

Supplementary Information

Is Productive Service Intermediate Input a good instrument for enhancing the Global Value Chain participation?

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Appendix A GVC Participation

A.1 Basic Structure of ICIO Table

Table A.1: OECD ICIO table

		Intermediate Use				Final Demand				Total Output
		1	2	...	N	1	2	...	N	
Intermediate Input	1	Z_{11}	Z_{12}	...	Z_{1N}	D_{11}	D_{12}	...	D_{1N}	X_1
	2	Z_{21}	Z_{22}	...	Z_{2N}	D_{21}	D_{22}	...	D_{2N}	X_2

	N	Z_{N1}	Z_{N2}	...	Z_{NN}	D_{N1}	D_{N2}	...	D_{NN}	X_N
Value-added		V_1	V_2	...	V_N					
Total Input		$(X_1)^T$	$(X_2)^T$...	$(X_N)^T$					

Table A.1 presents the structure of the OECD-ICIO table, which includes G sectors in N countries. Z_{NN} and D_{NN} are $G \times G$ matrices, while X_N and V_N are $G \times 1$ vectors. The coefficient of intermediate input A_{cs} and the coefficient of value-added $(A_V)_{cs}$ for sector s in country c can be defined as \mathbf{A} , where $\hat{\mathbf{X}}^{-1}$ is the diagonal matrix of X_{cs} . In fact, the final output \mathbf{X} can be decomposed as:

$$\mathbf{X} = \mathbf{AX} + \hat{\mathbf{D}} = \mathbf{A}^D \mathbf{X} + \mathbf{A}^F \mathbf{X} + \hat{\mathbf{D}}^D + \hat{\mathbf{D}}^F = \mathbf{A}^D \mathbf{X} + \hat{\mathbf{D}}^D + \mathbf{E} \quad (\text{A.1})$$

Where, $\mathbf{A}^D = \begin{bmatrix} \mathbf{A}_{1,1} & 0 & \cdots & 0 \\ 0 & \mathbf{A}_{2,2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \mathbf{A}_{N,N} \end{bmatrix}$ denotes coefficient of the domestic intermediate input, and each \mathbf{A}_{NN} is a $G \times G$ matrix. \mathbf{D} denotes the coefficient of inter-country intermediate input. $\hat{\mathbf{D}} = \left[\sum_{c'}^N \mathbf{D}_{1,c'}, \sum_{c'}^N \mathbf{D}_{2,c'}, \dots, \sum_{c'}^N \mathbf{D}_{N,c'} \right]^T$ denotes the aggregated final demand, $\hat{\mathbf{D}}^D = [\mathbf{D}_{1,1}, \mathbf{D}_{2,2}, \dots, \mathbf{D}_{N,N}]^T$ denotes domestic final demand, and $\hat{\mathbf{D}}^F = \hat{\mathbf{D}} - \hat{\mathbf{D}}^D$ denotes inter-country final demand. Based on the Leontief inverse matrix, the total output \mathbf{X} can be further expressed as:

$$\mathbf{X} = (\mathbf{I} - \mathbf{A}^D)^{-1} \hat{\mathbf{D}}^D + (\mathbf{I} - \mathbf{A}^D)^{-1} \mathbf{E} = \mathbf{L} \hat{\mathbf{D}}^D + \mathbf{LE} = \mathbf{B} \hat{\mathbf{D}} \quad (\text{A.2})$$

Where, $\mathbf{L} = (\mathbf{I} - \mathbf{A}^D)^{-1} = \begin{bmatrix} \mathbf{I} - \mathbf{A}_{1,1} & 0 & \cdots & 0 \\ 0 & \mathbf{I} - \mathbf{A}_{2,2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & \mathbf{I} - \mathbf{A}_{N,N} \end{bmatrix}^{-1}$ is the pure domestic Leontief inverse matrix which takes only the domestic value chains into account, and $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} \mathbf{I} - \mathbf{A}_{1,1} & -\mathbf{A}_{1,2} & \cdots & -\mathbf{A}_{1,N} \\ -\mathbf{A}_{2,1} & \mathbf{I} - \mathbf{A}_{2,2} & \cdots & -\mathbf{A}_{2,N} \\ \vdots & \vdots & \ddots & \vdots \\ -\mathbf{A}_{N,1} & -\mathbf{A}_{N,2} & \cdots & \mathbf{I} - \mathbf{A}_{N,N} \end{bmatrix}^{-1}$ is the global ma-

count, and $\mathbf{B} = (\mathbf{I} - \mathbf{A})^{-1} = \begin{bmatrix} \mathbf{I} - \mathbf{A}_{1,1} & -\mathbf{A}_{1,2} & \cdots & -\mathbf{A}_{1,N} \\ -\mathbf{A}_{2,1} & \mathbf{I} - \mathbf{A}_{2,2} & \cdots & -\mathbf{A}_{2,N} \\ \vdots & \vdots & \ddots & \vdots \\ -\mathbf{A}_{N,1} & -\mathbf{A}_{N,2} & \cdots & \mathbf{I} - \mathbf{A}_{N,N} \end{bmatrix}^{-1}$ is the global ma-

trix for the entire inter-country value chain.

The domestic value-added matrix \mathbf{V} , which is a $N \times NG$ matrix, can be define as:

$$\mathbf{V} = \overbrace{[\mathbf{V}_1, \mathbf{V}_2, \dots, \mathbf{V}_N]}^{} = \begin{bmatrix} \mathbf{V}_1 & \mathbf{0} & \cdots & \mathbf{0} \\ \mathbf{0} & \mathbf{V}_2 & \cdots & \mathbf{0} \\ \vdots & \vdots & \ddots & \vdots \\ \mathbf{0} & \mathbf{0} & \cdots & \mathbf{V}_N \end{bmatrix} \quad (\text{A.3})$$

where $\mathbf{V}_c = \mathbf{u}_G(\mathbf{I} - \sum_{c'}^N \mathbf{A}_{c'c})$ is the direct value-added share in each unit of gross output produced by countrys is equal to one minus the sum of the direct intermediate input share of all the domestic and foreign suppliers, \mathbf{u}_N is a $1 \times G$ unit vector. Worthy mentioning, for any given generic vector \mathbf{X} with length n , namely, $\mathbf{X} = [x_1, x_2, \dots, x_n]$ or $\mathbf{X} = [x_1, x_2, \dots, x_n]^T$, the overbrace-formed $\widehat{\mathbf{X}}$ denotes its is its $n \times n$ diagonal form,

$$\text{namely, } \widehat{\mathbf{X}} = \begin{bmatrix} x_1 & 0 & \cdots & 0 \\ 0 & x_2 & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & x_n \end{bmatrix}$$

A.2 Trade-related GVC participation

Then the directly absorbed value-added export can be defined as:

$$davaE_{cc'} = \widehat{\mathbf{V}_c \mathbf{L}_{cc'}} \mathbf{D}_{cc'} + \widehat{\mathbf{V}_c \mathbf{L}_{cc}} \mathbf{A}_{cc'} \mathbf{L}_{c'c'} \mathbf{D}_{cc'} \quad (\text{A.4})$$

The pure forward GVC trade-based participation (trGVC_pf) can be simply defined as the difference between the entire domestic value added that is exported and the one that is directly absorbed by the importer, namely, $davaE$:

$$\begin{aligned} \text{trGVC_pf}_{cc'} &= \widehat{\mathbf{V}_c \mathbf{L}_{cc}} \mathbf{E}_{cc'} - davaE_{cc'} \\ &= \widehat{\mathbf{V}_c \mathbf{L}_{cc}} \mathbf{A}_{cc'} \mathbf{L}_{c'c'} \left(\sum_{i \neq c'}^N \mathbf{D}_{c'i} + \sum_{i \neq c'}^N \mathbf{A}_{c'i} \sum_j^N \sum_k^N \mathbf{B}_{ij} \mathbf{D}_{jk} \right) \end{aligned} \quad (\text{A.5})$$

The pure backward GVC trade-based participation (trGVC_pb) can be given by the imported inputs embedded in the exports to final markets:

$$\begin{aligned} \text{trGVC_pb}_{cc'} &= \sum_{i \neq c}^N \widehat{\mathbf{u}_N \mathbf{A}_{ic} \mathbf{L}_{cc}} (\mathbf{D}_{cc'} + \mathbf{A}_{cc'} \mathbf{L}_{c'c'} \mathbf{D}_{c'c'}) \\ &= \left(\sum_{t \neq c}^N \widehat{\mathbf{V}_t \mathbf{B}_{tc}} + \widehat{\mathbf{V}_c \mathbf{L}_{cc}} \sum_{i \neq c}^N \mathbf{A}_{ci} \mathbf{B}_{ic} \right) (\mathbf{D}_{cc'} + \mathbf{A}_{cc'} \mathbf{L}_{c'c'} \mathbf{D}_{c'c'}) \end{aligned} \quad (\text{A.6})$$

The two-sided GVC trade-based participation (trGVC_ts) can be calculated by the imported inputs embedded in the re-exports of the bilateral partner:

$$\begin{aligned}
trGVC_ts_{cc'} &= \sum_{i \neq c}^N \overbrace{\mathbf{u}_N \mathbf{A}_{ic} \mathbf{L}_{cc}}^N \left(\mathbf{A}_{cc'} \mathbf{L}_{c'c'} \sum_{i \neq c'}^N \mathbf{E}_{c'i} \right) \\
&= \overbrace{\mathbf{V}_c \mathbf{L}_{cc} \sum_{i \neq c}^N \mathbf{A}_{ci} \mathbf{B}_{ic}}^N \left[\mathbf{A}_{cc'} \mathbf{L}_{c'c'} \sum_{i \neq c'}^N \left(\mathbf{D}_{c'i} + \mathbf{A}_{ci} \sum_j^N \sum_{k \neq c}^N \mathbf{B}_{ij} \mathbf{D}_{jk} \right) \right]
\end{aligned} \tag{A.7}$$

Finally, the GVC-related trade (trGVC) within the export flow from s to r for any sector n can be expressed as the sum of three components above:

$$trGVC_{cc'} = trGVC_pf_{cc'} + trGVC_pb_{cc'} + trGVC_ts_{cc'} \tag{A.8}$$

A.3 Output-related GVC participation

The pure forward GVC output-based participation (orGVC_pf) is equal to GVC-related value-added, meaning that value-added are sold by the sector of origin abroad or domestically and incorporated in exports later on, which can be expressed as:

$$orGVC_pf_c = \overbrace{\mathbf{V}_c}^N \sum_{c' \neq c}^N (\mathbf{A}_{cc'} \mathbf{reE}_{c'} + \mathbf{A}_{cc} \mathbf{L}_{cc} \mathbf{A}_{cc'} \mathbf{reE}_{c'}) \tag{A.9}$$

where \mathbf{reE}_c is the output of country c further re-exported, namely, $\mathbf{reE}_c = \mathbf{X}_c - \mathbf{L}_{cc} \mathbf{D}_{cc}$.

The pure backward GVC output-based participation (orGVC_pb) is equal to GVC-related final goods production, meaning that imported inputs are embedded by the sector in final goods, which can be expressed as:

$$orGVC_pb_c = \sum_i^N \left(\overbrace{\mathbf{V}_i \mathbf{L}_{ii} \sum_{j \neq i}^N \mathbf{A}_{ij} \mathbf{B}_{jc}}^N \sum_k^N \mathbf{D}_{ck} \right) - \sum_{i \neq c}^N \overbrace{\mathbf{V}_i \mathbf{L}_{ii} \mathbf{A}_{ic} \mathbf{L}_{cc}}^N \mathbf{D}_{cc} \tag{A.10}$$

The two-sided GVC trade-based participation (orGVC_ts) can be calculated by the sum of two components, representing domestic inputs and imported inputs are not embedded in final goods:

$$orGVC_ts_c = impGVC_ts_c + domGVC_ts_c \tag{A.11}$$

where impGVC_ts denotes GVC-related imported inputs, which is not pure backward but can be seen as two-sided, meaning that imported inputs are bought directly or indirectly by the sector (backward) but are sold to other sectors (forward):

$$impGVC_ts_c = \sum_i^N \left(\overbrace{\mathbf{V}_i \mathbf{L}_{ii} \sum_{j \neq i}^N \mathbf{A}_{ij} \mathbf{B}_{jc}}^N \mathbf{X}_c \right) - \sum_{i \neq c}^N \overbrace{\mathbf{V}_i \mathbf{L}_{ii} \mathbf{A}_{ic} \mathbf{L}_{cc}}^N \mathbf{L}_{cc} \mathbf{D}_{cc} - orGVC_pb_c \tag{A.12}$$

and domGVC_ts denotes GVC-related domestic inputs, which are bought within domestic chains (backward component) but also sold to other domestic sectors or directly exported (forward component):

$$domGVC_ts_c = \overbrace{\mathbf{V}_c \mathbf{L}_{cc} \mathbf{A}_{cc}}^N \sum_{c' \neq c}^N (\mathbf{A}_{cc'} \mathbf{reE}_{c'} + \mathbf{A}_{cc} \mathbf{L}_{cc} \mathbf{A}_{cc'} \mathbf{reE}_{c'}) \tag{A.13}$$

Finally, the GVC-related output consists of three components mentioned above:

$$orGVC_c = orGVC_pf_c + orGVC_pb_c + orGVC_ts_c \quad (\text{A.14})$$

Appendix B Open Flow Network

In order to calculate PS , consider using the flow network approach based on the Markov Chain. By row-normalizing $M_{ij} = \frac{Z_{ij}}{\sum_{j=1}^{N+1} Z_{ij}}$, Z can be transformed into a Markov Transition Matrix M . M denotes the “one-step transition” probability from vertex i to vertex j within the flow network. Based on this, the “complete transition” probability P from i to j can be obtained by:

$$P = \sum_{m=1}^{\infty} (M^m) = M + M^2 + \dots = \frac{M}{I - M} \quad (\text{B.1})$$

Topologically, P_{ij} represents the total probability of an individual transitioning from vertex i to j through one, two, and infinite steps in the flow network. It is worth noting that P_{ij} can be decomposed into two parts: $P_{ij} = P_{\phi,ij} + P_{\psi,ij}$, where $P_{\phi,ij}$ represents the “hitting probability” of an individual within the network transitioning from vertex i to j without ever passing through j, and $P_{\psi,ij}$ represents the “circular probability” of an individual within the network transitioning from i to node j which will necessarily pass through j. Given the definition of productive service intermediate inputs, once the input to any non-productive service sector is completed, it can be considered to have completed the input process, and its subsequent “flow” can no longer be considered. Therefore, the primary focus of productive service intermediate inputs is on the “hitting probability” aforementioned.

Consider the Leontief matrix, the basic matrix U can be defined as:

$$U = I + M + M^2 + \dots = (I - M)^{-1} \quad (\text{B.2})$$

The “hitting probability” and “circular probability” between vertex i and j mentioned above can also be expressed in terms of “flow”. That is, for any vertex i and j in the network, the total flow t_{ij} of individuals within the network from vertex i to j includes the hitting flow ϕ_{ij} and the circular flow ψ_{ij} , namely:

$$t_{ij} = \phi_{ij} + \psi_{ij} \quad (\text{B.3})$$

Where, circular flow ψ_{ij} can be calculated by:

$$\psi_{ij} = \phi_{ij} \times \left(\sum_{m=1}^{\infty} M^m \right)_{jj} \quad (\text{B.4})$$

Then, t_{ij} and ϕ_{ij} can be rewritten as:

$$t_{ij} = \phi_{ij} + \phi_{ij} \times \left(\sum_{m=1}^{\infty} M^m \right)_{jj} = \phi_{ij} \times \left(1 + \left(\sum_{m=1}^{\infty} M^m \right)_{jj} \right) = \phi_{ij} \times (U)_{jj} \phi_{ij} = \frac{t_{ij}}{u_{jj}} \quad (\text{B.5})$$

Given the circular flow of vertex i itself, which means that an individual within the network station in vertex i continuously, \hat{t}_{ij} of i to j will actually be:

$$\hat{t}_{ij} = \frac{t_{ij}}{u_{ii}} u_{ij} \quad (\text{B.6})$$

And hitting flow ϕ_{ij} can be expressed as:

$$\phi_{ij} = \frac{\hat{t}_{ij}}{u_{jj}} = \frac{t_{ij} u_{ij}}{u_{ii} u_{jj}} \quad (\text{B.7})$$

Correspondingly, the hitting probability $P_{\phi,ij}$ will be equivalent to:

$$P_{\phi,ij} = \frac{u_{ij}}{u_{ii} u_{jj}} = \frac{(\sum_{m=0}^{\infty} (\mathbf{M}^m))_{ij}}{(\sum_{m=0}^{\infty} (\mathbf{M}^m))_{ii} (\sum_{m=0}^{\infty} (\mathbf{M}^m))_{jj}} \quad (\text{B.8})$$

Under the framework of this article, $P_{\phi,ij}$ represents the servitization of manufacturing based on "hitting probability"; the higher $P_{\phi,ij}$, the higher the level of servitization of manufacturing, and vice versa.

Appendix C Complexity in the bipartite network

C.1 Bipartite Network Framework

Before calculating complexity, constructing the bipartite network based on the 2-mode data with two dimensions is indispensable. A usual approach to transforming the 2-mode data into a network is calculating the Revealed Comparative Advantage (RCA) proposed by (Balassa, 1965, 2013), which means that the element M_{cp} of the Adjacency Matrix \mathbf{M} corresponding to the bipartite network is actually the RCA_{cp} :

$$M_{cp} = RCA_{cp} = \frac{A_{cp}/\sum_p A_{cp}}{\sum_c A_{cp}/\sum_c \sum_p A_{cp}} \quad (\text{C.1})$$

where A_{cp} is original 2-mode data with two dimensions c and p .

Within the bipartite network, issues on "complexity" can be divided into two dimensions, namely, discussing the complexity of two objects corresponding to the two types of vertexes (Sciarra et al., 2020; Tacchella et al., 2012). As for a bipartite network consists of two type vertexes representing country and products respectively, issues of complexity can be described by determining two properties — X_c and Y_p , which represent the complexity properties of counties and products, respectively. Quantifying complexity is just equal to solving the coupled equations below:

$$\begin{cases} X_c = f(Y_1, Y_2, \dots, Y_t, M_{cp}) \\ Y_p = g(X_1, X_2, \dots, X_c, M_{cp}) \end{cases} \quad (\text{C.2})$$

The two functions in Eq.(C.2) allows one to recast the determination of X_c and Y_p as the solutions of an eigen-problem of a suitable transformation matrix \mathbf{W} .

$$\begin{cases} X_c = \frac{1}{\sqrt{\lambda}} \sum_p W_{cp} Y_p \\ Y_p = \frac{1}{\sqrt{\lambda}} \sum_c W_{cp} X_c \end{cases} \Leftrightarrow \begin{cases} X_c = \frac{1}{\lambda} \sum_p \sum_{c'} W_{cp} W_{c'p} X_{c'} = \frac{1}{\lambda} \sum_{c'} N_{cc'} X_{c'} \\ Y_p = \frac{1}{\lambda} \sum_c \sum_{p'} W_{cp} W_{cp'} Y_{p'} = \frac{1}{\lambda} \sum_{p'} G_{pp'} Y_{p'} \end{cases} \quad (\text{C.3})$$

where, W_{cp} can be calculated from M_{cp} by some kind of algorithm; λ is eigenvalue. $N_{cc'} = (\mathbf{W}\mathbf{W}^T)_{cc'}$ and $G_{pp'} = (\mathbf{W}^T\mathbf{W})_{pp'}$ are symmetrical square matrixes; thereinto, \mathbf{N} and \mathbf{G} can be explained as the proximity matrix of countries and products respectively.

C.2 Fitness and Complexity Algorithm

To obtain W_{cp} , the Fitness and Complexity algorithm recast Eq.(C.3) by determining two complexities — fitness F_c for countries, and complexity Q_p for technologies (Tacchella et al., 2012):

$$\begin{cases} \tilde{F}_c^{(n)} = \sum_p M_{cp} Q_p^{(n-1)}, & \forall c \\ \tilde{Q}_p^{(n)} = \frac{1}{\sum_c M_{cp} \frac{1}{F_c^{(n-1)}}}, & \forall p \end{cases} \Leftrightarrow \begin{cases} F_c^{(n)} = \frac{\tilde{F}_c^{(n)}}{\sum_c \tilde{F}_c^{(n)}/C} \\ Q_p^{(n)} = \frac{\tilde{Q}_p^{(n)}}{\sum_p \tilde{Q}_p^{(n)}/P} \end{cases} \quad (\text{C.4})$$

and the initial conditions are: $\begin{cases} \tilde{F}_c^{(0)} = 1, & \forall c \\ \tilde{Q}_p^{(0)} = 1, & \forall p \end{cases}$.

In Eq.(C.4), the intermediations of fitness and complexity, $\tilde{F}_c^{(n)}$ and $\tilde{Q}_p^{(n)}$, are all standardized in each step, which make $\tilde{F}_c^{(n)}$ and $\tilde{Q}_p^{(n)}$ tend to be converged. Therefore, the equations in iterative form can be expressed as non-iterative form, by introducing rescaling factors $c_F = C/\sum_p Q_p s_p$ and $c_Q = \sum_p Q_p s_p/P$:

$$\begin{cases} F_c = c_F \sum_p M_{cp} Q_p \\ Q_p = c_Q \frac{1}{\sum_c M_{cp} \frac{1}{F_c}} \end{cases} \quad (\text{C.5})$$

where s_p is the weight of technology vertex, namely $s_p = \sum_c M_{cp}$. In Eq.(C.5), Q_p is expressed as a non-linear function $f_{non-linear}(F_1, F_2, \dots, F_c, M_{cp})$. Based on the Taylor Expansion (Sciarra et al., 2020), Eq.(C.5) can be approximatively expressed in a linear form:

$$\begin{cases} F_c \simeq c_F \sum_p M_{cp} Q_p \\ Q_p \simeq \frac{c_Q}{(s_p')^2} \sum_c \frac{M_{cp} F_c}{s_c^2} \end{cases} \quad (\text{C.6})$$

where s_c is the weight of country vertex, namely $s_c = \sum_p M_{cp}$ and $s'_p = \sum_c M_{cp}/s_c$.

Eq.(C.5) is a linear form of Eq.(C.2) based on the FC algorithm, let $\begin{cases} X_c = F_c/s_c \\ Y_p = Q_p/s_p' \end{cases}$, and N/G can be expressed as:

$$\begin{cases} N_{cc'} = \frac{\sum_{c'} M_{cp} M_{c'p}}{(s'_p)^2 s_{c'} s_c} \\ G_{pp'} = \frac{\sum_{p'} M_{cp} M_{cp'}}{(s_p)^2 s'_{p'} s'_p} \end{cases} \quad (\text{C.7})$$

C.3 Matrix-Estimation Exercise

Because it is inevitable for the FC algorithm to generate ad hoc assumptions for their purpose of calculating the Eigenvector Centrality to some extent, which will make the results lack of effectiveness (Sciarra et al., 2018), conducting modification by the matrix-estimation exercise will be helpful. In terms of an adjacency matrix A , the matrix estimator \hat{A}_{ij} will depend on the centrality of vertex i and j, namely:

$$\hat{A}_{ij}(s) = f(x_i, x_j) = \sum_{t=1}^s \gamma_t x_{i,t} x_{j,t} = \gamma_1 x_{i,1} x_{j,1} + \gamma_2 x_{i,2} x_{j,2} + \dots + \gamma_s x_{i,s} x_{j,s} \quad (\text{C.8})$$

The same as OLS, \hat{A}_{ij} can be estimated by minimizing its Squared Error (SE). Actually, SE be partitioned into SE_0 and SE_k ; thereinto SE_0 is independent of x_k , and SE_k depending on x_k :

$$SE = SE_0 + SE_k = \sum_i \sum_j (A_{ij} - \hat{A}_{ij})^2 = \sum_i \sum_j (A_{ij} - f(x_i, x_j))^2 \quad (\text{C.9})$$

Because of SE_0 being independent of x_k , minimizing SE just equal to minimizing SE_k , which means that the derivate of SE_k should be equal to 0, namely:

$$\frac{\partial SE}{\partial x_k} = \frac{\partial SE_k}{\partial x_k} = 0 \quad (\text{C.10})$$

And based on the concept of unique contribution of commonality analysis, the unique contribution of the vertex k can be expressed as:

$$UC_k = R_N^2 - R_{N \setminus k}^2 == \frac{SE_{N \setminus k} - SE_N}{\sum_i \sum_j A_{ij} (1 - \frac{\sum_i \sum_j A_{ij}}{N^2})} \quad (\text{C.11})$$

where R_N^2 denotes the goodness of the estimation \hat{A}_{ij} by considering all centrality of vertexes, and $R_{N \setminus k}^2$ denotes that by excluding vertex k. Since invariance of TSS whether excluding vertex k or not, UC_k just depends on $\Delta SE = SE_{N \setminus k} - SE_N$:

$$\Delta SE(s) = -2 \sum_{t=1}^s \gamma_t^2 x_{k,t}^2 \sum_i x_{i,t}^2 + 4 \sum_{t=1}^s \gamma_t x_{k,t} \sum_i A_{ik} x_{i,t} + \left(\sum_{t=1}^s \gamma_t x_{k,t}^2 \right)^2 \quad (\text{C.12})$$

The unique contribution UC_k of vertex k can be expressed as:

$$UC_k(s) = 2 \sum_{t=1}^s \gamma_t^2 x_{k,t}^2 + \left(\sum_{t=1}^s \gamma_t x_{k,t}^2 \right)^2 \quad (\text{C.13})$$

Unique contribution UC_k represents the importance of a vertex derived from rectification of eigenvector centrality.

Thus, based on combining the FC algorithm and the unique contribution in the matrix-estimation exercise with $s = 2$, indicators for measuring the complexity of countries and products can be constructed, namely, CCOMP for countries and PCOMP for products respectively:

$$\begin{cases} CCOMP_c = \left(\sum_{i=1}^2 \lambda_i^N (v_{c,i}^N)^2 \right)^2 + 2 \sum_{i=1}^2 (\lambda_i^N)^2 (v_{c,i}^N)^2 \\ PCOMP_p = \left(\sum_{i=1}^2 \lambda_i^G (v_{p,i}^G)^2 \right)^2 + 2 \sum_{i=1}^2 (\lambda_i^G)^2 (v_{p,i}^G)^2 \end{cases} \quad (\text{C.14})$$

where $\lambda_1^N / \lambda_2^N$ and $\lambda_1^G / \lambda_2^G$ are the largest 2 eigenvalues of the modified proximity matrixes $N = \begin{cases} N_{cc'} = \frac{\sum_{c'} M_{cp} M_{c'p}}{(s_p')^2 s_{c'} s_c}, & \forall c' \neq c \\ N_{cc'} = 0, & c' = c \end{cases}$ and $G = \begin{cases} G_{pp'} = \frac{\sum_{p'} M_{cp} M_{cp'}}{(s_p)^2 s_{p'} s_p}, & \forall p' \neq p \\ G_{pp'} = 0, & p' = p \end{cases}$. $v_{c,1}^N / v_{c,2}^N$ and $v_{p,1}^G / v_{p,2}^G$ are the eigenvectors corresponding to $\lambda_1^N / \lambda_2^N$ and $\lambda_1^G / \lambda_2^G$ respectively.

C.4 Data Pre-processing

While measuring the "quality" of PSII, the bipartite network will be constructed based on OECD ICIO table, i.e., setting:

$$A_{t,cp} = \frac{\sum_j^{g_n} Z_{t,n,ij}}{X_{t,n,i}} \quad (\text{C.15})$$

where $Z_{t,n,ij}$ denotes the intermediate inputs of sector i to sector j in country n of year t ; $X_{t,n,i}$ denotes the total output of sector i in country n of year t . The indicator of PSIIcomp for countries can be given by $CCOMP_c$.

While measuring the knowledge complexity, the bipartite network will be constructed based on patent data provided by OECD, i.e., setting:

$$A_{t,cp} = P_{t,cp} \quad (\text{C.16})$$

where $P_{t,cp}$ denotes the patent number of country c in technology domain p of year t ; and the knowledge complexity indicator for countries can be given by $CCOMP_c$.

While measuring the economic complexity, the bipartite network will be based on trade data provided by TiVA, i.e., setting:

$$A_{t,cp} = T_{t,cp} \quad (\text{C.17})$$

where $T_{t,cp}$ denotes the trading value of country c in technology domain p of year t ; and the economic complexity indicator for countries can be also given by $CCOMP_c$.

Appendix D Research Design

Table D.1: Industries of manufacturing and service.

Sector	ICIO code	Industry
Manufacturing	D05T06	Mining and quarrying, energy producing products
	D07T08	Mining and quarrying, non-energy producing products
	D10T12	Food products, beverages and tobacco
	D13T15	Textiles, textile products, leather and footwear
	D16	Wood and products of wood and cork
	D17T18	Paper products and printing
	D19	Coke and refined petroleum products
	D20	Chemical and chemical products
	D21	Pharmaceuticals, medicinal chemical and botanical products
	D22	Rubber and plastics products
	D23	Other non-metallic mineral products
	D24	Basic metals
	D25	Fabricated metal products
	D26	Computer, electronic and optical equipment

Sector	ICIO code	Industry
	D27	Electrical equipment
	D28	Machinery and equipment, nec
	D29	Motor vehicles, trailers and semi-trailers
	D30	Other transport equipment
Service	D09	Mining support service activities
	D31T33	Manufacturing nec; repair and installation of machinery and equipment
	D35	Electricity, gas, steam and air conditioning supply
	D36T39	Water supply; sewerage, waste management and remediation activities
	D41T43	Construction
	D45T47	Wholesale and retail trade; repair of motor vehicles
	D49	Land transport and transport via pipelines
	D50	Water transport
	D51	Air transport
	D52	Warehousing and support activities for transportation
	D53	Postal and courier activities
	D55T56	Accommodation and food service activities
	D58T60	Publishing, audiovisual and broadcasting activities
	D61	Telecommunications
	D62T63	IT and other information services
	D64T66	Financial and insurance activities
	D68	Real estate activities
	D69T75	Professional, scientific and technical activities
	D77T82	Administrative and support services
	D84	Public administration and defence; compulsory social security
	D85	Education
	D86T88	Human health and social work activities
	D90T93	Arts, entertainment and recreation
	D94T96	Other service activities
	D97T98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

Table D.2: Industries of productive services.

ICIO code	ISIC rev.4	Industry
D09	09	Mining support service activities
D41T43	41, 42, 43	Construction
D49	49	Land transport and transport via pipelines
D50	50	Water transport
D51	51	Air transport
D52	52	Warehousing and support activities for transportation
D62T63	62, 63	IT and other information services
D64T66	64, 65, 66	Financial and insurance activities
D69T75	69 to 75	Professional, scientific and technical activities
D77T82	77 to 82	Administrative and support services
D84	84	Public administration and defence; compulsory social security
D97T98	97, 98	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

Table D.3: Variable abbreviations, names and descriptions

Classification	Abbr.	Name	Description
Dependent variable	orGVC	Ouput-related GVC participation	-
	orGVC_pb	Pure backward ouput-related GVC participation	-
	orGVC_pf	Pure forward ouput-related GVC participation	-
	orGVC_ts	Mixed Propagation Length	-
Core independent variable	PSII	Productive Service Intermediate Input (quantity)	Share of Productive Service Intermediate Input to total output of service sector
	PSIIComp	Productive Service Intermediate Input complexity (quality)	Percentile ranking of Productive Service Intermediate Input complexity
Control variable	freedom	Institutional quality	Economic Freedom Index
	HCI	Human capital	Human Capital Index
	depreciate	Asset depreciation	Average depreciation rate of the capital stock
	work	Working hours	Logarithmic average annual hours worked by persons engaged
	patent	Patent output	Logarithmic number of annual patent output
	GFCF	Fixed capital	Ratio of Gross Fixed Capital Formation to GDP
	GFCE	Government expenditure	Ratio of Government Final Consumption Expenditure to GDP
	labor	labor force	Labor force participation rate
	highend	High-tech output	Ratio of medium and high-tech manufacturing value-added to GDP
	openness	Openness of market	Ratio of total value of export and import to GDP
	capitalize	Market capitalization	Market Capitalization Index

Appendix E Robustness Checks and Endogeneity Handling

E.1 Results of Robustness Checks

Table E.1: Full results of robustness check based on explained variable replacement

Variable	GVC participation							
	trGVC		trGVC_pb		trGVC_pf		trGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSII	1.585*** (0.308)		1.649*** (0.326)		1.192*** (0.304)		1.476*** (0.404)	
PSIIcomp		0.391*** (0.080)		0.350*** (0.104)		0.410*** (0.072)		0.316*** (0.108)
policy	0.230*** (0.029)	0.228*** (0.027)	0.191*** (0.031)	0.190*** (0.030)	0.272*** (0.033)	0.266*** (0.031)	0.180*** (0.029)	0.179*** (0.027)
HCI	0.394*** (0.056)	0.302*** (0.053)	0.520*** (0.064)	0.434*** (0.056)	0.220*** (0.046)	0.133** (0.054)	0.392*** (0.081)	0.314*** (0.076)
depreciate	10.992 (8.549)	14.752 (8.721)	14.743 (9.512)	18.494* (9.493)	10.248 (8.043)	13.396 (8.308)	10.678 (12.009)	14.045 (11.964)
work	0.180 (0.211)	0.106 (0.226)	0.078 (0.254)	0.002 (0.261)	0.326 (0.220)	0.269 (0.234)	0.479* (0.266)	0.410 (0.280)
patent	0.094*** (0.024)	0.068** (0.025)	0.025 (0.029)	-0.002 (0.032)	0.133*** (0.022)	0.114*** (0.021)	0.112*** (0.026)	0.088*** (0.025)
GFCF	1.243*** (0.314)	1.262*** (0.339)	1.396*** (0.260)	1.431*** (0.298)	0.797* (0.397)	0.779* (0.403)	1.236*** (0.301)	1.267*** (0.318)
GFCE	-2.575** (0.963)	-1.978* (1.007)	-1.465 (0.972)	-0.914 (1.025)	-2.791** (0.987)	-2.198** (1.025)	-2.381** (1.064)	-1.884 (1.102)
labor	0.371 (0.376)	0.506 (0.396)	-0.159 (0.374)	-0.069 (0.412)	0.862** (0.400)	1.066** (0.402)	0.199 (0.420)	0.281 (0.457)
highend	0.111 (0.158)	0.173 (0.143)	0.176 (0.136)	0.242* (0.126)	0.091 (0.207)	0.134 (0.192)	0.478** (0.220)	0.536** (0.208)
openness	0.655*** (0.081)	0.626*** (0.086)	0.956*** (0.087)	0.929*** (0.097)	0.020 (0.092)	-0.005 (0.089)	0.899*** (0.091)	0.874*** (0.091)
capitalize	-0.080*** (0.020)	-0.076*** (0.020)	-0.081*** (0.025)	-0.077*** (0.025)	-0.063*** (0.013)	-0.059*** (0.012)	-0.110*** (0.020)	-0.107*** (0.019)
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.342	0.324	0.357	0.334	0.279	0.278	0.309	0.294
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.2: Full robustness checks results of time-lag effect.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ lagged 1 term</i>								
PSII	0.960*** (0.238)		0.680** (0.270)		0.734*** (0.232)		1.124*** (0.267)	
PSIIcomp		0.157** (0.058)		0.188*** (0.053)		0.136** (0.047)		0.144* (0.080)
policy	0.206*** (0.029)	0.211*** (0.028)	0.183*** (0.030)	0.183*** (0.029)	0.299*** (0.032)	0.301*** (0.031)	0.175*** (0.028)	0.182*** (0.028)
HCI	0.349*** (0.045)	0.296*** (0.045)	0.419*** (0.035)	0.369*** (0.034)	0.175*** (0.038)	0.132*** (0.043)	0.357*** (0.053)	0.302*** (0.052)
depreciate	6.499 (7.854)	8.367 (7.608)	12.555* (6.889)	14.199** (6.660)	7.293 (7.376)	8.786 (7.277)	4.711 (8.735)	6.732 (8.350)
work	-0.182	-0.264	0.199	0.134	0.014	-0.050	-0.383*	-0.476**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
patent	(0.197) 0.112*** (0.023)	(0.202) 0.099*** (0.022)	(0.217) 0.023 (0.034)	(0.220) 0.016 (0.031)	(0.258) 0.134*** (0.025)	(0.267) 0.125*** (0.024)	(0.220) 0.113*** (0.022)	(0.222) 0.098*** (0.021)
GFCF	2.244*** (0.233)	2.233*** (0.246)	3.597*** (0.242)	3.567*** (0.255)	0.646** (0.281)	0.633** (0.282)	2.058*** (0.249)	2.056*** (0.262)
GFCE	-1.117 (0.880)	-0.948 (0.888)	0.558 (0.870)	0.735 (0.875)	-2.138** (0.771)	-1.998** (0.785)	-1.232 (0.925)	-1.065 (0.934)
labor	-0.120 (0.305)	-0.084 (0.344)	-0.785** (0.340)	-0.693* (0.367)	0.800** (0.356)	0.842** (0.376)	-0.135 (0.308)	-0.126 (0.362)
highend	0.165 (0.170)	0.201 (0.162)	0.119 (0.145)	0.144 (0.138)	0.052 (0.176)	0.080 (0.170)	0.271 (0.184)	0.313* (0.175)
openness	0.529*** (0.076)	0.522*** (0.081)	0.481*** (0.075)	0.473*** (0.079)	0.125 (0.075)	0.118 (0.078)	0.634*** (0.077)	0.627*** (0.082)
capitalize	-0.078*** (0.017)	-0.080*** (0.018)	-0.040** (0.016)	-0.041** (0.016)	-0.055*** (0.012)	-0.056*** (0.012)	-0.092*** (0.019)	-0.094*** (0.020)
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.370	0.355	0.418	0.414	0.300	0.292	0.331	0.310
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ lagged 2 term

PSII	1.019*** (0.268)	0.651* (0.330)		0.844*** (0.257)		1.236*** (0.283)		
PSIICOMP		0.119* (0.068)	0.171** (0.078)		0.103* (0.059)		0.101 (0.081)	
policy	0.231*** (0.031)	0.238*** (0.030)	0.206*** (0.034)	0.208*** (0.033)	0.310*** (0.033)	0.316*** (0.033)	0.196*** (0.030)	
HCI	0.412*** (0.049)	0.363*** (0.049)	0.470*** (0.037)	0.423*** (0.041)	0.212*** (0.040)	0.170*** (0.044)	0.427*** (0.058)	
depreciate	6.794 (7.781)	8.093 (7.550)	13.189* (6.646)	14.487** (6.504)	7.918 (7.224)	9.016 (7.081)	4.967 (8.745)	
work	-0.192 (0.197)	-0.273 (0.197)	0.186 (0.230)	0.119 (0.230)	0.006 (0.277)	-0.062 (0.282)	-0.370* (0.209)	
patent	0.054** (0.019)	0.047** (0.021)	-0.047 (0.037)	-0.048 (0.037)	0.107*** (0.020)	0.101*** (0.021)	0.068*** (0.018)	
GFCF	2.267*** (0.248)	2.224*** (0.260)	3.582*** (0.248)	3.534*** (0.260)	0.678** (0.293)	0.642** (0.295)	2.112*** (0.242)	
GFCE	-0.689 (0.896)	-0.507 (0.898)	0.934 (0.883)	1.076 (0.897)	-2.087** (0.784)	-1.935** (0.795)	-0.761 (0.949)	
labor	0.232 (0.287)	0.243 (0.326)	-0.410 (0.305)	-0.329 (0.337)	0.903** (0.347)	0.917** (0.370)	0.172 (0.292)	
highend	0.173 (0.175)	0.237 (0.164)	0.141 (0.153)	0.182 (0.142)	0.045 (0.183)	0.098 (0.173)	0.264 (0.187)	
openness	0.589*** (0.073)	0.567*** (0.076)	0.539*** (0.070)	0.520*** (0.072)	0.155* (0.076)	0.135* (0.077)	0.694*** (0.074)	
capitalize	-0.076*** (0.017)	-0.079*** (0.018)	-0.038** (0.016)	-0.039** (0.016)	-0.052*** (0.011)	-0.055*** (0.012)	-0.089*** (0.018)	
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.355	0.341	0.388	0.385	0.299	0.290	0.325	0.306
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.3: Full results of robustness checks based on additional control variables.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ additional 3 control variables</i>								
PSII	2.987*** (0.278)		2.591*** (0.358)		3.032*** (0.380)		3.017*** (0.304)	
PSIICOMP		0.608*** (0.103)		0.488*** (0.114)		0.602*** (0.097)		0.627*** (0.114)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
policy	0.155** (0.057)	0.176*** (0.060)	0.136** (0.055)	0.156** (0.056)	0.247*** (0.060)	0.269*** (0.062)	0.130** (0.057)	0.151** (0.062)
HCI	0.652*** (0.162)	0.274 (0.194)	0.711*** (0.161)	0.379** (0.161)	0.854*** (0.123)	0.469*** (0.155)	0.479** (0.184)	0.099 (0.227)
depreciate	-10.369 (7.589)	-1.691 (8.031)	-8.552 (6.313)	-1.146 (6.419)	-10.254 (7.120)	-1.493 (7.550)	-12.532 (8.481)	-3.729 (8.991)
work	0.508 (0.384)	-0.091 (0.325)	1.388*** (0.463)	0.877* (0.441)	0.745 (0.454)	0.140 (0.367)	0.181 (0.354)	-0.427 (0.305)
patent	0.145*** (0.042)	0.103** (0.039)	0.028 (0.048)	-0.006 (0.043)	0.203*** (0.052)	0.161*** (0.050)	0.124*** (0.042)	0.081** (0.037)
GFCF	1.753*** (0.281)	2.298*** (0.311)	3.125*** (0.359)	3.618*** (0.376)	-0.147 (0.339)	0.414 (0.399)	1.675*** (0.276)	2.220*** (0.270)
GFCE	-1.412 (0.838)	0.194 (1.041)	0.143 (0.817)	1.481 (1.088)	-3.340*** (0.824)	-1.731* (0.914)	-1.060 (0.819)	0.580 (1.004)
labor	0.800** (0.367)	0.273 (0.340)	0.098 (0.402)	-0.366 (0.403)	1.991*** (0.595)	1.453** (0.552)	0.680** (0.295)	0.150 (0.266)
highend	0.469*** (0.153)	0.427** (0.154)	0.418** (0.147)	0.396** (0.157)	0.379** (0.157)	0.342* (0.169)	0.507** (0.180)	0.461** (0.172)
openness	0.612*** (0.119)	0.722*** (0.105)	0.591*** (0.126)	0.690*** (0.115)	0.146 (0.121)	0.258** (0.107)	0.743*** (0.120)	0.853*** (0.107)
capitalize	-0.013 (0.051)	-0.004 (0.050)	0.020 (0.060)	0.027 (0.061)	-0.025 (0.046)	-0.016 (0.046)	-0.028 (0.053)	-0.019 (0.053)
education	3.647* (1.915)	3.672* (1.792)	4.549** (1.726)	4.518** (1.676)	7.879*** (2.366)	7.884*** (2.289)	2.016 (1.988)	2.058 (1.819)
railline	-0.045 (0.035)	-0.095** (0.039)	-0.020 (0.046)	-0.063 (0.047)	0.057* (0.031)	0.006 (0.034)	-0.104** (0.040)	-0.155*** (0.044)
governance	5.606 (3.938)	5.291 (4.030)	11.526** (4.256)	11.301** (4.084)	1.029 (4.547)	0.728 (4.654)	6.472 (3.947)	6.139 (4.301)
Observation	573	573	573	573	573	573	573	573
Adj. R ²	0.450	0.415	0.458	0.430	0.408	0.373	0.413	0.382
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ additional 6 control variables

PSII	1.188*** (0.277)	0.944*** (0.203)		1.038*** (0.302)		1.316*** (0.324)		
PSIIcomp		0.226*** (0.058)	0.233*** (0.068)		0.164*** (0.055)		0.238*** (0.066)	
policy	0.160*** (0.034)	0.154*** (0.034)	0.121*** (0.033)	0.115*** (0.033)	0.263*** (0.037)	0.259*** (0.036)	0.134*** (0.034)	0.128*** (0.035)
HCI	0.329*** (0.044)	0.271*** (0.049)	0.396*** (0.028)	0.342*** (0.026)	0.157*** (0.039)	0.112** (0.049)	0.340*** (0.054)	0.278*** (0.058)
depreciate	2.391 (7.183)	4.998 (7.407)	9.568 (6.132)	11.766* (6.188)	2.311 (6.704)	4.511 (6.996)	0.222 (8.211)	3.082 (8.439)
work	-0.158 (0.171)	-0.246 (0.174)	0.262 (0.187)	0.192 (0.182)	-0.099 (0.220)	-0.175 (0.220)	-0.320 (0.191)	-0.417* (0.199)
patent	0.119*** (0.027)	0.105*** (0.027)	0.031 (0.031)	0.020 (0.032)	0.139*** (0.035)	0.127*** (0.033)	0.117*** (0.025)	0.102*** (0.025)
GFCF	1.979*** (0.223)	2.025*** (0.247)	3.289*** (0.222)	3.314*** (0.244)	0.463 (0.286)	0.510 (0.300)	1.787*** (0.256)	1.840*** (0.275)
GFCE	-1.151 (0.744)	-0.819 (0.797)	0.535 (0.641)	0.874 (0.700)	-2.241*** (0.714)	-1.997** (0.767)	-1.192 (0.782)	-0.842 (0.826)
labor	0.361 (0.399)	0.386 (0.419)	-0.158 (0.396)	-0.093 (0.404)	1.137** (0.477)	1.131** (0.487)	0.339 (0.394)	0.357 (0.426)
highend	0.034 (0.190)	0.089 (0.177)	-0.039 (0.166)	0.004 (0.153)	-0.037 (0.195)	0.012 (0.186)	0.137 (0.204)	0.199 (0.189)
openness	0.525*** (0.072)	0.501*** (0.076)	0.494*** (0.076)	0.473*** (0.079)	0.101 (0.066)	0.082 (0.068)	0.629*** (0.072)	0.603*** (0.076)
capitalize	-0.081*** (0.021)	-0.079*** (0.021)	-0.043** (0.019)	-0.041* (0.019)	-0.059*** (0.013)	-0.058*** (0.013)	-0.093*** (0.023)	-0.091*** (0.023)
law	20.197*** (3.893)	20.001*** (3.334)	27.445*** (4.191)	26.968*** (3.799)	13.401*** (3.962)	13.429*** (3.503)	18.254*** (3.806)	18.110*** (3.307)
exchange	0.012 (0.012)	0.013 (0.011)	0.018 (0.015)	0.018 (0.014)	0.011 (0.012)	0.012 (0.012)	0.012 (0.012)	0.013 (0.012)
account	-0.012 (0.012)	-0.003 (0.015)	-0.005 (0.016)	0.004 (0.018)	-0.023 (0.014)	-0.016 (0.015)	-0.016 (0.011)	-0.006 (0.014)
Observation	797	797	797	797	797	797	797	797
Adj. R ²	0.369	0.350	0.441	0.433	0.288	0.273	0.325	0.302
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
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Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.4: Full results of robustness checks based on additional fixed effects.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSII	1.433*** (0.372)		1.182*** (0.319)		1.298*** (0.403)		1.541*** (0.418)	
PSIICOMP		0.260*** (0.067)		0.286*** (0.074)		0.206*** (0.063)		0.250*** (0.080)
policy	0.210*** (0.029)	0.211*** (0.030)	0.165*** (0.031)	0.163*** (0.031)	0.305*** (0.028)	0.307*** (0.030)	0.184*** (0.030)	0.186*** (0.030)
HCI	0.310*** (0.053)	0.257*** (0.052)	0.340*** (0.040)	0.285*** (0.035)	0.185*** (0.037)	0.141*** (0.045)	0.312*** (0.065)	0.259*** (0.063)
depreciate	0.432 (6.810)	3.388 (6.869)	7.071 (5.853)	9.912 (5.743)	-5.977 (5.665)	-3.465 (5.897)	0.651 (8.016)	3.661 (8.010)
work	0.055 (0.226)	-0.009 (0.216)	0.473* (0.254)	0.424* (0.235)	0.118 (0.229)	0.059 (0.245)	-0.146 (0.269)	-0.216 (0.252)
patent	0.114*** (0.036)	0.083** (0.033)	0.037 (0.036)	0.012 (0.033)	0.117** (0.046)	0.089* (0.044)	0.118*** (0.035)	0.084** (0.031)
GFCF	1.562*** (0.187)	1.656*** (0.193)	2.889*** (0.212)	2.941*** (0.216)	0.129 (0.232)	0.225 (0.211)	1.342*** (0.227)	1.453*** (0.233)
GFCE	-1.579* (0.888)	-1.315 (0.964)	-0.324 (0.885)	0.043 (0.948)	-2.730*** (0.769)	-2.552*** (0.851)	-1.577 (0.974)	-1.355 (1.058)
labor	0.091 (0.324)	0.257 (0.354)	-0.889** (0.344)	-0.685* (0.370)	1.247*** (0.408)	1.370*** (0.426)	0.034 (0.348)	0.184 (0.394)
highend	0.417** (0.175)	0.474** (0.173)	0.492*** (0.144)	0.534*** (0.137)	0.122 (0.152)	0.175 (0.159)	0.535** (0.205)	0.598*** (0.201)
openness	0.724*** (0.090)	0.699*** (0.100)	0.636*** (0.091)	0.614*** (0.100)	0.307*** (0.076)	0.286*** (0.086)	0.827*** (0.094)	0.802*** (0.104)
capitalize	-0.104*** (0.026)	-0.100*** (0.026)	-0.063** (0.023)	-0.060** (0.023)	-0.071*** (0.019)	-0.067*** (0.019)	-0.120*** (0.028)	-0.116*** (0.028)
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.438	0.410	0.455	0.442	0.375	0.351	0.396	0.365
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.5: Full results of robustness checks based on period adjustment.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ Set I of period adjustment</i>								
PSII	1.198*** (0.265)		0.929*** (0.236)		1.024*** (0.275)		1.295*** (0.303)	
PSIICOMP		0.235*** (0.061)		0.247*** (0.066)		0.193*** (0.058)		0.231*** (0.073)
policy	0.204*** (0.028)	0.203*** (0.027)	0.179*** (0.030)	0.176*** (0.028)	0.297*** (0.032)	0.297*** (0.030)	0.174*** (0.027)	0.174*** (0.027)
HCI	0.337*** (0.045)	0.278*** (0.047)	0.410*** (0.036)	0.355*** (0.033)	0.170*** (0.038)	0.122** (0.045)	0.342*** (0.053)	0.283*** (0.054)
depreciate	5.988 (7.493)	8.662 (7.647)	12.161* (6.650)	14.416** (6.649)	6.608 (7.090)	8.873 (7.320)	4.170 (8.326)	6.998 (8.433)
work	-0.187 (0.196)	-0.242 (0.203)	0.198 (0.217)	0.154 (0.216)	0.004 (0.248)	-0.043 (0.263)	-0.402* (0.226)	-0.462* (0.228)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
patent	0.123*** (0.023)	0.105*** (0.022)	0.031 (0.030)	0.018 (0.030)	0.139*** (0.026)	0.123*** (0.024)	0.123*** (0.022)	0.104*** (0.021)
GFCF	2.183*** (0.210)	2.214*** (0.241)	3.539*** (0.220)	3.546*** (0.250)	0.585** (0.263)	0.614** (0.279)	1.993*** (0.234)	2.033*** (0.259)
GFCE	-1.274 (0.863)	-0.897 (0.895)	0.425 (0.850)	0.798 (0.882)	-2.209*** (0.757)	-1.895** (0.794)	-1.380 (0.907)	-0.999 (0.939)
labor	-0.145 (0.302)	-0.092 (0.335)	-0.798** (0.348)	-0.700* (0.370)	0.839** (0.350)	0.877** (0.366)	-0.161 (0.303)	-0.124 (0.345)
highend	0.138 (0.175)	0.185 (0.162)	0.095 (0.150)	0.129 (0.138)	0.033 (0.179)	0.073 (0.170)	0.247 (0.189)	0.298 (0.175)
openness	0.525*** (0.074)	0.510*** (0.080)	0.477*** (0.073)	0.463*** (0.077)	0.126 (0.073)	0.114 (0.077)	0.630*** (0.076)	0.614*** (0.081)
capitalize	-0.082*** (0.018)	-0.079*** (0.018)	-0.043** (0.016)	-0.040** (0.016)	-0.058*** (0.012)	-0.056*** (0.012)	-0.096*** (0.020)	-0.093*** (0.020)
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.376	0.358	0.424	0.418	0.307	0.295	0.335	0.314
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ Set II of period adjustment

PSII	1.537*** (0.227)	1.178*** (0.246)		1.408*** (0.268)		1.651*** (0.256)		
PSIIComp		0.223*** (0.068)	0.245*** (0.075)		0.187*** (0.063)		0.214** (0.082)	
policy	0.194*** (0.029)	0.198*** (0.025)	0.176*** (0.031)	0.175*** (0.027)	0.291*** (0.036)	0.296*** (0.033)	0.165*** (0.027)	
HCI	0.317*** (0.042)	0.253*** (0.044)	0.408*** (0.041)	0.348*** (0.037)	0.160*** (0.037)	0.104** (0.043)	0.323*** (0.049)	
depreciate	8.446 (7.664)	10.898 (7.868)	13.743* (6.855)	15.773** (6.939)	9.240 (7.335)	11.450 (7.554)	6.802 (8.423)	
work	-0.244 (0.208)	-0.316 (0.202)	0.206 (0.241)	0.149 (0.235)	0.074 (0.257)	0.009 (0.277)	-0.497** (0.230)	
patent	0.122*** (0.025)	0.101*** (0.021)	0.021 (0.030)	0.006 (0.029)	0.142*** (0.030)	0.123*** (0.025)	0.118*** (0.023)	
GFCF	2.179*** (0.240)	2.321*** (0.268)	3.582*** (0.240)	3.667*** (0.273)	0.565* (0.293)	0.701** (0.307)	1.979*** (0.281)	
GFCE	-1.669** (0.746)	-1.243 (0.793)	0.216 (0.812)	0.631 (0.854)	-2.584*** (0.668)	-2.215*** (0.735)	-1.662* (0.818)	
labor	-0.182 (0.325)	-0.148 (0.368)	-0.773** (0.362)	-0.676 (0.391)	0.787* (0.379)	0.801* (0.396)	-0.148 (0.334)	
highend	0.128 (0.209)	0.190 (0.185)	0.062 (0.178)	0.109 (0.159)	0.070 (0.218)	0.126 (0.199)	0.242 (0.222)	
openness	0.572*** (0.066)	0.553*** (0.072)	0.540*** (0.061)	0.522*** (0.068)	0.155** (0.072)	0.138* (0.075)	0.687*** (0.065)	
capitalize	-0.095*** (0.017)	-0.090*** (0.017)	-0.054*** (0.014)	-0.050*** (0.014)	-0.066*** (0.012)	-0.062*** (0.011)	-0.110*** (0.019)	
Observation	747	747	747	747	747	747	747	747
Adj. R ²	0.408	0.381	0.438	0.427	0.333	0.311	0.371	0.340
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel C: GVC participation ~ Set III of period adjustment

PSII	1.220*** (0.340)	1.015*** (0.322)		0.935*** (0.287)		1.273*** (0.424)	
PSIIComp		0.129* (0.072)	0.143* (0.076)		0.111* (0.053)		0.094 (0.102)
policy	0.173*** (0.022)	0.183*** (0.022)	0.143*** (0.023)	0.150*** (0.023)	0.251*** (0.019)	0.259*** (0.018)	0.151*** (0.024)
HCI	0.299*** (0.094)	0.204* (0.096)	0.439*** (0.062)	0.352*** (0.060)	0.110 (0.100)	0.035 (0.105)	0.284** (0.107)
depreciate	20.668** (7.427)	23.398*** (7.225)	23.632*** (6.639)	25.954*** (6.261)	17.837** (7.480)	19.946** (7.405)	22.430** (8.476)
work	0.023 (0.364)	-0.002 (0.394)	0.311 (0.388)	0.289 (0.409)	0.464 (0.339)	0.445 (0.372)	-0.237 (0.406)
patent	0.108** (0.043)	0.083* (0.042)	-0.016 (0.041)	-0.035 (0.040)	0.158*** (0.042)	0.139*** (0.041)	0.101** (0.045)
GFCF	2.055*** (0.241)	2.101*** (0.294)	3.602*** (0.238)	3.627*** (0.302)	0.824*** (0.208)	0.855*** (0.243)	1.625*** (0.296)
GFCE	-2.059** (-2.059**)	-1.849* (-1.849*)	-0.692 (-0.692)	-0.469 (-0.469)	-2.833*** (-2.833***)	-2.656*** (-2.656***)	-2.157* (-2.157*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
labor	(0.950) −0.415 (0.308)	(0.967) −0.434 (0.364)	(0.938) −1.175*** (0.313)	(0.948) −1.147*** (0.331)	(0.837) 0.603 (0.388)	(0.868) 0.602 (0.414)	(1.042) −0.352 (0.331)	(1.061) −0.422 (0.412)
highend	0.040 (0.168)	0.067 (0.169)	−0.002 (0.140)	0.020 (0.135)	−0.038 (0.171)	−0.018 (0.176)	0.131 (0.187)	0.159 (0.189)
openness	0.378*** (0.115)	0.379*** (0.123)	0.358*** (0.098)	0.358*** (0.107)	0.015 (0.092)	0.015 (0.097)	0.459*** (0.125)	0.461*** (0.133)
capitalize	−0.077*** (0.023)	−0.075*** (0.024)	−0.047** (0.019)	−0.045** (0.020)	−0.054*** (0.015)	−0.053*** (0.016)	−0.089*** (0.026)	−0.087*** (0.027)
Observation	672	672	672	672	672	672	672	672
Adj. R ²	0.407	0.385	0.481	0.469	0.347	0.336	0.340	0.317
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.6: Full results of robustness checks based on country adjustment.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ Set I of country adjustment</i>								
PSII	1.379*** (0.391)		0.959** (0.341)		1.040** (0.432)		1.560*** (0.412)	
PSIIComp		0.396*** (0.081)		0.397*** (0.079)		0.291*** (0.086)		0.406*** (0.091)
policy	0.156*** (0.037)	0.175*** (0.032)	0.131*** (0.038)	0.141*** (0.034)	0.239*** (0.043)	0.254*** (0.039)	0.121*** (0.034)	0.144*** (0.029)
HCI	0.254*** (0.053)	−0.029 (0.080)	0.270*** (0.063)	0.033 (0.069)	0.016 (0.050)	−0.194** (0.083)	0.276*** (0.057)	−0.029 (0.088)
depreciate	−1.678 (7.610)	1.612 (7.954)	5.344 (6.419)	8.017 (6.589)	1.438 (7.558)	3.895 (7.935)	−4.947 (8.439)	−1.359 (8.733)
work	0.543 (0.347)	0.541 (0.385)	0.667 (0.387)	0.697 (0.402)	0.599 (0.422)	0.595 (0.447)	0.429 (0.367)	0.415 (0.410)
patent	0.047** (0.018)	0.016 (0.019)	−0.029 (0.033)	−0.053 (0.032)	0.015 (0.018)	−0.008 (0.019)	0.073*** (0.019)	0.039* (0.021)
GFCF	2.255*** (0.276)	2.142*** (0.308)	3.675*** (0.309)	3.552*** (0.326)	0.647* (0.323)	0.565 (0.333)	2.117*** (0.277)	2.005*** (0.319)
GFCE	−1.183 (1.103)	0.199 (1.031)	0.312 (1.023)	1.500 (1.011)	−2.695*** (0.910)	−1.667* (0.820)	−1.035 (1.192)	0.449 (1.115)
labor	0.028 (0.392)	0.318 (0.422)	−0.846* (0.439)	−0.523 (0.456)	0.768* (0.414)	0.980** (0.413)	0.092 (0.401)	0.379 (0.453)
highend	0.076 (0.205)	0.096 (0.190)	0.016 (0.177)	0.019 (0.161)	0.000 (0.196)	0.016 (0.189)	0.182 (0.223)	0.208 (0.207)
openness	0.422*** (0.100)	0.529*** (0.107)	0.395*** (0.080)	0.479*** (0.085)	0.051 (0.078)	0.131 (0.086)	0.534*** (0.112)	0.652*** (0.119)
capitalize	−0.090*** (0.018)	−0.088*** (0.018)	−0.049*** (0.015)	−0.048*** (0.015)	−0.060*** (0.012)	−0.059*** (0.012)	−0.106*** (0.020)	−0.104*** (0.020)
Observation	552	552	552	552	552	552	552	552
Adj. R ²	0.357	0.347	0.408	0.415	0.297	0.290	0.323	0.307
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ Set II of country adjustment

PSII	1.448*** (0.280)	1.087** (0.380)		1.330*** (0.240)		1.537*** (0.328)	
PSIIComp		0.152*** (0.050)	0.171** (0.063)		0.160*** (0.052)		0.126* (0.060)
policy	0.256*** (0.035)	0.256*** (0.032)	0.232*** (0.038)	0.229*** (0.034)	0.305*** (0.037)	0.304*** (0.034)	0.240*** (0.035)
HCI	0.373*** (0.041)	0.339*** (0.040)	0.460*** (0.035)	0.424*** (0.034)	0.192*** (0.037)	0.157*** (0.041)	0.386*** (0.048)
depreciate	10.935 (8.349)	16.543* (8.420)	18.314** (8.557)	22.607*** (7.777)	10.208 (7.062)	15.389* (7.451)	8.071 (9.070)
							13.973 (9.257)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
work	0.162 (0.166)	0.260 (0.179)	0.691*** (0.209)	0.763*** (0.212)	0.313 (0.220)	0.402 (0.241)	-0.085 (0.186)	0.020 (0.193)
patent	0.071** (0.034)	0.062* (0.034)	-0.035 (0.038)	-0.041 (0.039)	0.127*** (0.040)	0.119*** (0.039)	0.080** (0.036)	0.070* (0.036)
GFCF	1.780*** (0.212)	1.896*** (0.201)	3.153*** (0.218)	3.226*** (0.220)	0.291 (0.274)	0.393 (0.267)	1.569*** (0.238)	1.701*** (0.210)
GFCE	-0.901 (0.853)	-0.539 (0.905)	0.963 (0.916)	1.307 (0.969)	-2.578*** (0.673)	-2.220*** (0.756)	-0.731 (0.938)	-0.391 (0.978)
labor	-0.221 (0.255)	-0.180 (0.294)	-0.935*** (0.279)	-0.852** (0.306)	0.545 (0.335)	0.601 (0.356)	-0.273 (0.238)	-0.262 (0.289)
highend	0.478** (0.171)	0.679*** (0.150)	0.522*** (0.181)	0.663*** (0.143)	0.160 (0.162)	0.341** (0.157)	0.608*** (0.185)	0.827*** (0.160)
openness	0.507*** (0.085)	0.478*** (0.091)	0.453*** (0.081)	0.429*** (0.087)	0.168* (0.081)	0.140 (0.086)	0.594*** (0.090)	0.564*** (0.096)
capitalize	-0.083*** (0.016)	-0.079*** (0.017)	-0.043*** (0.014)	-0.040** (0.015)	-0.063*** (0.012)	-0.059*** (0.013)	-0.097*** (0.018)	-0.092*** (0.019)
Observation	775	775	775	775	775	775	775	775
Adj. R ²	0.428	0.408	0.479	0.471	0.354	0.339	0.387	0.366
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel C: GVC participation ~ Set III of country adjustment

PSII	2.010*** (0.187)	1.694*** (0.241)		2.072*** (0.217)		2.126*** (0.231)		
PSIIComp		0.211** (0.083)	0.260** (0.094)		0.072 (0.087)		0.245** (0.086)	
policy	0.148*** (0.032)	0.182*** (0.034)	0.094** (0.035)	0.121*** (0.036)	0.243*** (0.031)	0.282*** (0.034)	0.116*** (0.032)	
HCI	0.386*** (0.077)	0.138 (0.084)	0.443*** (0.098)	0.200* (0.099)	0.208*** (0.069)	0.013 (0.093)	0.406*** (0.083)	
depreciate	-1.507 (7.994)	1.790 (8.201)	7.372 (7.482)	10.395 (7.526)	-0.955 (6.833)	2.004 (6.944)	-4.415 (8.745)	
work	0.267 (0.244)	0.170 (0.241)	0.518* (0.276)	0.423 (0.272)	0.648** (0.265)	0.572* (0.286)	0.116 (0.279)	
patent	0.132*** (0.037)	0.095** (0.035)	0.058 (0.037)	0.027 (0.038)	0.129*** (0.038)	0.091** (0.033)	0.159*** (0.045)	
GFCF	2.569*** (0.290)	2.773*** (0.325)	3.966*** (0.281)	4.106*** (0.339)	0.789** (0.302)	1.055*** (0.331)	2.436*** (0.322)	
GFCE	0.011 (1.117)	1.146 (1.288)	0.750 (1.167)	1.868 (1.355)	-1.204 (0.864)	-0.323 (1.108)	0.203 (1.218)	
labor	-0.844** (0.324)	-0.848** (0.379)	-1.516*** (0.290)	-1.443*** (0.333)	0.000 (0.407)	-0.139 (0.442)	-0.876** (0.327)	
highend	0.232 (0.248)	0.230 (0.241)	0.317 (0.251)	0.315 (0.244)	-0.178 (0.207)	-0.181 (0.197)	0.381 (0.277)	
openness	0.748*** (0.115)	0.797*** (0.123)	0.683*** (0.102)	0.731*** (0.105)	0.421*** (0.115)	0.459*** (0.130)	0.853*** (0.124)	
capitalize	-0.104*** (0.020)	-0.098*** (0.021)	-0.068*** (0.019)	-0.062*** (0.019)	-0.081*** (0.016)	-0.075*** (0.017)	-0.120*** (0.023)	
Observation	588	588	588	588	588	588	588	588
Adj. R ²	0.415	0.373	0.479	0.455	0.344	0.292	0.369	0.328
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel D: GVC participation ~ Set IV of country adjustment

PSII	1.335*** (0.337)	1.037*** (0.317)		1.146*** (0.348)		1.425*** (0.369)	
PSIIComp		0.250*** (0.071)	0.265*** (0.072)		0.253*** (0.061)		0.222** (0.090)
policy	0.239*** (0.034)	0.250*** (0.031)	0.218*** (0.035)	0.223*** (0.032)	0.311*** (0.042)	0.319*** (0.039)	0.215*** (0.032)
HCI	0.207*** (0.031)	0.141*** (0.035)	0.298*** (0.029)	0.234*** (0.031)	0.033 (0.031)	-0.031 (0.040)	0.200*** (0.038)
depreciate	17.687** (7.639)	20.122** (7.455)	23.015*** (6.807)	25.201*** (6.533)	13.616 (8.778)	15.865* (8.750)	17.244* (8.227)
work	0.319 (0.251)	0.233 (0.246)	0.765*** (0.262)	0.690** (0.247)	0.302 (0.208)	0.224 (0.236)	0.131 (0.313)
patent	0.043* (0.025)	0.038 (0.029)	-0.054 (0.036)	-0.059 (0.037)	0.049* (0.025)	0.044 (0.029)	0.076*** (0.024)
GFCF	1.552*** (1.552)	1.619*** (1.619)	2.947*** (2.947)	2.967*** (2.967)	-0.010 (0.030)	0.030 (1.401)	1.491*** (1.491)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GFCE	(0.226) -1.731** (0.639)	(0.248) -1.249* (0.692)	(0.222) -0.028 (0.681)	(0.233) 0.442 (0.726)	(0.252) -3.119*** (0.588)	(0.253) -2.654*** (0.643)	(0.253) -1.773** (0.674)	(0.282) -1.318* (0.722)
labor	0.659 (0.406)	0.704 (0.422)	-0.013 (0.445)	0.085 (0.443)	1.668*** (0.544)	1.741*** (0.541)	0.489 (0.374)	0.497 (0.407)
highend	0.002 (0.148)	0.044 (0.144)	-0.019 (0.125)	0.010 (0.117)	-0.123 (0.157)	-0.088 (0.154)	0.097 (0.166)	0.145 (0.163)
openness	0.323*** (0.089)	0.286*** (0.095)	0.251*** (0.087)	0.221** (0.091)	-0.076 (0.085)	-0.108 (0.090)	0.417*** (0.096)	0.380*** (0.102)
capitalize	-0.075*** (0.015)	-0.072*** (0.015)	-0.034** (0.013)	-0.031** (0.013)	-0.051*** (0.011)	-0.048*** (0.010)	-0.089*** (0.017)	-0.086*** (0.017)
Observation	726	726	726	726	726	726	726	726
Adj. R ²	0.449	0.423	0.486	0.476	0.371	0.356	0.405	0.375
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

E.2 Results of Endogeneity Handling

Table E.7: Full first stage results of TSLS regressions

Variable	GVC participation					
	Set I		Set II		Set III	
	(1)	(2)	(3)	(4)	(5)	(6)
language	0.016*** (0.003)			0.017** (0.008)		
intdis	1.661*** (0.284)			-5.637*** (1.740)		
BIV		85.767*** (16.327)				
PSII_lag 3			0.576*** (0.067)			
BIVcomp					-4.095*** (1.350)	
PSIIComp_lag 3						0.871*** (0.031)
policy	0.011*** (0.004)	-0.006 (0.005)	0.002 (0.005)	0.051*** (0.010)	0.039*** (0.010)	0.006 (0.005)
HCI	-0.006 (0.008)	-0.010** (0.004)	-0.003 (0.008)	0.203*** (0.043)	0.159*** (0.037)	0.006 (0.012)
depreciate	1.696*** (0.514)	0.528 (0.379)	2.032*** (0.544)	-3.087** (1.141)	-2.672** (1.130)	0.845 (0.629)
work	-0.118** (0.043)	-0.050** (0.023)	0.021 (0.025)	-0.314*** (0.100)	0.052 (0.068)	-0.056 (0.041)
patent	-0.001 (0.008)	-0.013* (0.007)	-0.009* (0.005)	0.005 (0.019)	-0.002 (0.021)	0.018* (0.009)
GFCF	0.118** (0.055)	0.035 (0.039)	0.087* (0.049)	0.254** (0.107)	0.211* (0.109)	0.025 (0.074)
GFCE	0.201** (0.071)	-0.052 (0.074)	0.084 (0.058)	-1.248*** (0.224)	-1.125*** (0.224)	-0.585*** (0.126)
labor	-0.159*** (0.039)	-0.043* (0.024)	-0.105*** (0.031)	-0.829*** (0.205)	-0.952*** (0.177)	-0.144 (0.109)
highend	0.060*** (0.019)	0.002 (0.018)	0.006 (0.012)	0.063 (0.037)	0.000 (0.034)	0.023 (0.028)
openness	0.012 (0.009)	0.008 (0.013)	-0.008 (0.009)	0.092*** (0.027)	0.048* (0.025)	0.007 (0.011)
capitalize	-0.001 (0.002)	-0.001 (0.001)	0.006*** (0.002)	-0.001 (0.004)	-0.006 (0.004)	-0.002 (0.001)
Observation	822	841	841	822	832	841
Adj. R^2	0.121	0.394	0.394	0.182	0.163	0.776
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓

Note: *p<0.1; **p<0.05; ***p<0.01

Table E.8: Full second stage results of TSLS regressions.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ language and intdis</i>								
PSII (fitted)	2.766** (1.143)		4.267*** (0.911)		2.329* (1.213)		2.815** (1.176)	
PSIIComp (fitted)		1.203*** (0.372)		0.477 (0.365)		1.287*** (0.412)		1.353*** (0.401)
policy	-0.118 (0.075)	0.162*** (0.032)	-0.246*** (0.063)	0.167*** (0.034)	-0.073 (0.085)	0.251*** (0.036)	-0.105 (0.075)	0.125*** (0.031)
HCI	-0.727*** (0.068)	0.144** (0.066)	-0.773*** (0.060)	0.330*** (0.050)	-0.631*** (0.081)	-0.039 (0.087)	-0.746*** (0.063)	0.125 (0.072)
depreciate	-13.103*** (4.079)	10.731 (7.925)	-9.148** (3.872)	14.683** (6.845)	-18.501*** (4.447)	11.376 (7.890)	-10.450** (4.039)	9.539 (8.710)
work	-0.470 (0.428)	0.317 (0.344)	0.595 (0.366)	0.364 (0.357)	-0.568 (0.439)	0.426 (0.435)	-0.712 (0.444)	0.222 (0.361)
patent	1.039*** (0.033)	0.080*** (0.027)	0.874*** (0.031)	0.006 (0.032)	1.098*** (0.036)	0.109*** (0.036)	1.042*** (0.033)	0.076** (0.027)
GFCF	0.562 (0.384)	1.926*** (0.273)	1.626*** (0.330)	3.488*** (0.243)	-1.410*** (0.479)	0.304 (0.270)	0.805* (0.412)	1.696*** (0.324)
GFCE	-2.274*** (0.566)	0.113 (1.014)	-0.875 (0.666)	1.063 (0.969)	-3.039*** (0.696)	-0.774 (0.906)	-2.083*** (0.522)	0.135 (1.060)
labor	1.263*** (0.206)	0.981* (0.491)	0.366 (0.338)	-0.375 (0.527)	3.025*** (0.151)	1.950*** (0.495)	0.869*** (0.231)	1.119** (0.526)
highend	2.303*** (0.395)	0.107 (0.160)	3.216*** (0.381)	0.112 (0.139)	2.917*** (0.344)	-0.014 (0.171)	2.126*** (0.426)	0.203 (0.175)
openness	0.500*** (0.167)	0.461*** (0.088)	-0.099 (0.140)	0.450*** (0.083)	0.095 (0.181)	0.068 (0.082)	0.718*** (0.172)	0.553*** (0.091)
capitalize	0.169*** (0.029)	-0.072*** (0.017)	0.198*** (0.026)	-0.038** (0.015)	0.125*** (0.031)	-0.048*** (0.010)	0.179*** (0.029)	-0.085*** (0.019)
Observation	822	822	822	822	822	822	822	822
Adj. R ²	0.807	0.234	0.765	0.411	0.837	0.147	0.792	0.158
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
<i>Panel B: GVC participation ~ Bartik IV</i>								
PSII (fitted)	2.843*** (0.643)		2.543*** (0.665)		2.605*** (0.614)		2.963*** (0.659)	
PSIIComp (fitted)		2.416*** (0.796)		2.140** (0.828)		3.301*** (1.005)		2.157*** (0.747)
policy	0.191*** (0.031)	0.120** (0.053)	0.167*** (0.032)	0.104** (0.044)	0.279*** (0.035)	0.178** (0.063)	0.161*** (0.030)	0.099* (0.052)
HCI	0.356*** (0.049)	-0.070 (0.129)	0.432*** (0.045)	0.055 (0.108)	0.180*** (0.041)	-0.386* (0.184)	0.363*** (0.056)	-0.023 (0.129)
depreciate	3.363 (7.359)	15.062* (8.587)	9.525 (6.554)	19.932** (7.437)	4.596 (7.044)	18.539* (9.037)	1.389 (8.100)	12.461 (9.203)
work	-0.106 (0.204)	-0.270 (0.275)	0.266 (0.225)	0.122 (0.260)	0.056 (0.233)	-0.112 (0.333)	-0.322 (0.242)	-0.486 (0.295)
patent	0.153*** (0.030)	0.124** (0.051)	0.056* (0.029)	0.032 (0.036)	0.164*** (0.035)	0.144* (0.078)	0.155*** (0.029)	0.120** (0.046)
GFCF	2.052*** (0.197)	1.630*** (0.309)	3.407*** (0.174)	3.046*** (0.305)	0.427* (0.243)	-0.295 (0.435)	1.869*** (0.242)	1.539*** (0.321)
GFCE	-1.488 (0.874)	1.712 (1.322)	0.252 (0.878)	3.109* (1.496)	-2.521*** (0.750)	1.816 (1.569)	-1.579 (0.921)	1.265 (1.234)
labor	0.009 (0.291)	1.901** (0.837)	-0.622* (0.344)	1.062 (0.852)	0.935** (0.341)	3.684*** (1.021)	-0.005 (0.291)	1.612* (0.813)
highend	0.061 (0.187)	0.115 (0.152)	0.022 (0.160)	0.070 (0.122)	-0.047 (0.191)	-0.029 (0.178)	0.171 (0.202)	0.240 (0.163)
openness	0.517*** (0.068)	0.439*** (0.100)	0.474*** (0.066)	0.406*** (0.094)	0.114 (0.067)	0.003 (0.110)	0.622*** (0.072)	0.552*** (0.098)
capitalize	-0.083*** (0.017)	-0.068*** (0.016)	-0.044** (0.016)	-0.031* (0.015)	-0.059*** (0.012)	-0.039*** (0.012)	-0.097*** (0.020)	-0.084*** (0.018)
Observation	841	832	841	832	841	832	841	832
Adj. R ²	0.330	-0.319	0.383	-0.051	0.268	-0.997	0.291	-0.175
Year FE	✓	✓	✓	✓	✓	✓	✓	✓

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
<i>Panel C: GVC participation ~ lagged term</i>								
PSII (fitted)	1.420*** (0.367)		0.897** (0.407)		1.000*** (0.335)		1.761*** (0.425)	
PSIICOMP (fitted)		0.182** (0.064)		0.219*** (0.059)		0.159*** (0.054)		0.164* (0.090)
policy	0.200*** (0.028)	0.203*** (0.027)	0.178*** (0.029)	0.176*** (0.028)	0.290*** (0.031)	0.290*** (0.030)	0.169*** (0.028)	0.175*** (0.027)
HCI	0.333*** (0.046)	0.281*** (0.045)	0.406*** (0.034)	0.357*** (0.033)	0.154*** (0.039)	0.113** (0.044)	0.344*** (0.056)	0.289*** (0.052)
depreciate	5.784 (7.650)	8.705 (7.577)	12.324* (6.786)	14.458** (6.634)	7.325 (7.312)	9.469 (7.307)	3.431 (8.560)	6.883 (8.348)
work	-0.164 (0.194)	-0.224 (0.202)	0.199 (0.213)	0.159 (0.215)	-0.009 (0.239)	-0.052 (0.258)	-0.371 (0.229)	-0.445* (0.228)
patent	0.132*** (0.024)	0.112*** (0.023)	0.033 (0.032)	0.020 (0.030)	0.140*** (0.025)	0.126*** (0.024)	0.138*** (0.024)	0.113*** (0.023)
GFCF	2.167*** (0.217)	2.231*** (0.239)	3.540*** (0.240)	3.553*** (0.248)	0.556* (0.276)	0.593** (0.272)	1.966*** (0.230)	2.063*** (0.257)
GFCE	-1.375 (0.858)	-1.038 (0.896)	0.382 (0.848)	0.723 (0.872)	-2.394*** (0.738)	-2.118** (0.783)	-1.485 (0.909)	-1.143 (0.951)
labor	-0.171 (0.310)	-0.189 (0.336)	-0.831** (0.350)	-0.750* (0.358)	0.732* (0.364)	0.747* (0.375)	-0.158 (0.313)	-0.235 (0.354)
highend	0.122 (0.179)	0.179 (0.162)	0.093 (0.153)	0.126 (0.138)	0.023 (0.184)	0.062 (0.169)	0.222 (0.194)	0.294 (0.176)
openness	0.514*** (0.073)	0.506*** (0.081)	0.471*** (0.072)	0.462*** (0.078)	0.111 (0.073)	0.104 (0.077)	0.620*** (0.075)	0.611*** (0.083)
capitalize	-0.082*** (0.017)	-0.080*** (0.018)	-0.042** (0.015)	-0.040** (0.016)	-0.058*** (0.012)	-0.056*** (0.012)	-0.096*** (0.019)	-0.094*** (0.020)
Observation	841	841	841	841	841	841	841	841
Adj. R ²	0.376	0.357	0.425	0.418	0.309	0.296	0.333	0.313
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.9: Results of IV diagnoses.

Variable	GVC participation							
	PSII				PSIIcomp			
	orGVC	orGVC_pb	orGVC_pf	orGVC_ts	orGVC	orGVC_pb	orGVC_pf	orGVC_ps
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: ~ Set I of IV</i>								
Anderson-Rubin F	66.35*** [0.000]	92.65*** [0.000]	53.88*** [0.000]	58.53*** [0.000]	66.18*** [0.000]	89.01*** [0.000]	47.42*** [0.000]	60.36*** [0.000]
Conditional	7.52***	7.52***	6.41**	6.46**	88.43***	137.83***	56.95***	75.49***
Likelihood Ratio	[0.006]	[0.006]	[0.011]	[0.011]	[0.000]	[0.000]	[0.000]	[0.000]
Kleibergen-Paap	36.969***	36.969***	36.969***	36.969***	6.966***	6.966***	6.966***	6.966***
Wald F	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]
Durbin-Wu-	25.292***	12.453***	33.138***	20.225***	11.848***	4.142**	18.971***	8.074***
Hausmann	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.042]	[0.000]	[0.005]
Hansen Sargan J	0.606 [0.436]	3.952** [0.047]	0.138 [0.710]	0.712 [0.399]	1.470 [0.225]	5.599** [0.018]	1.350 [0.245]	1.132 [0.287]
<i>Panel B: ~ Set II of IV</i>								
Anderson-Rubin F	42.04*** [0.000]	49.19*** [0.000]	36.43*** [0.000]	38.59*** [0.000]	20.52*** [0.000]	18.84*** [0.000]	10.45*** [0.001]	22.25*** [0.000]
Conditional	42.04***	49.19***	36.43***	38.59***	20.52***	18.84***	10.45***	22.25***
Likelihood Ratio	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.001]	[0.000]
Kleibergen-Paap	32.693***	32.693***	32.693***	32.693***	9.172***	9.172***	9.172***	9.172***
Wald F	[0.000]	[0.000]	[0.000]	[0.000]	[0.003]	[0.003]	[0.003]	[0.003]
Durbin-Wu-	28.747***	18.038***	30.995***	24.703***	12.608***	9.080***	20.594***	8.117***
Hausmann	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.003]	[0.000]	[0.005]
Hansen Sargan J	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
<i>Panel C: ~ Set III of IV</i>								
Anderson-Rubin F	25.67*** [0.000]	14.44*** [0.000]	24.39*** [0.000]	28.02*** [0.000]	17.47*** [0.000]	12.73*** [0.000]	20.12*** [0.000]	18.18*** [0.000]
Conditional	25.67***	14.44***	24.39***	28.02***	17.47***	12.73***	20.12***	18.18***
Likelihood Ratio	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Kleibergen-Paap	77.841***	77.841***	77.841***	77.841***	778.481***	778.481***	778.481***	778.481***
Wald F	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Durbin-Wu-	0.381	0.003	0.158	1.885	1.363	0.384	0.531	1.720
Hausmann	[0.537]	[0.959]	[0.691]	[0.170]	[0.243]	[0.536]	[0.466]	[0.190]
Hansen Sargan J	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Note: *p<0.1; **p<0.05; ***p<0.01

Table E.10: Full results of Fuller estimations.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Panel A: GVC participation ~ language and intdis

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PSII	5.538*** (1.375)		6.871*** (1.292)		5.347*** (1.569)		5.417*** (1.389)	
PSIICOMP		1.167** (0.455)		0.479 (0.430)		1.247** (0.507)		1.316*** (0.496)
policy	-0.314*** (0.104)	0.163*** (0.033)	-0.434*** (0.100)	0.167*** (0.030)	-0.289** (0.116)	0.252*** (0.036)	-0.285*** (0.106)	0.126*** (0.035)
HCI	-0.677*** (0.081)	0.149 (0.095)	-0.727*** (0.085)	0.330*** (0.089)	-0.586*** (0.081)	-0.033 (0.106)	-0.701*** (0.084)	0.131 (0.104)
depreciate	-8.389* (4.410)	10.638*** (3.664)	-5.509 (4.458)	14.688*** (3.401)	-13.079*** (4.651)	11.269*** (4.085)	-5.866 (4.517)	9.442** (3.990)
work	-0.086 (0.405)	0.308 (0.347)	0.771* (0.399)	0.364 (0.322)	-0.075 (0.440)	0.416 (0.387)	-0.357 (0.412)	0.213 (0.378)
patent	0.979*** (0.041)	0.080** (0.035)	0.818*** (0.043)	0.006 (0.032)	1.052*** (0.042)	0.109*** (0.039)	0.989*** (0.042)	0.076** (0.038)
GFCF	0.457 (0.589)	1.936*** (0.295)	1.446** (0.623)	3.488*** (0.274)	-1.275** (0.583)	0.316 (0.328)	0.632 (0.609)	1.707*** (0.321)
GFCE	-2.868*** (0.806)	0.073 (0.800)	-1.664* (0.850)	1.065 (0.747)	-3.627*** (0.802)	-0.820 (0.892)	-2.730*** (0.833)	0.094 (0.872)
labor	0.913** (0.413)	0.948* (0.536)	-0.022 (0.434)	-0.374 (0.503)	2.703*** (0.412)	1.911*** (0.597)	0.517 (0.427)	1.084* (0.584)
highend	2.626*** (0.341)	0.108 (0.140)	3.376*** (0.337)	0.112 (0.130)	3.282*** (0.369)	-0.012 (0.157)	2.394*** (0.348)	0.205 (0.153)
openness	0.291 (0.186)	0.463*** (0.081)	-0.205 (0.179)	0.450*** (0.075)	-0.150 (0.207)	0.070 (0.090)	0.532*** (0.189)	0.555*** (0.088)
capitalize	0.198*** (0.031)	-0.073*** (0.011)	0.213*** (0.031)	-0.038*** (0.010)	0.160*** (0.034)	-0.048*** (0.013)	0.204*** (0.032)	-0.085*** (0.012)
Observation	822	822	822	822	822	822	822	822
k class	1.093	0.999	1.067	1.000	1.117	0.999	1.088	0.999
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ Bartik IV

PSII	2.540*** (0.345)		2.004*** (0.344)		2.588*** (0.384)		2.640*** (0.370)	
PSIICOMP		2.140*** (0.762)		1.864*** (0.711)		2.863*** (0.951)		1.881** (0.754)
policy	0.197*** (0.025)	0.137*** (0.044)	0.175*** (0.025)	0.120*** (0.041)	0.287*** (0.028)	0.205*** (0.055)	0.167*** (0.027)	0.115*** (0.044)
HCI	0.372*** (0.060)	-0.013 (0.144)	0.439*** (0.060)	0.109 (0.134)	0.204*** (0.067)	-0.300* (0.179)	0.377*** (0.065)	0.032 (0.142)
depreciate	3.432 (3.258)	13.821*** (4.765)	10.037*** (3.245)	18.754*** (4.445)	3.859 (3.622)	16.560*** (5.942)	1.682 (3.493)	11.408** (4.711)
work	-0.141 (0.274)	-0.295 (0.366)	0.236 (0.273)	0.113 (0.342)	0.073 (0.305)	-0.095 (0.457)	-0.350 (0.294)	-0.502 (0.362)
patent	0.137*** (0.033)	0.107** (0.044)	0.044 (0.033)	0.024 (0.041)	0.164*** (0.036)	0.139** (0.055)	0.137*** (0.035)	0.100** (0.043)
GFCF	2.075*** (0.244)	1.701*** (0.386)	3.461*** (0.243)	3.127*** (0.360)	0.465* (0.272)	-0.143 (0.481)	1.887*** (0.262)	1.603*** (0.382)
GFCE	-1.247** (0.569)	1.566 (1.213)	0.451 (0.567)	2.911** (1.131)	-2.284*** (0.633)	1.494 (1.512)	-1.361** (0.611)	1.094 (1.199)
labor	0.123 (0.296)	1.777** (0.809)	-0.584** (0.295)	0.898 (0.755)	1.074*** (0.330)	3.401*** (1.009)	0.106 (0.318)	1.486* (0.800)
highend	0.087 (0.128)	0.141 (0.171)	0.054 (0.127)	0.090 (0.159)	-0.037 (0.142)	-0.003 (0.213)	0.194 (0.137)	0.263 (0.169)
openness	0.551*** (0.072)	0.463*** (0.099)	0.498*** (0.072)	0.425*** (0.093)	0.147* (0.080)	0.031 (0.124)	0.656*** (0.077)	0.576*** (0.098)
capitalize	-0.084*** (0.010)	-0.070*** (0.014)	-0.044*** (0.010)	-0.032** (0.013)	-0.060*** (0.011)	-0.041** (0.018)	-0.098*** (0.011)	-0.085*** (0.014)
Observation	841	832	841	832	841	832	841	832
k class	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel C: GVC participation ~ lagged term

PSII	1.347*** (0.351)		0.896** (0.353)		0.896** (0.390)		1.685*** (0.378)	
PSIICOMP		0.180** (0.089)		0.217** (0.089)		0.156 (0.099)		0.165* (0.096)
policy	0.206***	0.210***	0.183***	0.182***	0.300***	0.300***	0.174***	0.181***

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	(0.024)	(0.025)	(0.024)	(0.024)	(0.027)	(0.027)	(0.026)	(0.026)
HCI	0.349*** (0.059)	0.295*** (0.061)	0.418*** (0.059)	0.367*** (0.061)	0.172*** (0.065)	0.131* (0.067)	0.359*** (0.064)	0.301*** (0.066)
depreciate	5.443* (3.180)	8.215*** (3.176)	11.905*** (3.196)	14.017*** (3.165)	6.712* (3.528)	8.655** (3.507)	3.291 (3.427)	6.592* (3.422)
work	-0.193 (0.267)	-0.254 (0.271)	0.188 (0.269)	0.146 (0.270)	0.000 (0.297)	-0.041 (0.299)	-0.391 (0.288)	-0.466 (0.292)
patent	0.118*** (0.032)	0.096*** (0.032)	0.027 (0.032)	0.012 (0.032)	0.137*** (0.035)	0.123*** (0.035)	0.122*** (0.034)	0.095*** (0.034)
GFCF	2.170*** (0.238)	2.228*** (0.241)	3.549*** (0.239)	3.561*** (0.240)	0.600** (0.264)	0.629** (0.266)	1.963*** (0.257)	2.052*** (0.260)
GFCE	-1.162** (0.555)	-0.843 (0.573)	0.530 (0.558)	0.862 (0.571)	-2.164*** (0.616)	-1.907*** (0.632)	-1.293** (0.598)	-0.968 (0.617)
labor	-0.037 (0.289)	-0.058 (0.300)	-0.733** (0.291)	-0.661** (0.299)	0.846*** (0.321)	0.864*** (0.331)	-0.023 (0.312)	-0.102 (0.323)
highend	0.141 (0.125)	0.197 (0.125)	0.104 (0.125)	0.139 (0.125)	0.040 (0.138)	0.076 (0.138)	0.237* (0.134)	0.309** (0.135)
openness	0.540*** (0.070)	0.521*** (0.071)	0.488*** (0.071)	0.472*** (0.071)	0.131* (0.078)	0.117 (0.079)	0.647*** (0.076)	0.626*** (0.077)
capitalize	-0.083*** (0.010)	-0.080*** (0.010)	-0.043*** (0.010)	-0.040*** (0.010)	-0.058*** (0.011)	-0.056*** (0.011)	-0.097*** (0.011)	-0.094*** (0.011)
Observation	841	841	841	841	841	841	841	841
k class	0.999	0.999	0.999	0.999	0.999	0.999	0.999	0.999
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.11: Full results of LIML estimations.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ language and intdis</i>								
PSII	5.608*** (1.389)		6.948*** (1.305)		5.426*** (1.589)		5.481*** (1.402)	
PSIIcomp		1.204** (0.466)		0.488 (0.439)		1.288** (0.520)		1.359*** (0.509)
policy	-0.319*** (0.105)	0.162*** (0.033)	-0.440*** (0.101)	0.167*** (0.031)	-0.294** (0.118)	0.251*** (0.037)	-0.289*** (0.106)	0.125*** (0.036)
HCI	-0.676*** (0.081)	0.143 (0.097)	-0.726*** (0.085)	0.329*** (0.090)	-0.584*** (0.081)	-0.039 (0.108)	-0.700*** (0.084)	0.124 (0.106)
depreciate	-8.243* (4.437)	10.734*** (3.695)	-5.347 (4.484)	14.712*** (3.410)	-12.916*** (4.688)	11.380*** (4.121)	-5.732 (4.541)	9.554** (4.027)
work	-0.070 (0.408)	0.317 (0.350)	0.789** (0.402)	0.366 (0.323)	-0.056 (0.445)	0.426 (0.390)	-0.342 (0.415)	0.223 (0.381)
patent	0.978*** (0.041)	0.080** (0.035)	0.817*** (0.043)	0.005 (0.032)	1.051*** (0.042)	0.109*** (0.039)	0.989*** (0.042)	0.076** (0.038)
GFCF	0.461 (0.591)	1.925*** (0.298)	1.451** (0.625)	3.485*** (0.275)	-1.270** (0.585)	0.304 (0.332)	0.636 (0.610)	1.695*** (0.324)
GFCE	-2.877*** (0.809)	0.114 (0.811)	-1.674* (0.853)	1.075 (0.754)	-3.637*** (0.805)	-0.773 (0.905)	-2.738*** (0.835)	0.141 (0.885)
labor	0.907** (0.414)	0.982* (0.546)	-0.028 (0.436)	-0.365 (0.510)	2.696*** (0.414)	1.951*** (0.609)	0.512 (0.428)	1.124* (0.595)
highend	2.640*** (0.344)	0.106 (0.141)	3.391*** (0.339)	0.112 (0.130)	3.298*** (0.373)	-0.014 (0.158)	2.407*** (0.350)	0.203 (0.154)
openness	0.282 (0.188)	0.461*** (0.081)	-0.214 (0.181)	0.450*** (0.075)	-0.160 (0.210)	0.068 (0.091)	0.524*** (0.190)	0.553*** (0.089)
capitalize	0.199*** (0.032)	-0.072*** (0.011)	0.214*** (0.032)	-0.038*** (0.010)	0.161*** (0.034)	-0.048*** (0.013)	0.205*** (0.032)	-0.085*** (0.012)
Observation	822	822	822	822	822	822	822	822
k class	1.094	1.000	1.068	1.002	1.119	1.000	1.090	1.000
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel B: GVC participation ~ Bartik IV</i>								
PSII	2.544*** (0.346)		2.007*** (0.344)		2.593*** (0.385)		2.644*** (0.371)	
PSIIcomp		2.288*** (0.819)		1.990*** (0.759)		3.070*** (1.030)		2.010** (0.803)
policy	0.197*** (0.025)	0.131*** (0.047)	0.175*** (0.025)	0.115*** (0.043)	0.287*** (0.028)	0.197*** (0.059)	0.167*** (0.027)	0.110** (0.046)
HCI	0.372*** (0.060)	-0.037 (0.153)	0.439*** (0.060)	0.089 (0.142)	0.204*** (0.067)	-0.332* (0.192)	0.377*** (0.065)	0.012 (0.150)
depreciate	3.424 (3.259)	14.217*** (4.970)	10.031*** (3.245)	19.091*** (4.608)	3.850 (3.623)	17.117*** (6.252)	1.675 (3.494)	11.752** (4.874)
work	-0.141 (0.274)	-0.297 (0.379)	0.236 (0.273)	0.111 (0.352)	0.074 (0.305)	-0.098 (0.477)	-0.349 (0.294)	-0.504 (0.372)
patent	0.137*** (0.033)	0.107** (0.045)	0.044 (0.033)	0.024 (0.042)	0.164*** (0.036)	0.140** (0.057)	0.137*** (0.035)	0.101** (0.044)
GFCF	2.075*** (0.244)	1.661*** (0.404)	3.461*** (0.243)	3.094*** (0.375)	0.465* (0.272)	-0.198 (0.508)	1.886*** (0.262)	1.569*** (0.396)
GFCE	-1.247** (0.570)	1.749 (1.284)	0.451 (0.567)	3.066** (1.191)	-2.284*** (0.633)	1.749 (1.616)	-1.361** (0.611)	1.252 (1.260)
labor	0.124 (0.297)	1.914** (0.862)	-0.584** (0.295)	1.014 (0.800)	1.074*** (0.330)	3.593*** (1.085)	0.106 (0.318)	1.605* (0.846)
highend	0.087 (0.128)	0.137 (0.177)	0.054 (0.127)	0.086 (0.164)	-0.037 (0.142)	-0.008 (0.222)	0.194 (0.137)	0.259 (0.173)
openness	0.551*** (0.072)	0.458*** (0.103)	0.498*** (0.072)	0.421*** (0.096)	0.147* (0.080)	0.024 (0.130)	0.656*** (0.077)	0.571*** (0.101)
capitalize	-0.084*** (0.010)	-0.069*** (0.015)	-0.044*** (0.010)	-0.032** (0.014)	-0.060*** (0.011)	-0.040** (0.018)	-0.098*** (0.011)	-0.085*** (0.014)
Observation	841	832	841	832	841	832	841	832
k class	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

<i>Panel C: GVC participation ~ lagged term</i>								
PSII	1.347*** (0.352)		0.896** (0.353)		0.895** (0.390)		1.687*** (0.379)	
PSIIcomp		0.180** (0.089)		0.216** (0.089)		0.156 (0.099)		0.165* (0.096)
policy	0.206*** (0.024)	0.210*** (0.025)	0.183*** (0.024)	0.182*** (0.024)	0.300*** (0.027)	0.300*** (0.027)	0.174*** (0.026)	0.181*** (0.026)
HCI	0.349*** (0.059)	0.295*** (0.061)	0.418*** (0.059)	0.367*** (0.061)	0.172*** (0.065)	0.131* (0.067)	0.359*** (0.064)	0.301*** (0.066)
depreciate	5.442* (3.180)	8.215*** (3.176)	11.905*** (3.196)	14.016*** (3.165)	6.712* (3.528)	8.655** (3.507)	3.289 (3.427)	6.592* (3.422)
work	-0.193 (0.267)	-0.254 (0.271)	0.188 (0.269)	0.146 (0.270)	0.000 (0.297)	-0.041 (0.299)	-0.391 (0.288)	-0.466 (0.292)
patent	0.118*** (0.032)	0.096*** (0.032)	0.027 (0.032)	0.012 (0.032)	0.137*** (0.035)	0.123*** (0.035)	0.122*** (0.034)	0.095*** (0.034)
GFCF	2.170*** (0.238)	2.228*** (0.241)	3.549*** (0.240)	3.561*** (0.240)	0.600** (0.264)	0.629** (0.266)	1.963*** (0.257)	2.052*** (0.260)
GFCE	-1.162** (0.555)	-0.843 (0.573)	0.530 (0.558)	0.862 (0.571)	-2.164*** (0.616)	-1.907*** (0.632)	-1.293** (0.598)	-0.968 (0.617)
labor	-0.037 (0.289)	-0.058 (0.300)	-0.733** (0.291)	-0.661** (0.299)	0.846*** (0.321)	0.864*** (0.331)	-0.022 (0.312)	-0.102 (0.323)
highend	0.141 (0.125)	0.197 (0.125)	0.104 (0.125)	0.139 (0.125)	0.040 (0.138)	0.076 (0.138)	0.237* (0.134)	0.309** (0.135)
openness	0.540*** (0.070)	0.521*** (0.071)	0.488*** (0.071)	0.472*** (0.071)	0.131* (0.078)	0.117 (0.079)	0.647*** (0.076)	0.626*** (0.077)
capitalize	-0.083*** (0.010)	-0.080*** (0.010)	-0.043*** (0.010)	-0.040*** (0.010)	-0.058*** (0.011)	-0.056*** (0.011)	-0.097*** (0.011)	-0.094*** (0.011)
Observation	841	841	841	841	841	841	841	841
k class	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

Table E.12: Full results of GMM estimations.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ language and intdis</i>								
PSII	8.317*** (1.149)	10.107*** (1.261)	7.685*** (1.083)	8.007*** (1.153)				
PSIIComp					3.510*** (0.487)	4.267*** (0.558)	3.242*** (0.467)	3.379*** (0.494)
policy	-0.382*** (0.086)	-0.508*** (0.090)	-0.331*** (0.083)	-0.348*** (0.088)	-0.250*** (0.089)	-0.348*** (0.096)	-0.210** (0.086)	-0.222** (0.090)
HCI	-0.465*** (0.093)	-0.446*** (0.107)	-0.432*** (0.090)	-0.510*** (0.094)	0.244* (0.140)	0.416** (0.168)	0.222* (0.128)	0.172 (0.141)
depreciate	8.285** (4.214)	9.141* (5.015)	4.877 (4.161)	9.979** (4.023)	12.713** (5.799)	14.502** (6.605)	8.979 (5.977)	14.239** (5.610)
work	0.717* (0.415)	1.587*** (0.461)	0.326 (0.405)	0.549 (0.421)	-2.243*** (0.321)	-2.006*** (0.388)	-2.412*** (0.307)	-2.301*** (0.319)
patent	1.092*** (0.045)	0.954*** (0.051)	1.132*** (0.045)	1.119*** (0.044)	1.151*** (0.043)	1.026*** (0.051)	1.187*** (0.043)	1.176*** (0.042)
GFCF	2.420*** (0.641)	4.215*** (0.722)	-0.104 (0.649)	2.678*** (0.652)	7.006*** (1.400)	9.795*** (1.666)	4.130*** (1.285)	7.094*** (1.406)
GFCE	-3.842*** (1.016)	-3.664*** (1.196)	-4.535*** (1.034)	-3.344*** (1.008)	-5.031*** (1.158)	-5.102*** (1.488)	-5.638*** (1.035)	-4.488*** (1.134)
labor	1.627*** (0.411)	0.858* (0.477)	2.950*** (0.386)	1.469*** (0.418)	-3.181*** (0.801)	-4.987*** (0.883)	-1.491* (0.768)	-3.159*** (0.814)
highend	3.175*** (0.481)	4.082*** (0.530)	3.732*** (0.466)	2.890*** (0.480)	1.901*** (0.353)	2.535*** (0.378)	2.554*** (0.355)	1.664*** (0.354)
openness	-0.360* (0.213)	-0.963*** (0.238)	-0.773*** (0.198)	-0.059 (0.213)	0.274** (0.133)	-0.196 (0.149)	-0.187 (0.127)	0.551*** (0.133)
capitalize	0.293*** (0.033)	0.307*** (0.035)	0.252*** (0.031)	0.299*** (0.033)	0.086*** (0.021)	0.057* (0.029)	0.062*** (0.018)	0.101*** (0.021)
Observation.	822	822	822	822	822	822	822	822
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
<i>Panel B: GVC participation ~ Bartik IV</i>								
PSII	1.559*** (0.402)	1.121*** (0.410)	1.526*** (0.433)	1.690*** (0.400)				
PSIIComp					1.241*** (0.319)	0.897*** (0.324)	1.206*** (0.336)	1.345*** (0.320)
policy	0.028 (0.062)	0.047 (0.059)	0.040 (0.066)	0.034 (0.062)	-0.018 (0.074)	0.014 (0.069)	-0.004 (0.080)	-0.015 (0.075)
HCI	-0.543*** (0.070)	-0.545*** (0.070)	-0.527*** (0.071)	-0.573*** (0.071)	-0.279*** (0.103)	-0.351*** (0.097)	-0.265** (0.106)	-0.289*** (0.107)
depreciate	-1.890 (3.262)	-2.184 (3.550)	-5.308 (3.374)	0.570 (3.189)	0.006 (3.372)	-0.773 (3.416)	-3.610 (3.749)	2.651 (3.317)
work	-1.516*** (0.231)	-1.322*** (0.249)	-1.804*** (0.240)	-1.502*** (0.239)	-2.173*** (0.222)	-1.792*** (0.240)	-2.428*** (0.225)	-2.221*** (0.226)
patent	1.126*** (0.033)	1.004*** (0.034)	1.153*** (0.036)	1.156*** (0.033)	1.130*** (0.033)	1.007*** (0.034)	1.155*** (0.035)	1.161*** (0.033)
GFCF	0.195 (0.533)	1.196** (0.568)	-2.189*** (0.537)	0.634 (0.542)	2.196** (0.861)	2.623*** (0.873)	-0.264 (0.858)	2.818*** (0.884)
GFCE	-2.438*** (0.698)	-1.650** (0.764)	-3.238*** (0.716)	-2.062*** (0.719)	-3.149*** (0.735)	-2.153*** (0.786)	-3.879*** (0.735)	-2.849*** (0.753)
labor	1.589*** (0.333)	0.821** (0.360)	2.959*** (0.320)	1.411*** (0.352)	0.069 (0.588)	-0.244 (0.630)	1.516*** (0.563)	-0.264 (0.601)
highend	1.192*** (0.291)	1.407*** (0.295)	1.938*** (0.320)	1.036*** (0.286)	1.165*** (0.305)	1.386*** (0.302)	1.916*** (0.329)	1.007*** (0.304)
openness	0.745*** (0.102)	0.494*** (0.103)	0.234** (0.101)	0.975*** (0.107)	0.751*** (0.100)	0.497*** (0.100)	0.242** (0.098)	0.981*** (0.104)
capitalize	0.163*** (0.024)	0.137*** (0.022)	0.136*** (0.024)	0.177*** (0.025)	0.118*** (0.016)	0.104*** (0.015)	0.092*** (0.016)	0.128*** (0.017)
Observation	841	841	841	841	832	832	832	832
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel C: GVC participation ~ lagged term</i>								
PSII	1.673*** (0.350)	1.311*** (0.355)	1.680*** (0.370)	1.777*** (0.352)	0.408*** (0.100)	0.363*** (0.101)	0.451*** (0.106)	0.424*** (0.102)
PSIIcomp								
policy	0.020 (0.059)	0.035 (0.056)	0.030 (0.063)	0.029 (0.060)	0.080 (0.051)	0.077 (0.047)	0.085 (0.054)	0.093* (0.052)
HCI	-0.543*** (0.069)	-0.545*** (0.068)	-0.527*** (0.071)	-0.573*** (0.070)	-0.460*** (0.068)	-0.471*** (0.069)	-0.436*** (0.072)	-0.487*** (0.069)
depreciate	-1.833 (3.242)	-2.082 (3.517)	-5.227 (3.348)	0.611 (3.175)	-1.962 (3.265)	-2.095 (3.476)	-5.273 (3.501)	0.454 (3.191)
work	-1.486*** (0.234)	-1.272*** (0.252)	-1.762*** (0.243)	-1.479*** (0.240)	-2.017*** (0.212)	-1.697*** (0.228)	-2.305*** (0.217)	-2.042*** (0.218)
patent	1.125*** (0.033)	1.002*** (0.034)	1.151*** (0.036)	1.155*** (0.032)	1.140*** (0.031)	1.013*** (0.033)	1.165*** (0.034)	1.171*** (0.030)
GFCF	0.231 (0.538)	1.257** (0.570)	-2.139*** (0.544)	0.662 (0.547)	0.550 (0.540)	1.595*** (0.561)	-1.735*** (0.560)	0.980* (0.547)
GFCE	-2.465*** (0.702)	-1.694** (0.766)	-3.274*** (0.724)	-2.083*** (0.723)	-2.447*** (0.699)	-1.720** (0.765)	-3.293*** (0.723)	-2.054*** (0.715)
labor	1.591*** (0.332)	0.825** (0.358)	2.962*** (0.321)	1.413*** (0.350)	1.014*** (0.369)	0.316 (0.403)	2.328*** (0.348)	0.812** (0.385)
highend	1.227*** (0.285)	1.466*** (0.290)	1.986*** (0.309)	1.063*** (0.281)	0.864*** (0.229)	1.197*** (0.239)	1.637*** (0.243)	0.674*** (0.227)
openness	0.727*** (0.096)	0.464*** (0.096)	0.209** (0.093)	0.961*** (0.101)	0.915*** (0.061)	0.602*** (0.064)	0.390*** (0.057)	1.162*** (0.066)
capitalize	0.166*** (0.023)	0.140*** (0.021)	0.139*** (0.023)	0.179*** (0.024)	0.127*** (0.019)	0.110*** (0.017)	0.100*** (0.019)	0.138*** (0.020)
Observation	841	841	841	841	841	841	841	841
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note: *p<0.1; **p<0.05; ***p<0.01

Appendix F Results of Mechanism Tests

F.1 Results of Heterogeneity Analyses

Table F.1: Full results of heterogeneity analyses.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ domestic PSII</i>								
PSII_dom	1.696*** (0.231)		1.416*** (0.178)		1.715*** (0.271)		1.719*** (0.276)	
PSIIcomp_dom		0.311*** (0.058)		0.326*** (0.060)		0.238*** (0.054)		0.316*** (0.067)
policy	0.192*** (0.028)	0.203*** (0.027)	0.170*** (0.029)	0.176*** (0.028)	0.282*** (0.031)	0.296*** (0.030)	0.162*** (0.028)	0.174*** (0.026)
HCI	0.378*** (0.045)	0.276*** (0.045)	0.447*** (0.038)	0.351*** (0.032)	0.210*** (0.040)	0.118** (0.044)	0.382*** (0.053)	0.278*** (0.053)
depreciate	4.598 (7.223)	8.711 (7.683)	10.814 (6.469)	14.462** (6.710)	5.073 (6.769)	8.986 (7.308)	2.976 (8.057)	7.147 (8.466)
work	-0.208	-0.255	0.186	0.146	0.005	-0.042	-0.420*	-0.468**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
patent	(0.188) 0.104*** (0.022)	(0.201) 0.097*** (0.021)	(0.208) 0.019 (0.030)	(0.220) 0.013 (0.028)	(0.229) 0.131*** (0.028)	(0.264) 0.123*** (0.025)	(0.221) 0.103*** (0.021)	(0.223) 0.096*** (0.020)
GFCF	2.109*** (0.220)	2.184*** (0.243)	3.480*** (0.216)	3.522*** (0.248)	0.501* (0.260)	0.600** (0.277)	1.926*** (0.254)	2.002*** (0.264)
GFCE	-1.597* (0.822)	-0.753 (0.876)	0.150 (0.803)	0.922 (0.865)	-2.636*** (0.715)	-1.860** (0.781)	-1.711* (0.873)	-0.855 (0.921)
labor	-0.045 (0.279)	0.084 (0.325)	-0.709** (0.329)	-0.536 (0.355)	0.901** (0.326)	0.957** (0.357)	-0.073 (0.284)	0.058 (0.341)
highend	0.147 (0.166)	0.199 (0.159)	0.098 (0.140)	0.141 (0.135)	0.024 (0.176)	0.078 (0.170)	0.258 (0.180)	0.310* (0.172)
openness	0.567*** (0.072)	0.522*** (0.079)	0.513*** (0.071)	0.474*** (0.078)	0.164** (0.071)	0.119 (0.077)	0.673*** (0.073)	0.627*** (0.080)
capitalize	-0.088*** (0.018)	-0.080*** (0.017)	-0.047*** (0.015)	-0.041** (0.015)	-0.063*** (0.012)	-0.056*** (0.012)	-0.102*** (0.020)	-0.094*** (0.019)
Observation	841	841	841	841	841	841	841	841
adj. R\$^2\$	0.392	0.367	0.435	0.425	0.327	0.298	0.346	0.323
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ imported PSII

PSII_for	-1.084** (0.383)	-1.230*** (0.394)	-1.924*** (0.322)	-0.733 (0.430)				
PSIIComp_for	-0.029 (0.095)	0.032 (0.083)	-0.081 (0.094)	-0.019 (0.109)				
policy	0.209*** (0.028)	0.217*** (0.027)	0.181*** (0.029)	0.189*** (0.029)	0.293*** (0.031)	0.307*** (0.031)	0.182*** (0.028)	0.187*** (0.027)
HCI	0.356*** (0.051)	0.328*** (0.048)	0.439*** (0.039)	0.396*** (0.037)	0.213*** (0.046)	0.168*** (0.044)	0.349*** (0.059)	0.330*** (0.054)
depreciate	7.427 (7.445)	7.629 (7.522)	13.090* (6.429)	13.506* (6.563)	7.714 (6.826)	7.990 (7.133)	5.940 (8.366)	6.079 (8.328)
work	-0.253 (0.196)	-0.245 (0.198)	0.147 (0.210)	0.143 (0.217)	-0.042 (0.258)	-0.022 (0.267)	-0.465** (0.219)	-0.460** (0.217)
patent	0.088*** (0.023)	0.096*** (0.023)	0.003 (0.034)	0.012 (0.033)	0.108*** (0.025)	0.122*** (0.023)	0.089*** (0.022)	0.094*** (0.022)
GFCF	2.275*** (0.248)	2.276*** (0.234)	3.618*** (0.257)	3.624*** (0.249)	0.667** (0.279)	0.665** (0.275)	2.096*** (0.263)	2.096*** (0.250)
GFCE	-1.1283 (0.833)	-1.106 (0.937)	0.347 (0.808)	0.637 (0.921)	-2.485*** (0.698)	-2.209** (0.842)	-1.320 (0.898)	-1.198 (0.986)
labor	-0.240 (0.315)	-0.244 (0.381)	-0.878** (0.342)	-0.826* (0.394)	0.687* (0.360)	0.654 (0.417)	-0.264 (0.320)	-0.266 (0.390)
highend	0.210 (0.161)	0.202 (0.165)	0.154 (0.138)	0.143 (0.140)	0.095 (0.164)	0.083 (0.173)	0.319* (0.176)	0.314* (0.178)
openness	0.566*** (0.085)	0.529*** (0.079)	0.524*** (0.080)	0.477*** (0.077)	0.193** (0.085)	0.128 (0.075)	0.658*** (0.085)	0.633*** (0.081)
capitalize	-0.085*** (0.019)	-0.081*** (0.018)	-0.046** (0.017)	-0.041** (0.016)	-0.064*** (0.013)	-0.057*** (0.013)	-0.098*** (0.021)	-0.095*** (0.021)
Observation	841	841	841	841	841	841	841	841
adj. R\$^2\$	0.356	0.351	0.415	0.409	0.304	0.290	0.310	0.308
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Note:

*p<0.1; **p<0.05; ***p<0.01

F.2 Results of Mediating Effect

Table F.2: Results of mediating effect tests

Variable	servitization					
	IV Set I		IV Set II		IV Set III	
	(1)	(2)	(3)	(4)	(5)	(6)
PSII (fitted)	3.388** (1.256)		2.076** (0.973)		2.539* (1.193)	
PSIIcomp (fitted)		1.879*** (0.515)		0.848*** (0.130)		0.570*** (0.148)
policy	-0.056 (0.040)	-0.005 (0.023)	0.014 (0.034)	0.000 (0.031)	-0.044 (0.031)	0.002 (0.013)
HCI	0.469* (0.217)	0.063 (0.104)	-0.009 (0.025)	0.041 (0.054)	0.361* (0.191)	0.066 (0.079)
depreciate	-12.579* (6.050)	-0.629 (2.712)	0.163 (0.989)	-0.164 (1.758)	-9.560* (4.680)	-1.784 (1.335)
work	-0.285 (0.297)	0.360 (0.327)	0.205* (0.112)	-0.097 (0.091)	-0.043 (0.225)	0.246* (0.130)
patent	0.085 (0.057)	0.029 (0.031)	-0.127*** (0.031)	-0.127*** (0.026)	0.052 (0.058)	-0.016 (0.021)
GFCF	0.410 (0.288)	0.066 (0.350)	-0.417* (0.247)	0.464 (0.400)	0.370 (0.216)	0.209 (0.188)
GFCE	-0.209 (0.635)	2.593*** (0.734)	0.101 (0.229)	0.154 (0.359)	0.018 (0.623)	1.509*** (0.392)
labor	0.237 (0.399)	0.500 (0.348)	-0.250 (0.176)	-1.183*** (0.140)	0.175 (0.333)	0.115 (0.191)
highend	-0.134 (0.122)	-0.044 (0.099)	0.340 (0.244)	0.376*** (0.121)	-0.131 (0.094)	-0.081 (0.046)
openness	-0.027 (0.085)	-0.054 (0.096)	-0.483** (0.191)	-0.314*** (0.051)	-0.024 (0.073)	-0.014 (0.066)
capitalize	-0.006 (0.008)	0.012* (0.006)	0.038** (0.015)	-0.012 (0.011)	-0.003 (0.009)	0.008* (0.004)
Observation	410	410	412	419	419	419
Adj. R ²	0.878	0.761	0.651	-0.329	0.920	0.950
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓

Note: *p<0.1; **p<0.05; ***p<0.01

Table F.3: Full results of grouping regressions based on financial constraint.

Variable	Constraint	GVC participation								
		Low constraint					High constraint			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<i>Panel A: ~ PSII</i>										
PSII		-0.094*** (0.030)	1.045** (0.430)	1.202*** (0.348)	0.386 (0.392)	1.121** (0.525)	0.437 (0.430)	0.273 (0.539)	-0.043 (0.487)	0.602 (0.503)
policy		0.001 (0.004)	0.241** (0.087)	0.187** (0.073)	0.306*** (0.105)	0.235** (0.088)	0.009 (0.052)	0.085 (0.079)	-0.006 (0.042)	-0.027 (0.057)
HCI		-0.020** (0.008)	0.855*** (0.103)	0.894*** (0.088)	0.487*** (0.133)	0.934*** (0.109)	0.243*** (0.061)	0.288*** (0.074)	0.170* (0.089)	0.259*** (0.070)
depreciate		-0.134 (0.496)	-11.440 (9.305)	-4.329 (8.878)	-3.670 (9.624)	-16.534* (9.256)	6.043 (4.188)	11.255* (5.997)	-4.829 (4.408)	7.606 (4.981)
work		0.060* (0.034)	-0.419 (0.410)	-0.222 (0.364)	-0.322 (0.649)	-0.569 (0.433)	1.166* (0.587)	1.121 (0.713)	1.380** (0.487)	1.268* (0.667)
patent		-0.024*** (0.006)	0.176*** (0.058)	0.171*** (0.054)	0.105 (0.081)	0.207*** (0.058)	-0.009 (0.042)	0.007 (0.054)	-0.058 (0.053)	0.000 (0.050)
GFCF		-0.098** (0.040)	2.159*** (0.412)	3.419*** (0.416)	0.585 (0.377)	2.109*** (0.472)	1.376*** (0.419)	2.103*** (0.585)	0.037 (0.554)	1.433*** (0.422)
GFCE		-0.140* (0.076)	0.230 (1.183)	1.164 (1.050)	-0.168 (1.167)	0.199 (1.197)	1.037 (1.500)	4.196* (2.055)	-1.960 (1.990)	1.059 (1.329)
labor		-0.054 (0.045)	0.344 (0.581)	-0.542 (0.518)	1.435* (0.778)	0.139 (0.565)	0.946** (0.424)	-0.139 (0.542)	1.889*** (0.445)	1.074* (0.520)
highend		0.019 (0.019)	0.107 (0.186)	0.043 (0.144)	0.041 (0.175)	0.259 (0.218)	-0.218 (0.264)	-0.445 (0.290)	-0.097 (0.161)	-0.187 (0.303)
openness		0.024** (0.011)	0.818*** (0.214)	0.855*** (0.166)	0.201 (0.168)	0.964*** (0.251)	0.535*** (0.112)	0.494** (0.223)	0.122 (0.079)	0.637*** (0.118)
capitalize		0.001 (0.003)	0.004 (0.026)	0.034* (0.018)	-0.005 (0.018)	-0.005 (0.030)	-0.008 (0.020)	-0.020 (0.013)	0.003 (0.036)	-0.003 (0.023)
Observation		578	382	382	382	382	196	196	196	196
adj. R\$^2\$		0.145	0.359	0.473	0.190	0.362	0.373	0.348	0.158	0.402
Year FE		✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE		✓	✓	✓	✓	✓	✓	✓	✓	✓
<i>Panel A: ~ PSIIcomp</i>										
PSIIcomp		-0.058*** (0.009)	0.204* (0.112)	0.372*** (0.109)	-0.057 (0.107)	0.243* (0.134)	0.069 (0.074)	0.037 (0.088)	-0.063 (0.093)	0.130* (0.067)
policy		0.004 (0.003)	0.203** (0.084)	0.141* (0.073)	0.295*** (0.100)	0.194** (0.086)	0.012 (0.054)	0.086 (0.084)	-0.011 (0.041)	-0.020 (0.057)
HCI		-0.012 (0.009)	0.740*** (0.102)	0.735*** (0.080)	0.470*** (0.152)	0.805*** (0.107)	0.256*** (0.055)	0.297*** (0.064)	0.178** (0.070)	0.271*** (0.071)
depreciate		-0.324 (0.484)	-10.421 (9.855)	-3.123 (9.572)	-3.325 (9.842)	-15.434 (9.857)	7.690 (4.521)	12.230* (5.807)	-5.464 (5.044)	10.175* (5.665)
work		0.064* (0.034)	-0.616 (0.402)	-0.464 (0.322)	-0.379 (0.635)	-0.783* (0.439)	1.048* (0.590)	1.052 (0.684)	1.432** (0.526)	1.078 (0.684)
patent		-0.021*** (0.007)	0.163** (0.065)	0.157** (0.057)	0.100 (0.084)	0.193*** (0.064)	-0.002 (0.055)	0.012 (0.065)	-0.050 (0.061)	0.004 (0.060)
GFCF		-0.094** (0.042)	2.065*** (0.440)	3.247*** (0.409)	0.611 (0.395)	1.997*** (0.513)	1.412*** (0.435)	2.123*** (0.593)	0.008 (0.551)	1.499*** (0.457)
GFCE		-0.237*** (0.071)	0.548 (1.127)	1.556 (0.982)	-0.076 (1.171)	0.545 (1.127)	1.092 (1.444)	4.206* (2.236)	-2.172 (1.864)	1.265 (1.211)
labor		-0.096* (0.054)	0.601 (0.691)	-0.072 (0.625)	1.363 (0.835)	0.446 (0.690)	1.097** (0.461)	-0.058 (0.532)	1.757*** (0.473)	1.356** (0.546)

highend	0.015 (0.016)	0.090 (0.185)	0.013 (0.142)	0.044 (0.172)	0.239 (0.217)	-0.186 (0.274)	-0.428 (0.292)	-0.128 (0.176)	-0.125 (0.312)
openness	0.029** (0.011)	0.721*** (0.216)	0.723*** (0.175)	0.185 (0.161)	0.857*** (0.249)	0.542*** (0.109)	0.498** (0.223)	0.117 (0.081)	0.650*** (0.114)
capitalize	0.001 (0.003)	0.006 (0.027)	0.039* (0.019)	-0.006 (0.019)	-0.002 (0.031)	-0.008 (0.020)	-0.020 (0.013)	0.003 (0.036)	-0.002 (0.023)
Observation	578	382	382	382	196	196	196	196	196
adj. R\$^2\$	0.184	0.341	0.463	0.187	0.346	0.372	0.348	0.161	0.405
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: *p<0.1; **p<0.05; ***p<0.01

Table F.4: Full results of grouping regressions based on productivity

Variable	Productivity	GVC participation							
		Low productivity				High productivity			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: ~ PSII</i>									
PSII	0.258*** (0.061)	-1.954* (0.891)	-2.116 (1.067)	-0.581 (1.301)	-2.434** (0.731)	2.448** (0.676)	2.145** (0.650)	2.464** (0.894)	2.557** (0.694)
policy	0.063*** (0.016)	-0.065 (0.050)	-0.146* (0.061)	0.134 (0.135)	-0.054 (0.071)	0.187 (0.120)	0.157 (0.138)	0.099 (0.118)	0.243* (0.117)
HCI	-0.111*** (0.011)	-0.897*** (0.099)	-0.937*** (0.137)	-1.163** (0.273)	-0.912*** (0.104)	-0.291 (0.172)	-0.412* (0.163)	-0.219 (0.195)	-0.271 (0.181)
depreciate	0.073 (1.516)	-16.911** (5.271)	-21.967** (6.902)	-14.706** (4.639)	-11.195* (5.070)	-19.107 (11.709)	-17.849 (10.011)	-18.271 (12.670)	-20.816 (12.944)
work	-0.336*** (0.066)	-1.564*** (0.119)	-1.576*** (0.178)	-1.573** (0.359)	-1.555*** (0.264)	-0.381 (0.625)	0.217 (0.606)	-0.130 (0.510)	-0.596 (0.708)
patent	-0.003 (0.009)	1.053*** (0.093)	0.865*** (0.095)	1.127*** (0.110)	1.116*** (0.095)	1.136*** (0.100)	1.037*** (0.114)	1.245*** (0.063)	1.125*** (0.107)
GFCF	0.859*** (0.114)	-1.261 (0.698)	1.309 (0.929)	-4.225*** (0.549)	-1.375* (0.638)	2.279 (1.531)	2.421 (1.405)	2.060 (1.960)	2.453 (1.673)
GFCE	1.104*** (0.180)	-4.172 (2.890)	-1.243 (3.125)	-6.824 (4.167)	-4.118 (2.015)	0.460 (2.470)	1.718 (2.414)	1.474 (2.576)	-0.243 (2.499)
labor	-0.190*** (0.050)	3.698*** (0.714)	1.364* (0.561)	6.159** (1.511)	3.278*** (0.494)	-1.876 (1.573)	-2.101 (1.149)	0.874 (1.613)	-2.758 (1.653)
highend	-0.049* (0.027)	2.601*** (0.224)	2.382*** (0.366)	3.116*** (0.613)	2.599*** (0.198)	1.508** (0.431)	1.866** (0.585)	2.033** (0.554)	1.349** (0.353)
openness	-0.088*** (0.016)	1.229*** (0.156)	1.617*** (0.101)	0.178 (0.284)	1.468*** (0.204)	0.644** (0.209)	0.371 (0.229)	0.300 (0.165)	0.810** (0.219)
capitalize	0.003 (0.003)	0.116 (0.142)	-0.158 (0.096)	0.501* (0.216)	0.113 (0.157)	0.155*** (0.029)	0.144*** (0.028)	0.140*** (0.030)	0.153*** (0.031)
Observation	577	191	191	191	191	386	386	386	386
adj. R\$^2\$	0.478	0.942	0.927	0.915	0.947	0.869	0.859	0.879	0.862
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Panel A: ~ PSIIcomp

PSIIcomp	0.083*** (0.024)	-0.388*** (0.096)	-0.291*** (0.094)	-0.667*** (0.135)	-0.286*** (0.088)	0.345*** (0.096)	0.249** (0.096)	0.337** (0.112)	0.370*** (0.113)
policy	0.057*** (0.015)	0.133 (0.084)	0.069 (0.075)	0.208*** (0.067)	0.134 (0.100)	0.102*** (0.032)	0.099* (0.046)	0.138*** (0.038)	0.084** (0.033)

HCI	-0.122*** (0.016)	0.657*** (0.120)	0.514*** (0.118)	0.645*** (0.156)	0.687*** (0.107)	0.544*** (0.084)	0.531*** (0.067)	0.325*** (0.087)	0.572*** (0.103)
depreciate	0.750 (1.604)	-28.253*** (9.238)	-16.461* (7.574)	-19.622* (9.231)	-34.572*** (10.217)	-5.155 (5.092)	1.891 (5.441)	-12.124 (7.557)	-6.807 (5.710)
work	-0.349*** (0.069)	-0.159 (0.599)	0.315 (0.584)	-0.459 (0.707)	-0.031 (0.563)	0.767 (0.493)	0.613 (0.392)	0.566 (0.556)	0.600 (0.614)
patent	-0.007 (0.008)	0.362*** (0.098)	0.261*** (0.085)	0.411*** (0.119)	0.356*** (0.098)	-0.035 (0.021)	-0.081* (0.042)	-0.032 (0.036)	-0.012 (0.027)
GFCF	0.841*** (0.115)	2.046*** (0.633)	3.298*** (0.579)	0.379 (0.556)	2.051** (0.763)	0.978*** (0.290)	2.188*** (0.295)	-0.525 (0.401)	0.973** (0.353)
GFCE	1.276*** (0.188)	0.002 (0.935)	1.481 (1.027)	-2.206 (1.337)	0.347 (0.980)	-1.607** (0.649)	0.498 (0.640)	-2.736*** (0.787)	-2.029** (0.690)
labor	-0.165** (0.055)	-1.526** (0.577)	-1.879*** (0.451)	-1.778** (0.705)	-1.373** (0.607)	1.402*** (0.272)	0.561 (0.483)	2.981*** (0.517)	1.110*** (0.200)
highend	-0.041 (0.025)	1.011** (0.337)	0.801** (0.312)	0.732* (0.371)	1.284*** (0.395)	-0.131 (0.161)	-0.105 (0.133)	-0.298* (0.155)	-0.038 (0.188)
openness	-0.104*** (0.018)	0.942*** (0.162)	1.066*** (0.137)	0.254 (0.153)	1.074*** (0.202)	0.319** (0.126)	0.264* (0.139)	-0.136* (0.070)	0.447** (0.156)
capitalize	0.003 (0.003)	-0.065 (0.050)	-0.067 (0.047)	-0.045 (0.061)	-0.076 (0.048)	0.003 (0.012)	0.035*** (0.010)	-0.002 (0.012)	0.000 (0.016)
Observation	577	191	191	191	191	386	386	386	386
adj. R\$2\$	0.479	0.611	0.567	0.460	0.626	0.339	0.307	0.336	0.319
Year FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓	✓

Note: *p<0.1; **p<0.05; ***p<0.01

F.3 Results of Moderating Effect

Table F.5: Full results of moderating effect.

Variable	GVC participation							
	orGVC		orGVC_pb		orGVC_pf		orGVC_ts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Panel A: GVC participation ~ GPYC</i>								
PSII	2.454*** (0.733)		2.067*** (0.672)		2.610*** (0.787)		2.649*** (0.772)	
GPYC	1.229***	0.829***	1.067***	0.778***	1.362***	0.605**	1.183***	0.732***
PSII×GPYC	-2.177** (0.909)		-1.981** (0.861)		-2.896*** (0.978)		-2.362** (0.943)	
PSIIcomp		0.499*** (0.128)		0.585*** (0.130)		0.253** (0.096)		0.497*** (0.157)
PSIIcomp×GPYC		-0.547*** (0.283)		-0.672*** (0.158)		-0.161 (0.118)		-0.551** (0.201)
policy			0.175*** (0.024)	0.199*** (0.022)	0.156*** (0.028)	0.176*** (0.024)	0.254*** (0.027)	0.282*** (0.028)
HCI			0.286*** (0.036)	0.176*** (0.037)	0.364*** (0.039)	0.257*** (0.026)	0.155*** (0.036)	0.047 (0.039)
depreciate			21.692*** (5.820)	25.026*** (6.200)	26.746*** (5.285)	29.528*** (5.351)	17.563*** (5.711)	21.145*** (6.502)
work			0.741*** (0.209)	0.661*** (0.215)	1.052*** (0.205)	1.014*** (0.199)	0.671*** (0.211)	0.520** (0.235)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
patent	0.068*** (0.020)	0.054*** (0.015)	-0.025 (0.028)	-0.036 (0.023)	0.096*** (0.020)	0.086*** (0.019)	0.069*** (0.021)	0.054*** (0.017)
GFCF	1.776*** (0.212)	1.736*** (0.244)	3.150*** (0.224)	3.072*** (0.246)	0.327 (0.255)	0.297 (0.275)	1.565*** (0.241)	1.531*** (0.268)
GFCE	-1.708** (0.653)	-1.204 (0.745)	0.124 (0.712)	0.686 (0.795)	-2.742*** (0.579)	-2.482*** (0.662)	-1.780** (0.704)	-1.279 (0.817)
labor	0.243 (0.284)	0.232 (0.313)	-0.423 (0.336)	-0.329 (0.339)	1.150*** (0.338)	0.972** (0.371)	0.227 (0.279)	0.186 (0.330)
highend	-0.069 (0.146)	0.003 (0.137)	-0.086 (0.133)	-0.047 (0.117)	-0.171 (0.152)	-0.042 (0.146)	0.004 (0.161)	0.086 (0.155)
openness	0.452*** (0.115)	0.371*** (0.085)	0.416*** (0.111)	0.345*** (0.082)	0.115 (0.114)	-0.003 (0.086)	0.561*** (0.118)	0.473*** (0.083)
capitalize	-0.080*** (0.018)	-0.071*** (0.016)	-0.041** (0.016)	-0.031** (0.014)	-0.059*** (0.013)	-0.053*** (0.011)	-0.094*** (0.021)	-0.084*** (0.019)
Observation	825	825	825	825	825	825	825	825
adj. R\$^2\$	0.449	0.415	0.494	0.480	0.362	0.327	0.399	0.359
Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Country FE	✓	✓	✓	✓	✓	✓	✓	✓

Panel B: GVC participation ~ GENEPY

PSII	2.435*** (0.463)		1.913*** (0.394)		2.067*** (0.558)		2.573*** (0.460)	
GENEPY	2.584*** (0.238)	1.792*** (0.140)	2.110*** (0.274)	1.460*** (0.133)	2.395*** (0.285)	1.588*** (0.163)	2.752*** (0.222)	1.968*** (0.159)
PSII×GENEPY	-3.105*** (0.595)		-2.401*** (0.714)		-2.663*** (0.708)		-3.184*** (0.532)	
PSIIcomp		0.394*** (0.120)		0.343** (0.121)		0.231* (0.117)		0.411*** (0.128)
PSIIcomp×GENEPY		-0.507** (0.238)		-0.330 (0.257)		-0.186 (0.197)		-0.576** (0.270)
policy	0.112*** (0.025)	0.137*** (0.028)	0.102*** (0.024)	0.119*** (0.028)	0.191*** (0.026)	0.212*** (0.029)	0.078*** (0.025)	0.104*** (0.028)
HCI	0.362*** (0.048)	0.295*** (0.050)	0.429*** (0.033)	0.367*** (0.033)	0.155*** (0.042)	0.102* (0.042)	0.375*** (0.050)	0.307*** (0.059)
depreciate	7.341 (6.301)	9.548 (6.257)	13.476** (5.742)	15.336** (5.492)	10.042 (5.826)	11.561* (5.814)	4.766 (6.971)	7.199 (6.960)
work	0.505* (0.244)	0.455 (0.293)	0.763*** (0.264)	0.708** (0.288)	0.645* (0.335)	0.553 (0.351)	0.373 (0.254)	0.332 (0.314)
patent	-0.014 (0.025)	-0.015 (0.027)	-0.091** (0.037)	-0.090** (0.037)	0.000 (0.022)	0.003 (0.024)	0.000 (0.027)	-0.002 (0.030)
GFCF	2.141*** (0.143)	2.274*** (0.193)	3.501*** (0.181)	3.595*** (0.231)	0.489** (0.206)	0.632** (0.228)	2.007*** (0.168)	2.147*** (0.206)
GFCE	-2.384** (0.832)	-1.624* (0.783)	-0.525 (0.789)	0.151 (0.760)	-3.768*** (0.767)	-3.112*** (0.714)	-2.486*** (0.862)	-1.719** (0.813)
labor	-0.092 (0.251)	0.033 (0.275)	-0.737** (0.295)	-0.594* (0.306)	0.686** (0.314)	0.762** (0.329)	-0.157 (0.246)	-0.044 (0.276)
highend	0.017 (0.167)	0.002 (0.158)	-0.011 (0.141)	-0.023 (0.129)	-0.117 (0.175)	-0.132 (0.172)	0.106 (0.180)	0.094 (0.171)
openness	0.530*** (0.074)	0.605*** (0.092)	0.490*** (0.073)	0.548*** (0.091)	0.119 (0.074)	0.193** (0.090)	0.637*** (0.080)	0.714*** (0.096)
capitalize	-0.075*** (0.016)	-0.080*** (0.017)	-0.037** (0.015)	-0.040** (0.016)	-0.051*** (0.011)	-0.055*** (0.012)	-0.089*** (0.018)	-0.094*** (0.019)
Observation	841	841	841	841	841	841	841	841
adj. R\$^2\$	0.503	0.464	0.511	0.491	0.424	0.395	0.472	0.431
Year FE	✓	✓	✓	✓	✓	✓	✓	✓

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Country FE	✓	✓	✓	✓	✓	✓	✓	✓
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01							

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