780)	-0.00124 (0.0125)	-0.00889 (0.0157)	0.0281* (0.0157)	0.00168 (0.00814)	-0.00481 (0.0128)	-0.0186 (0.0164)	0.0292* (0.0160)
Firm Age	0.0412 (0.0334)	0.0440 (0.0569)	-0.0165 (0.0652)	0.0965 (0.0617)	0.0437 (0.0334)	0.0505 (0.0571)	-0.0223 (0.0652)	0.0969 (0.0618)
Constant	0.456* (0.244)	0.0394 (0.346)	0.484 (0.760)	-0.518 (0.430)	-0.129 (0.253)	-0.504 (0.353)	-0.00664 (0.773)	-0.791* (0.453)
Firm Controls	Y	Y	Y	Y	Y	Y	Y	Y
Firm Fixed Effects	Y	Y	Y	Y	N	N	N	N

Year Fixed Effects	Y	Y	Y	Y	Y	Y	Y	Y
Observations	3,570	1,097	1,313	1,160	3,570	1,097	1,313	1,160
Firms	2,612	836	994	915	2,612	836	994	915
R-squared	0.169	0.245	0.181	0.250	0.173	0.250	0.188	0.250

Note: Data sourced from WBES (2023). Industries are categorized into low-technology, medium-technology, and high-technology by the UNIDO classification and are detailed in Appendix C.1. Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

APPENDIX C

Table C.1: List of Industries by Technology Group

Technology Grouping	List of Manufacturing Industries
Low-Technology	Food & Beverages; Tobacco; Textiles; Apparel; Leather & Footwear; Wood Products; Paper Products; Publishing; Furniture & Other.
Medium-Technology	Fuels; Rubber & Plastics; Glass, Ceramics & Cement; Basic Metals; Metal products.
High-Technology	Chemicals; Machinery & Appliances; Office Equipment; Electrical Apparatus; Telecommunications; Scientific Instruments; Automotive; Other Transport.

Note: Industries are categorized into low-technology, medium-technology, and high-technology by the UNIDO (2010) classification.