

Hyper Competitiveness Between China and The U.S., Using The Gravity Model and Finger- Kreinin Index Over The Period (2005-2022)

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Abstract: This study seeks to demonstrate the main factors determining international competitiveness between China and the United States of America in manufacturing exports over the period 2005-2022. The results indicate the existence of hyper competitiveness between them for 24 partner countries, where the Finger- Kreinin index has generally recorded high values. Both trade openness and the real gross domestic product of partner countries have a significant positive impact on China's manufacturing exports, while the bilateral real exchange rate has a negative effect.

Keywords: Finger-Kreinin index; Gravity model.; International competitiveness.

1.Introduction

The product diversification of exports has gained much debate by the international trade theories; Adam Smith and David Ricardo have argued that countries should specialize in products in which they have comparative advantages. The Heckscher-Ohlin theory argues that countries should specialize in products, which they have the factor intensity (Gozgor & Can, 2016). China as an emerging country has sought to close the gap, particularly the technological gap between itself and developed economies such as the U.S. The catch-up or convergence theory argues that the availability of the appropriate conditions enables poorer countries to realize income levels similar to those achieved by more developed countries through replication of the technologies, policies and institutions of successful predecessor nations (Enderwick, 2021). Accession of China to the World Trade Organization in 2001, has contributed to inducing its exports to the U.S (Meza-González & Sepulveda, 2019).

We employed a descriptive approach to analyze the evolution of U.S international trade with China from 2005 to 2022 and to measure the manufacturer's products 'export similarity index between the U.S and China for 24 partner countries using Finger and Kreinin methodology. In addition, we used an econometric approach

1.1. Research Problematic

Today, China has played an important role in international trade, especially in

manufactures exports, so what are the main factors determining international competitiveness between China and the U.S in manufacturing exports?

1.2. Research Aims

The importance of this study resides in clarifying the main intervenient factors which were made China the biggest competitor to the United States of America in manufacturing exports.

2. Literature review

Among the previous studies that addressed some aspect of this topic:

The results of the study of Bierut and Dybka (2021) have pointed out that freedom to trade internationally has the highest positive impact on manufacturing exports of 28(EU) European Union countries.

Study of Irshad et al.,(2018), concludes that both trade openness in 189 partner countries of South Korea and the bilateral exchange rate have a highly and significant positive impact on exports from South Korea to those countries.

Study of Cheung et al.,(2016), has pointed out that China's exports to the United States of America react negatively to real renminbi (RMB), while the U.S's GDP has a positive effect.

3. International Competitiveness

Most economists agree that the international competitiveness of a given country is defined as, the capability of that country to achieve its central economic policy targets, particularly avoiding potential difficulties in the balance of payments with growth in income and employment. Growth in relative unit labour costs is the most popular and influential measure of the international competitiveness of a country (Fagerberg, 1988).

3.1 Trade Competitiveness Index

The trade competitiveness index (TCI) is used to account for whether a given country or region has a competitive advantage on specific products relative to other countries or regions that produce the same products. The TCI equation is given as follows:

$$TCI_n = (X_{ni} - M_{ni}) / (X_{ni} + M_{ni})$$

Where: X_i denotes the exports value of product i from country n, M_{ni} refers to the imports value of product i into country n. The value of TCI ranges among $[-1, 1]$ as detailed below:

Table.01. The TCI scales and their significance

TCI range	Significance
$TCI = 0$	The competitiveness of country n equals the international average
$-1 \leq TCI < -0.6$	A strong competitive disadvantage (a weaker international competitiveness)
$-0.6 \leq TCI < -0.3$	A medium competitive disadvantage (a weaker international competitiveness)
$-0.3 \leq TCI < 0$	A weak competitive disadvantage (a weaker international competitiveness)
$0 \leq TCI < 0.3$	A weak competitive advantage (a strong international competitiveness)
$0.3 \leq TCI < 0.6$	A moderate competitive advantage (a strong international competitiveness)
$0.6 \leq TCI < 1$	A strong competitive advantage (a strong international competitiveness)

Source: (Kang et al., 2023)

This index was developed by Finger and Kreinin in 1979; it measures the degree of similarity or dissimilarity of the export composition of two countries or two groups to a third country or market. It is defined by the following formula:

$$ESI = S(ab, c) = \{ \sum_i \text{Minimum} [Xi(ac), Xi(bc)] \} 100$$

Where: a and b refer to countries or country groups, c indicates the third market (country or country groups), $Xi(ac)$ suggests the share of commodity i in exports of a to c, $Xi(bc)$ denotes the share of commodity i in exports of b to c. Its value ranges from 0% to 100%, where 0% refers to total dissimilarity (for $Xi(bc) > 0$, $Xi(ac) = 0$, and vice versa) and the two countries (a and b) are considered imperfect competitors in the third market (c), while 100% indicates that the two countries (a and c) are considered perfect competitors in the third market(c), namely ($Xi(bc) = Xi(ac)$ for each i) (Finger & Kreinin, 1979; Akgüngör et al., 2002; Roy & Mathur, 2016).

4. Methods and Material

4.1 Model specification

Our empirical model is grounded on the gravity equation. This equation is introduced by Jan Tinbergen. It is the most successful empirical approach to studying international bilateral trade flows (Bierut & Dybka, 2021). The general model of panel data can be written as follow:

$$Y_{it} = \beta_0 + \beta_1 A_{it} + \beta_2 B_{it} + \beta_3 C_{it} + \varepsilon_{it}$$

where $\beta_0, \beta_1, \beta_2, \beta_3$ represent explanatory variables' coefficients and ε_{it} refers to the error term (Paul & Mitra, 2018). Our model is based on modeling frameworks (Irshad et al., 2018; Cheung, et al., 2016). It can be specified as follow:

$$MEX_{ij} = f(GDP_i, TO_j, RER_j)$$

$$MEX_{ij} = \beta_0 + \beta_1 GDP_i + \beta_2 TO_j + \beta_3 RER_j + \varepsilon_{it}$$

Where: MEX_{ij} denotes China's manufacturing exports to country_j in US trillion \$. GDP_j is country_j's real GDP measured in constant 2015 US\$. TO_j points out the trade openness degree of country_j. RER_j refers to the bilateral real exchange rate, is formula is expressed as follow:

$$RER = (\text{China's Currency/Foreign Currency}) * (\text{China's CPI/Partner's CPI})$$

Where China's currency denotes the renminbi (RMB), Foreign Currency indicates the foreign currencies of 8 trading partners of China, which are: Australia, Germany, Hong Kong, Japan, Netherlands, Singapore, the United Kingdom and the United States of America. CPI is the consumer price index (Erlat & Arslaner, 1997 ; Cheung et al., 2016; Wang, 2020).

4.2 Data source

Data were taken from the World Integrated Trade Solution (WITS) database, the World Bank (WB) database, International Monetary Fund, the Bureau of Economic Analysis (BEA) and the Fraser institute.

5. Results and Discussion

Table .02.U.S. International Trade with China from 2005 to 2022

(UM: US Million \$)

Year	U.S exports of goods and services to the entire world	U.S exports of goods and services to China	Share of total exports	U.S imports of goods and services from the entire world	U.S imports of goods and services from China	Share of total imports	Overall balance on Goods and Services	Balance on Goods and Services with China
2005	1 291 503	50 685	3,92	2 008 045	251 791	12,54	-716 542	-201 106
2006	1 463 991	64 841	4,43	2 227 523	298 012	13,38	-763 533	-233 171
2007	1 660 815	76 672	4,62	2 371 811	333 249	14,05	-710 997	-256 577
2008	1 849 586	86 274	4,66	2 561 936	350 448	13,68	-712 350	-264 173
2009	1 592 792	86 766	5,45	1 987 563	307 347	15,46	-394 771	-220 580
2010	1 872 320	113 576	6,07	2 375 407	377 619	15,90	-503 087	-264 042
2011	2 143 552	130 701	6,10	2 698 074	413 275	15,32	-554 522	-282 574
2012	2 247 453	141 706	6,31	2 773 359	440 286	15,88	-525 906	-298 580
2013	2 313 121	158 078	6,83	2 759 982	456 195	16,53	-446 861	-298 116
2014	2 392 615	166 374	6,95	2 876 566	484 566	16,85	-483 952	-318 192
2015	2 280 778	163 329	7,16	2 771 554	499 697	18,03	-490 776	-336 368
2016	2 240 824	169 387	7,56	2 720 282	479 718	17,63	-479 458	-310 330
2017	2 394 476	187 875	7,85	2 911 415	524 144	18,00	-516 939	-336 268
2018	2 542 462	180 596	7,10	3 121 057	558 324	17,89	-578 594	-377 728
2019	2 546 276	167 475	6,58	3 105 670	469 514	15,12	-559 395	-302 039
2020	2 160 147	166 311	7,70	2 813 838	448 652	15,94	-653 691	-282 341
2021	2 570 802	192 225	7,48	3 418 871	526 413	15,40	-848 070	-334 188
2022	3 039 405	197 361	6,49	3 984 167	563 558	14,14	-944 762	-366 197

Source: Bureau of Economic Analysis (BEA) 2025

Table 2 displays U.S. international trade trends with the entire world and China such that we have remarked the following results: firstly Overall balance of Goods and Services has experienced negative value. It has registered a sharp decline from -716 542 US Million \$ in 2005 to -944 762US Million \$ in 2022.

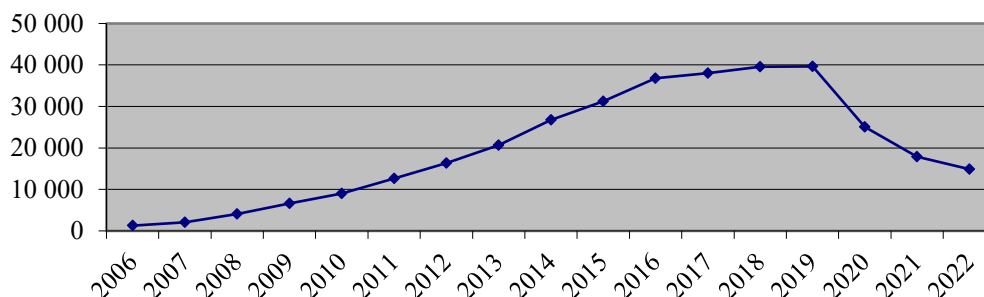
This chronic deficit is due to the growth of US imports of goods and services from 2 008 045 US Million \$ in 2005 to 3 984 167 US Million \$ in 2022 from one side and the modest US exports of goods and services from another side. Secondly, the balance on Goods and Services with China has registered a negative value (deficit) throughout the study where it has recorded a sharp decline from -201 106 US Million \$ in 2005 to -366 197US Million \$ in 2022. This bad performance is due to grew increase in US imports of goods and services from China from 251 791US Million \$ in 2005 to 563 558US Million \$ in 2022 from one hand and the modest of US exports of goods and services to China which haven't exceeded 197 361US Million \$ from another hand. The share of China in U.S's total exports is very moderate; it hasn't surpassed 7.85% in the better circumstances. On the contrary, the share of the U.S from china's total exports is significant, and it has jumped from 12,54% in 2005 to 14.14% in 2022. These results assert that American exports face fierce competition from other developed countries especially from China.

To examine the defect in terms of trade between the United States of America and China we

have divided the U.S's Balance on Goods and Services with China into two categories, the U.S's Balance on Goods and the U.S's Balance on Services.

Fig.1. U.S's Balance on services with China from 2005 to 2022

(UM: US Million \$)



Source: Author's preparation using STATA software based on Bureau of Economic Analysis (BEA) database, 2025.

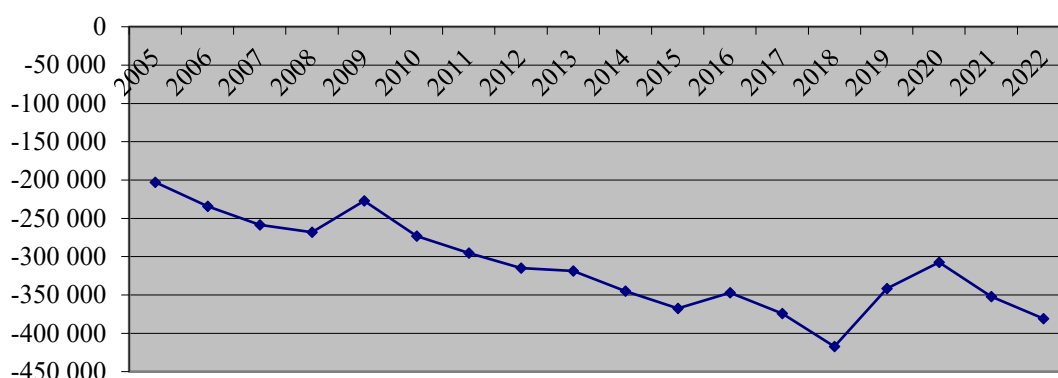
As shown in Figure 1, the U.S's Balance on services with China has registered a positive balance (surplus) from 2005 to 2022, this means that the services transaction value between U.S and China is in favour of the U.S at the cost of China, in which the evolution of balance value has experienced steadily growing from 1 719 US Million \$ in 2005 to 39 650 US Million \$ in 2019. Then it recorded a sharp decline to 14 872 US Million \$ in 2022.

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Fig.2. U.S's Balance on goods with China from 2005 to 2022

(UM: US Million \$)



Source: Author's preparation using STATA software based on Bureau of Economic Analysis (BEA) database, 2025

The results of Figure 2, assert that the trade imbalance between the U.S and China is due to the deterioration of the U.S's Balance on goods with China, where its value in general has declined sharply, from -202 825 US Million \$ in 2005 to -381 261 US Million \$ in 2022.

Table 3. Manufactures products' export similarity index among U.S and China for partner countries over the period (2020-2022)

				(UM: %)			
ESI				ESI			
	2020	2021	2022	Country	2020	2021	2022
Australia	81	82	82	Mexico	73	68	67
Belgium	87	87	82	Netherlands	71	68	58
Brazil	68	66	64	Philippines	56	58	52
Canada	74	73	72	Poland	81	75	52
France	81	78	61	Russian Federation	91	92	88
Germany	85	82	79	Saudi Arabia	75	74	75
Hong Kong	85	79	85	Singapore	81	73	61
India	58	49	47	South Africa	72	72	78
Italy	62	59	52	Spain	61	58	44
Japan	62	56	56	Thailand	62	64	62
Korea, Rep.	61	55	54	United Arab Emirates	81	82	86
Malaysia	76	75	78	United Kingdom	57	58	54

Source: Author's Computation using STATA software based on World Integrated trade Solution (WITS) database, 2025.

In our study we have measured the ESI between the U.S and China for selected countries as shown in Table 3, where country a represents the United States of America, country b refers to China, country c (third market) indicates 24 selected countries, $Xi(ac)$ represents the share of U.S' manufactures exports to 24 partner's countries and $Xi(bc)$ denotes the share of China's manufactures exports to 24 partner's countries. The results of Table 3 reflect the hyper competitiveness between the U.S and China for partner countries, where ESI values are close to 1, especially for the Russian Federation which has recorded 91, 92 and 88 percent in 2020, 2021 and 2022 respectively, followed by Belgium by 87, 87 and 82 percent. The rest countries have registered also high values. This means that China has become a fierce competitor to the U.S in these countries, especially in its traditional markets such as the European Union (EU), where Germany and France are the key drivers of the EU's Manufacturing exports.

Table 4. Matrix of Correlations

Variables	MEX	GDP	TO	RER
MEX	1.000			
GDP	0.717	1.000		
TO	-0.054	-0.460	1.000	
RER	-0.305	0.104	-0.055	1.000

Source: Author's Computation using STATA software

The existence of a multi-collinearity problem can be found if the correlation coefficients among independent variables are 0.8 or more, otherwise, a multicollinearity problem exists (Nguyen et al., 2020).

As shown in Table 4, the pairwise correlation coefficients among independent variables are very moderate except for (TO, GDP) which recorded at -0.460; nevertheless, this value is less than 0.8, and so our model doesn't suffer from this problem.

Table 5. Variance inflation factor

Independent variables	VIF	1/VIF
GDP	1.28	0.782
TO	1.27	0.788
RER	1.01	0.989
Mean VIF	1.19	.

Source: Author's Computation using STATA software

When VIF values of independent variables are less than 10, this implies an absence of a multi-collinearity problem among independent variables (Nguyen et al., 2020). The results of Table 5 display that VIF values are less than 10, so this reaffirms the same results mentioned in Table 4.

Table 6. China's gravity equation of manufacturing exports

MEX	OLS	RE	FE
GDP	0.019***	0.058***	0.036***
TO	0.070***	-0.016	-0.005
RER	-0.012***	-0.005**	-0.009***
Constant	-0.496***	0.067	0.075
R-squared	0.755	0.677	0.639
F- Prob	0.000	0.000	0.000
Number of obs	144		
Number of countries	08		
LM (prob)		0.0000	
Hausman (prob)		0.0000	

Source: Author's Computation using STATA software, *** and ** refer to significant levels at $p < 0.01$ and $p < 0.05$, respectively.

To select the fit model between ordinary least square (OLS), fixed effects (FE) and random effects (RE), we used the Breusch-Pagan Lagrange Multiplier (LM) Test and the Hausman test.

Concerning the appropriate model between ordinary least square (OLS) and random effects (RE), we assigned the Breusch-Pagan Lagrange Multiplier (LM), such that, if the probability value is less than 1%, we select the random effects model, otherwise, pooled OLS model should be selected (Adow, 2025). To choose the fit model among the FE model and RE model we look at the chi-square statistic probability value, where if the chi-square statistic probability of the Hausman test is less than 5%, we select the fixed effects model. On the contrary, if the chi-square statistic probability of the Hausman test is greater than 5%, we choose the random effects model (Pham, 2023). The results of Table 6 portray that the chi-square statistic probability of the LM test is less than 1%, which was estimated at 0.0000, so we chose the RE model instead pooled OLS model. We selected the FE model instead RE model because the probability value of the Hausman test is less than 5%, which was estimated at 0.0000.

Table 7. Heteroskedasticity test

Chi2 (1)	Prob > chi2
31.67	0.0000

Source: Author's Computation using STATA software

To check the robustness of our model, we run both the heteroskedasticity test and the serial correlation test. If the p-value of the Breusch-Pagan / Cook-Weisberg test is less than 5% heteroscedasticity becomes a problem (Emako et al., 2023). The results of Table 7 indicate that the chi-square probability value equals 0.0000 which means a heteroskedasticity problem.

Table 8. Serial correlation (autocorrelation) test of pooled regression model

Chi2 (1)	Prob > chi2
98.88	0.0000

Source: Author's Computation using STATA software

If the p-value of the Breusch-Godfrey test is less than 5% serial correlation becomes a problem (Ilaboya & Ohiokha, 2016). From Table 8 we found that our model suffers from a serial correlation problem since the value of chi-square probability is less than 5%, which was estimated at 0.0000.

Table 9. Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)

MEX	Coef.	St.Err.	p-value
GDP	0.018***	0.002	0.000
TO	0.020**	0.009	0.030
RER	-0.010***	0.001	0.000
Constant	-0.070	0.079	0.377
R-squared	0.472	Number of obs	144
Chi-square	104.58	Prob > chi2	0.000

Source: Author's Computation using STATA software, ***and ** refer to significant level at $p < 0.01$ and $p < 0.05$ respectively

Our selected model suffers from both problems, autocorrelation and heteroskedasticity. According to Montes-Solla (2015), when both problems exist, one of these methods must be used: Panel-corrected standard errors (PCSE) or Feasible Generalized Least Squares (FGLS). Panel-corrected standard errors (PCSE) is one of the best method in Panel data estimation when the number of observations is small (نجة & نصيرة, 2021).

From Table 9, our panel model can be written as follows: $MEX = -0.07 + 0.018 GDP + 0.02 TO - 0.01 RER + \varepsilon_{it}$, the value of R-squared (R^2) is 0.472, this means a modest explanatory power of the model, namely, GDP, TO and RER explain 47.2% changes in MEX. In addition, a significant F-statistic refers that the model has a statistical significance. An increase of 1% in the GDP of trading partners implies an improvement in MEX by 0.018%, this result matches with the economic theory that increasing in GDP means an improvement in power purchasing and so, will spur governments and individuals to more spend on manufacturing imports. A 1% increase in TO will lead MEX to increase by 0.02%. This result is in line with that reported by Irshad et al. (2018). RER has a negative impact on MEX. This result is in line with that reported by Cheung et al. (2016).

6. Conclusion

We attempted across this study to shed and highlight the main factors determining international competitiveness between China and the United States of America in manufacturing exports over the period 2005-2022. as a first step we employed the Export Similarity Index (ESI) of Finger and Kreinin to measure the degree of similarity or dissimilarity of the export composition of the U.S and China to 24 partner countries, then as

a second step we applied a gravity model using panel data of main trading partners countries to China, one of them the U.S.

We reached to following results:

- ✓ China is the biggest trading partner to the U.S., such that the U.S. Balance on services with China is in favour of the U.S. at the cost of China. On the contrary the U.S. Balance on goods with China has registered deterioration.
- ✓ The export Similarity Index of China and the U.S. has registered high values, which means that China has become a fierce competitor to the U.S. in manufacturing exports, notably in the U.S.'s traditional markets such as the European Union (EU).
- ✓ The bilateral real exchange rate has a negative effect on China's manufacturing exports (i.e., appreciation in China's currency will discourage its manufacturing exports).
- ✓ China's manufacturing exports react positively to the real gross domestic product of partner countries. This result matches with economic theory that increasing GDP means an improvement in power purchasing and so, will spur governments and individuals to more spend on imports.
- ✓ Trade openness of trading partners of China induces positively China's manufacturing exports to grow, hence reflecting the success of China's foreign trade policy in terms of benefiting from international trade, and its excellent planning on building good economic relationships with other countries.

7. References

1. *Bureau of Economic Analysis (BEA)*. (s.d.). Consulted on 2025, on <https://www.bea.gov/data/intl-trade-investment>
2. *World Integrated Trade Solution (WITS)* . (s.d.). Consulted on January 1, 2025, on <https://wits.worldbank.org/countrystats.aspx?lang=en>
3. Adow, A. A. (2025). Remittances and economic growth in East Africa. *Cogent Economics & Finance* , 13, pp. 5-7.
4. Akgüngör, S., Barbaros, R. F., & Kumral, N. (2002). Competitiveness of the Turkish Fruit and Vegetable Processing Industry in the European Union Market. *Russian & East European Finance and Trade* , 38 (3), p. 38.
5. Bierut, B. K., & Dybka, P. (2021). Increase versus transformation of exports through technological and institutional innovation: Evidence from Bayesian model averaging. *Economic Modelling* , 99, p. 4.
6. Cheung, Y.-W., Chinn, M. D., & Qian, X. (2016). China–US trade flow behavior: the implications of alternative exchange rate measures and trade classifications. *Review of World Economics* , 152, pp. 49-64.
7. Emako, E., Nuru, S., & Menza, M. (2023). The effect of foreign direct investment on capital accumulation in developing countries. *Development Studies Research* , 10, p. 9.
8. Enderwick, P. (2021). Chinese Innovative Capacity—State of the Art of the Leading Edge. In F. Spigarelli, & J. R. McIntyre, *The New Chinese Dream: Industrial Transition in the Post-Pandemic Era* (pp. 35-36). Palgrave Macmillan Cham.
9. Erlat, G., & Arslaner, F. (1997). Measuring Annual Real Exchange Rate Series for Turkey. 36. Germany: University Library of Munich.
10. Fagerberg, J. (1988). International Competitiveness. *The Economic Journal* , 98 (391), p. 355.
11. Finger, J. M., & Kreinin, M. E. (1979). A Measure of 'Export Similarity' and Its Possible Uses. *The Economic Journal* , 89 (356), pp. 905-906.
12. Gozgor, G., & Can, M. (2016). Effects of the product diversification of exports on income at different stages of economic development. *Eurasian Business Review* , 6, p. 216.

13. Ilaboya, O. J., & Ohiokha, F. (2016). Firm Age, Size and Profitability Dynamics: A Test of Learning by Doing and Structural Inertia Hypotheses. *Business and Management Research* , 5 (1), p. 36.
14. *International Monetary Fund*. (s.d.). Consulted on January 2025
15. Irshad, M. S., Xin, Q., Shahriar, S., & Ali, F. (2018). South Korea's potential export flow: a panel gravity approach. *Asian Journal of Empirical Research* , 8, pp. 129-132.
16. Kang, H., Yang, Z., & Zhang, Z. (2023). The competitiveness of China's seaweed products in the international market from 2002 to 2017. *Aquaculture and Fisheries* , 8 (5), p. 580.
17. Meza-González, L., & Sepulveda, J. M. (2019). The impact of competition with China in the US market on innovation in Mexican manufacturing firms. *Latin American Economic Review* , 28, p. 3.
18. Montes-Solla, P. (2015, July 21). *ResearchGate*. Consulted on 2025, Steps in Panel data analysis?: <https://www.researchgate.net/post/Steps-in-Panel-data-analysis>
19. Nguyen, V. C., Nguyen, T. T., & Nguyen, H. T. (2020). Government Ability, Bank-Specific Factors and Profitability: An Insight from Banking Sector of Vietnam. *Journal of Advanced Research in Dynamical & Control Systems* , 12 (4), p. 419.
20. Paul, P., & Mitra, P. (2018). Analysis of the Effect of Working Capital Management on Profitability of the Firm: Evidence from Indian Steel Industry. *Asia-Pacific Journal of Management Research and Innovation* , 14, p. 3.
21. Pham, N. H. (2023). CEO characteristics and bank performance: Case of Vietnamese commercial banks. *Cogent Economics & Finance* , 11, pp. 6-9.
22. Roy, A., & Mathur, S. K. (2016). Brexit and India–EU Free Trade Agreement. *Journal of Economic Integration* , 31 (4), pp. 754-755.
23. *The Fraser Institute*. (2024). Consulted on January 10, 2025, on Economic Freedom: <https://efotw.org/economic-freedom/dataset?geozone=world&year=2022&page=dataset&min-year=2&max-year=0&filter=0&sort-field=freedomToTradeInternationally&sort-reversed=0>
24. *The World Bank*. (s.d.). Consulted on January 2025
25. Wang, P. (2020). International Parity Conditions. In *The Economics of Foreign Exchange and Global Finance* (pp. 36-40). Springer, Berlin, Heidelberg.
26. نصيرة, ب. ا. & نجاة, ح. (2021). تكنولوجيا المعلومات والاتصال كمحدد لتدفقات الاستثمار الاجنبي المباشر الوافد الى دول Mena دراسة قياسية باستعمال بيانات بانل خلال الفترة 2007-2018. *مجلة العلوم الاقتصادية والتسيير والعلوم التجارية*. 14, (1) 180 p.