

Has the Exchange Depreciation Contributed to Exports? The Japanese Case

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ABSTRACT

Many people believe that depreciation of exchange rate promotes exports and leads to economic growth. Export-oriented countries sometimes become very nervous about currency appreciation. This study examines whether or not the Japanese yen's depreciation has increased volume of exports after Abenomics, which flowed a large amount of capital into the domestic markets to boost the economy. The Japanese yen has depreciated according to quantitative easing, however, whether or not the volume of exports has increased is not certain. Empirical results of this study show that there is not a strong relationship between currency depreciation of the yen and Japanese exports. Also, elasticity, the total percentage changes in trade divided by the total percentage changes in exchange rates, is calculated for main international trade partners for Japan. The results are different for each country. The shock on the exchange rate appears and continues after some time passes.

Keywords: yen depreciation, exchange rate, export, Japan

INTRODUCTION

Japan could have enjoyed high economic growth in the middle of the 1980s, and stock and land prices rose tremendously. Some people believed that such prices would continue to rise eternally. This phenomenon was called a bubble economy in Japan as stock and land prices rose far above ordinary prices. The Japanese yen appreciated greatly after the Plaza Accord signed on September 1985, but exports that have traditionally been negatively related to the exchange rate appreciation in Japan did not decrease. This bubble economy suddenly burst at the beginning of the 1990s. Stock and land prices reversed and dropped, and bad loans became prevalent. That capital had been used for investment in stocks and lands. After that, the Japanese economy gradually recovered in the 1990s as the bad loan problem was partially solved, however, Japan experienced a serious recession. People describe that phenomena as a lost 20 or 30 years. The cause of the recession is said to be the weak Japanese financial system and structural problems, such as delays in reforms and deregulation in many fields in Japan. The bad loans from the end of the bubble economy delayed the necessary changes.

The Japanese government, of course, had implemented fiscal policies to recover the economy. Also, the Japanese central bank, the Bank of Japan (BOJ), conducted drastic monetary policy (quantitative easing) for the first time in the world in March 2001 after the zero interest rate policy

was adopted. However, the BOJ quit the quantitative easing in 2006 as there were some signs that the economy was recovering from the serious situation, namely, deflation and recession. However, the Japanese economy had not achieved high enough economic growth. An unfortunate worldwide crisis occurred in 2008 that damaged the world economy and the Japanese economy.

In Japan, a more drastic and aggressive new policy, called Abenomics, was introduced in April 2013 to combat deflation. By strengthening coordination between the BOJ and the Japanese government, the government has conducted policies to achieve a new fiscal structure to obtain credibility of the fiscal condition. At that time, the BOJ introduced an unprecedented and aggressive monetary policy to increase the purchase volume of government bonds to flow capital into financial markets for consumption, investment, and so on. As a result of this monetary expansion, exchange rates depreciated and stock prices rose.

It has been said that the Japanese economy is an export-led economy. Depreciation of the domestic currency is usually considered to promote exports and lead to increasing stock prices. Markets, in general, welcome depreciation of the exchange rate as the depreciation contributes to economic growth. However, authorities cannot manipulate exchange rates although the manipulation is not prohibited by treaties. Although exchange rate is considered to positively affect economic growth, it cannot be employed as a policy tool in reality.

This paper examines whether or not exchange rate depreciation has promoted exports for the recent Japanese case. Since 2013, Japanese yen has depreciated, but whether or not the volume of exports has increased is uncertain. This issue is important as it is strongly related with economic policies. Examining the relationship between exchange rate and export and evaluating economic policies are the purpose of this study. Section 2 reviews related existing studies. Section 3 provides theoretical analyses for empirical analyses. Section 4 implements empirical analyses and the empirical results are analyzed. Finally, this paper ends with a brief summary.

PREVIOUS STUDIES

There has been a lot of discussion on whether or not exchange rate depreciation has promoted exports as this issue is important for implementing economic policies. As there are too many existing studies, the focus is basically limited to only recent studies.

First, there are a lot of related studies presented by now. Kurihara and Nezu (2006) found that there is a significant relationship between daily exchange rates and daily stock prices. Kurihara (2013a) showed that regional trade agreements promote international trade more in OECD countries than in non-OECD countries. Kato (2015) found that technology-intensive exports react more to real exchange rates in China and Taiwan than in other economies. Rose (2018) confirmed that quantitative easing policy has impacts on exports that are about 10% lower to countries not conducting unconventional monetary policy. Sasaki and Yoshida (2018) suggested that economic damage by the worldwide financial crisis around the year of 2008 and a big earthquake in 2011 caused Japan's international trade balance into deficit, however, the deficit ended and changed 26 years of international trade surplus. Wang (2018) showed that the incomes of the United States and China are vital determinants of the U.S. international trade deficit with China. Pizada (2019) found that exchange rate shocks have a significant influence on exports.

Also, the relationship between exchange rate volatility and exports (trade) has been analyzed a lot. Kurihara (2013b) demonstrated that exchange rate fluctuations have negative impacts on international trade in developing countries and that the developments of financial instruments (derivatives and so on) have positive effects on international trade in developed countries. Pino, Tas, and Sharma (2016) showed that exchange rate volatility has an effect on export in the short-run and in the long-run. Barseghyan and Hambarzumyan (2018) found that the exchange rate volatility can be thought as a deterministic element of export. Lin, Shi, and Ye (2018) suggested that exchange rate volatility has a more negative relation with financially constrained companies. Chang, Raiput, and Bhutto (2019) showed that the impact of exchange rate volatility on the U.S. exports is not found. In the past, the relationship between exchange rate volatility and international trade seems to be negative, however, recent studies are not conclusive. The improvement of hedging instruments against exchange rates may be related to the results.

There are a lot of studies that examined the relationship between exchange rate and international trade. This paper examines this issue. Hanslin, Lein, and Schmidt (2016) found that both foreign demand elasticities and exchange rate elasticities vary significantly in Switzerland. Aman et al. (2017) showed that exchange rate has a positive impact on economic growth via the channel of export promotion willingness. Haider and Adil (2017) suggested that the real exchange rate direction has no significant impact on exports. Iwaisako and Nakata (2017) found that the structural economic shocks and movements of exchange rate do not contribute to structural shocks in explaining Japanese exports changes. Kurtovic, Halili, and Maxhuni (2017) showed the J-curve effect existence on the cases of Germany, Austria, and Croatia. Mahmood, Al Khateeb, and Ahmad (2017) found that depreciation of Saudi rial leads to increases of industrial exports. Fontagne, Martin, and Orefice (2018) indicated that the export price elasticity is larger than the exchange rate elasticity. Moslares and Ekanayake (2018) showed that exports have significant impacts on the levels of foreign economic activity and negative impacts on the relative prices and real exchange rate. Paternesi (2018) found that manufacturing and machinery sectors confer the highest real exchange rate elasticities. Sun and Kim (2018) confirmed that depreciation of currency does not show to reduce the U.S. international trade deficit. Badinger and Fichet (2019) suggested the existence of a J-curve effect. Iossifoy and Fei (2019) found that biases are small for the case of exchange rate and large for the case of demand elasticity. Lourenco and Vasconcelos (2019) showed that exchange rate appreciation does not decrease exports in Brazil.

As shown above, there are a lot of related studies, however, the relationship among monetary expansion, currency depreciation, and exports is not still clear. There is no consensus about this issue and there is need for further study.

THEORETICAL ANALYSIS

The empirical estimation of international trade elasticity is calculated according to traditional definitions, which corresponds to the total percentage changes in trade divided by the total percentage changes in exchange rates following trade shock. Conventional theory states that incomes and exchange rates are the key determinants of the trade balance. Also, a lot of empirical studies have been presented using these variables as explanation variables for explaining international trade. Instead of this approach, a gravity model has been employed to examine how to determine international trade recently. The gravity model is a rather simple but robust approach

to estimating bilateral trade flow on the cross-section data. More concretely, income, distance, language, land border, direct flight, and so on are used for estimation in this model.

However, the main topic of trade in international economics is still the reaction of international trade to changes in trade costs, namely elasticity. The elasticity catches the effects of an exchange rate change on international trade and the changes in home expenditures (Arkolakis, Costinot, & Rodriguea-Clare, 2012). This study examines empirically whether or not the Japanese yen's depreciation has promoted volumes of exports after Abenomics during which huge amounts of money flowed into the domestic markets to boost the economy. To examine this issue, the reaction of international trade to changes in exchange rates is evaluated in this paper.

This paper uses a panel data and structural vector autoregression (VAR) approach for empirical analysis. In the panel structural VAR framework, the definition corresponds to dividing the cumulative impulse response of international trade. Using VAR approach, impulse response is examined.

The panel structural VAR model is that one. $Z_{it} = (\Delta y_{it}, \Delta e_{it})$ based on quarterly data, where Z_{it} is the percentage change in exports for each country, Δy_{it} is the percentage change in each country's real GDP, Δe_{it} is the percentage change in exchange rate for each country from trading partner, Japan. i denotes country and t denotes time.

Also, adding to basic panel data analysis, robust estimation is used for estimation along with panel VAR approach. Ordinary Least Squares (OLS) estimates for regression are sensitive to the variables that do not consider the other variables. If the outlier is an extreme observation from the pattern of a normal distribution, it does not cause a problem, however, if the outlier comes from non-normal measurement error or some other violation of standard OLS, it compromises the validity of the regression results if a non-robust regression method is still used. In this study, because the sample size is not so large, robust estimation along with the OLS is used for estimations.

All of the data are converted into the rate. The reason is to avoid the unit roots. The sample period is from 2000Q1 to the latest 2019Q3. The estimation is achieved by pooling Japanese exports data from its major trading partners of Australia, China, Germany, Korea, and the United States.

EMPIRICAL ANALYSIS

The empirical results of the equations are in Table 1 in equations (1) to (4). The basic estimation is equation (1). Robust estimations cases are equations (2) and (4). Also, one-time lag is included in equations (3) and (4). It is interesting to note that the coefficients of the exchange rate are negative and significant. However, as shown in Table 1, the time lag is positive and significant. A J-curve effect would exist, and most of the results seem to be conclusive.

Table 1. Regression analysis.

	Panel Least Squares (1)	Robust Least Squares (2)	Panel Least Squares (3)	Robust Least Squares (4)
C	1.455 (1.381)	0.280 (0.312)	-0.977 (-1.219)	-1.551*** (-2.740)
Exchange rate	-0.0004*** (-6.176)	-0.0004*** (-7.377)	-9.78E-05* (-1.750)	-3.88E-05 (-0.982)
Real GDP	1.778** (2.096)	4.230*** (5.876)	2.397*** (3.846)	1.560*** (3.541)
Export(-1)			0.725*** (23.976)	0.837*** (39.140)
Adjusted R2	0.075		0.614	
Adjusted Rw2		0.197		0.827
F-statistic	21.267		218.170	
Prob(F-statistic)	0.000		0.000	
Rn2 statistic		88.908		1669.937
Prob(Rn2 statistic)		0.000		0.000

Note. ***, **, and * are significant at 1, 5, and 10%, respectively. Parentheses are t-value (panel least squares) and z-statistic (robust least squares).

According to equation (1), the short-term elasticity is calculated in each country's case. Table 2 shows the regression results.

Table 2. Elasticity of exchange rate change on export for each country.

	Exchange rate elasticity to export	t-statistic	Prob.
Australia	0.863	5.846	0.000
China	-0.412	-1.982	0.051
Germany	0.166	1.233	0.221
Korea	0.112	0.727	0.469
United States	-0.210	-1.412	0.121

The results are mixed, and it is difficult to analyze the reason. Japanese trade surplus (deficit) would occur when appreciation (depreciation) goes occurs in the short-run, and the opposite movement that is considered to be normal, would occur later, however, for each country, the results are inconclusive. The significant relationship between exchange rate and international trade is not found for Japan and each country, however, significant relationship totally, namely between Japan and other countries exists. Moreover, the trade would depend on the time, trade policies and so on as there is a significant relationship between international trade and the one-time lag of that as shown in Table 1. So, panel analysis would be necessary and this study employed this method.

The general agreement in the trade elasticity is that the elasticity is lower in the short-run and higher in the long-run (Gallaway, McDaniel, & Rivera, 2003; Obstfeld and Rogoff, 2007). Despite the agreement in the literature regarding the international trade elasticity for periods, the estimated international trade elasticity is mixed.

VAR model is used for analyzing the effects of exchange rate shock on Japanese exports. Panel Vector Autoregression Estimates are employed for estimation. One-time lag is used for estimation. The results are in Table 3, and the response of exchange rate to the export is Figure 1.

Table 3. Panel Vector Autoregression Estimates.

	Vector Autoregression Estimates
C	-1.078* (-1.623)
Export(-1)	0.721*** (25.617)
Exchange rate(-1)	-1.10E-05 (-0.233)
Real GDP(-1)	2.751*** (5.161)
Adj.R2	0.609
F-statistic	256.047
Akaike information criterion	30.024
Schwartz criterion	30.126

Note. ***, **, and * are significant at 1, 5, and 10%, respectively. Parentheses are t-value.

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.

Response of EXCHANGERATE to TRADE

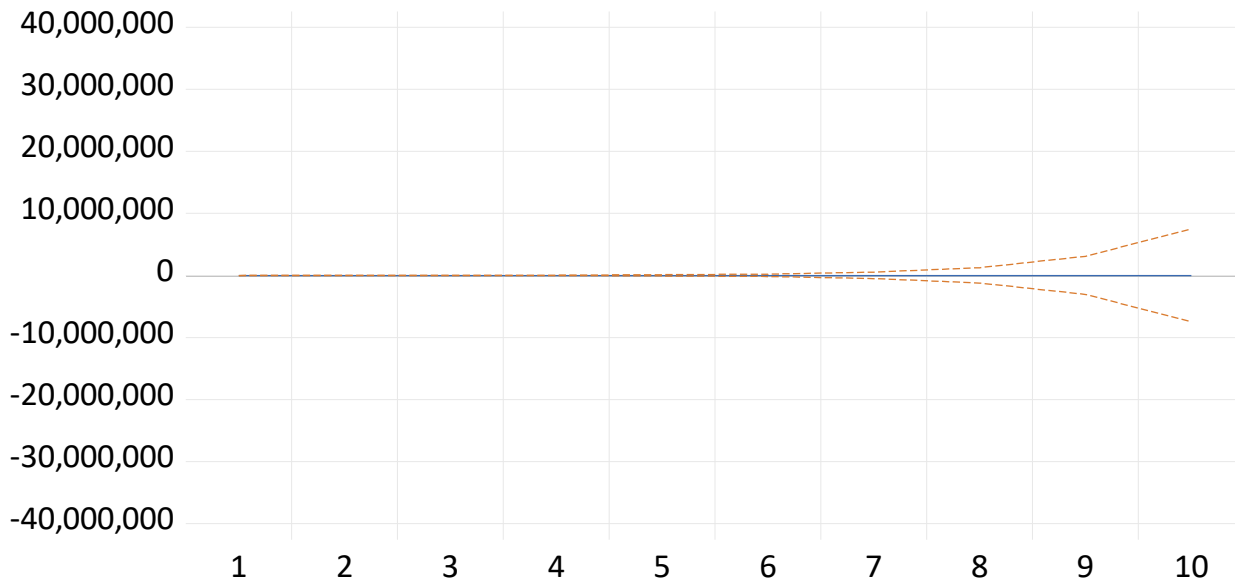


Figure 1. Response to Cholesky one S.D. innovations ±2 S.E. (Response of exchange rate to export).

The results are interesting to note. The shock does not occur in the short-run, however, it does occur later, and the effects continue for some time. The results seem to fit well with previous

analysis of this paper and J-curve effects. The relationship between international trade and exchange rate would be inconclusive in each country level, however, the effects on the change in exchange rate appear later totally. It should be noted that each effect would be different for each country.

CONCLUSIONS

In general, it is thought that currency depreciation would be preferable as it would promote exports and cause economic growth. Of course, currency depreciation sometimes leads to high inflation and damages the economy, however, most countries do not need to worry about inflation under severe recession and deflation, so most countries, especially developed countries would like to promote depreciation or at least would like to avoid appreciation. In Japan, drastic and unprecedented monetary easing has led to depreciation, however, the relationship between depreciation and the increase of exports is not clear. There is no evidence that Japan has gained export markets through unconventional monetary policy. Also, the shock on the exchange rate appears and continues after some time passes. To promote exports, other methods should be considered for policy makers.

For policies, there are some important suggestions obtained from this study. First, too much dependence on depreciation to promote exports can be wasteful and dangerous. Second, the effects of the changes in exchange rate are different from countries. There is a relationship between exchange rates and exports, however, the variety exists in each country's case. Finally, the effects of the changes in exchange rate tend to appear later and continue for some time. Unprecedented monetary easing is considered to be a very specific case. There is some possibility that markets become confusing and cannot judge it correctly. Further study would be necessary.

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