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### Empirical Links between Global Value Chains, Trade and Unemployment

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#### ABSTRACT

*This study purposes to explore the determinants of unemployment in 35 countries distinguished between 18 developed and 17 developing countries over 12 years covering 2005-2016. Unlike the majority of the relevant literature, the study integrates different aspects of internal and external predictors of unemployment focusing on global value chains (GVCs) involvement. The study employs a panel regression analysis to estimate the relationships of unemployment with economic growth, government expenditure, inflation, human capital, population, industrialization, trade openness, and foreign direct investment flows. To what extent countries involve in GVCs are measured by the foreign value-added share of gross exports and domestic value-added share of gross imports. Empirical results show that it is yet hard to come to a global consensus about a common set of determinants of unemployment in a cross-country aspect. Moreover, the influences of internal and external factors tend to vary substantially across the development phases and structural changes of countries. Overall findings keep the debate about jobless export, the job-carrying function of foreign direct investment, employment gain from trade and trade in employment at the center of the unemployment agenda of both developed and developing countries. The study concludes with some discussions and implications of the evidence.*

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#### INTRODUCTION

Unemployment means a waste of human capital and brings about serious social, political, and economic issues. Because many developed and developing countries have been dealing with high and persistent unemployment, it is a longstanding issue of great concern for policymakers who re-quire more

empirical evidence from scholars' research about the determinants of (un)employment. Meanwhile, there has been a vast literature on the predictors of unemployment enriched by new evidence of empirical studies of both developed (e.g. the case the United States and 20 advanced economies of a study of Ball et al., 2017) and developing countries (e.g. 10 emerging countries case of Horvath and Zhong, 2019) as a group. The relevant literature has been widening with both country-specific (e.g. The United Kingdom study of Greenaway et al. (1999) and Turkey case of Aydiner-Avsar and Onaran (2010)) and cross-country (developed and developing countries categorization of Bartolucci et al. (2018)) studies. However, the existing literature is still unable to capture all the external dynamics of new international trade patterns formed by global production networks which have direct and indirect impacts on domestic labor markets.

There is a salient trend of studies to associate unemployment with other macroeconomic variables. These studies conclude that many variables tend to affect unemployment at the macro level. One of the main predictors of unemployment is economic growth hypothesized within Okun's law framework. Okun's law that was first documented in the early 1960s refers to the negative correlation between unemployment and economic growth measured by the increases in the gross domestic product (GDP). Theoretically, the inflation rate is another well-documented factor affecting unemployment based on the Phillips Curve which predicts a long-run trade-off between inflation and unemployment. But, this prediction of the original Phillips Curve is not that clear in the literature since there are contemporary studies that have documented positive, negative or even insignificant link between these two variables (Turner and Seghezza, 1999).

The global economic system has been witnessing profound transformation dynamically. Traditional trade theories, in general, predicted that countries would export goods they produced using entirely domestic components based on their comparative cost advantages. However, a dramatic structural change has occurred in the international trade system especially since the 1960s that international production has crossed national borders before the final assembly. Therefore, local producers have restructured their operations internationally through outsourcing and offshoring activities. Consequently, some countries have turned into even the main exporter of goods that require scarce sources they have. This process where the different stages of the production are located across different countries is called global value chains (GVCs)<sup>1</sup>. In today's global economy which has been increasingly functioned by GVCs, final goods are typically produced by combining domestic and foreign value-added. Most recent data reveal that foreign value-added accounts for 20 percent of the value of final manufacturing output in many countries, and more than 50 percent in some countries and sectors (OECD TIVA, 2020). Starting from the increasing integration of countries' complex production networks, the present study focuses on the impacts of international factors, especially on the impacts of GVCs. Conventionally, trade openness (and/or trade liberalization) is acknowledged as one of the main sources of employment in all countries. The recent literature suggests that even trade openness affects unemployment, the direction and magnitude of the effect are still not clear (Gozgor, 2014). Consistently, literature reviews reveal that there exist different cross-country studies concluding with both negative (e.g. Dutt et al., 2009; Gozgor, 2014) and positive (e.g. Helpman and Itskhoki, 2010; Fugazza et al., 2014) relationships between unemployment and trade openness. The first group studies suggest policy-makers to facilitate the trade liberalization to lower unemployment. But second group studies have linked the positive nexus between unemployment and trade to country idiosyncrasies such as increased imports, the abundance of low-skilled labor, trading in employment, low domestic value-added in exports, the prevalence of labor-intensive manufacturing activities, employment carrying operations of foreign direct investments, and labor market differences in regulation and structure.

Contrary to the argument which limits the gains from GVCs to developed countries, developing countries and their enterprises can take substantial opportunities from joining GVCs as well. GVCs enable producers within the chain to obtain modern managerial skills, know-how and the free information on quality standards and new technologies. Thus, GVCs-integrated companies become more competitive

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<sup>1</sup> In the study, the term 'global value chain' is used interchangeable with 'global supply chain', 'global production chain', 'global commodity chain', and 'global production network' which might be sometimes studied differently and/or separately in the relevant literature.

since they learn more about demand patterns and new directions of consumer preferences in international markets. Participation in GVCs may also provide economy-wide externalities for developing countries, such as job creation, improvement in technology and skills, productive capacity upgrading and export diversification that result in more domestic value-added. In turn, those externalities would increase countries' attractiveness for more foreign direct investment (FDI). Although these potential gains lead to an increase in overall productivity and industrial upgrading, since productivity means fewer employees are needed, the impacts of GVCs on employment remain inconclusive. This ambiguity calls for more cross-country analysis that is one of the main motivators of the present study.

The development of GVCs and their economic impacts on countries, industries, and firms (even on individuals) have increasingly drawn great attention from international economics and business scholars<sup>2</sup>. Even there are theoretical studies on the effect of GVCs on (un)employment, few studies have empirically investigated the nexus between them. This ignorance of the employment impacts of GVCs in the related literature especially on the comparison of developed and developing countries stems from mainly three reasons (Demiral, 2016). Firstly, unemployment is still widely considered as a domestic issue. Secondly, because unemployment rates in many developed countries have been relatively lower than those in most developing countries, researchers seem to be concentrated on developing countries. Finally, country involvement in GVCs can be efficiently measured using harmonized and comparable international statistics from specific data sources such as input-output tables that are not systematically provided by countries.

Starting from the lack in the relevant literature and focusing on the complex impacts of GVCs on the domestic labor market, the present study comparatively assesses the determinants of unemployment in both developed and developing countries. The study is organized as follows: The next section briefly explains the development of GVCs. This is followed by a summary of theoretical foundations and study motivation. After explaining the model, variables, and sample and presenting the analysis results in the empirical framework section, the study concludes with a short discussion of noteworthy findings and implications in the final section.

## 1. DEVELOPMENT OF GLOBAL VALUE CHAINS

Technological developments and economic globalization that have been respectively spurred by advances in information and transportation technologies and liberalization of trade, production, and investment have affected the interrelations of businesses. These directions have been occurring in different ways. On the one hand, new technologies have been creating a shift from old integrated firms and arm's length relations between them towards outsourcing. On the other hand, globalization and deregulations have created a tendency for some (mostly developed) countries to transfer certain labor-intensive parts of their production process to other (mostly developing) countries providing cheaper labor, *i.e.* lower wages (Gereffi et al., 2005; Acemoglu et al., 2010). Consequently, horizontal integration and specialization structures of countries and firms have become more vertical.

Vertical integration is a business strategy to gain control over its suppliers or distributors whereas horizontal integration is a process of acquiring or merging with competitors operating in the same value chains. The purposes of vertical integration are to increase the firm's power in the marketplace, reduce transaction costs and secure supplies or distribution channels while by horizontally integrated firms aim to grow in size, increase product differentiation, achieve economies of scale, reduce competition or access new markets. In some studies (e.g. Antras and Rossi-Hansberg, 2009; Gereffi, 2018) integration decisions of firms are investigated as cross-country integration decisions within a holistic approach. Vertical specialization in the country level occurs when a country imports intermediates to produce exported goods while in horizontal specialization a country trades goods that are produced from start to finish within the country. At the firm level, in fact, it is about the decision of making or buying that vertical specialization-oriented firms obtain intermediate products from outside suppliers whereas horizontally-specialized firms own every stage of what they produce and make every part of their final production.

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<sup>2</sup> A wide range of GVCs publications can be found at <https://globalvaluechains.org/publications>

GVCs aspect combines country-level and firm-level vertical specialization approaches and points out a production process in which multiple stages of a product are made by various firms located in different countries. The earlier definition of GVCs is the concept of commodity chain which refers to “a network of labor and production processes whose final result is a finished commodity” (Hopkins and Wallerstein, 1986, p.159). This chain starts with primarily raw materials, continues sequentially with many values from various firms in different countries and finishes final production operation.

After the 1960s, GVCs have increasingly gained importance in linking developing countries to international markets. Consequently, the participation and share of developing countries in global value-added trade have substantially increased (OECD TiVA, 2020). GVCs offer opportunities as well as challenges for particularly developing countries and their businesses. There are different aspects of the existing literature about the impacts of GVCs on countries. One important strand focuses on the economic development and structural changes contributions of GVCs for developing countries by underlining the production and export diversifications opportunities and their increasing integration into the global economy (World Bank, 2017; World Trade Organization, 2019). The other stream deals with whether GVCs offer learning and innovation opportunities for developing countries (e.g. Gereffi et al., 2005; De Marchi, et al., 2018). This study purposes to contribute to the literature by analyzing the determinants of unemployment in both developed and developing countries focusing on the effects of external factors with a specific interest in the influences of GVCs.

## 2. THEORY, EVIDENCE, AND STUDY MOTIVATION

Both international business scholars and international economics scholars intensively deal with cross-border flows of trade and investment that significantly impact the economic growth, employment and innovation potentials of countries and firms. However, it can be inferred that business scholars usually adopt the firm-centric approach while economists tend to have a country-level macro approach. Besides this distinction between the international business and international economics research traditions, a third major research domain that links the firm-specific approach to the country-level approach is the GVCs literature (Gereffi, 2018).

Because of ignoring the import content of gross exports (and export content of gross imports) and embodying the multiple counting of intermediate goods and re-export, standard trade statistics seem to be unable to capture countries' real gains in their exports and give rise export illusion for the countries that involve in the GVCs intensively. Both scholars and policy-makers in developed and developing countries agree that growing export creates new job opportunities at least in theory. Conventionally, trade is acknowledged as the key driver of employment. Nevertheless, trade has recently been blamed for the decline of especially manufacturing employment in developed countries. The rationale behind this argument is that, through their multinational operations, companies in developed countries have been carrying labor-intensive stages of production to the developing countries such as China that provide relatively cheaper natural resources and/or lower labor costs (Hamada, 2016; Mei and Wang, 2016). Even this suggestion predicts that developing countries have been taking advantage of the new trade pattern, most recent studies reveal that increasing export does not create new job opportunities enough to be able to promote the overall employment in developing countries. This is sometimes accepted as a strong symptom of the export illusion problem in developing countries that have been immensely participating in GVCs.

The study adopts the unemployment definition of the World Bank (WB WDI, 2020) which defines unemployed people as “those individuals without work, seeking work in a recent past period, and currently available for work, including people who have lost their jobs or who have voluntarily left work”. The study used the version of harmonized International Labour Organization estimates for its advantage to ensure comparability across countries and over time by accounting for differences in the data source, the scope of coverage, methodology, and other country-specific factors. As previously stated, the study's proposed framework distinguishes the determinants of employment between two groups, internal and external factors. Furthermore, the study focuses on the direct and indirect impacts of GVCs involvement of countries among the external predictors of unemployment. Internal antecedents of employment are tradition-

al domestic factors determining unemployment. These are to capture the growth and production benefits of employment.

Typically, growth slowdowns coincide with rising unemployment. This negative correlation between GDP growth and unemployment has been named 'Okun's law' after A. Okun first documented it in the early 1960s. Okun's study which found an Okun coefficient of 3 in the United States for the period of 1947-1960 revealed that unemployment tended to fall by 1% for every 3% rise in output. Following Okun's conclusion regarding the trade-off relation between unemployment and real GDP growth, new studies on different aspects of variables and methodological issues have provided new empirical evidence. For example, Gil-Alana, Skare, and Buric (2020) test Okun's law by analyzing a dataset of 24 countries using fractionally integrated methods. As in many other studies (e.g. Onaran, 2008; Demiral, 2016), their results change across countries which underlines the importance of grouping countries by different aspects in order to hinder possible estimation biases. Many studies use gross trade statistics which tend to be unable to capture the real benefit of export and the real cost of import. This ignorance has left an important research gap in the relevant literature. As a result, many research initiatives conclude that economic growth alone does not necessarily result in more jobs. This research strand tends to provide support for the jobless growth phenomenon. A cross-country study of Bartolucci et al. (2018) confirms the general validity of Okun's law but the Okun coefficients substantially vary over the income levels of countries. Another demand-side theoretical framework is the Phillips curve which suggests a negative nexus between wage inflation and unemployment. Even the simple Phillips curve relationship has been later questioned and weakened by other studies, there are cross-country studies (e.g. Turner and Seghezza, 1999) yet finding a long-run relationship between inflation and unemployment.

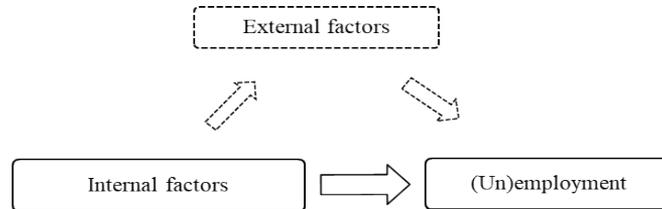
Taken a closer look at developed countries, because their export baskets mostly comprise high-tech products and advanced service contents, low skilled workers are in the disadvantageous group. Greenaway et al. (1999) investigated the effects of trade on employment in the United Kingdom in a dynamic labor demand framework, on a panel of 167 manufacturing industries and found trade, both in terms of imports and exports, leading to decreases in the labor demand. Freeman (2000) analyzed national and regional time series of the United States economy and found employment was not that responsive to the growth. Ball et al. (2017) tested Okun's law in the United States and 20 advanced economies and found that Okun's law was a strong relationship in most countries. They also found that the coefficient in the relationship varied substantially across countries as similar to the cases of many studies. They partly explain this variation with specific features of national labor markets of countries even differences in employment protection legislation do not have any effect.

Unemployment research mostly tends to cover developing countries for the reasons stated earlier. As one of the examples of studies of developing countries, employing country-specific panel data analysis based on data of Central and East European countries, Onaran (2008) found a generally positive but weak relationship between growth and employment. A study by Aydiner-Avsar and Onaran (2010) analyzed the effects of wages, openness, and demand on employment in the private manufacturing industry in Turkey based on panel data for the period of 1973-2001. They found that wage elasticity of employment increased after trade liberalization, output elasticity of labor demand was higher than wage elasticity in the total manufacturing sector, and trade had a weak effect. They also found some evidence of a negative import effect in the low-skilled sectors whereas in the high- and medium-skilled group a complementary relation between domestic labor and imported inputs dominated the effects. Folawewo and Adeboje (2017) analyzed the relationship between macroeconomic aggregates and unemployment in the Economic Community of West African States and found that GDP growth had a reducing but insignificant effect on the unemployment rate. Their other finding reveals that inflation has an overwhelming positive impact on unemployment. Both pieces of evidence indicate the invalidity of the Okun's law and Phillips curve hypotheses, respectively. Our study adopts an approach pointing out that what countries produce and export, their structural changes, industrialization trajectories, and development level matter for the unemployment-GDP relationship. Besides dealing with the real gains from the trade based on the value-added approach, the study also takes the impacts of GVCs involvement of countries into account by including the real value-added contribution in foreign trade.

### 3. EMPIRICAL FRAMEWORK

#### 3.1 Model and Variables

Since the study aims to assess the direct and indirect influences of both internal and external factors on unemployment, the theoretical model of the study is proposed as in Figure 1.



**Figure 1.** The proposed theoretical model for the study

The model shown in Figure 1 posits a two-step relationship between the variables that internal factors may be affecting unemployment directly. On the other hand, these factors can also have indirect impacts on unemployment depending on the mutual relationships among internal factors, external factors, and unemployment. Based on the evidence of previous studies the regression model of the study is constructed as shown in equation 1.

$$unemp_{it} = \beta_0 + \beta_1 rgrowth_{it} + \beta_2 gove_{it} + \beta_3 inf_{it} + \beta_4 hci_{it} + \beta_5 popg_{it} + \beta_6 ind_{it} + \beta_7 open_{it} + \beta_8 infdi_{it} + \beta_9 outfdi_{it} + \beta_{10} fvsx_{it} + \beta_{11} dvsm_{it} + u_{it} \quad (1)$$

$$\left( \begin{array}{l} i_{global}=1, \dots, 35; \\ i_{developed\ countries}=1, \dots, 18; \\ i_{developing\ countries}=1, \dots, 17; \\ t=2005, \dots, 2015=T \end{array} \right)$$

Where ‘unemp’ is unemployment, ‘rgrowth’ is real economic growth, ‘gove’ is government expenditure, ‘inf’ is inflation, ‘hci’ is human capital, ‘popg’ is population growth, ‘ind’ is industrialization level, ‘open’ is trade openness, and ‘infdi’ and ‘outfdi’ are FDI inflows and outflows, while ‘fvsx’ and ‘dvsm’ symbolize foreign value-added share of gross exports and domestic value-added share of gross imports, respectively. Proxies of these variables and their descriptions are presented in Table 1. In equation 1, the indices ‘i’ and ‘t’ respectively correspond to cross-section (countries) and time units (years), ‘β<sub>0</sub>’ is the constant term, ‘u’ is the error term, and betas (β<sub>1</sub>, ..., β<sub>11</sub>) are the coefficients of the respective explanatory variables to be estimated.

**Table 1.** Variables, descriptions, and sources

Variables	Descriptions	Sources
<i>Dependent variable</i>		
<i>unemp</i>	Total unemployment as a percentage of the total labor force	WB WDI, 2020
<i>Explanatory variables</i>		
Internal sources of employment		
<i>rgrowth</i>	Percentage annual change in real GDP per worker	WB WDI, 2020
<i>gove</i>	General government final consumption expenditure as a share of GDP	
<i>inf</i>	Annual inflation rate. Calculated based on the consumer price index (CPI). Used as an interchangeable proxy for wage level and labor cost	
<i>hci</i>	Percentage change in human capital index calculated based on years of schooling and returns to education	PWT, 2020
<i>popg</i>	Population growth as an annual percentage	WB WDI, 2020
<i>ind</i>	Industrialization level measured as manufactures exports as a percentage of total merchandise export	
External sources of employment		

<i>open</i>	The sum of exports and imports of goods and services measured as a percentage share of GDP	WB WDI, 2020
<i>infdi</i>	Net foreign direct investment inflows as a percentage share of GDP	
<i>outfdi</i>	Net foreign direct investment outflows as a percentage share of GDP	
	GVC involvement factors	
<i>fvsx</i>	Foreign value-added share of gross exports, percentage	OECD TIVA, 2020
<i>dvsm*</i>	Domestic value-added share of gross imports, percentage	

Note: \*In the data source, *dvsm* series is not provided for the year 2016 but it is expanded 1 year through data generation process based on moving-average in order to have a greater number of cross-section than that of explanatory variables' coefficients which is necessary for random effect estimation while comparing fixed and random effect estimators.

### 3.2 Sample

The study uses a dataset of 35 countries from all around the world over a 12-year period spanning from 2005 to 2016. As many studies face, data availability has restricted the study to a short time span. Developing countries more severely suffer from this data unavailability. Besides the limited data availability, the sample was selected based on some criteria: Countries that are excessively dependent on oil revenues (*i.e.* oil-rich countries), those that have inconsiderable manufacturing export share in the world trading system and have little to no involvement in GVCs are excluded. As seen in Table 2, there are 18 developed countries and 17 developing countries in the study's sample. Developing countries included in the sample are sometimes investigated individually or as a group with different names such as emerging markets, industrializing economies, and newly industrialized countries. The figures in the parentheses in Table 2 are the 2005-2016 average of relevant countries' total unemployment rates which indicate that unemployment is a problem for both developing and developed countries. Spain (17.767) and South Africa (25.469) are those that have the highest unemployment rates in respectively developed and developing countries group.

**Table 2.** Countries included in the study's sample

Developed countries (18)		Developing countries (17)	
Australia (5.251)	Japan (4.127)	Argentina (8.223)	Peru (3.669)
Austria (5.175)	Netherlands (5.063)	Brazil (8.161)	Philippines (3.533)
Belgium (7.938)	Norway (3.472)	Chile (7.995)	Poland (9.901)
Canada (7.029)	Portugal (11.062)	China (4.533)	Russia (6.315)
Denmark (5.872)	Spain (17.767)	Colombia (10.281)	South Africa (25.469)
Finland (8.041)	Sweden (7.510)	India (2.644)	Thailand (0.848)
France (9.009)	Switzerland (4.379)	Indonesia (5.776)	Tunisia (14.518)
Germany (6.872)	United Kingdom (6.331)	Mexico (4.436)	Turkey (10.839)
Italy (9.237)	United States (6.642)	Morocco (9.454)	

Note: The figures in the parentheses are the 2005-2016 average of total unemployment rates.

### 3.3 Analysis and Empirical Results

The analysis proceeded for three separate groups of countries: All 35 countries (*i.e.* global panel), 18 developed countries and 17 developing countries. Table 3 shows descriptive statistics of the three clusters of countries followed by Table 4 which shows correlations of the dependent variable (unemployment) with the explanatory variables.

**Table 3.** Descriptive statistics

Variables	Mean	Median	Max.	Min.	Std. dev.
	Global panel (N:35, Obs.: 385)				
<i>unemp</i>	7.614	7.063	29.253	0.489	4.781
<i>rgrowth</i>	2.058	1.823	13.636	-8.513	3.126
<i>gove</i>	17.590	18.297	27.935	8.110	4.645
<i>inf</i>	3.645	2.589	40.283	-1.353	4.270
<i>hci</i>	2.941	3.014	3.742	1.661	0.542
<i>popg</i>	0.798	0.843	2.061	-1.854	0.544

<i>ind</i>	61.400	71.951	94.366	12.388	4.288
<i>open</i>	69.818	62.645	161.494	22.106	3.968
<i>infdi</i>	4.125	2.597	86.611	-5.615	7.368
<i>outfdi</i>	3.694	1.620	71.355	-4.718	8.001
<i>fvsv</i>	21.068	21.900	39.030	6.920	7.710
<i>dvsm</i>	0.845	0.630	4.637	0.046	0.890
<i>Developed countries (N:18, Obs.: 198)</i>					
<i>unemp</i>	7.252	6.889	26.094	2.493	3.783
<i>rgrowth</i>	0.680	1.069	5.869	-8.513	2.230
<i>gove</i>	20.493	20.160	27.935	10.909	3.573
<i>inf</i>	1.655	1.720	4.489	-1.353	1.242
<i>hci</i>	3.320	3.397	3.742	2.230	0.349
<i>popg</i>	0.611	0.589	2.061	-1.854	0.522
<i>ind</i>	68.121	75.180	91.970	14.650	20.383
<i>open</i>	76.802	69.965	161.494	24.491	33.530
<i>infdi</i>	5.078	2.303	86.611	-5.615	10.025
<i>outfdi</i>	6.058	3.026	71.355	-4.718	10.562
<i>fvsv</i>	22.049	22.940	37.010	9.430	6.821
<i>dvsm</i>	1.166	0.806	4.637	0.216	0.982

<i>Developing countries (N: 17, Obs.: 187)</i>					
<i>unemp</i>	7.998	7.209	29.253	0.489	5.635
<i>rgrowth</i>	3.518	3.621	13.636	-7.828	3.277
<i>gove</i>	14.517	13.926	20.796	8.110	3.544
<i>inf</i>	5.751	4.386	40.283	-0.900	5.227
<i>hci</i>	2.539	2.516	3.372	1.661	0.402
<i>popg</i>	0.996	1.069	1.889	-0.381	0.496
<i>ind</i>	54.284	63.764	94.366	12.388	26.054
<i>open</i>	62.422	55.989	140.437	22.106	26.121
<i>infdi</i>	3.116	2.690	11.340	0.152	1.910
<i>outfdi</i>	1.191	0.803	8.028	-0.739	1.329
<i>fvsv</i>	20.028	19.530	39.030	6.920	8.446
<i>dvsm</i>	0.506	0.289	3.557	0.046	0.623

Correlations matrix illustrates that there is not a strong correlation between unemployment and other variables in all country classifications. The relatively high correlations with *hci* (negative) for developed countries group and with *gov* (positive) for developing countries are consistent with the country characteristics that being a well-equipped skilled employee is one of the main sources of employment in developed countries that produce and export high-tech products. On the other hand, government expenditures in developing countries seem to be discouraging job-creating enterprises. This crowding-out effect indicates a general consideration of governmental institutions to have still been one of the main employment sources in many developing countries.

Before conducting regression analysis, all the variables were checked for stationarity using unit roots tests considering both common unit root process (Levin, Lin, and Chu *t* value) and individual unit root process (Im, Pesaran and Shin *W*-statistic; Augmented Dickey-Fuller (ADF) Fisher Chi-square; Phillips-Perron (PP) Fisher Chi-Square). Human capital index (*hci*) was found as nonstationary,  $I(1)$ , for all samples, thus, it was redefined as human capital change by taking the first difference. All the other variables were found level-stationary at the 10% level of significance. A panel data regression estimation can be conducted through pooled, fixed effect and random effect models. There are several tests to choose the best-fitting one. In the study the *F*-test and Hausman test were used to compare the fixed-effect model to the pooled-effect model and the fixed-effect model to the random effect model, respectively. In the study's case, both tests consistently verified that fixed-effect models are the most appropriate method to estimate all model specifications.

**Table 4.** Correlations of unemployment (unemp) by country groups

	Global panel (35 countries)	Developed countries (18 countries)	Developing countries (17 countries)
<i>rgrowth</i>	-0.148	-0.178	-0.220
<i>gove</i>	0.224	0.106	0.553
<i>inf</i>	0.028	-0.091	0.001
<i>hci</i>	-0.214	-0.526	-0.048
<i>popg</i>	-0.016	-0.302	0.142
<i>ind</i>	0.004	0.193	-0.065
<i>open</i>	-0.094	-0.112	-0.055
<i>infdi</i>	-0.092	-0.129	-0.072
<i>outfdi</i>	-0.136	-0.190	-0.105
<i>fvsx</i>	0.015	0.245	-0.100
<i>dvsm</i>	-0.175	-0.088	-0.266

Durbin-Watson statistics and residual test statistics respectively indicated autocorrelation and heteroscedasticity. In order to have robust results without biases stemmed from the autocorrelation and heteroscedasticity, linear regressions were estimated with panel-corrected standard errors (PCSE). The final control was about the multicollinearity problem that refers to high and linear relationships among explanatory variables. In addition to the low correlation coefficients, the variance inflation factors revealed that interrelations between regressors were between tolerance thresholds. Consequently, the regression models of the study were estimated within the balanced panel fixed-effect structure and results are reported<sup>3</sup> in Table 5.

**Table 5.** Panel least squares estimation of the determinants of unemployment  
(Dependent variable: *unemp*)

Variables	Global panel (N:35, Obs.: 420)	Developed countries (N:18, Obs.: 216)	Developing countries (N:17, Obs.: 204)
<i>rgrowth</i>	-0.162 [0.044] (0.000)***	-0.368 [0.085] (0.000)***	-0.097 [0.125 ] (0.269)
<i>gove</i>	0.234 [0.123] (0.058)*	0.220 [0.156 ] (0.161)	0.142 [0.152 ] (0.000)***
<i>inf</i>	-0.117 [0.041] (0.005)***	-0.336 [0.158] (0.035)**	-0.047 [0.048] (0.006)***
<i>hci</i>	0.251 [0.608] (0.263)	0.528 [0.397] (0.000)***	0.609 [0.164] (0.000)***
<i>popg</i>	-2.167 [0.327] (0.000)***	-1.723 [0.348 ] (0.000)***	-1.152 [0.992] (0.000)***
<i>ind</i>	-0.017 [0.025] (0.513)	-0.093 [0.042] (0.029)**	0.041 [0.022] (0.916)
<i>open</i>	0.074 [0.022] (0.001)***	0.128 [0.031] (0.000)***	-0.016 [0.141] (0.094)*
<i>infdi</i>	0.042 [0.032] (0.190)	0.041 [0.032 ] (0.203)	-0.211 [0.204] (0.473)
<i>outfdi</i>	-0.062 [0.034] (0.070)*	-0.031 [0.034 ] (0.353)	0.179 [0.284] (0.091)*
<i>fvsx</i>	-0.137 [0.079] (0.085)*	-0.234 [0.115 ] (0.044)**	0.118 [0.094] (0.211)
<i>dvsm</i>	-1.704 [0.698] (0.015)**	-0.436 [1.183 ] (0.713)	-0.420 [0.498 ] (0.057)*
Constant	3.310 [6.555] (0.962)	-8.615 [3.848] (0.476)	-6.196 [5.491 ] (0.192)
R <sup>2</sup>	0.915	0.897	0.963
Adjusted R <sup>2</sup>	0.901	0.874	0.955

<sup>3</sup> Unreported results are available from the authors upon request.

<i>F</i> -statistic	69.353 (0.000)***	39.263 (0.000)***	113.246 (0.000)***
<i>Cross-section/Period F</i>	63.784 (0.000)***	27.352 (0.000)***	72.083 (0.000)***
<i>Cross-Section/Period <math>\chi^2</math></i>	918.478 (0.000)***	362.314 (0.000)***	520.014 (0.000)***
<i>Hausman <math>\chi^2</math></i>	19.246 (0.057)*	20.211 (0.043)**	28.957 (0.000)***

Notes: \*\*\*, \*\* and \* indicate statistical significance at 1%, 5% and 10% levels, respectively. Panel-corrected standard errors (PCSE) are in [brackets] and probabilities are in (parentheses).

Results shown in Table 5 confirm two noteworthy inferences. First, it is hard to come to a consensus about the determinants of unemployment. Second, the influences of internal and external factors on employment vary substantially across the development stages and structural changes of countries. According to the statistically significant coefficients, economic growth tends to reduce unemployment for global panel and developed countries, but its impact is insignificant for developing countries which can be considered as a symptom of jobless growth for developing countries. Government expenditures are found leading to an increase in unemployment for all samples. Population growth is found to be reducing unemployment implying that labor force growth determines employment growth. Positive signs of human capital make the employment return of education controversial for all countries. Industrialization significantly has a reducing effect on unemployment in developed countries.

The study focuses on external factors. The direction of the impact of openness varies across samples that in developed countries trade openness tends to increase unemployment but tends to decrease it in developing countries. FDI inflows variable does not have a significant effect while outflowing FDI is found leading to an increase in unemployment in developing countries sample. Contradictorily, FDI outflows in developed countries that are sometimes blamed for carrying job opportunities to the developing countries are found rather reducing unemployment. Assessing the impacts of involvement in GVCs on unemployment is a specific interest in the study. Foreign value-added share of gross exports is found lessening the unemployment significantly in developed countries whereas the positive coefficient is found statistically insignificant for developing countries. As expected theoretically and intuitively, the domestic value-added share of gross imports is found significantly reducing unemployment in both developed and developing countries. Finally, high constants imply a common evidence that unemployment is a complex macroeconomic variable that might be affected by many factors that some of them are not measurable.

## CONCLUSION

There is a worldwide consensus about the importance of full employment. Thus, full employment remains at the center of any economic policy for all countries regardless of their development and national income levels. Starting from its undesired socio-economic consequences, both scholars and policy-makers have immensely attempted to clarify the factors affecting unemployment. Empirical studies in the related literature seem to have been restricted to either the internal factors such as investment, government expenditure, and economic growth or external factors such as globalization, trade, and foreign direct investment. A lesser number of studies have dealt with the influences of GVCs involvement of countries considering import share of gross export. These studies have naturally found a negative impact of GVCs on employment because of ignoring the export share of imports which is taken into account by only a few studies. Moreover, the evidence from a limited number of cross-country studies underlines the ambiguous relationship and addresses to the necessity of the consideration of development stages of countries while examining the GVCs and unemployment nexus.

Addressing the research gap, this study analyzed the determinants of unemployment using a 12-year (2005-2016) dataset of 35 countries distinguished into 18 developed and 17 developing countries. The study carried out panel regression analysis to estimate the influences of a set of internal (economic growth, government expenditure, inflation, human capital, population, industrialization) and external (trade openness, foreign investment, and GVCs involvement) factors on unemployment. The level of

countries' involvement in GVCs is measured by the foreign value-added share of gross exports and the domestic value-added share of gross imports.

Results of panel regression analysis reveal that the influences of internal and external factors on unemployment vary substantially across the development stages and structural changes of countries and it is hard to come to a global consensus about the common determinants of unemployment. There are some noteworthy findings of the study that can be summarized as follows: *i)* economic growth tends to stimulate employment for developed countries. Developing countries seem to have been facing jobless growth since their economic growth and unemployment relationship is insignificant. *ii)* Government expenditures were found contributing to unemployment for both developed and developing countries. This evidence points out that the crowding-out effect of government expenditure might be overwhelming its employment-creating effect. *iii)* The evidence of negative relationship between inflation and unemployment for both developed and developing countries groups provides strong support for the validity of the initial suggestion of the original Philips curve hypothesis for all countries. When inflation is used interchangeably with a wage increase, this evidence indicates the demand side of employment. *iv)* Positive signs of human capital make the employment return of education controversial for all countries. In this regard, quality of the education systems and local availability of specialized training services, as well as specific employment programs, become more important for all countries to provide job opportunities for their well-educated but inexperienced candidates for employment. *v)* Population growth was found to be reducing the unemployment in both country groups implying that labor force growth determines employment growth. This evidence again underlines the demand side of employment. On the other hand, since developing countries have a considerably larger young population compared to developed countries, persistent youth unemployment in developing countries is another issue examined in the literature. *vi)* The negative relationship between industrialization and unemployment for developed countries underlines that deindustrialization paths in these countries can result in a job loss. Consistently, there are some empirical findings linking the increasing unemployment in advanced countries to their decreasing competitiveness in manufacturing activities. *vii)* Trade openness deteriorates employment in developed countries whereas it tends to boost employment in the developing countries. This evidence apparently supports the premise that developed countries export capital/knowledge-intensive products and services and import labor-intensive products. This trade-off goes back to the suggestions of the Heckscher-Ohlin theory of comparative advantages. This inference is also consistent with the observation that in the global trade pattern where developing countries have been mostly occupying in labor-intensive chains of global value production. *viii)* FDI inflows variable does not have a significant effect while outflowing FDI is found leading to an increase in unemployment in developing countries sample. Contradictorily, in developed countries, FDI outflows that are sometimes blamed for carrying job opportunities to the developing countries, are found rather reducing unemployment. These findings give new insights into the roles of multinationals and international investments in forming the GVCs.

The study specifically aimed to assess the impacts of the involvement in GVCs on unemployment. However, how GVCs involvement proxied by foreign value-added share of gross exports and domestic value-added share of gross imports affects unemployment is a hard question to infer a general answer. *ix)* Foreign value-added share of gross exports is found lessening the unemployment significantly in developed countries whereas the positive coefficient is found statistically insignificant for developing countries. As expected theoretically and intuitively, the domestic value-added share of gross imports is found significantly reducing unemployment in both developed and developing countries. Based on this finding it can be concluded that all countries regardless of their development levels need to increase domestic value-added share in both export and import as well as in overall production. In the new division of labor and specialization pattern of international trade, the overall labor force of countries needs to be well-educated and equipped according to the level of the GVCs they are involving. Dynamically, some structural changes should be accompanied by supplementary labor orientation programs for both developed and developing countries. These domestic initiatives can help in reducing unemployment and rebalancing the world trade. Moreover, subsidies for stimulating entrepreneurial intentions also help improve the general employment in both developed and developing countries.

Overall findings, in general, keep doors open to the debates about jobless growth, jobless export, job-carrying functions of foreign direct investment, and net gains from trade in both developed and develop-

ing countries. Further studies considering these aspects will be able to present new and more specific results beyond just the gross benefits of trade. Potential studies considering different features of labor market like youth unemployment, gender gap in employment, natural rate of unemployment as well as labor force participation can enrich the existing literature. This study does not cover the potential impacts of structural policies, labor market regulations, entrepreneurial programs, and institutions that can be considered by future studies. For these reasons, new evidences from country-specific studies with micro-approach are needed for a better understanding of the roots of employment in a global context. Further studies are recommended to take informal activities into account as well since many people work informally especially in developing countries and informal employment may also be affected by global value chains and international trade.

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