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Factors Driving World Market Integration: *The Case of Jordan's Industries*

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ABSTRACT

The purpose of this study is to examine the impacts of factors driving world market integration using panel data on the micro-level of 20 industries (2digits-ISIC) over the period 2009-2017. The present study suggested relatively large system of simultaneous equations model to avoid the simultaneous and specification bias. The model consists of three endogenous variables (industrial production, manufactured exports, and manufactured value-added), and four exogenous variables (workers' compensation, intermediate goods, intermediate services, and spending on improvement and development). Based on the export-to-output ratio, industries have been divided into two groups: the high exporting group (export-to-output ratio exceeds 25%), and the low exporting group (export-to-output ratio varies between 4.5% and 25%). That is to reflect the differences between these two groups which may result due to differences in strategy, competitiveness, innovation, and access to world markets. The simultaneous model was estimated for all industries, and for each of the previous groups. The intermediate goods show very impressive success in most of the equations estimated, confirming the role of imported inputs in driving world market integration in Jordan. The workers' compensation turn out to have significantly positive effect on most of the endogenous variables for all industries and for the high exporting group. The intermediate services appear to have no significant effect in all models, except for the high exporting group, while spending on improvement and development appears to have a significantly positive effect for the entire sample and for the low exporting group. Finally, the hypothesis of export-led-growth received no empirical support at any significance level in all models.

Keywords: World Market Integration, Simultaneous Equations Model, International Fragmentation of Production, Intermediate goods, Imported Inputs, Manufactured Exports, Manufactured Value-Added, Research and Development.

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1) Introduction

Since the beginning of 1980's, the integration into the world market has been considered as one of the most important strategies to promote economic growth, sustain development, and poverty reduction. The role of industrial sectors in driving world market integration continues to be the subject of considerable lively controversy among economists and policy makers. The IMF staff (2001) studied the experience of integration in many developing countries in Asia, Middle East, and Latin America. The study found that only few countries have achieved impressive success, compared to uneven and intermittent success in many countries.

The measures of integration into the world market fall into two major categories. The first category consists of measures that can be implemented on the international level which deal with creating export markets, removing trade barriers, and standardizing tariffs and trade laws. The second category consists of measures that can be implemented on the national level, which deal with producing more new goods and services that are compatible with most foreign markets, enhancing domestic productive capacity, and promoting manufactured value-added. Dolfsma (2019) and Dolfsma and Łukasz (2020) argue that the effectiveness of these measures depends on the national industrial policy implemented by the intentional attempts of government to influence the private sector in attracting foreign direct investment to reach the societal goals.

The International Fragmentation of Production (henceforth, IFP) was among the most effective and popular industrial strategies implemented by developing and developed countries to speed up the process of integration into the global markets. The IFP process involves improving domestic productive capacities, enhancing exports, and increasing the value added.

The present study would be the first to study the effectiveness of the industrial sector to the world market integration. The integration implies two aspects: a) increasing dependency of the domestic markets on foreign markets, and b) less reliance on domestically produced inputs.

Gonzalez (2016) argues that increasing dependency of domestic markets on foreign markets would have adverse impact on GDP unless these imports are manufactured more cheaply than domestically produced-equivalent. In this case, imports will help consumers manage their strained household's budget. Similarly, Kee (2015) and Kee & Tang (2016) indicate that increasing reliance on imported goods will help domestic industries to use more productive inputs at lower cost and become more competitive at foreign markets. The increasing dependence on imported inputs can also increase the production efficiency and the manufactured value added (Timmer & et al. 2019; Hiau & Heiwai, 2016). In this study, intermediate goods will be used as a proxy for the imported inputs, because most of the raw material and capital used in industrial sector are imported. Similarly, the intermediate services will be considered as one of the factors driving world market integration. This variable may not be among the key factors driving world market integration, because it is mainly composed of fixed expenses which are independent of a firm's output.

As suggested by Porter (1985), the skilled labor can also be considered as one of the effective factors that would drive the economy to integrate into the world economy. Skilled labor refers to highly educated, trained, or experienced workers segments of the workforce that can promote competitiveness and increase the manufactured value added. The market conditions state that the increase in the wage rates of skilled labor will not have any adverse impact on the demand for labor if the increase in the value of marginal product of the worker exceeds the wage rate.

Finally, most economists believe that investments in R&D can play a decisive factor behind increases in productivity and producing high value-added products (Szarowská, 2018). Thus, the spending on improvement

and development will be considered as a proxy for R&D.

The purpose of this study is to examine the impacts of imported inputs, intermediate services, workers' compensation and investment in research and development factors driving world market integration using panel data on the micro-level of 20 industries (2digits-ISIC) over the period 2009-2017. The present study suggested relatively large system of simultaneous equations model to avoid the simultaneous and specification bias (Johnson, 2014). As will be shown in the third section, the model consists of three endogenous variables (industrial production, manufactured exports, and manufactured value-added), and four exogenous variables (workers' compensation, intermediate goods, intermediate services, and spending on improvement and development).

The study consists of five sections. The next section reviews the most recent literatures pertaining to the subject matter. The third section introduces the econometric model and define the data. The fourth section discusses the empirical finding and compares their robustness. The fifth section concludes.

2) Literature Review

This section reviews the most important previous studies pertaining to the measures implemented by developed and developing countries to integrate into the world markets. The literature review concentrates on the varying measures implemented across countries to enhance domestic productive capacity and promote industrial value-added to speed up the process of integration into foreign markets.

Choi (2013) employed the gravity model, the Heckscher-Ohlin model, and the Ricardian model to study the determinants of trade value added across 40 countries and 35 industries over the sample period 1996-2009. When he used the data on trade in value added, the explanatory power of the gravity model turned out to be relatively small compared to the pooled data on trade in gross value. Furthermore, the results indicate that export and import values in value added turned out to be smaller than the values in gross value.

Hummels et al. (2001) attempted to analyze the dimension of the rising trade shares using case studies and input-output tables. The study presented empirical evidence supporting the role of imported inputs in the production of goods that are exported. The study also confirmed the changing nature of trade from making a complete good from start to finish to specialize in producing stages of good. This vertical trade is also what links heightened international trade to greater international production.

Zhang (2017) studied China's industrial development based on eight indicators grouped into three dimensions (industrial capacity, industrial intensity, and industrial quality) over the period 1978-2014. The study showed that One of the main conclusions is that China’s industrial development has been driven by development strategy and industrial policy, and success in exports and FDI. International comparisons suggest advantages and disadvantages for China in industrial development. The advantages include strong and effective central government, abundant and cheap but productive labor, a huge and growing domestic market, high quality of infrastructure, and a culture of patience, persistence, innovation and frugality.

Anil (2012) conducted empirical study to investigate how regions move to a higher-skill, higher value-added equilibrium on Canada. The study confirmed that higher skill jobs are created when firms try to compete through innovation, and any improvement, whether in productivity, or value addition requires using cutting-edge knowledge and learning new skills.

Massimiliano et. al (2016) suggested a new methodology to measure the quantity of jobs and value wages embodied in exports for many large countries and sectors for intermittent years between 1995 and

2011. The analysis documented several findings showing that the global share of labor value added in exports has been declining globally since 1995. The findings also confirmed that the composition of labor contained in exports is skewed toward skilled labor in high-income countries relative to developing countries.

Hajnalka (2017) provided analysis on the implications of international trade on employment and skills demand in selected countries, including Cambodia, Ghana, Jordan, Malawi, Morocco, Myanmar, the Philippines, Tunisia and Viet Nam. The classification of merchandise exports by their skill and technology intensity provides some insight into the employment creation potential of exports and the level of skills for which they generate demand.

Rahardja and Varela (2015) investigated the impact of imported inputs on the productivity in Indonesia. The study revealed empirical results showing the growth of intermediates imports roughly matches the growth of Indonesian GDP, suggesting a relatively stable reliance on imported inputs. The study also showed that users of imported inputs in Indonesia grow faster in terms of output, value added and employment, they are more productive, and they pay higher wages.

Erdum et al. (2020) investigate the evolution of the import content of production and exports in Turkey over the 2002–2018 period. Their findings confirm that import dependency increases for exports but stays relatively stable for production over time. In general, the import content of production is lower than that of exports. This difference is mainly attributable to the services sector, which has low import dependency, yet a large share in production.

3) The Model and the Data

In this section, we attempt to formulate a theoretical framework that can evaluate the role of Jordanian industry in enhancing the domestic productive capacity and promoting the manufactured value-added to integrate into the world market. Most of the previous studies pertaining to this issue have been designed to test the hypothesis of export-led- growth using single equation models and macro data (Alkhatib, 2021). Such models are likely to suffer simultaneous and specification bias (Golden et al. 2019). To avoid this bias, relatively large simultaneous equations is suggested, which the differentiates between endogenous and exogenous variables. The set of endogenous variables consists of (industrial production, manufactured exports, and manufactured value-added). These endogenous variables are functions of other endogenous variables rather than just exogenous variables. On the other hand, the set of exogenous variables have been selected considering the mainstream economic theory and data availability. The list of exogenous variables should be selected to reflect the inputs that businessmen use to enhance the domestic productive capacity and to promote industrial value-added products. These factors are:

a. Workers compensation (wages & salaries, medical coverage, disability rehabilitation, and death compensation) which stands as a proxy for use of high-skilled workers (ILO, 2011). The equilibrium market condition asserts that businesspeople will be willing to pay high wages as far the value of marginal product of the labor exceeds the wage rate.

b. Intermediate goods: defined as products that are made during manufacturing process but that are also used in the production of other goods. The intermediate goods can be subdivided into three broad categories: parts or components that are embedded in final goods; fixed inputs that assist in the production of other goods; and consumption (or final) goods. The reliance of most industries in Jordan on imports of intermediate goods is notable. Therefore, intermediate goods would be included in the model to stand for the less reliance on domestically produced inputs as an important factor to

expand domestic productive capacity and to promote manufactured value-added.

c. Intermediate services: defined as services which are used as intermediate inputs in the production of other goods and services. Intermediate services critically affect the competitiveness of the economy (Behuria and Khular, 1994).

d. Spending on improvement and development: this variable can be used as a proxy for R & D which can play an important role in the innovation and developing new competitiveness advantage.

The theoretical framework will take the generalized Cobb-Douglas function because it provides important framework for the measurement of productivity and employment of factors of production (Amuka et al. 2018). These equations are:

$$y_1 = a_1 y_2^{\gamma_1} x_1^{\beta_1} x_2^{\beta_2} x_3^{\beta_3} e^{\epsilon_1} \quad (1)$$

$$y_2 = a_2 y_3^{\gamma_3} x_1^{\beta_4} x_2^{\beta_5} x_3^{\beta_6} e^{\epsilon_2} \quad (2)$$

$$y_3 = a_3 x_1^{\beta_7} x_2^{\beta_8} x_4^{\beta_9} e^{\epsilon_3} \quad (3)$$

The endogenous variables are: $y_1$represents the industrial production, y_2 represents the manufactured exports, and y_3 represents the manufactured value-added.

The exogenous variables are: x_1 represents workers' compensation, $x_2$represents intermediate goods, x_3 represents intermediate services, and x_4 represents spending on improvement and development.

The nonlinear system of equations (1-3) can be transformed into a loglinear model as:

$$\log(y_1) = c_1 + \gamma_1 \log(y_1) + \beta_1 \log(x_1) + \beta_2 \log(x_2) + \beta_3 \log(x_3) + \epsilon_1 \quad (4)$$

$$\log(y_2) = c_2 + \gamma_3 \log(y_1) + \beta_4 \log(x_1) + \beta_5 \log(x_2) + \beta_6 \log(x_3) + \epsilon_2 \quad (5)$$

$$\log(y_3) = c_3 + \beta_7 \log(x_1) + \beta_2 \log(x_2) + \beta_9 \log(x_4) + \epsilon_3 \quad (6)$$

where c_i=log(a_i) $i = 1,2,3$. All explanatory variables and endogenous on the right-hand side are assumed to be uncorrelated with the stochastic error term (ϵ_i). The simultaneous equations system (4-6) will be simultaneously estimated using 3SLS method which is relatively more efficient than the 2SLS and superior to the OLS methods.

The data come from the industry surveys carried out by the Department of Statistics between 2009-2017. Appendix (a) shows that the sample consists of 20 industries on (2-digit SIC). These industries produce about 77% of the total industrial production over the sample period 2009-2017. Industries in the entire sample are divided into two equal groups each of which consists of 10 industries, based on the average export-to-output ratio over the entire period 2009-2017. First, industries in the low exporting group (4.5 < export-to-output ratio ≤ 25), which produced about 55% of the total production in the sample. Second, industries in the high exporting group (export-to-output ratio > 25), which produced about 45% of the total production in the over the same period. Finally, eight industries have been dropped from the sample because they do not have any export-oriented industrialization strategy. The latter include five utility industries (oil & natural gas extraction, metal mining, gas and electric supplies, water supply, home trash & recycling pick up), and three industries producing only for a domestic market (wood processing, manufacture of coke and refined petroleum products, vehicles maintenance and repairs).

4) The Empirical Results

The simultaneous equations model (4-6) has been estimated for industries in the entire sample and then for industries in the high and low exporting groups, using the 3SLS method. Distinction between high and low

exporting industries is of special importance because industries in these groups substantially differ in strategy, competitiveness, innovation, and access to foreign markets (Negassi & et al. 2019). These differences are possible to be reflected in the empirical results of the models estimated for each group.

Table 1 shows that intermediate goods turn out to have positive and significant on the endogenous variables in all equations for the entire sample, confirming the importance of the less reliance on domestically produced inputs to promote industrial production, manufactured exports, and manufactured value-added. The results also confirm the relative importance of workers' compensation in promoting the manufactured value-added and exports at the 1% level of significance, supporting the role of high wages in attracting high-skilled labor. Finally, spending on the improvement and development turns out to have a positive and significant effect on the manufactured value-added.

Against all expectations, the export-led -growth hypothesis has received no empirical evidence at any usual level of significance. As shown by Pryor (1999), the insignificant impact of export on economic growth could be attributed to two reasons. The first reason is that high export industries are likely to depend more on unskilled workers to strengthen its competitiveness position in the foreign markets by reducing its cost. The second reason is that the increase in imports is likely to be associated with increasing imports, which will, in turn, adversely affect the economic growth. On the other hand, Medina-Smith (2001) provided evidence showing that evidence on the export-led growth hypothesis may vary across countries, depending on the physical investment and population.

On the other hand, evidence on the export-led growth may differ across countries and across historical eras, depending on

Equations (4 & 6) show relatively high explanatory power ($\bar{R}^2$ = 0.865 and 0.78, respectively), while it is moderate ($\bar{R}^2 = 0.468$) for equation (5).

Estimating the model for industries in the high exporting group reveal very impressive results concerning the effect of intermediate goods which turn out to be significant and positive in all equations, while workers' compensation shows significantly positive effect on industrial output and manufactured value-added. The intermediate services turn out to have positive impact in equation (4) only. The explanatory power is very high for equations (4) and (6), while it is moderate for equation (5). Equations (4) and (6) are very, and moderate for equation (5).

With respect to the results of the model estimated for industries in the low exporting group, intermediate goods appear to have significantly positive effect on the manufactured value-added. The explanatory powers also dropped dramatically to 0.395, 0.604 for equations (4) and increased to 0.711 for equation (5). These results confirm the relative importance of industries of high exporting group over industries of low exporting group in emerging into global markets.

Table (1): The Results of the Simultaneous Equations Model for the Entire Industries, and High and Low Export Industries.

	Var	Entire Industries		Industries in the high exporting group		Industries in the low exporting group	
		Coef.	se	Coef.	se	Coef.	se
Equation (4)	C_1	1.021	0.600	1.110**	0.277	1.885	3.127
	y_2	-0.017	0.310	-0.074	0.123	1.483	6.313
	x_1	0.239	0.249	0.222**	0.056	-0.242	1.790
	x_2	0.776**	0.205	0.725**	0.105	-0.604	6.027
	x_3	-0.002	0.112	0.138**	0.028	0.522	2.276
	$\bar{R}^2$	0.865		0.984		0.395	
	N	176		88		88	
	SE	0.422		0.129		0.994	
Equation (5)	C_2	-1.043	1.204	-1.280	2.075	-0.322	1.333
	y_3	-0.809	0.755	-1.980	2.094	-0.129	0.742
	x_1	1.109**	0.232	1.834	1.178	0.358	0.261
	x_2	1.125*	0.466	1.428*	0.633	1.048	0.589
	x_3	-0.359	0.234	-0.040	0.418	-0.417	0.250
	$\bar{R}^2$	0.468		0.450		0.604	
	N	176		88		88	
	SE	1.091		1.001		0.880	
Equation (6)	C_3	1.639**	0.537	0.860	0.505	1.950	0.813
	x_1	0.348**	0.072	0.715**	0.062	0.130	0.129
	x_2	0.506**	0.076	0.259**	0.066	0.670**	0.125
	x_4	0.063**	0.022	0.031	0.018	0.065	0.037
	$\bar{R}^2$	0.780		0.920		0.711	
	N	176		88		88	
	SE	0.548		0.306		0.675	

*&** Significant at 5% and 1% significance levels, respectively.

The insignificance of intermediate services in three out of four equations has very important implications. The weak impact of intermediate services can be attributed to the fact that this variable mainly consists of fixed cost and many nonproductive inputs. To compare the robustness of the results, the same model is estimated without intermediate services as shown in table (2). The empirical results remain unchanged and almost identical in their magnitudes to the results of the model in table (1).

Table 2: The Results of the Simultaneous Equations Model for the Entire Industries and High and Low Export Industries (Excluding Intermediate Services).

	Var	Total Export		Industries in the high exporting group		Industries in the low exporting group	
		Coef.	se	Coef.	se	Coef.	se
Equation (4)	C_1	1.024*	0.491	0.722*	0.336	1.676	2.024
	y_2	-0.016	0.287	-0.097	0.155	1.300	4.871
	x_1	0.237	0.141	0.374	0.060	0.272	0.443
	x_2	0.776**	0.189	0.757**	0.132	-0.455	4.753
	$\bar{R}^2$	0.866		0.976		0.527	
	N	176		88		88	
	SE	0.421		0.158		0.879	
Equation (5)	C_2	-0.528	1.051	-1.175	1.368	-0.182	1.318
	y_3	-0.928	0.705	-1.993	1.943	-0.151	0.747
	x_1	0.796**	0.299	1.802	1.446	-0.062	0.202
	x_2	1.186**	0.443	1.429*	0.621	1.090	0.584
	$\bar{R}^2$	0.443		0.457		0.594	
	N	176		88		88	
	SE	1.117		0.994		0.892	
Equation (6)	C_3	1.639**	0.537	0.860	0.5045	1.951	0.813
	x_1	0.348**	0.072	0.715**	0.062	0.130	0.129
	x_2	0.506**	0.076	0.259**	0.066	0.670**	0.125
	x_4	0.063**	0.022	0.031	0.018	0.065	0.037
	$\bar{R}^2$	0.780		0.920		0.711	
	N	176		88		88	
	SE	0.548		0.306		0.675	

*&** Significant at 5% and 1% significance levels, respectively.

5) Conclusions and Recommendations

This study is an attempt to evaluate the role of Jordan's Industries to integrate into the world market using panel data on the micro-level of 20 industries (ISIC - two digits) over the period 2009-2017. The study developed a simultaneous equations model which consists of three endogenous variables (industrial production, manufactured exports, and manufactured value-added). Each endogenous variable is assumed to be a function of other independent variables and or a set of exogenous variables representing the classical inputs along with a proxy representing the research and development efforts.

The model has been estimated over the entire sample, and for industries of high and low exporting groups using the 3SLS method. Distinction between high and low exporting industries is of special importance because industries in these groups may substantially differ in strategy, competitiveness, innovation, and access to foreign markets, which can be reflected in the empirical results of the models estimated for each group.

The results provided evidence about the role of intermediate goods in the three equation, supporting the relative importance of imported inputs in expanding domestic productive capacity, manufactured exports, and manufactured value-added. The results also confirm the importance of workers' compensation in affecting all endogenous variables for industries in the high exporting group, and manufactured exports and manufactured value-added for the entire sample. Finally, the results confirm the relative importance of industries of high

exporting group over industries of low exporting group in emerging into global markets, which is very consistent with the theory of economic organization.

Based on the findings of the study, the following recommendations may speed up the process of world market integration in Jordan.

1. To speed up the process of world market integration in Jordan, both private and public sectors are strongly recommended to play a key role in enhancing research and development generating new knowledge, new markets, and new products.

2. Spending on the research and development in Jordan is less than 0.5% of the total industrial production compared to 2.5% in the developed economies. This percent will not enough to drive strongly and efficiently the innovation process, which is a necessary condition to world market integration.

3. Establishing an active collaboration among industry actors, public sector, research centers, universities, and vocational education institutions, which is very essential for manufacturing competitiveness.

Appendix (a)

Total production and the average export-to-output ratio for industries in the sample (Figures in JD)

Industry	Production	Average Export-to-output ratio
Food Industry	19202708	13.81
Beverage Industry	4129225	17.89
Cigarettes and Tobacco Industry	5349100	9.69
Textile Manufacturing	789151	19.06
Apparel Industry	5442603	80.01
Leather products	365012	12.16
Paper and Paper Products	3064771	29.94
Printing and Reproduction of Recorded Media	2007487	26.13
Chemical Industry	10559000	49.28
The drug, chemical, and pharmaceutical industry	7599146	73.07
Plastic and Rubber Products	4165225	29.46
Nonmetallic Industry	7867924	4.52
Metals Industry	5336846	17.02
Fabricated Metal Products, except Machinery	5082342	26.73
Computer, Electronic and Optical	736917	16.08
Electrical Equipment	3353104	23.61
Machinery and equipment n.e.c.	1345441	49.05
Motor Vehicle, Trailers and Semi-Trailers	352647	33.93
Furnitures	2047349	15.54
Manufacturing Industry	1159043	67.51

Source: Industry Survey 2009-2017, Department of Statistics, Amman.

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العوامل المحركة لتكامل الأسواق العالمية: حالة الصناعات الأردنية

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ملخص

تهدف الدراسة إلى اختبار أثر العوامل الدافعة للاقتصاد الاردني نحو التكامل مع الاسواق العالمية، باستخدام بيانات مقطعية–زمنية على المستوى الجزئي لعشرين صناعة أردنية (على المستوى الثاني للتصنيف الصناعي الدولي الموحد) خلال الفترة 2009–2017. اقترحت الدراسةاستخدام نظام معادلات آنية كبير نسبيا وذلك لتجنب التحيز الآني والتحيز الناتج عن التوصيف. ويتكون النظام المقترح من ثلاث متغيرات داخلية (الانتاج الصناعي القائم، الصادرات الصناعية، والقيمة الصناعية المضافة) بالاضافة إلى أربع متغيرات خارجية (تعويضات العاملين، المدخلات السلعية الوسيطة، المدخلات الخدمية الوسيطة، الانفاق على التحسين والاضافات). تم تقسيم الصناعات على أساس نسبة الصادرات للانتاج إلى مجموعتين: المجموعة الاولى وهي مجموعة الصناعات عالية التصدير والتي تزيد فيها نسبة الصادرات للانتاج عن 25%، ومجموعة الصناعات منخفضة التصدير والتي تتراوح فيها نسبة الصدرات للانتاج بين 4.5% و25%، حيث تختلف الصناعات في هاتين المجموعتين في الاستراتيجية والتنافسية والابتكار والقدرة في الوصول للأسواق العالمية مما قد يؤدي إلى اختلافات جوهرية في النتائج بين هاتين المجموعتين. هذا وقد تم تقدير النموذج الاني لجميع الصناعات في العينة ثم على مستوى الصناعات في كل مجموعة من المجموعات السابقة. أظهرت النتائج الدور الايجابي المعتبر للمدخلات السلعية في قيادة الاقتصاد الاردني للتكامل مع السوق العالمي في معظم المعادلات، وتليها في الأهمية تعويضات العاملين التي تؤكد النتائج أثرها الايجابي في معظم المعادلات على مستوى جميع الصناعات ومجموعة الصناعات عالية التصدير. أما فيما يتعلق بالمدخلات الخدمية، فكان تأثيرها محدودا جدا ويقتصر على الانتاج لمجموعة الصناعات منخفضة التصدير، بينما اقتصر أثر الانفاق على التحسينات والاضافات على مجموعة الصناعات عالية التصدير. وأخيرا لم تظهر النتائج أي تأييد يذكر لفرضية قيادة الصادرات الصناعية للنمو الصناعي.

الكلمات الدالة: تكامل السوق العالمية، نظام المعادلات الآنية، التجزئة الدولية للانتاج، المدخلات السلعية، المدخلات المستودة، الصادرات الصناعية، القيمة المضافة المصنعة، البحث والتطوير.

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