E-Commerce, Exports and Imports Growth: Casual Relations Between Us and China

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Abstract
The main aim of this paper is to do empirical analysis of the causal links between growth in e-commerce, exports and imports in US and China. The decision to select these countries is based on their performance of E-commerce and International Trade over the decade in the world. The case whereby the causal links between the e-commerce, exports and imports sector of a nation can be discovered and analyzed. The causality concept used in this research is VAR Granger causality/Block Exogeneity Wald Test. There exists solid indication of Granger causality, bidirectional association between E-commerce, Exports and Imports growth for US in our sample. There is a weaker evidence of existence of causality between the variables in the case of China. The phenomenon of e-commerce entails important opportunities for improving the international integration and therefore all countries can also profit from policies that promote strategic sectors of their markets.
Keywords: E-Commerce, Exports, Imports, Causal Relations

1. INTRODUCTION

Since the beginning of the second half of the 1990s, e-commerce has developed significantly throughout the world. The development of e-commerce has been driven by broaden of high-speed internet links, tablets, smartphones and other devices. The complexity of social and economic development is phenomena. This situation is affected by processes such as globalization and the knowledge in the economy. The gradual intensification of globalization processes was created the environment for the worldwide market. The increased range of knowledge has opened new potentiality to sell product using e-commerce technologies. The growth and expansion have helped to established movement of capital, labour, commodities, open a possibility to enhance the competitiveness of American and Chinese establishments in the world. There is dramatic increase in development in the worldwide economy and rapid access of broadband internet in the settings of the world's major countries and regions to sustain a high speed ecommerce market growth. Developed nations led by the U.S.A. are still the major force in the global e-commerce and the sudden emergence of China and other developing states in e-commerce are becoming a significant force in international e-commerce market.

In 2003 the total number of internet users was 14.2 million but it grew to 2.93 billion users in 2014. Which represents 0.3 percent of the whole world population in 2003. But in 2014 it rose to 40.4 percent of the world population. In 2003 United State was highest in terms of usage of internet followed by China. However, in 2014 China has taken over in leading position with more than 641 million internet users in the world. The increased utilization of the internet in China is an advantage for the high development of the ecommerce in China and the world as a whole. The total amount of worldwide trade of China is $43030.4 in 2014, showing a rise of 3.4% from a previous year. In general China's international trade growth is 2.7 percent higher than the international trade growth. China is still the major international trade nation in the world. In 2014 United State export and import total sum growth was 6.6 percent and 9.9 percent which was more than the previous year. China is sometimes refer to as the world factory and almost all the world market is open for China and therefore has a deep influence on the world's economy.

The effects of these new technologies on worldwide trade flows is mostly significant because of the potential for market development that are entail, which has yet to be fully taken advantage of. In 2014, cross-border online transactions from the B2C segment amounted to US$ 328 billion at the global level, the equivalent of 1.4% of worldwide exports of commodities and 16.9% of worldwide B2C e-commerce. These dealings involved 309 million consumers, representing 27.1 percent of the individuals who make online procurements obtain commodities from abroad. (Ecommerce Foundation, 2015). Research indicated that in 2017 worldwide transactions will signify expand more than 40% of e-commerce in Asia, more than a third in the United States and the EU, and roughly 18% in LAC (Suominen, 2014). Similarly, it is anticipated that more than 1 billion people will make cross-border purchases online in 2020 (Ecommerce Foundation, 2015).

The objective of the paper is to empirically investigate the causal links between E-commerce, Exports and Imports in the two leading countries in E-commerce and the world trade. The decision to select these countries is based on their performance of e-commerce, Exports and Imports over the decade in the global environment. The data set is obtained from world development indicators (WDI) and consists of time series for each of the three variables in each country. The data period is from 2000 to 2016. The study then employed multivariate Granger causality test within the framework of VAR structure.

2. LITERATURE REVIEW

Many economists including Balassa (1978, 1985), Bhagwati and Shrinivasan (1978), Krueger (1980) and Feder (1983) have posit to the positive effects of the exports division on the rest of the economy. A flourishing exports sector helps the economy of a state because the sector must be very efficient and effective in order to succeed in global competition. Exporting enterprises earn high profits and workers employed by such firms earn the maximum remuneration in the country. Economists believe that the latest economic achievement of the Southeastern Asian nations is ascribed to export preferment policies. Successful advancement of the exports sector gives emerging nations access to superior foreign technologies and scientifically rich capital, because domestic exports are the key source of foreign exchange to procure investment goods. The inference of export preferment theories is that the foreign sector of a nation is an important feature that controls domestic economic growth.

Freund and Weinhold (2004) discovered a substantial effect of the Internet on trade in the last decade from the indication of the increase in growth of web hosts in a nation leads to the rise in export growth. In 2009 and 2010, Bojnec and Ferto study the consequence of Internet users on the bilateral manufacturing export growth, and conclude that internet stimulates manufacturing export among OECD countries. He Yong et al (2011), concludes that e-commerce affects the product of output, profit of businesses, prices of output, exports and imports of commodities trade and the overall commodities trade. Nuray Terziaa (2011), studies show that the internet will encourage international trade as lifting other trade barriers. It stated that nations open to imports from rich nations economies will gain from knowledge spillover and e-commerce will have a greater effect on trade in services.

2.1 CHINA'S E-COMMERCE EXPORTS AND IMPORTS

E-commerce market in China in the last decade continues to sustain high value-added E-commerce trend, but the later development of the worldwide financial crunch and the holdup resulted in slower growth in turnover. The overall progress of e-commerce market in China is still increasingly forward. Chinese E-commerce market dealings in 2008 amounted to 2.4 trillion RMB, up 41.2 percent value-added to which B2B market is still the leading structure of the total turnover, C2C essentially preserving the status quo, B2C will hasten development. China has been the biggest trading country since 2013 and has also become the leading online market worldwide. E-commerce accounted for a remarkable growth every year as a consequence of the nation subvention policies. China's E-commerce trade has been flourishing in current years, with enterprises as Alibaba Group Holding Ltd and JD.com Inc enjoying from an emergent middle class with more personal income to spend. Cross-border E-commerce accounted for a turnover of $3.32 billion ever since China directed cross-border foreign exchange payments in 2013, with trade size in the first five months of this year near the total value of the whole of 2014, eMarketer reports that E-commerce retail transactions improved by 42.1 percent to US$672.01 billion, representing over 40 percent of the world E-commerce retail transactions in 2015. The E-commerce forecast in 2018 is anticipated to stretch to US$1.57 trillion. China's E-commerce marketplace is increasing at least three times quicker than that of the U.S. China has become the world's biggest E-commerce market. Nevertheless, the official mean income of the Chinese online purchaser is much less than their American counterparts, disposable income of the Chinese middle-class grew by 10 percent (CNBS). iResearch forecasted that China's E-commerce market will develop at a 27 percent rate over the next four years.

Cross-border E-commerce exports from China was $648 billion (4.5 trillion RMB) in 2016, the growth representing 26 percent year-on-year, both B2B and B2C modes inclusive (China E-Commerce Research Center). Medium and Small-sized enterprises in the China are more positive about the use of E-commerce and digital channels to push export expansion than their counterparts in the rest of the globe. Average of about three-fifth of the Chinese enterprises trust they will increase more E-commerce income next year (2018), compared with 44 percent in Asia-Pacific and 40 percent globally. In spite of sluggish worldwide growth, Chinese SMEs are weathering the storm. Ninety-three percent of exporters estimate that their existing level of export proceeds will either remain the same or enlarge in the next 12 months. Chinese SMEs are forward-thinking, seeing technology as means to manage their concerns from this year 2017 and help them to develop their export businesses (Eddy Chan-FedEx China).

The E-commerce marketplace in Asia is anticipated to account for 48% of worldwide cross-border E-commerce sales by the end of the 2020. China is forecasted to expend $245 billion on imported products online by 2020 alone. The Chinese market is projected to spend roughly $6.7 billion on U.S. imports alone this year. This total does exclude other growing import markets from other key continents such as Europe and South America. The consumers typically focus their expenditure on U.S. apparel, cosmetics, electronics, health products, food, jewelry and home goods also attracting a multitude of shoppers. Chinese consumers of about 61 percent say they would pay more for a product made in the United States (Internet Retailer). Inflows of western goods are pleasant and trendy for Chinese consumers. E-commerce companies in China (eg. Alibaba and JD) have setup online U.S. digital malls for their consumers to match the growing demand of the middle class. The

middle class in China is equal to the entirety of America's population and likely to increase in twofold in the next seven years (2024), it has increased in their expenditure pattern over recent years.

2.2 US E-COMMERCE, EXPORTS AND IMPORTS

The USA was the world's biggest economy and also the world leader when it comes to cross-border E-commerce exports and imports. In 2013, 75.8% of the population was shopping online and the US was the world's leading consumer market. In 2015, according to A.T. Kearney's global E-commerce index, the US has overtaken China. In 2013 North American region recorded 34.9 percent of the worldwide B2C sales. E-commerce retail transactions in US recorded over US$305 billion in 2014 and are expected that it will grow to US$548 billion in 2019. In cross-border shopping, there are over 34 million American online shoppers who mostly buy from United Kingdom constitute 49 percent, 39 percent buy from China, 34 percent from Canada, 20 percent from Hong Kong and 18 percent from Australia. Online sales of physical goods amounted to 294.45 billion US dollars in 2015 and are expected to exceed 485 billion US dollars in 2021. U.S. is anticipated to produce a close to 100 billion U.S. dollars in income by 2021 for apparel and accessories retail E-commerce. The United States comes behind some nations in terms of E-commerce transaction as percentage of total retail transaction - nearly a fifth of China's retail transaction happened through the internet, as related to only 8.1 percent in the United States in 2016. The UK, Denmark and South Korea are also ahead of the U.S. in standings of retail e-commerce stake. It is projected that E-commerce cross-border sales from US to china is expected to grow by 74 percent.

Many U.S. enterprises have taken note of the upsurge and are hopping forward, first into the emergent market. A number of large players of web merchants like Amazon, Zazzle, ebay etc. have opened their own customized E-commerce sites in Asian countries. For example, Amazon has since increased their sales by billions of dollars. Some big-name U.S. apparel retailers have partnered with Chinese enterprises, operating digital storefronts through leading online retailers in China's marketplace. Some also have produced distinctive brand lines explicitly for their newfound shoppers in China. Additional businesspersons are also seeking to meet the growing demands of the middle class in China. The CEO of Alibaba, Jack Ma, aims to add ten million U.S. small businesses to his site in the future.

The cross-border E-commerce transactions from the U.S. to China are estimated to grow by a staggering 74% by the coming three years. However, the development and unpredictable changes to come are a huge worry for many businesses wanting to enter or continue their progress in the Chinese market, especially with the RMB's recent decrease in value. Perhaps it's a good idea to wait and make entry once the sand settles and the price of RMB levels out or perhaps it would be cheaper to jump in now while the market is increasing and constrain the next few years in cementing brand awareness among new customers. Both ways, U.S. goods remain tall among players, growing at a stride suggestively faster than expected just a few years ago.

Trends of the variables in the two countries
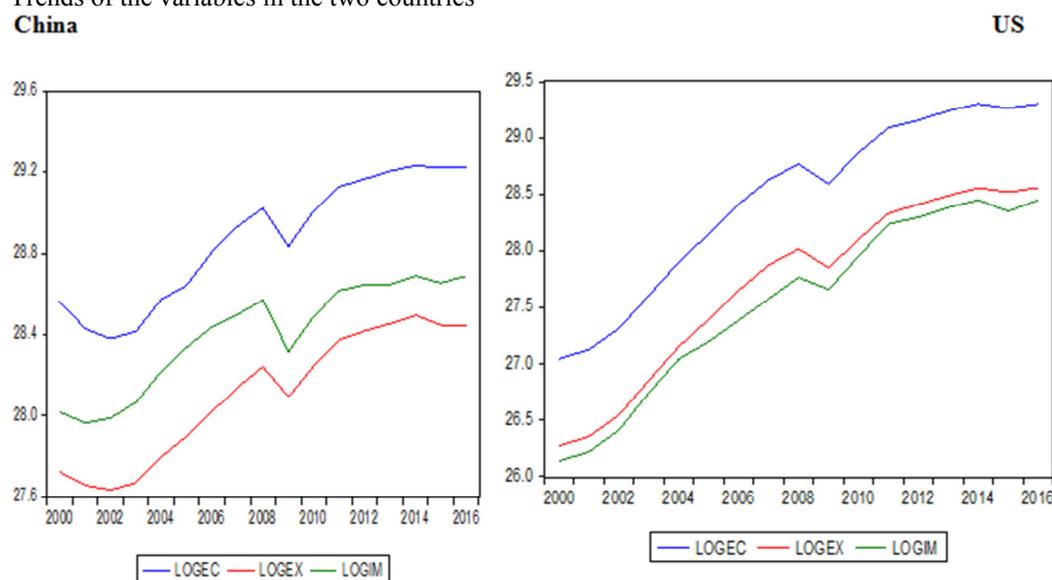
A causal look at the graphs shows that there is a strong links between the E-commerce, Exports and Imports. There is also a causal link between the two countries, effects of world economy impact heavily on both economies, for instance the slum in world trade in 2008 affected both nations.

3. METHODOLGY

E-commerce will be proxy by secures internet servers, fixed broadband, fixed telephone lines and mobile cellular subscriptions (Danquah & Chen 2017). Exports and Imports of commodities in current US$. Data source is from World Development Indicators - World Bank which covers the date of 2000 – 2016 and it is annual data. Stationality test is performed using both Descriptive Statistics and Augmented Dickey – Fuller (ADF) test to check the presence of unit roots. The multivariate co integration test based on Johansen model is performed. The VAR Granger Causality/Block Exogeneity Wald Test is performed to show the causal relationship among the variables in the two countries.

3.1 UNIT ROOT TEST

The equation of ADF test is given as:

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \Sigma \delta_i \Delta Y_{t-1} + \delta_n \Delta Y_{t-n} + \varepsilon_t$$

The equation includes intercept and time trend. α_0 is a constant, δ is a coefficient of autoregressive process, Δ is the difference operator, t is a time trend, Y_t is the variable under consideration, n is the number of lags and ε_t is the stochastic error term. The lagged differences of the variables are augmented to the test model in order to mitigate autocorrelation problems in the disturbance term. The PP test is given as

$$\Delta Y_t = \alpha + \beta t + \delta Y_{t-1} + \Sigma \delta_i \Delta Y_{t-1} + \varepsilon_t$$

It is almost the same to ADF test except n is left out to adjust for error to correct autocorrelation and hetroskedasticity. The tests rely on rejecting the null hypothesis of a unit root (the series are non-stationary) in favor of the alternative hypothesis of no unit root (the series are stationary).

CHINA

Table 1A: Unit Root Test Results from ADF

VARIABLES	NO. OF LAGGED	T-STAT	1%	5%	10%	PROBABILITY
LOGEC	1	-3.941380	-4.728363	-3.759743	-3.324976	0.0371[**]
LOGEX	1	-3.871758	-4.728363	-3.759743	-3.324976	0.0416[**]
LOGMI	1	-4.404440	-4.800080	-3.791172	-3.342253	0.0188**

Note: ***, ** and * indicates that the variable is stationary at the 1 %, 5% and 10% level of significance respectively

All the values were not stationery at their levels but achieved stationality at their first difference with trends and intercept. The stationality was achieved at 5 percentage level. This suggests the use of co-integration analysis since the concept of co-integration requires variables must be stationary after differencing at least once I (1).

US

Table 1B: Unit Root Test Results from ADF

VARIABLES	NO. OF LAGGED	T-STAT	1%	5%	10%	PROBABILITY
LOGEC	1	-3.941380	-2.728252	-1.966270	-1.605026	0.0066[*]
LOGEX	1	-3.551116	-3.959148	-3.081002	-2.681330	0.0213[**]
LOGMI	1	-4.404440	-3.959148	-3.081002	-2.681330	0.0188**

Note: ***, ** and * indicates that the variable is stationary at the 1 %, 5% and 10% level of significance respectively

The variables e-commerce, exports and imports were stationery at their first difference intercept. E-commerce and Imports achieved stationality at 1 percentage point whereas Export achieved it at 5 percentage points. This also suggests the use of co-integration analysis since the concept of co-integration requires variables must be stationary after differencing at least once I (1).

All the variables are fit to be used for the comparism between china and US because all of them fitted well in the time series and are stationery at their first difference with order 1(1). The US has a better fitted probabilities then China.

3.2 COINTEGRATION TEST

The stationary linear arrangement is termed the co-integrating equation and can be assume as a long run stability association between the variables. The universal objective is to resolve the most stationary linear arrangement of the time series variables under reflection. Accordingly, Johansen and Juselius (1988, 1990) co-integration technique was used for the investigation of stable long run relationships between E-commerce, Exports and Imports in China and USA. The results are presented in table 2A and 2B.

CHINA

Series: LOGEC, LOGEX. LOGIM

Table 2A: Unrestricted Co-integration Rank Test Result (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value (0.05)	Prob.**
None *	0.694318	32.38226	29.79707	0.0246
At most 1	0.475822	14.60410	15.49471	0.0678
At most 2 *	0.279409	4.915249	3.841466	0.0266

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

Table 2B:Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value (0.05)	Prob.**
None	0.694318	17.77816	21.13162	0.1384
At most 1	0.475822	9.688850	14.26460	0.2332
At most 2 *	0.279409	4.915249	3.841466	0.0266

Max-eigenvalue test indicates no cointegration at the 0.05 level. * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

The hypothesis that there is no co integration relationship existing between the variables was refuted at None and At Most 2 because both the trace statistics and max-eigen value were bigger than their critical values at 5 percent. It also shows that it is statistically significant. However we accept the null hypothesis that At Most 1 co integration relationship exist at 5 percent level since the trace value and max-eigen value are less than their critical value. The test also review that there is existence of long run relationship among e-commerce, exports and imports in China.

The normalized results show that Imports has a positive impact on E-commerce but Exports show otherwise. The long-run elasticity of Imports to E-commerce is a 0.053331, consequently a 10 percent rise in Imports increases the E-commerce by 0.53 percent. But exports and E-commerce has a negative relationship. A 10 percent rise in Exports cause E-commerce to fall by 10.5 percent. They were all significant at 5 percent levels.

US

Series: LOGEC, LOGEX, LOGIM

Table 3A: Unrestricted Co-integration Rank Test Result (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	Critical Value (0.05)	Prob.**
None *	0.748668	41.00142	29.79707	0.0017
At most 1[*]	0.658549	20.28669	15.49471	0.0088
At most 2 *	0.242624	4.168426	3.841466	0.0412

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

Table 3B: Unrestricted Cointegration Rank Test (Maximum Eigen value)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	Critical Value (0.05)	Prob.**
None	0.748668	20.71473	21.13162	0.0571
At most 1[*]	0.658549	16.11826	14.26460	0.0252
At most 2 *	0.242624	4.168426	3.841466	0.0412

Max-eigenvalue test indicates no cointegration at the 0.05 level, * denotes rejection of the hypothesis at the 0.05 level, **MacKinnon-Haug-Michelis (1999) p-values

The hypothesis that there is no co integration relationship existing between the variables was refuted At Most 1 & 2 because both the trace statistics and max-eigen value were bigger than their critical values at 5 percent and also their max-Eigen Statistic values greater than their critical values at 5 percent. It also shows that it is statistically significant. However we accept the null hypothesis that None co integration relationship exist at 5 percent level since the trace value and max-eigen value are less than their critical value. The test also review that there is existence of long run relationship among e-commerce, exports and imports in US

The normalized results show that Exports and Imports have a negative impact on E-commerce. The long-run elasticity of Imports to E-commerce is a 0.561922, consequently a 10 percent rise in Imports decrease in the E-commerce by 5.6 percent. Whereas a 10 percent rise in Exports causes E-commerce to fall by 6 percent. But they were not significant in the long run.

3.3 GRANGER CAUSALITY TEST

The VAR Granger Causality/Exogeneity Wald Test was used in place of VECM because of the inadequate number of observations. These hypotheses can be tested using Chi-Square distributed and F statistics.

CHINA

Table 4A: VAR Granger Causality/Block Exogeneity Wald Test

Dependent variable	ExcludedIndependent	Chi-square	Df	Probabilities
LOGEC	LOGEX	0.637702	2	0.6989
	LOGIM	0.522270	2	0.7702
LOGEX	LOGEC	0.716365	2	0.6989
	LOGIM	0.566838	2	0.7532
LOGIM	LOGEC	0.653279	2	0.7213
	LOGEX	0.655149	2	0.7207

Note:***denotes no sig. at all levels; **denotes 10% level of sig.;*denotes 5% level of sig.

The VAR Granger Causality / Block Exogeneity Wald Test show that there is a relationship between the variables but were not significant in the short run. None of the variables will influence the other in the short run period.

US

Table 4B: VAR Granger Causality/Block Exogeneity Wald Test

Dependent variable	Excluded/Independent	Chi-square	Df	Probabilities
LOGEC	LOGEX	8.190584	2	0.0167[*]
	LOGIM	5.276468	2	0.0715[**]
LOGEX	LOGEC	9.969948	2	0.0068[*]
	LOGIM	6.871890	2	0.0322*
LOGIM	LOGEC	7.723697	2	0.0210[*]
	LOGEX	6.150365	2	0.0462*

Note:***denotes no sig. at all levels; **denotes 10% level of sig.;*denotes 5% level of sig

The test for US shows that there is a bidirectional relationship between all the variables with either 5 percent or 10 percent significance level. Each of the variables influences each other in the short run.

CUSUM and CUSUM of square were performed to test the stability of the variables used in the period. For China the variables were stable throughout the period and stay within the 5 percent boundary. But the variables for US were not stable when CUSUM test was performed. However it achieved stability when CUSUM of squares was performed and it was stable within the 5 percent line.

4. CONCLUSION

This paper examined the causal relations between E-commerce, Exports and Imports for US and China from 2000 to 2016. The concept of Granger causality was employed to study these relations, because it goes beyond simple correlation analysis and deals with the issue of direction of causation. This is an appropriate methodology, since economic theory allows for direct and reverse causation. E-commerce led growth theories emphasize increase in volume for Exports and Imports growth. A VAR Granger Causality/Block Exogeneity Wald Tests in the growth of E-commerce, Exports and Imports was employed to analyze causality. The empirical findings provide partial support for the theory. For the given data set, there exists solid evidence of Granger causality, bidirectional association between E-commerce, Exports and Imports growth for US in our sample. There is a weaker evidence of existence of causality between the variables in the case of China. The policy implications of these outcomes are clear, US can gain from policies that promote E-commerce and their foreign sectors. Further, in view of the empirical outcomes of bi-directional causality established in this paper, all the nations can also take advantage from policies that promote key sectors of their economies. (E-commerce, Exports and Imports).

In conclusion, e-commerce is growing fast and cross-border dealings are increasingly significant. These trends have main effects on markets: on the one hand, they expand the range of information available to the consumer, along with the number and variety of goods and services available for acquire; they also make possible many companies' entrance to international markets, especially in the situation of MSMEs, and increase competition. The phenomenon of e-commerce entails important opportunities for improving the international integration.

REFERENCES

Ayoub Yousefi, The impact of cross-border E-commerce on International Trade, 16th International Academic Conference, Amsterdam, May 2015, Doi:10.20472/IAC.2015.016.078

Balassa, B., (1978), "Export and Economic Growth: Further Evidence", Journal of Development Economics, 2, 181-189.

Balassa, B., (1985), "Exports Policy Choices and Economic Growth in Developing Countries After the 1973 Oil Shock", Journal of Development Economics, 18, 23-25.

Bhagwati, J. N. and Shrinivasan, T.N., (1978), "Trade Policy and Development", in Dornbusch, R. and Frenkel, J.A., (eds) International Economic Policy: Theory and Evidence, Johns Hopkins University Press, Ch. 1, 1-38

Chang Yanan, The effect of E-commerce on the International Trade of Small and Medium Enterprises in China, May 2016. Thesis

Clarke, G. and R.G. Wallsten, "Has the internet increased trade ? Evidence from industrial and developing countries", World Bank Policy Research. Working Paper 3215, February, 2004.

Danquah, B. A and Chen, D. l., (2017), The Dynamic Relationship Between E-commerce, Foreign Direct Investment and Economic Growth, A case of Ghana, European Journal of Business, Economics and Accountancy, Vol. 5(3), 49-60

eMarketer. 2015. Global B2C E-commerce Report 2015. Amsterdam: Ecommerce Foundation.

eMarketer. 2015. B2C Ecommerce Sales Approach $90 Billion in Latin America [JULIETA: este vínculo no se puede abrir]. March 26

Engle, R. F. and Granger, C.W., (1987), "Cointegration and Error Correction: Representation, Estimation and Testing", Econometrica 55, 251-276.

Enders, W., (1995), Applied Econometric Time Series, John Wiley & Sons, Inc.

Feder, G., (1982), "On Exports and Economic Growth", Journal of Development Economics 12, 59-73.

Freund, C. and Weinhold, D. On the effect of the Internet on International Trade, International Finance Discussion Papers, No. 693, December, 1999.

HE Yong, LI Jun-yang, WU Xue-pin, and JIANG Jiao-jiao, Impact of e-Commerce on International Trade—Based on a Iceberg Cost Model International Journal of Trade, Economics and Finance, Vol. 2, No. 3, June 2011.

Krueger, A.O., (1980), "Trade Policy as an Input to Development", American Economic Review, 70, 288-292.

Kuwayama, M. E-Commerce and Export Promotion Polices for Small and Medium-Sized Enterprises: East Asian and Latin American Experiences, Serie Comercio Internacional, LC/L.1619-P, October, Santiago de Chile, ECLAC, 2001.

MacKinnon, J. G., (1991), "Critical Values for Cointegration Tests", in Long-run Economic Relationships, in Engle, R.F. and Granger, C.W. J., (eds), Oxford University Press, 267-276.

Manyika, J.; Bughin, J.; Lund, S.; Nottebohm, O.; Poulter, D.; Jauch, S.; and Ramaswamy, S. 2014. Global Flows in a Digital Age: How Trade, Finance, People and Data Connect the World Economy. McKinsey Global Institute. April

Michelis, L. and Zestors, G. K., (2004), Exports, Imports and GDP Growth; Causal Relations in Six European Union Countries, The Journal of Economic Asymmetries, Dec. 2004, p71-85.

Phillips, P. C. B., (1987), "Time Series Regression with a Unit Root", Econometrica, 55, 277-301.

Phillips, P.C.B. and Perron, P., (1988), "Testing for a Unit Root in Time Series

Statista, Digital Economy Compass, April 2017