

# Uneven Development in Open Economies: Regimes of Productive Structure, Economic Integration and Income Distribution in the context of Global Value Chains

Arpan Ganguly<sup>1</sup>, Danilo Spinola<sup>2</sup>

## Abstract

This article aims to theoretically and empirically analyze the interactions between productive structure and income distribution in the context of the Global Value Chains (GVC). First, we develop a theoretical framework, inspired by the Structuralist macroeconomic literature (Taylor, 2021), to establish different regimes in the scenario of globalized production chains. We define (1) a structure regime and (2) an integration regime, drawing both from the Balance of Payments Constrained Model (BPCM) literature (Blecker & Setterfield, 2019; Dutt, 2002), and (3) a distribution/supply regime, defined in terms of employment, value added and costs. Guided by the theoretical framework, we then select proxies to characterize each regime. Inspired by Braunstein et al. (2020), we use a Principal Component Analysis (PCA) to identify patterns of structural growth and income distribution for distinct countries and regions, classifying them in a four-fold typology. Our dataset consists of 37 countries, and the data sources come from the World Development Indicators (WDI), World Input Output Database (WIOD), Trade in Value Added (TiVA), and the Penn World Tables (PWT). On one hand, this article contributes to structuralist growth models that typically estimate demand and distribution regimes independently, thereby offering a unified narrative on regimes of economic growth in the context of GVCs. On the other hand, the four-fold typology depicts how growth dynamics vary distinctly by geographical regions and how globalization has retained and accelerated processes of uneven development globally.

**Keywords:** Global Value Chains, Structuralism, Income Distribution

---

<sup>1</sup> Department of Economics, FLAME University. [arpan.ganguly@flame.edu.in](mailto:arpan.ganguly@flame.edu.in)

<sup>2</sup> Birmingham City University (BCU); University of Johannesburg and UNU-MERIT. [spinola@merit.unu.edu](mailto:spinola@merit.unu.edu).

## 1. Introduction

In the classical structuralist tradition, the role of the productive structure is a central element to define the position of a country in the international division of labor (Prebisch, 1962). The literature that has developed from this tradition (Taylor, 2021; Missio et al, 2015; Porcile & Yajima, 2021) focused on the concept of center-periphery, in which countries with different institutional conditions lead to divergent economic behavior. That heterogeneity, caused by distinct structural conditions, leads to an increase in the gap between the developed and the developing world, a source of uneven development. Using north-south models, a number of structuralist contributions discussed the problem of uneven development in terms of (I) price-effects, through a decline in the terms of trade of the periphery (Prebisch-Singer hypothesis), and (II) income-effects, through growth constraints, with the Balance of Payments constrained model (Thirlwall, 1979; Thirlwall & Hussain, 1982; Dutt, 2002; Blecker & Setterfield, 2019). For the above traditions, the conditions of the productive structure play a central role in defining the economic possibilities (Cimoli & Porcile, 2014).

In order to understand the conditions of the productive structure in the contemporary context, though, we should also focus on the changes that have occurred in the global pattern of the production process. The characteristics of global production, since the 1980s, has gone through major changes in terms of the global integration of the productive structure. The verticalized large firm discussed by Chandler (1990) declined, giving rise to a new modularized pattern (Sturgeon, 2002), in which production chains were disintegrated and outsourced around the world which gave rise to the literature on the Global Value Chains (GVCs) (Gereffi et al, 2005). There is a large literature discussing the global reallocation of production. Many authors have championed GVCs in terms of a window of opportunity for economic development (Sturgeon & Kawakami, 2010), as countries in South and East Asia, have managed to benefit during this period. However, the effect has been quite uneven between different regions of the globe. Despite some notable exceptions (Andreoni & Tregenna, 2021; Blair & Werner, 2015; Smichowski et al, 2020) there is a gap in the literature in terms of observing the effect of GVC integration in the structuralist debate of uneven development, which is the first gap we would like to address with our paper. There has been a recent surge in the classical debate in the structuralist literature (Cimoli & Porcile, 2014). However, there has been few conciliations with the topic of global production chains. To address this, we propose the development of two growth regimes, (1) a structure regime, focused on quantity adjustments, and (2) an integration regime, focused on price-adjustments related to changes in the integration pattern of the economy.

Furthermore, another research gap that we would like to address in our paper focuses on linking the discussion of income distribution with the BPCM literature. The classical BPCM literature assumes that wages track productivity, such that wages and profits have a stable ratio. What we observe, however, is that, as growth can take different patterns of inclusiveness (Ranieri & Ramos, 2003), that will differently affect the conditions of the balance of payments (Ribeiro et al, 2016). It is possible to grow with income concentration (see the literature on conservative modernization) or with a more inclusive and balanced relationship between labor and capital. In order to address this gap, and link it to the GVC integration discussion, we model income distribution using a Leontief production function with imported intermediary goods (Cimoli et al, 2016; Ribeiro et al, 2016).

Finally, we empirically relate this theoretically constructed distribution regime with the conditions of the economic structure and the two other regimes using a Principal Component Analysis (PCA), inspired by Braunstein et al. (2020). We observe the bilateral effects between structure, integration and distribution for a pool of developed and emerging economies – classifying them into distinct groups in terms of their different regime characteristics.

In the rest of this paper, Section 2 presents the theoretical framework while Section 3 presents our empirical strategy. We then discuss the data and results in Section 4, followed by the conclusion in Section 5.

## 2. Theoretical Framework

### 2.1. Growth rate compatible with balance of payments: Structure and Integration

In this section, we explain the basic characteristics of our theoretical model, inspired by the Balance of Payments Constrained Model (BPCM) (Thirlwall, 1979; Thirlwall & Hussain, 1982), in order to understand the growing role of GVC integration on the economic possibilities of a country, as well as its impact on income distribution. The BPCM is a model in which growth is constrained by the conditions of the balance of payments. The BPCM framework allows us to link demand and supply constraints for the development of the economic system (Porcile & Yajima, 2021). Demand operates as exports, imports and financial flows play a central role in defining growth possibilities. Supply mechanisms work as the economic structure defines the elasticities in which the external conditions affect the domestic possibilities.

We highlight the characteristics of Supply from the BPCM by dividing it into two components: (1) the Structural component, which is related to the degree of diversification and technological change in the economic system, captured by the income elasticity of demand for exports and imports (Cimoli & Porcile, 2011, 2014); and (2) the Integration component, which focuses on the strength of the integration of an economy in global value chains, captured by the price-elasticity of demand for exports and imports (Ahmed et al, 2017; Zhao et al, 2020).

Countries, especially developing ones, are constantly constrained by their balance of payments (Jayme, 2020; Blecker, 2021), being a central element of concern in the search for a stable development process. We start our model from this view on the permanent role of external constraints limiting (and defining) growth possibilities, drawing from the literature on the BPCM (Thirlwall, 1979). The BPCM has also been known in the literature as the 45-degree rule by Krugman (1989), but with a supply determination. From the explicit definition of the exports and imports, we can model the BPCM from the explicit functional forms. Domestic exports ( $X$ ) and imports ( $M$ ) are affected by price-effects (real exchange rate fluctuation) and quantity effects (total output produced by foreign and domestic economies). From Dutt (2002) and Spinola (2020), we model them in the following way:

$$X = \theta_X q^v (Y_f)^\varepsilon \quad (1)$$

$$M = \theta_M \left(\frac{1}{q}\right)^\mu Y^\pi \quad (2)$$

In which  $q$  represents the Real Exchange Rate (*RER*),  $\varepsilon$  is the income elasticity of demand for exports;  $\pi$  is the Income elasticity of demand for imports;  $\nu$  is the Price elasticity demand for exports;  $\mu$  the price elasticity of demand for imports;  $Y_f$  is the foreign output or demand and  $Y$  represents domestic demand.  $\theta_X$  and  $\theta_M$  are constants.

In terms of growth rates, after log deriving equations (1) and (2) we have, respectively:

$$\hat{X} = \nu\hat{q} + \varepsilon\hat{Y}_f \quad (3)$$

$$\hat{M} = -\mu\hat{q} + \pi\hat{Y} \quad (4)$$

The equilibrium condition for the external sector is one in which both exports (in domestic prices), and net financial flows match the value of total imports, such that balance of payments does not lead to a secular accumulation of surplus or deficit.

$$PX + F = M \quad (5)$$

Replacing this relationship in terms of growth rates (Dutt, 2002), and stating that the rate of growth of the economy compatible with stability in the external sector is given by  $\widehat{Y}^{BP} = \hat{Y}$ , then solving for domestic growth (in the short run) we have:

$$\widehat{Y}^{BP} = (1/\pi)\{(1 - \mu - \nu)\hat{q} + [1 - (F/M)]\varepsilon\hat{Y}_f + (F/X_N)[\hat{F} - (1 - \nu)\hat{P}]\} \quad (6)$$

There is a strand of literature that strongly supports the idea that the balance of payments crisis is the origin of development traps in emerging economies. This literature highlights both the long-run and the short-run constraints (see Ocampo, 2016) with the idea of Balance-of-Payments dominance. We will draw from this idea, and focus on the role of growth constraints not only in the long-run, but also the short-run.

For the original model, in the long-run of the BPCM, the authors disregard the long-run impact of price-effects, which results in assuming that  $\hat{F} = 0$  and  $\hat{q} = 0$ . This assumption leads to what is well known in the literature as the Thirlwall law (Blecker, 2021), or the Krugman 45-degree rule:

$$\widehat{Y}^{BP} = \frac{\varepsilon}{\pi}\hat{Y}_f \quad (7)$$

For the short-run, however, we have the effects of the exchange-rate dynamics and financial flows affect growth rates. There may emerge hysteresis effects on these dynamics (as those might affect the structure of the economy, and, subsequently the income elasticities of demand ( $\varepsilon$  and  $\pi$ )). There is a debate on the hysteresis effects in Porcile et al (2021), which highlight the

effect of short-run fluctuations to the long-run growth possibilities, in which the price-elasticities then play a central-role.

### *Price-effects*

To understand the characteristics of the price-effects, we start with our debate of the GVC effects on the macroeconomic conditions of developing countries from eq. (6). From the literature, we observe how the emergence of global value chains has changed the response of the domestic economy to changes in the real exchange rate. Ahmed et al (2017) measure how GVCs affect the price elasticity of exports ( $\nu$ ). The authors show that further integration in GVCs makes a country's output more responsive to exchange rate fluctuations.

Intuitively, the relation between GVCs and price-elasticity is quite straightforward. A country that further integrates itself in the value chains tend to (1) have a more open trade account, and the share of exports and imports on GDP increase. Also, (2) the integration with value chains increases the share of intermediary goods in total trade, so that exports and imports have a further interrelation, and price dynamics affect products in the same value chain (i.e. importing iron and selling steel).

In this sense, one contribution of our paper is to consider GVC integration as an important element in the definition of the price-elasticities of an economy. GVC integration does not necessarily lead to a sectoral decomposition of the economy, but it affects how price effects will affect exports and imports, and then domestic output compatible with external restrictions. It is then a central aspect in the definition of structures.

### *Income effects*

For income elasticity of exports and imports, we follow the approach by Cimoli & Porcile (2014), and the neo-Ricardian model (Cimoli, 1989). Each product has a distinct income elasticity of demand, and manufacturing products and high-tech products tend to be more demanded when income grows. For this reason, a country that diversifies towards more complex products tends to have a higher income elasticity. We can then relate income elasticities to the productive structure in the sense of its diversification pattern (Cimoli & Porcile, 2014).

Finally, we model the above discussion by decomposing the growth rate into two components, one centered on the structural conditions of the productive structure, and another on the degree of integration of the economy to the GVCs.

- a. Structural component ( $\Psi$ ): The structural component is related to the degree of diversification of the economy, proxied by the income elasticity ratio  $\left(\frac{\varepsilon}{\pi}\right)$ , and how the domestic economy reacts to the growth of foreign economy.

$$\Psi = [1 - (F/M)] \frac{\varepsilon}{\pi} \widehat{Y}_f \quad (8)$$

- b. Integration component ( $\Omega$ ): This component is related to the reaction of the economy to changes in the real exchange rate (price-elasticity). Price-elasticities ( $\mu$  and  $\nu$ ) depends on the conditions of the integration of the economy in the GVC:

$$\Omega = \frac{\left[ (1 - \mu - \nu)\hat{q} + \frac{F}{X_N}(\hat{F} - (1 - \nu)\hat{P}) \right]}{\pi} \quad (9)$$

In summary, the growth rate compatible with balance of payments constraints depends on two components:

$$\widehat{Y}^{BP} = \Psi + \Omega \quad (10)$$

In the long-run, only quantity effects limit growth ( $\widehat{Y}^{BP} = \Psi$ ). The degree of integration has no effects on the long-run growth rate ( $\Omega$ ), unless it is related to a structural change that also affects the diversity pattern and technological intensity of the economy.

## 2.2. Supply growth rate and income distribution:

The BPCM does not deal directly with matters of income distribution. Supply constraints are also dealt with indirectly using income elasticities. In this second step, we draw from the Structuralist literature (Taylor, 2021) and the Kaldorian literature on adjustments between supply and demand (Fazzari et al, 2020; Setterfield, 2011; Magacho & Spinola, 2021; Nomaler et al, 2021) to model the determinants of functional income distribution.

The role of imported intermediary goods in total production has been growing with globalization. In order to capture that, we draw from Ribeiro et al (2016) and Cimoli et al (2016), who discuss a production function with fixed coefficients (Leontief type) with the presence of imported intermediary goods. We link the share of imported goods to the debate on GVC integration, in which foreign intermediate goods play a role as a possible constraint in the economy. From a Leontief production function:

$$Y = \min (aL, bM^m, vK) \quad (11)$$

Here,  $a$  is labor productivity,  $L$  is total employment,  $b$  is the productivity of foreign intermediate goods,  $M^m$  is the amount of foreign intermediate goods;  $v$  is the productivity of capital and  $K$  is the total capital stock comprising domestic capital goods and imported capital goods,  $K = kKd + (1 - k)Ki$ .

We draw from the literature on imperfect competition (Robinson, 1969). In a monopolized goods market, with imperfect competition, firms apply a mark-up factor over unit variable costs to define prices:

$$P = z \left( \frac{W}{a} + \frac{P^*E}{b} \right) \quad (12)$$

In which  $z$  is the mark-up factor and  $W$  represents nominal wages. Production costs are then defined by wages and by the increase in the cost of imported intermediary goods.

From the monopolized market we can derive the pattern of functional income distribution in this model. Following the neo-Kaleckian literature (Bhaduri & Marglin, 1991; Blecker, 2002) the wage share represents that part of total income that goes to workers (paid as wages):

$$\sigma = \frac{WL}{PY} = \frac{\omega}{a} \quad (13)$$

In which  $\omega$  is real wages. As we have intermediary goods in this framework of the open economy, we also consider the part that flows to the foreign sector, as part of intermediate goods:

$$\delta = \frac{P^*EM^m}{PY} = \frac{P^*E}{Pb} = \frac{q}{b} \quad (14)$$

The real exchange rate then has important distribution effects, as a currency depreciation reduces the wage share of the economy without affecting the profit share (which depends on the mark-up only), but increases the outflow of resources. The productivity of the intermediary imported goods also affects distribution, and the higher productivity generated from imported goods, smaller is the outflow of resources. The profit share can then be derived such that it only depends on the mark-up level of the economy:

$$\pi = 1 - \sigma - \delta = \frac{z}{1 - z} \quad (15)$$

In this sense, we can observe the factors that define the distribution of income between income and profit, as well as the leakages to the external sector, which are central in the discussion of GVC's.

### 3. Methodological procedure

Most of the empirical works have tried to estimate income and price elasticities. In this article, the definition of the theoretical model had as its objective to define the characteristics of growth and distribution in a developing economy that has been further integrated into GVCs. In this section, we intend to pick the main variables from the literature in order to create theoretically backed proxies for **Structure, Integration and Distribution**.

We analyze variables for 37 countries, observing the presence of different patterns of structure, integration and distribution. At this point, we observe which countries can be characterized under different groups. In order to do so, we start with a Principal Component Analysis.

We are not aiming, at this point, to state the causal relationship between Structure, Integration and Distribution, as we consider the endogeneity present in this complex relationship. In this section we want to highlight the emergence of distinct patterns for different countries based on the data.

From Equation (10) we have that  $\widehat{Y}^{BP} = \Psi + \Omega$ , and from equations 13-15 we have the distribution patterns for the wage share ( $\sigma$ ), share of intermediate imported goods ( $b$ ), and the profit share ( $\pi$ ). These equations form the theoretical basis for the construction of the empirical analysis.

### Box 1. Main equations

Structure:

$$\Psi = \left[1 - \left(\frac{F}{M}\right)\right] \frac{\varepsilon}{\pi} \widehat{Y}_f$$

Integration

$$\Omega = \frac{\left[(1 - \mu - \nu)\widehat{q} + \frac{F}{X_N}(\widehat{F} - (1 - \nu)\widehat{P})\right]}{\pi}$$

Distribution (Wage share):

$$\sigma = 1 - \pi - \delta$$
$$\sigma = 1 - \frac{z}{1 - z} - \frac{q}{b} = \frac{W}{Pa}$$

Based on the theoretical model, Box 1 lists the main equations that identify the key determinants of integration, structure and distribution.

## 4. Data and Results

### 4.1. Data

The theoretical model motivates the choice of indicators which are then used to estimate the separate scores for integration, structure and distribution. Table 1 lists all the variables used in the analysis, while table A in Appendix 1 lists the source and method of estimation of each variable.

We use data from multiple datasets covering 37 countries for the period 1995 to 2011. The sample comprises a select set of developed and emerging countries, that are open and more integrated into global value chains. The choice of the sample time-period is based on the limited availability of data on global value chains.

Firstly, we capture economic integration using measures of gross trade in final goods, trade in intermediate inputs (or GVCs), and capital flows. It is important to note that gross measures of exports and imports (as a share of GDP) in standard trade statistics are inadequate to capture GVC integration, as it double counts the value of intermediate inputs at each stage of production (Koopman et al., 2008). Instead, using the UNCTAD (2013) definition, we calculate GVC integration as the sum of domestic value-added in foreign exports (DVA in FX) and foreign value-added (FVA) in exports as a share of total exports. While DVA in FX captures the level of forward participation, FVA captures the level of backward participation in GVCs. For China or India, the share of FVA in exports exceeds that of DVA in exports, which implies that these economies are less integrated in value-added terms despite being heavily integrated in terms of gross exports and imports (Timmer et al., 2014; Banga, 2014).

The financial aspect of integration is captured using the net capital account position of a country. The net capital account records the nominal values of acquisitions and disposals of non-produced non-financial assets in the balance of payments statistics of a country. It excludes financial transactions and only includes capital transactions in terms of foreign direct investment (FDI) and portfolio investment flows. A surplus in the capital account can help ease an ongoing balance of payments deficit, thereby positively affecting external integration.

**Table 1. List of Variables**

<b>Integration variables</b>	<b>Economic variables</b>	<b>Structure</b>	<b>Distribution (Wage Share) variables</b>
GVC Participation ( $\mu, \nu$ )	Private Credit to GDP Ratio		Unemployment rate
Backward Participation in GVCs ( $u, v$ )	Economic Index (or Diversification)	Complexity	Exchange rate ( $q$ )
Exports + Imports as a share of GDP (Trade Openness)	Medium and High-tech Exports as a share of Manufactured Exports		Real Wage per hour (for unit labor cost ( $W/a$ ))
Net Capital Account (F)			Domestic Prices (Gross Output) Value added per worker (Productivity) ( $a$ ) Hirschman Herfindahl Index (for degree of Monopoly power)

Secondly, we measure economic structure using the share of private credit to GDP, diversification or economic complexity, and technological capability. Private credit to GDP ratio can be considered a proxy for investment as higher credit availability can stimulate business decisions and investment. In terms of the impact on economic growth, Oyvat et al (2020) find that an increase in private credit to GDP leverages profit shares leading to a profit-led demand regime.

Diversification, measured by the economic complexity index (ECI), captures the composition of a country's productive output and the economic structure that combines productive knowledge effectively. It is a proxy for structural change as it includes the share of high-skilled labor involved in the most complex economic activities. The ECI takes both positive and negative index values. Positive and large index value implies that a country can make complex products such as sophisticated chemicals and machines, while large negative value implies the production of least complex products such as raw minerals or simple agricultural products. In this sense, countries with a high degree of economic complexity will have higher economic growth relative to countries with a low degree of complexity.

Improvement in a country's technological capability can be gauged using the share of medium and high-technology exports in total manufactured exports. Across all countries in the sample, on average, medium and high-tech exports constitute 51% of total manufactured exports. However, there is a large difference between developed and emerging nations with an average of 57% and 41% respectively. China stands out within the sample of emerging nations with an average of 50% across the full sample period. Similar to investment and diversification, an increase in the technological content of exported manufacturing goods tends to positively affect economic growth through its positive impact on economic structure.

Finally, we measure distribution using the unemployment rate, exchange rate, real hourly wages, domestic prices, labor productivity, and the degree of market concentration. In this article, we only consider the functional distribution of income, and not personal income distribution. In this sense, the distribution score should be interpreted as changes in the wage share in aggregate income, rather than changes in the income accruing to the top 10% or bottom 90% of the population.

The unemployment rate is a proxy for the bargaining power of labor, where a higher unemployment rate implies a decrease in worker's bargaining power thereby decreasing the wage share. An increase in the real exchange rate (or depreciation of the currency) tends to be positively associated with the wage share. Emerging nations pursuing an export-led industrialization policy typically keep the exchange rates depreciated as it makes the exports cheaper in foreign markets. We measure labor productivity using real value-added per worker. Higher labor productivity induces workers to target a higher wage share or firms to target a lower mark-up rate, thereby increasing the wage share.

Real hourly wages are measured as the ratio of total labor compensation and total hours worked in the industrial sector, and expressed in PPP dollars. Higher real wages positively affect the wage share by redistributing each additional dollar of income towards wages rather than profits. In the post-Keynesian literature, economic growth can go hand in hand with higher real wages in a wage-led demand regime, and conversely, decrease real wages in a profit-led demand regime.

Gross output prices negatively impact the wage share by redistributing income in favor of profits and by inducing firms to target a higher mark-up rate. Lastly, the degree of monopoly power or market concentration is calculated using the Hirschman Herfindahl index (HHI). The index takes values between 0 and 1. Index values closer to 1 indicates a high degree of domestic market concentration or more monopoly power for firms, and vice versa. Higher monopoly power allows firms to target a higher profit share thereby decreasing the wage share.

## **4.2. Principal Component Analysis Results**

The variables listed in Table 1 above are used to estimate distinct scores for integration, structure and distribution. PCA offers an adequate empirical framework in this context, to account for the high degree of correlation between variables. The first component of the PCA score explains the largest amount of variation in the data, with each subsequent component accounting for lesser and lesser variation. In this analysis, we only report and consider the first component of integration, structure and distribution to map countries into separate regimes of growth. Moreover, the results are reported separately for three different periods – the full sample from 1995-2011, the pre-crisis period (1995-2007), and the post-crisis period (2008-2011) – to assess any change in country positions due to the global financial crisis of 2007-08.

We begin by looking at the total (or cumulative) variation explained by the first component of each score (Table 2), which sheds light on the overall explanatory power of the model. Across all three time periods, integration and structure account for nearly 65% to 68% of the total variation in the data. Distribution, on the other hand, accounts for nearly 39-44% of the total variation in the data across different periods. This suggests that integration and structure are

stronger predictors of economic growth compared to distribution. Thus, table 2 offers preliminary support justifying the use of PCA.

**Table 2. Cumulative Variation explained by First Component**

Variable	1995-2011	1995-2007	2008-2011
Integration score	0.6678	0.6672	0.6840
Structure score	0.6567	0.6551	0.6660
Distribution score	0.3946	0.3944	0.4358

We now consider how the loadings are correlated with the first component of integration, structure, and distribution, in tables 3, 4, and 5 respectively. This part of the analysis allows us to check if the relationship between variables as prescribed in the theoretical model is justified in the data. Tables 3, 4, and 5 show the relative contributions (or loadings) of each integration, structure, and distribution variable in the first component. Since all original variables have high variation across country and time, we *log normalize* all variables.

**Table 3. Loadings of First Component – Integration score**

Variable	1995-2011	1995-2007	2008-2011
GVC participation (%)	0.5485	0.5507	0.5401
Backward Participation in GVCs (%)	0.5859	0.5876	0.5736
X + M as a share of GDP (Openness)	0.5720	0.5717	0.5704
Net Capital Account (F)	0.1692	0.1570	0.2321

**Notes:** All variables are logged and are means over the specified period. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is a useful test post-estimation, as it shows whether the number of loadings used is adequate for creating a composite score. For 1995-2011, with these four measures, KMO stat for the structure score is **0.7142** which suggests that sampling is adequate and using PCA is justified (rule of thumb says that KMO stat > 0.5 is adequate).

In table 3, all measures of external integration are positively correlated with the integration score. The KMO statistic for sampling adequacy is 0.71 (greater than 0.5), which means that the loadings used to estimate the component score are adequate as it explains nearly 71% of the total variation. All the loadings have the same sign or direction of correlation as specified in the theoretical model. This means that countries that are more externally oriented witness an increase in economic growth by easing the balance of payment constraint. It has been argued that countries with a high share of trade in GDP are associated with a profit-led demand regime, as economic growth increases by leveraging the profit share at the cost of the wage share (Bhadhuri and Marglin, 1990; Blecker and Setterfield, 2019).

**Table 4. Loadings of First Component – Structure score**

Variable	1995-2011	1995-2007	2008-2011
Private Credit to GDP Ratio (%)	0.3604	0.3737	0.2991
Economic Complexity Index (or Diversification)	0.6575	0.6543	0.6785
Medium and High-tech Exports as a share of Manufactured Exports (%)	0.6617	0.6575	0.671

**Notes:** All variables are logged and are means over the specified period. For the full sample period, the KMO stat for sampling adequacy is **0.5484**.

In Table 4, all three loadings are positively correlated with economic structure. Higher credit availability, product diversification, and technological capability improve economic structure. Particularly in emerging economies, the co-movement of all three loadings is indicative of

productivity-enhancing structural change. From 1995-2011, economic complexity and technological capability explain 67% of the total variation in the first component of structure, while private credit to GDP explains 36% of the variation.

**Table 5. Loadings of First Component – Distribution score**

<b>Variable</b>	<b>1995-2011</b>	<b>1995-2007</b>	<b>2008-2011</b>
Unemployment rate	0.0091	-0.0337	0.1021
Exchange rate (q)	-0.3615	-0.3418	-0.3708
Real Wage per hour (W/a)	0.6122	0.6184	0.5893
Value added per worker (Productivity) (a)	0.6118	0.6117	0.5794
Prices (Gross Output, Industry)	-0.3457	-0.3535	-0.4111
Hirschman Herfindahl Index	-0.0255	-0.019	0.0057

**Notes:** All variables are logged and are means over the specified period. For the full sample period, the KMO stat for sampling adequacy is **0.5647**.

Table 5 shows the contribution of each loading in the distribution score. For the full sample period, unemployment rate, real hourly wages, and labor productivity move in the same direction and are positively correlated with the distribution score. On the other hand, exchange rate, prices, and market concentration move in the opposite direction and are negatively correlated with distribution. All the loadings have the same sign as predicated in the theoretical model, except for unemployment rate. The negative (expected) sign on unemployment is evident only in the pre-crisis period.

A key point to highlight is that the global financial crisis of 2007-08 has no distinct effect on the direction or magnitude of correlation for any of the loadings of integration and structure, but has a notable effect on distribution.

### **4.3. Analysis of the results**

The scores estimated using PCA allows us to group countries that depict similar characteristics in terms of integration, structure, and distribution. For a clearer graphical presentation, component scores are averaged over 17 years such that each country's position is represented using a single data point. The scores reflect context-specific values for each sample country, and countries with similar characteristics are positioned closer to each other. Importantly, the PCA approach is useful in separating developed and emerging nations in the sample to the right and left sides of the Y-axis respectively. The mapping of countries is reported in Appendix 2 for all three time periods.

Based on the PCA results, we can now identify three distinct trajectories or regimes of economic growth associated with integration, structure, and distribution.

Firstly, in terms of integration, all countries in the sample are open economies that have achieved a notable level of integration into GVCs. However, the countries below and above the x-axis follow different trajectories. A group of developed economies (US, UK, Germany, France, Italy, Spain, Japan, and Canada) and emerging economies (India, Indonesia, Turkey, Russia, Brazil, Romania, Lithuania, Cyprus, and Greece) are located below the x-axis. External integration in these countries goes hand in hand with a high degree of capital concentration in the sense that the gains from integration are redistributed towards profits rather than wages.

Rising levels of income inequality (between the top 1% and the rest) in these countries suggest that gains from trade accrue to a small section of businesses and corporations. This trajectory aligns with the insights of Smichowski et al (2020) who propose different developmental regimes or classes associated with GVC integration. They propose that developed and developing nations (including those mentioned above) show low to high levels of GVC integration but are more likely to capture a high level of value within GVCs. On the other hand, for the rest of the sample countries (except for Australia) above the x-axis, integration goes hand in hand with a relatively smaller degree of capital concentration. In this sense, countries below the x-axis depict patterns of “*exclusive integration*” while those above the x-axis depict “*inclusive integration*”.

Secondly, developed and emerging nations depict two distinct trajectories in terms of economic structure, as they are located to the right and left sides of the Y-axis respectively. Developed nations have a higher share of investment in GDP, credit availability for the private sector, product and process diversification, and technological capabilities. These countries show a pattern of “*inclusive structural change*” backed by a strong macroeconomic structure and a history of successful structural transformation that moved labor and resources from low-productivity agricultural jobs to high-productivity manufacturing and service sector occupations. Emerging nations to the left of the Y-axis show patterns of “*exclusive structural change*” with significant constraints on the macroeconomic structure and a history of fragmented structural change.

Finally, in terms of the functional distribution of income, the PCA results strongly show two distinct trajectories. All developed nations in the sample are situated on the right of the Y-axis, which means that the redistribution of aggregate income in favor of profits is less severe. The presence of strong labor market institutions achieved on the basis of strong labor movements and union success in the past, continues to act as a cushion and resist the decline in wage shares and real wages from greater integration. In this sense, the conflict between labor and capitalists is less acute. On the other hand, developing countries on the left of the Y-axis, are characterized by a greater redistribution of trade gains in favor of profits rather than wages. The presence of weak labor market institutions combined with a history of state repression against widespread unionization has increased the conflict between labor and capitalists. In this sense, distribution regimes in developed nations facilitate coordination among classes to a larger extent relative to emerging nations where the regime is exploitative.

To summarize, integration, economic structure, and distribution are associated with distinct trajectories of economic growth in developed and emerging economies.

## **5. Conclusion**

This article contributes to the structuralist growth and development tradition by highlighting how integrating into a unified process of globalized capitalism impacts domestic macroeconomic structures differently giving rise to different regimes of growth. Traditionally, structuralist growth theories have not modeled the impact of GVCs (rather than trade in general) on economic growth explicitly. The proposed conceptual framework and empirical analysis in this article attempt to bridge this important gap in the literature.

Furthermore, we link the discussion of integration with income distribution. Countries, such as Mexico, have seen a strong integration of their productive structure in the value chains, however, the impact on the functional income distribution is not clear. The use of our framework that considers not only profit and wage shares, but also leakages, allows us to look at that. We observe that in this case, a reduction in wage share may not necessarily result in a redistribution to profits, but rather an increase in the leakages. In this sense, the debate of profit-led and wage-led growth needs to be redefined, as it is possible to have neither, as depending on the patterns of structure and integration, the leakages may overcome both effects, reducing the amount of resources moving to domestic consumption and investments (towards import of intermediary goods).

This paper is an initial contribution that can be further developed in several ways, Firstly, using cluster analysis to increase the possible classification of countries. Secondly, to observe the causal relations between structure, integration and distribution using a panel and econometric estimations. Finally, to construct a further theoretical framework to link integration and structure (using hysteresis effects from price-elasticities to income-elasticities) and between integration and distribution.

## 6. References

- Ahmed, S., Appendino, M., & Ruta, M. (2017). Global value chains and the exchange rate elasticity of exports. *The BE Journal of Macroeconomics*, 17(1).
- Banga, R. (2014). Linking into Global Value Chains Is Not Sufficient: Do You Export Domestic Value-Added Contents? *Journal of Economic Integration*, Vol. 29, No. 2, June, pp. 267-297.
- Bhaduri, A., and S. A. Marglin (1990). Unemployment and the real wage: the economic basis for contesting political ideologies. *Cambridge Journal of Economics* 14 (4): 375–93.
- Bair, J., & Werner, M. (2015). Global production and uneven development: when bringing labour in isn't enough. *Putting Labor in its Place: Labor Process Analysis and Global Value Chains*, K. Newsome, P. Taylor, J. Bair and A. Rainnie, eds. Basingstoke, UK: Palgrave MacMillan, 119-134.
- Blecker, R. (2002). Kaleckian macro models for open economies. In *Foundations of international economics* (pp. 126-160). Routledge.
- Blecker, R. A. (2021). New advances and controversies in the framework of balance-of-payments-constrained growth. *Journal of Economic Surveys*.
- Braunstein, E., Bouhia, R., & Seguino, S. (2020). Social reproduction, gender equality and economic growth. *Cambridge Journal of Economics*, 44(1), 129-156.
- Chandler, A. D. (1990). *Strategy and structure: Chapters in the history of the industrial enterprise* (Vol. 120). MIT press.
- Cimoli, M., Lima, G. T., & Porcile, G. (2016). The production structure, exchange rate preferences and the short-run—Medium-run macrodynamics. *Structural Change and Economic Dynamics*, 37, 13-26.
- Cimoli, M., & Porcile, G. (2014). Technology, structural change and BOP-constrained growth: a structuralist toolbox. *Cambridge journal of economics*, 38(1), 215-237.
- Dutt, A. K. (2002). Thirlwall's law and uneven development. *Journal of Post Keynesian Economics*, 24(3), 367-390.
- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. *Review of international political economy*, 12(1), 78-104.
- Jayme, F. G. (2020). Balance-of-payments-constrained economic growth in Brazil. *Brazilian Journal of Political Economy*, 23, 63-86.
- Koopman, R., Z. Wang, and Shang-Jin Wei (2008). How much of Chinese exports is really made in China? Assessing domestic value-added when processing trade is pervasive. NBER Working Paper, 14109.
- Ocampo, J. A. (2016). 10. Balance-of-Payments Dominance: Implications for Macroeconomic Policy. In *Macroeconomics and Development* (pp. 211-228). Columbia University Press.
- Oyvatt, C., O. Öztunalı and C. Elgin (2020). Wage-led versus profit-led demand: A comprehensive empirical analysis. *Metroeconomica* 71 (3): 458-486.

- Porcile, G., & Yajima, G. T. (2021). New Structuralism and the balance-of payments constraint. In Thirlwall's Law at 40. Edward Elgar Publishing.
- Prebisch, R. (1962). The economic development of Latin America and its principal problems. *Economic Bulletin for Latin America*.
- Ranieri, R., & Ramos, R. A. (2013). Inclusive growth: Building up a concept (No. 104). Working paper.
- Ribeiro, R. S., McCombie, J. S., & Lima, G. T. (2016). Exchange rate, income distribution and technical change in a balance-of-payments constrained growth model. *Review of Political Economy*, 28(4), 545-565.
- Robinson, J. (1969). *The economics of imperfect competition*. Springer.
- Smichowski, Bruno Carballa, Durand, Cédric and Knauss, Steven (2020). Participation in global value chains and varieties of development patterns. *Cambridge Journal of Economics* 2021, 45, 271–294.
- Sturgeon, T. J. (2002). Modular production networks: a new American model of industrial organization. *Industrial and corporate change*, 11(3), 451-496.
- Sturgeon, T. J., & Kawakami, M. (2010). Global value chains in the electronics industry: was the crisis a window of opportunity for developing countries? World Bank.
- Spinola, D. (2020). Uneven development and the balance of payments constrained model: Terms of trade, economic cycles, and productivity catching-up. *Structural change and economic dynamics*, 54, 220-232.
- Taylor, L. (2021). *Reconstructing macroeconomics*. Harvard University Press.
- Thirlwall, A. P. (1979). The balance of payments constraint as an explanation of international growth rate differences. *BNL Quarterly Review*, 32(128), 45-53.
- Thirlwall, A. P., & Hussain, M. N. (1982). The balance of payments constraint, capital flows and growth rate differences between developing countries. *Oxford economic papers*, 34(3), 498-510.
- Timmer, Marcel, A. A. Erumban, B. Los, R. Stehrer and G. J. de Vries (2014). Slicing Up Global Value Chains. *The Journal of Economic Perspectives* 28 (2): 99-118.
- UNCTAD (2013). *Global Value Chains: Investment and Trade for Development*. World Investment Report. Geneva: United Nations Conference on Trade and Development.
- Zhao, Y., Fei, X., Wu, C., & Hashmi, S. M. (2020). A global value chain (GVC) model for determining changes in global output caused by currency appreciation. *The Journal of International Trade & Economic Development*, 29(4), 482-493.

## Appendix 1: Description of Sample Countries, Variables used, and Summary Statistics

### 1.A. Estimation Method of above variables

<b>Integration</b>	<b>Estimation method</b>
GVC Participation ( $\mu, \nu$ )	$GVCParticipation \text{ as a share of Gross Exports (\%)} \\ = \left( \frac{DVAinForeign \text{ Exports}}{GrossExports} + \frac{FVAinExports}{GrossExports} \right)$ <p><i>Source:</i> TIVA 2016 release</p>
Backward Participation in GVCs ( $u, v$ )	<p><i>FVA in Exports as a share of Gross Exports (%)</i>  <i>Source:</i> TIVA 2016 release</p>
Exports + Imports as a share of GDP	<p>Gross Exports as a % o GDP + Gross Imports as a % of GDP  <i>Source:</i> TIVA 2016 release</p>
Net Capital Account (F)	<p>Net Capital Account (BOP, current USD)  <i>Source:</i> WDI, WB. Missing values extrapolated.</p>
<b>Economic Structure</b>	
Private Credit to GDP Ratio	<p>Domestic credit to private sector (% of GDP)  <i>Source:</i> WDI, WB</p>
Economic Complexity Index (or Diversification)	<p><i>Source:</i> Atlas of Economic Complexity database, Center for International Development, Harvard University.</p>
Medium and High-tech Exports as a share of Manufactured Exports	<p>Medium and high-tech exports (% manufactured exports)  <i>Source:</i> WDI, WB</p>
<b>Distribution variables</b>	
Unemployment rate	<p><i>Source:</i> WDI, WB  <i>Definition:</i> Unemployment refers to the share of the labor force that is without work but available for and seeking employment.</p>
Exchange rate ( $q$ )	<p>ER = (national currency/US dollar)  <i>Source:</i> PWT 9.1</p>
Real Wage per hour ( $W/a$ )	<p>Real wage per hour = <math>\left( \frac{Total \ Labor \ Compensation \ in \ Industry \ in \ PPP \ dollars}{Total \ Hours \ worked \ in \ Industry} \right)</math>  <i>Source:</i> Socio Economic Accounts (SEA) of the World Input-Output database (WIOD), 2014.</p>
Value added per worker (Productivity) ( $a$ )	<p><i>Value Added per worker</i>  <math>= (VAPW \ in \ Agriculture + VAPW \ in \ Industry + VAPW \ in \ Services)</math>  <i>Source:</i> WDI, WB. Missing values extrapolated.</p>
Prices (Gross Output)	<p>Price Index. <i>Source:</i> Socio Economic Accounts (SEA) of the World Input-Output database (WIOD), 2014.</p>
Hirschman Herfindahl Index (for degree of Monopoly power)	<p>Index of market concentration  <i>Source:</i> WITS (World Integrated Trade Solution) database, WB. Missing values extrapolated.</p>

## 1.B. Summary Statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<b><i>Integration Variables</i></b>				
GVC participation (%) ( $\mu, \nu$ )	45.41	9.15	22.24	69.10
Backward Participation in GVCs (%) ( $u, v$ )	25.82	9.76	5.62	51.50
X + M as a share of GDP (Openness)	69.15	30.29	14.74	167.18
Net Capital Account (F)	3.00e+08	2.72e+09	-1.65e+10	1.22e+10
<b><i>Economic Structure</i></b>				
Private Credit to GDP Ratio (%)	82.96	57.80	1.02	355.23
Economic Complexity Index (or Diversification)	1.07	0.68	-0.48	2.86
Medium and High-tech Exports as a share of Manufactured Exports	51.27	16.43	14.48	85.39
<b><i>Distribution Variables</i></b>				
Unemployment Rate (%) (worker's bargaining power)	8.05	3.82	2.05	22.68
Exchange rate (national currency/US dollar)	260.00	1382.38	0.05	10389.90
Real Wage per hour (in PPP US dollars) ( $W/a$ )	14.21	11.80	0.21	48.05
Value added per worker (Productivity) ( $a$ )	128659.90	83307.36	6257.60	304348.30
Prices (Gross Output), Industry	355.54	790.58	86.24	5781.80
Hirschman Herfindahl Index (for degree of Monopoly power)	0.11	0.13	0.03	0.71
<b><i>N (observations) = 629</i></b>				
<b><i>Time = 17</i></b>				
<b><i>Country = 37</i></b>				

**Note:** Taiwan, Malta and Luxemburg are dropped from the sample to give a total of 37 countries.

### 1.C. List of Sample Countries

<b>EU</b>	<b>New EU members</b>	<b>Other Countries</b>	<b>G7</b>	<b>Asia</b>	<b>Latin America</b>
Austria Belgium Denmark Finland France Germany Greece Ireland Italy Netherlands Portugal Spain Sweden United Kingdom	Bulgaria Cyprus Czech Republic Estonia Hungary Latvia Lithuania Poland Romania Slovakia Slovenia	Australia Canada Japan United States	Canada Japan France Germany Italy United Kingdom United States	China Indonesia Republic of Korea India Turkey Russia	Brazil Mexico

**Source:** The sample consists of 37 countries, which is organized as per the WESP, UN classification of countries. The number of emerging nations is limited by the availability of data on value-added trade and real hourly wages.

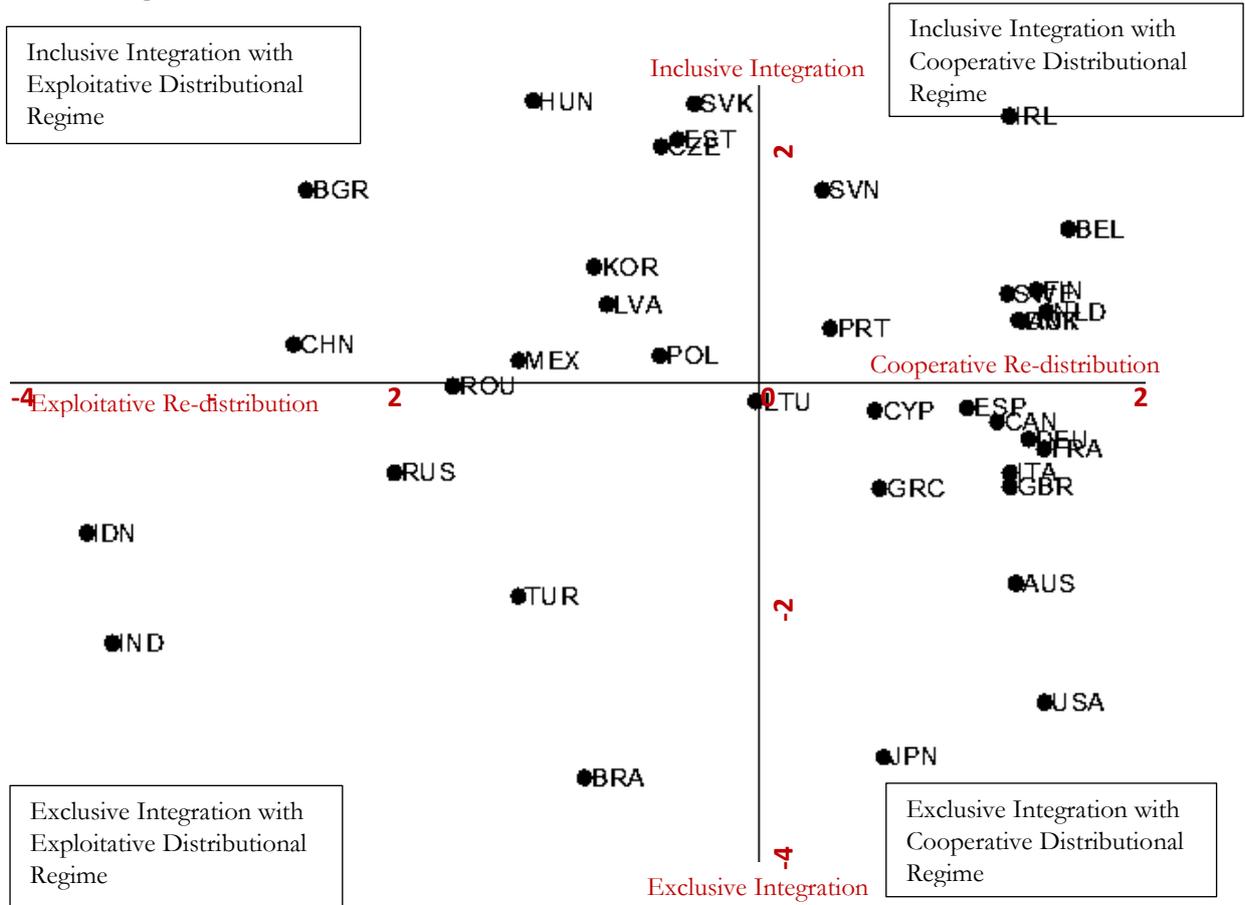
## Appendix 2. Graphs

### 2.1. For full sample – 1995-2011

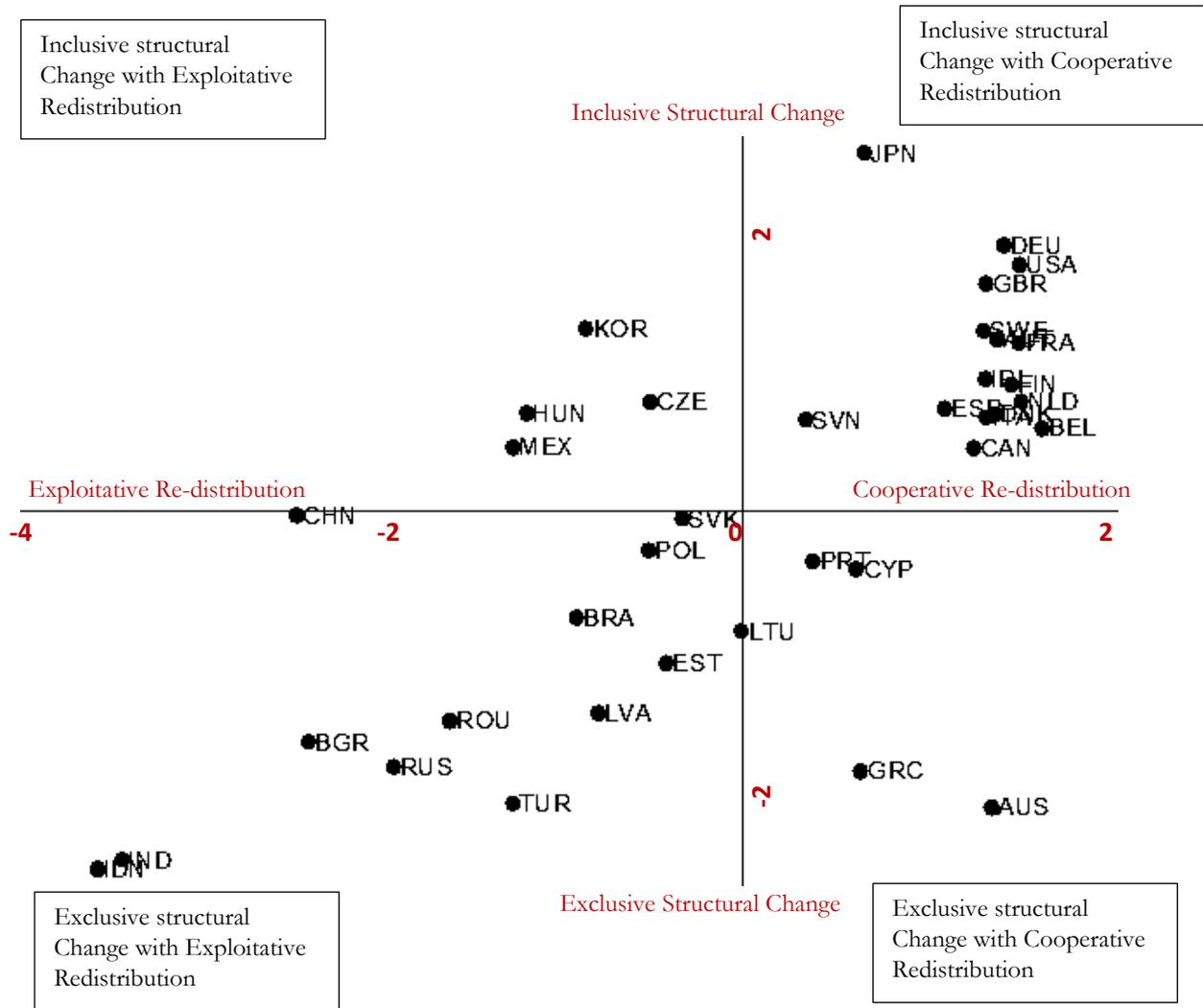
#### 2.1.1. Integration And Structure



### 2.1.2. Integration And Distribution

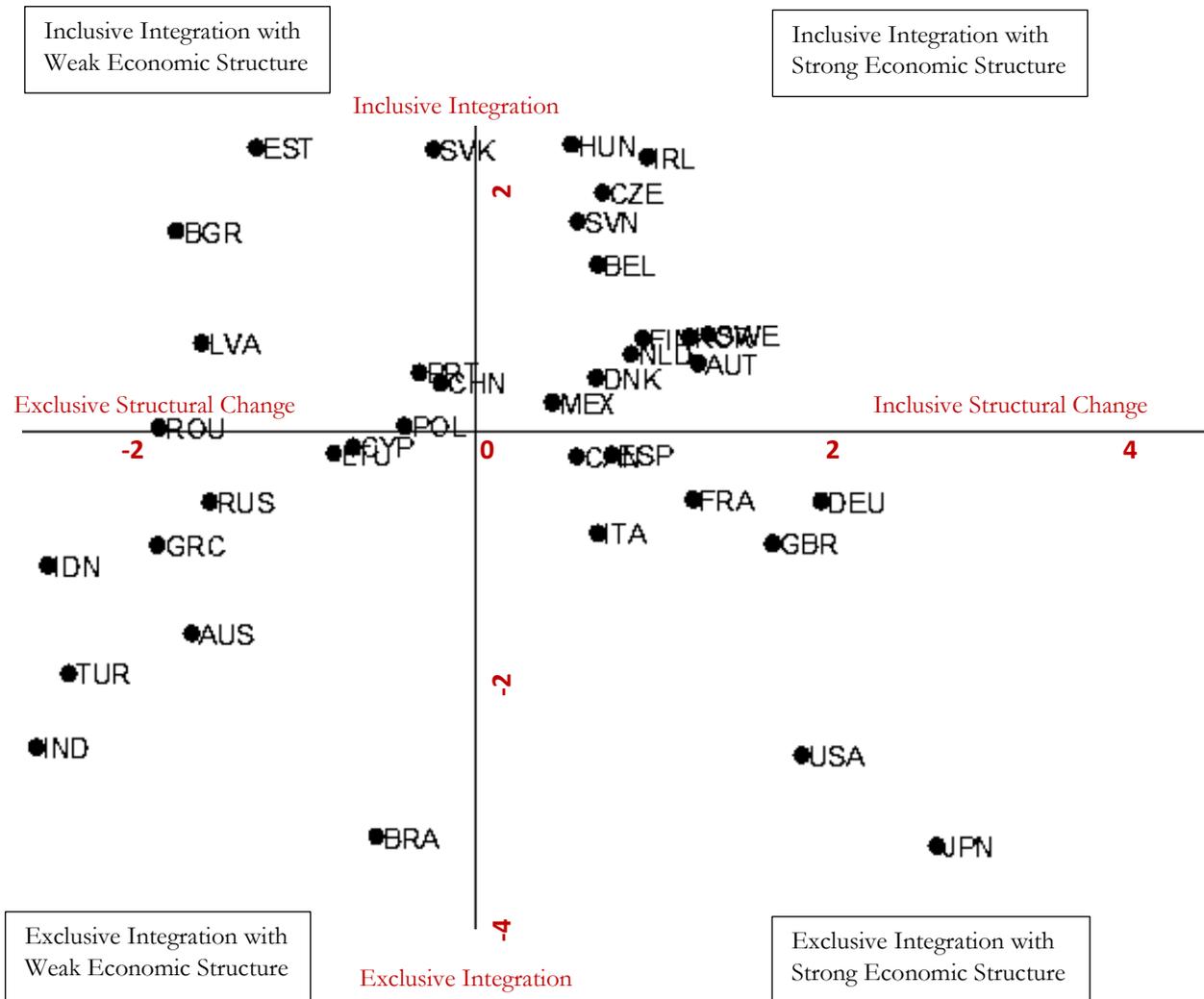


### 2.1.3. Structure And Distribution

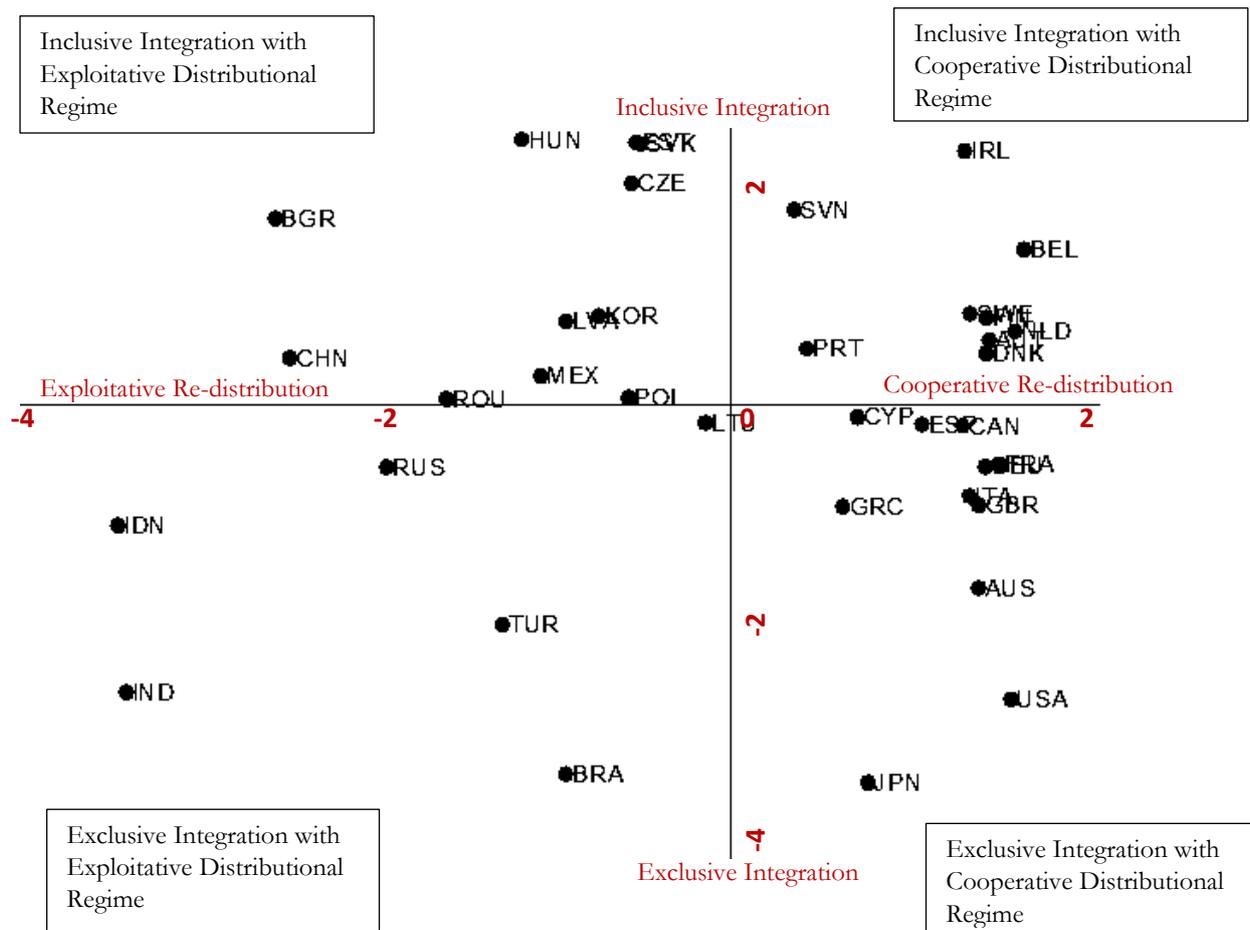


## 2.2. Pre-crisis sample – 1995-2007

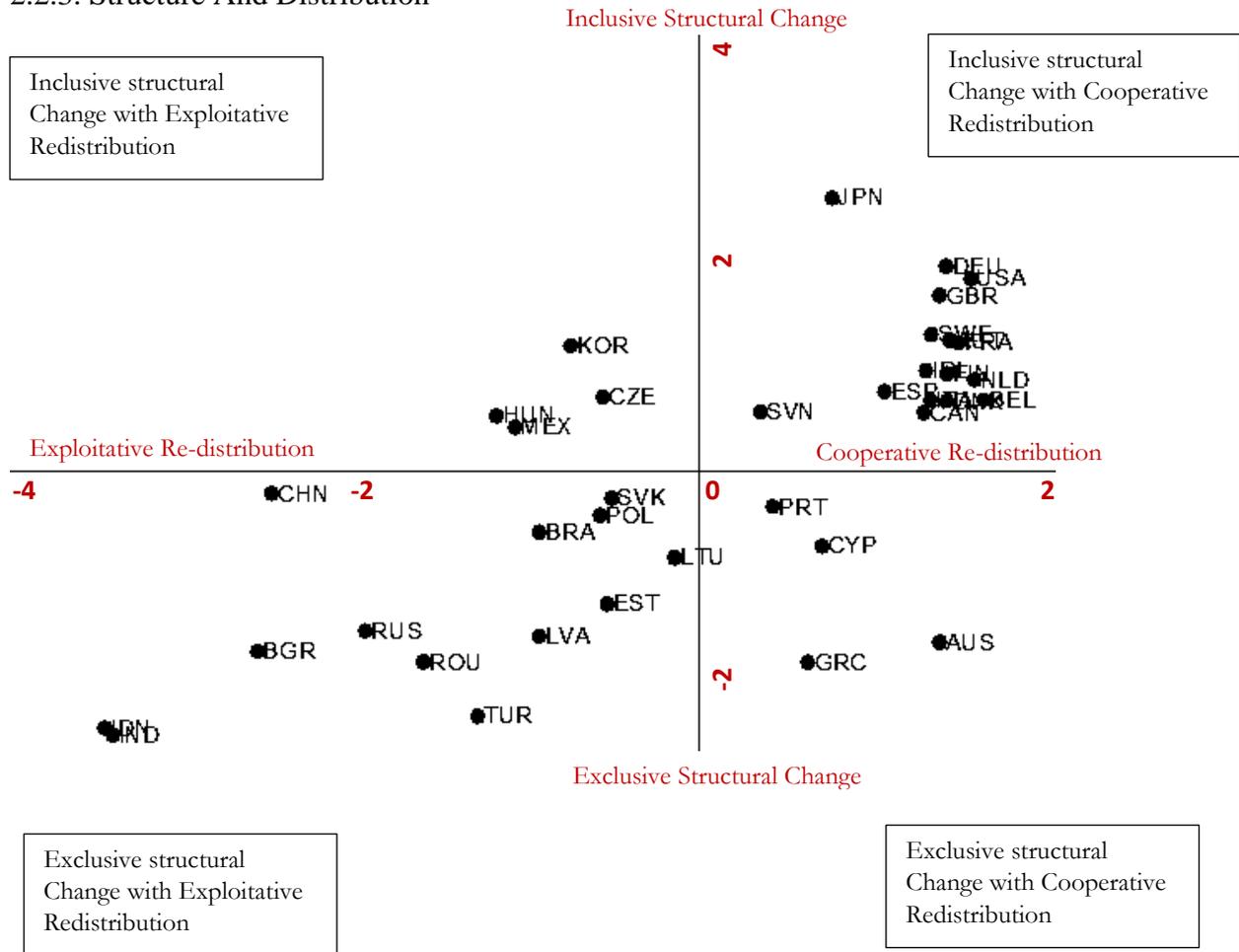
### 2.2.1. Integration And Structure



### 2.2.2. Integration And Distribution

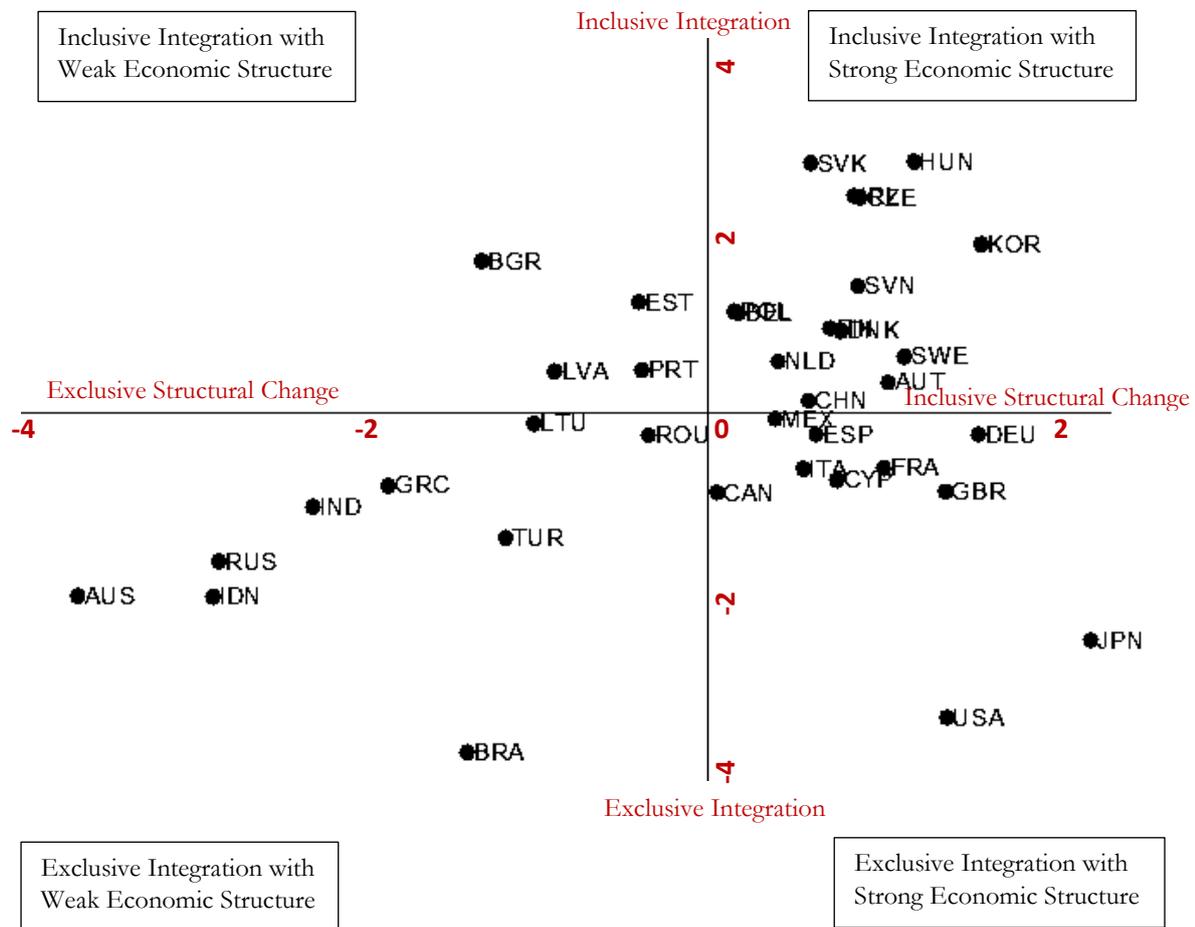


### 2.2.3. Structure And Distribution

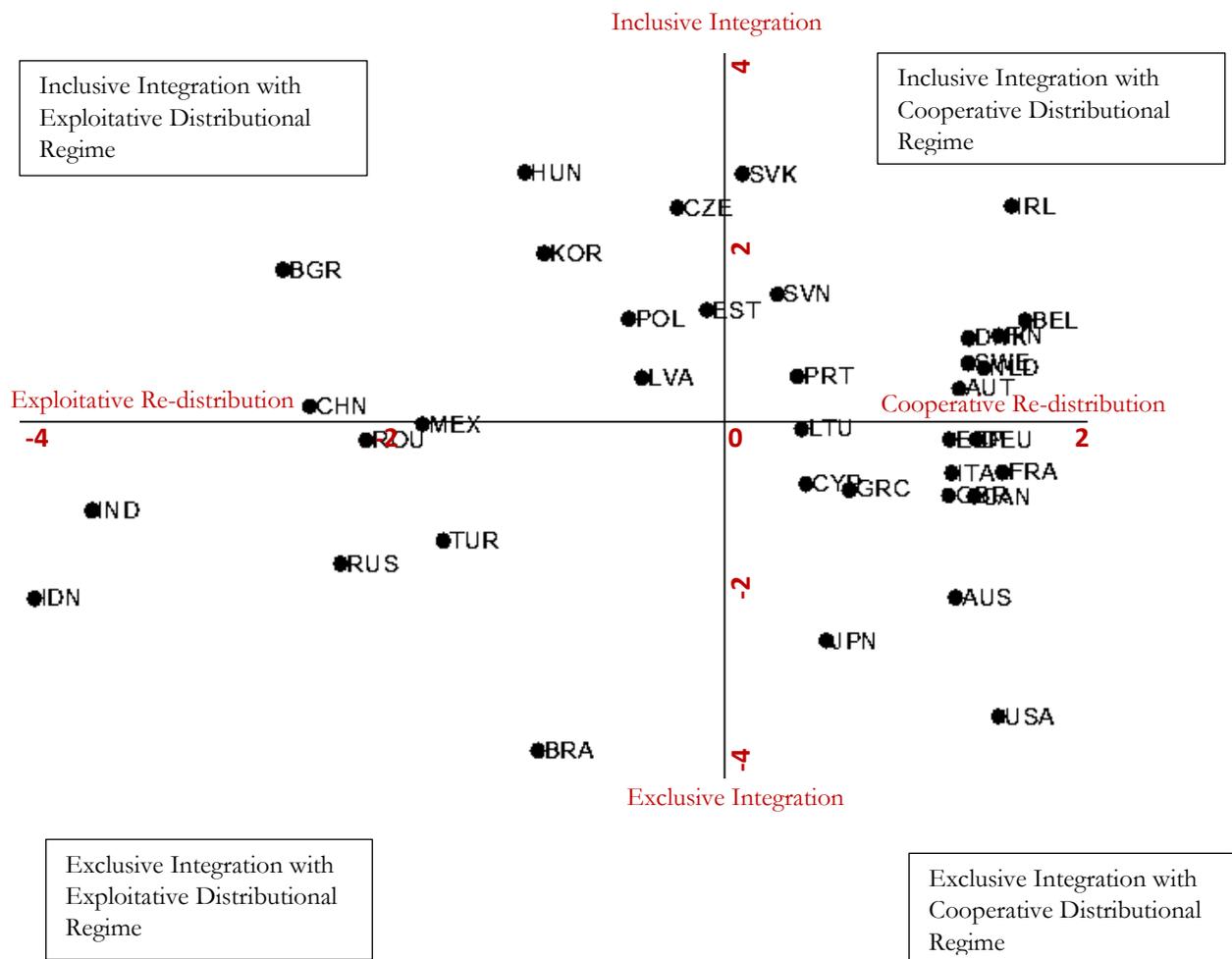


## 2.3. Post-crisis sample – 2008-2011

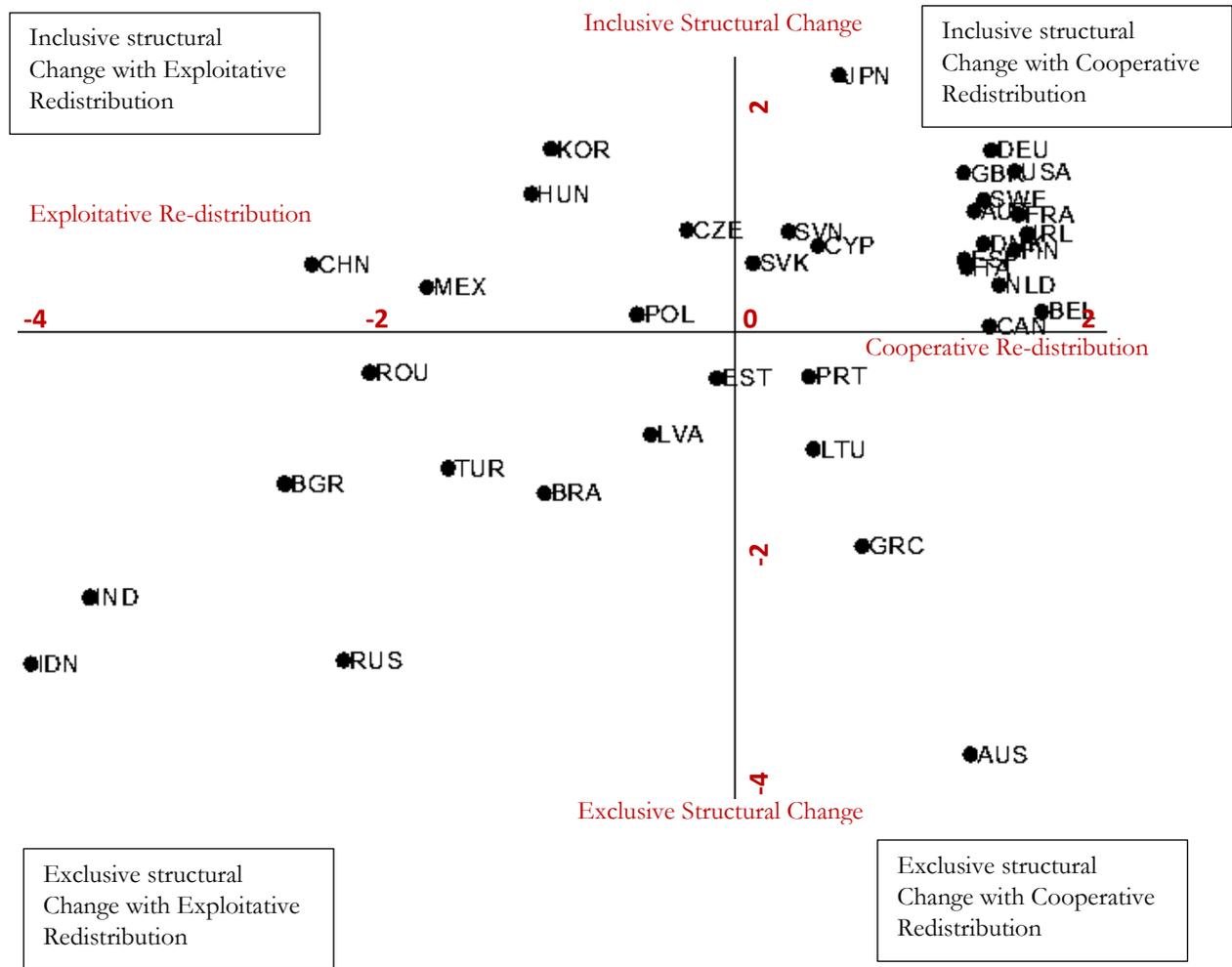
### 2.3.1. Integration And Structure



### 2.3.2. Integration And Distribution



### 2.3.3. Structure And Distribution



### Appendix 3. Classifying Integration, Structure and Distribution Regimes

Based on the PCA analysis, we can now identify two distinct trajectories associated with regimes of integration, structure and distribution.

	<b>Trajectory 1</b>	<b>Trajectory 2</b>
<b>Integration</b>	<p><b>Inclusive Integration</b>            External integration goes hand in hand with high degree of capital concentration in the sense that the gains from integration are redistributed towards profits rather than wages. Rising levels of income inequality (between the top 1% and the rest) in these countries suggests that gains from trade accrue to a small section of businesses and corporations. A small section of firms is able to capture the majority of value within GVCs.</p>	<p><b>Exclusive Integration</b>            External Integration goes hand in hand with a relatively smaller degree of capital concentration. Value capture and gains from GVC trade is more equally distributed among firms in these countries.</p>
<b>Structure</b>	<p><b>Inclusive Structural Change</b>            These countries show a pattern of “<i>inclusive structural change</i>” backed by strong macroeconomic structure and a history of successful structural transformation that moved labor and resources from low-productivity agricultural jobs to high-productivity manufacturing and service sector occupations.</p>	<p><b>Exclusive Structural Change</b>            These countries show patterns of “<i>exclusionary structural change</i>” with significant constraints on macroeconomic structure and a history of fragmented structural change. There exist pockets of economic efficiency and the fractured process of structural change gives rise to widespread informality of employment. The constraints on structural change are partly external and partly internal, and tied to the history of post-colonial development and institutions.</p>
<b>Distribution</b>	<p><b>Cooperative Distribution Regime</b>            Redistribution of aggregate income in favor of profits is less severe. Presence of strong labor market institutions achieved on the basis of strong labor movements and union success in the past, continues to act as a cushion and resist the decline in wage shares and real wages from greater integration. In such regimes, the conflict between labor and capitalists is less acute and facilitates coordination among classes to some extent.</p>	<p><b>Exploitative Distribution Regime</b>            Countries in this regime are characterized by a greater redistribution of trade gains in favor of profits rather than wages. The presence of weak labor market institutions combined with a history of state repression against widespread unionization increases the conflict between labor and capitalists, making the regime exploitative.</p>