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DOES THE YUAN'S DEVALUATION AFFECT CHINA'S INTERNATIONAL TRADE?

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ABSTRACT

China's exchange rate policy to keep the national currency undervalued has been at the centre of interest during the last decade. Especially, developed countries like the US accuses China to keep the Yuan undervalued in order to enhance the competitiveness of its products in the international market. Countries debate this issue and even apply further restrictions reciprocally, known as the "trade war". The aim of this article is to estimate the impact of changes in the Yuan's exchange rate over China's international trade overall, and especially with the US. For the period of 1991-2020, empirical findings present no significant evidence about the impact of Yuan's exchange rate changes on China's international trade. The impact is statistically insignificant in all cases. Instead, international trade indicators represent to have a strong correlation with its own one-year past value.

Keywords: China, trade war, devaluation, Yuan, currency, international trade.

INTRODUCTION

Trade between countries has a long history and is influenced by various factors. At the same time, the dynamics and structure of exports and imports of countries have always been the subject of attention of the respective governments, which regularly tried to achieve beneficial changes in these indicators, stimulating the development of national exports, especially high value-added goods, and suppressing the growth of imports, especially those that compete with local producers, using various factors of influence. Accordingly, the easier it seemed to the government of a particular country to use any factor of influence, the more motives were to use it, while failures in foreign trade were logical to explain by the more active use of this factor in competing countries.

It seems indisputable that the development of exports and imports is primarily affected by the following factors: trade barriers (tariff and non-tariff), as well as the size, dynamics, structure of supply and demand in the markets of interacting countries. However, the introduction of trade barriers, although a fairly simple measure, can be accompanied by similar countermeasures from trading partners, and the impact on the size and structure of the market is a rather difficult and long-term task for the government.

However, currency devaluations are seen as one of the important factors affecting the trade balance of the countries (Olasubomi, 2019; Cheng, 2020; Kamugisha and Assoua, 2020). Over the years, there have been wide disputes that China's economic policy has been aimed at keeping the yuan undervalued (Frankel, 2006; Ogawa and Sakane, 2006; Das, 2009; Mallaby and Wethington, 2012; Gao, Gan and Li, 2019). However, Wang (2020) argues that the undervaluation of the Yuan happened only for a few years. Protecting the currency from speculation also helped keep Chinese exports safe. This task was the central pillar of the Public Republic of China's (PRC) economic development model, which gave it a trade advantage.

The economic successes of the Chinese economy over the past few years have raised a natural question about the possibilities and prospects of converting the yuan into an international currency (Jaeger et al., 2010; Cohen, 2012; Bhat, 2013; Garić and Filipović, 2019), which plays an important role in servicing the country's investment relations, foreign trade contracts and world financial relations. Recent competitive devaluations, especially in the case of US-China competition, have been a primary issue for the stability of international trade (Weber and Shaikh, 2021). Therefore, the issue is important to be investigated. It is interesting that how the devaluation "attempts" of China has affected its international trade, both exports and imports. Especially, the impact on the US-China trade is noteworthy to be studied. In this context, this article analyzes the role of the devaluation of the yuan in China's international trade.

1. THEORETICAL FOUNDATIONS: J-CURVE

It was believed that an increase in the country's exports and the suppression of its imports could be achieved by weakening (devaluation) of the national currency, and its strengthening, accordingly, will have the opposite (negative) effect on exports and at the same time stimulate the growth of imports (Hirschman, 1949; Miles, 1979; Bahmani-Oskooee, 1985; Himarios, 1989).

The theoretical legacy that emerged during the exceptional period of development of international economic relations retains its influence at the level of decision-making in the field of foreign trade policy. In fact, the exchange rate continues to be considered at the present time as one of the strongest and most determining factors, among all the others, affecting foreign trade. Therefore, one might get the impression that this approach is also supported by the theory of international trade. However, this is not the case if at least briefly consider its main provisions.

The classical theory, based on the works of Smith and Ricardo, about the absolute and relative (comparative) advantages of different countries in their foreign trade, uses the concept of price or replacement costs (Hollander, 1911). However, they are expressed not in monetary units but in terms of the amount of working time spent on the production of compared goods, that is, the exchange rate simply could not be present in this model.

The theory of Heckscher and Ohlin, which emerged at the beginning of the twentieth century, about two factors of production (labor and capital) was focused on providing the countries under consideration with these factors (Batra and Casas, 1976). Later, this idea was developed in the model of specific factors, Samuelsen and Jones, first with the addition of a third factor of production (land), and then with the construction of a multivariate model. Subsequently, these theories were used by Krugman (1994). It includes relative prices, world equilibrium prices and terms of trade, but these are expressed in terms of indices. That is, the exchange rate is also not built into this model.

The transformation of foreign trade into one of the many indicators of a country's international competitiveness was proposed by Porter (1986). In Porter's (1986) theory, there is no exchange rate policy since he comes to the conclusion that the exchange rate was not the reason for the emergence of success in the country's economic development. Moreover, he recommends that governments refrain from interfering in the processes in the foreign exchange market in order to establish the desired exchange rate.

It can be argued that the modern theory of competitiveness while systematizing the factors that can affect the foreign trade of countries, does not attach decisive importance to the exchange rate. In addition, the exchange rate policy is missing from the UNCTAD list of trade policy instruments. Finally, the modern works of Western scholars on the generalization of the theory of international trade also do not consider the exchange rate as an instrument of foreign trade policy. In fact, it is only relatively recently that there have been attempts to incorporate the exchange rate into international trade theory in the following areas: exchange rate volatility as a constraining factor in trade, the transfer of exchange rate fluctuations to prices, and the delayed effects (hysteresis) of exchange rate abrupt changes for firms. Thus, the modern theory of international trade does not assume that exports and imports noticeably react to the exchange rate factor and does not attach significant importance to it.

The weakening of the national currency leads to a decrease in prices for national goods when converted into foreign currency. Therefore, exports become more competitive, which contributes to its growth. At the same time, prices for foreign goods denominated in the national currency are growing, as a result of which their imports are reduced. An increase in the exchange rate causes the opposite effect - an increase in prices for national goods when converted into foreign currency, which leads to a decrease in the competitiveness of exports and, as a consequence, to its decrease. At the same time, prices for foreign goods denomina-

ted in national currency are falling, which leads to an increase in imports. This model always presupposes the invariability of domestic prices in each of the partner countries. In addition, since the formulation of the Marshall-Lerner condition, it has been assumed that exporters deliver goods in exchange for their national currency, and importers, accordingly, always pay in the currency of the exporting country.

The main theoretical provisions on which this model is based, one way or another, assume that the influence is transmitted through changes in export (import) prices, which "automatically" change when they are converted into competitors' currencies due to changes in the national currency exchange rate. Two aspects are distinguished here: the elasticity of exports (imports) at the exchange rate (the price of goods) and the effect of the exchange rate pass-through on the prices of goods.

The first aspect was investigated in the works of Marshall and Lerner, well-known as the Marshall - Lerner condition in existing literature (Bahmani-Oskooee and Niroomand, 1998). By the price elasticity of demand for *exports* (*imports*), the authors understood the ratio of changes in exports (imports) to changes in the exchange rate of the national currency, which in their understanding was identical to a change in *export* (*import*) prices for goods, since the basic assumption of this theory is that prices are invariable, as well as calculations only in the currency of exporters. Based on this, the *elasticity of demand* for exports (η_x) or imports (η_m) of the country in question is:

$$\eta_x = \frac{\frac{\Delta X}{X}}{\frac{\Delta E}{E}} \tag{1}$$

And

$$\eta_m = \frac{\frac{\Delta M}{M}}{\frac{\Delta E}{E}} \tag{2}$$

where X is the volume of exports of goods and services, ΔX is the change in the volume of exports of goods and services, E is the nominal exchange rate (units of national currency for 1 unit of foreign currency), ΔE is the change in the exchange rate, M is the volume of imports, ΔM is the change in the volume of imports.

Based on this, the so-called Marshall-Lerner condition was derived, which describes how the elasticity of demand for exports (imports) and the current account balance are related. It should be noted that the last term, at the time of writing the works of the above economists, actually meant the balance of trade in goods and services, and often both terms were used in parallel as synonyms. The condition states that if all other factors affecting export (import) are equal, then, starting from the moment the time when the current account balance was in equilibrium, currency devaluation will contribute to an increase in the trade surplus if the sum of the elasticities of demand for exports and imports is greater than one. If the amount is less, then the balance of payments will worsen:

$$\frac{\Delta CA}{\Delta E} = \eta_x + \eta_m - 1 \tag{3}$$

where ΔCA is the current account balance of payments.

It follows from this that the higher the elasticity of demand for exports (imports), the more it will change if the exchange rate changes and vice versa. Under this condition, the normal reaction of exports to a weakening of the national currency is considered to be its growth, while imports - a decrease, and vice versa to a strengthening of the currency.

Mathematically, the trade balance can grow even if the sum of the elasticities is less than one. Suppose, after a 20% devaluation, the elasticities for exports and imports were 0.25 each. This is possible if, for example, exports increased by 5% and imports decreased by 5% (change in the trade balance by 10%). In practice, such indicators of change in trade are not impossible, although the sum of the elasticities in this example is only 0.5. Since the Marshall-Lerner condition is often used by summing the elasticity coefficients modulo (not taking into account their sign), it is not surprising that their sum is often more than one.

Therefore, in practice, the Marshall-Lerner condition can be fulfilled even if the coefficient of elasticity for imports is negative (less than zero), that is, when imports grow in response to the devaluation of the national currency. Thus, the basic assumption that devaluation stimulates exports and suppresses imports is, in fact, not a strict rule but only a case.

The validity of the Marshall - Lerner condition has been tested in many studies over past years (Jamilov, 2013; Bahmani-Oskooee, Huseynov and Jamilov, 2014; Dong, 2017; Shahzad, Nafees and Farid, 2017; Amaral and Breitenbach, 2021, among others). Though this study does not test the validity of the Marshall-Lerner condition for China directly, it examines long-run association between Yuan's exchange rate changes and Chinas international trade overall, and specifically with the US.

2. EXCHANGE RATE DEVALUATIONS IN THE CONTEXT OF "TRADE WAR"

A country's global competitiveness is determined by a number of factors, one of which is the exchange rate of its national currency, which largely determines its purchasing power in the global market. The exchange rate, purchasing power of goods and services, and competitive devaluation have all taken on greater significance in this regard for the economic welfare of all countries. The notion of "trade war" especially took much attentions during US-China disagreements triggered by "unfair" devaluations of Yuan which has some global effects as well (Liu and Woo, 2018; Steinbock, 2018; Lukin, 2019). For several years, currency wars have been used to ensure the competitiveness of national economies. The decline in the value of the national currency is a protectionist method of maintaining political and economic stability in the region, rather than a preventive measure to establish conditions for the growth of national competitiveness.

"Devaluation" means "loss of value" in Latin, which means that the national currency of one country loses some of its value in relation to the national currency of another country during devaluation. Such a measure lowers the nominal value of products manufactured in a given country, making them more competitive in the global market.

As a result of the devaluation, there is an increase in exports, an increase in the working population, and a boost to the domestic economy's growth. Devaluation benefits foreign investors and people who have gained employment as a result of increased demand for labor from export-oriented businesses. Devaluation has a negative impact on imports, employment, and the price of products imported from other countries. Furthermore, the reduction of the national currency's value is followed by a rise in domestic inflation. Therefore, compe-

titive devaluation has some economic and social implications. The national currency's exchange rate will help to increase market demand for goods and services, but products that do not fulfil modern customer needs are deprived of the ability to gain competitive advantages in the future.

2.1. Overview of China's economic performance and dynamics of Yuan's exchange rate

The achievements that China is demonstrating in restructuring the economy and the country as a whole leave no one indifferent. Moreover, some countries are even frightening at such rates of development. One way or another, the whole world is closely following the development of China and recognizes that the changes that are taking place in this country are amazing. According to the World Bank, the PRC ranks first in the world in terms of GDP ($ 24.1 trillion), accounting for 17.08% of world GDP (see Table 1).

Table 1: The main indicators of the economic development of the PRC

	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP PPP (mln USD)	15137	16277	17200	17880	18701	19814	21659	23393	24162
GDP growth,%	7.9	7.8	7.3	6.9	6.8	6.9	6.8	6.1	1.9
GDP per capita, PPP, USD	11179	11962	12575	13007	13525	14254	15522	16709	17206
Export, bln USD	13729	14586	15130	14709	14617	16384	17569	18586	-
Imports, bln. USD	12266	13131	13769	12475	12920	14926	16863	17105	-

Source: *compiled by the author from open sources*

To a significant extent, the modern economy of the PRC depends on foreign trade. China has first place in the world in terms of total exports, which brings 80% of the country's foreign exchange earnings. At the same time, China is considered a sufficiently large importer of resources, as a result of which it is exposed to the risk of resource crises. China's exports of goods and services have grown over the past 10 years by 135.37%, but at the same time, the volume of imports increased at a faster pace. The growth is currently 139.45%.

The leading spheres of China's economy belong to the sphere of metalworking and mechanical engineering, which occupies 35% of the industrial structure. We are talking about heavy mechanical engineering, such as automotive, machine tools, electronics, electrical engineering, instrument making. The main centres for the formation and development of leading industries in China are Shenyang, Shanghai, Beijing, Dalian, Shenzhen, Guangzhou. In 2019, China's total foreign trade turnover reached USD 35692.57 billion. Including exports – USD 18588.65 billion, imports – USD 17105.97 billion.

Since the establishment of the PRC, the national currency of the country has come a long way - from a strictly regulated, non-convertible instrument of planned resource allocation to a significant currency of the world and to the only currency of a developing country approved in November 2015 for entry to the SDR basket. It is important to ensure consistency in the dynamics of China's currency, the Yuan, in regional and global trade in order to improve the Yuan's role in regional and global trade. This has been accomplished in phases.

The move to a dual exchange rate structure marked the first stage of monetary policy reforms (1981-1993). The financial framework of the foreign exchange industry was changing at this stage. Since 1981, the exchange rate for domestic settlements has been used in addition to the official exchange rate for international trade activities. China's monetary authorities exercised a strong impact on the control and management of the yuan exchange rate, periodically changing its exchange rate, according to an overview of adjustments in the regulation of the yuan exchange rate at this time. Simultaneously, the foundations for the yuan's internal convertibility were laid, and a full-fledged internal foreign exchange market began to emerge, ensuring the Chinese economy's development.

During this point of monetary policy adjustment, the use of a two-level exchange rate control mechanism, known as the two-track monetary system, restricted the growth of foreign trade. As a result of the poor productivity of foreign exchange policy during the first stage of adjustment, the transition to the second stage of liberalization of foreign exchange policy occurred (1994-2005). The government adopted a single exchange rate in 1994 to enact "the transition to a single, regulated floating exchange rate system dependent on market supply and demand," which was the second step in the implementation of exchange rate policy.

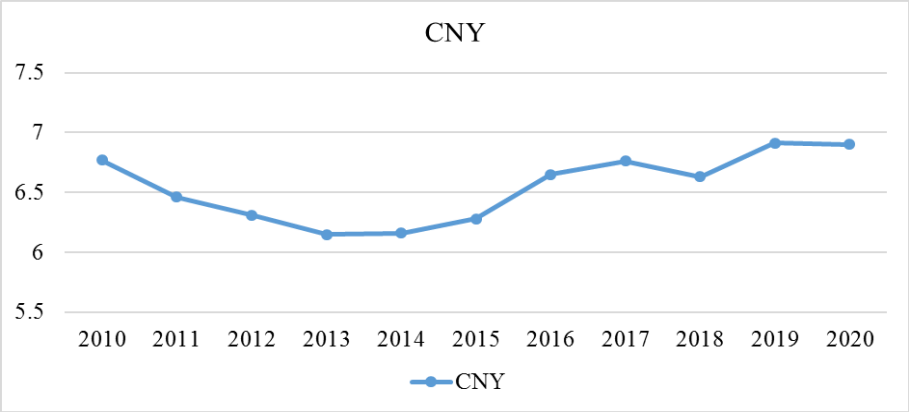
The yuan's exchange rate against the US dollar steadily rose from 1994 to 1998, with the most significant rise occurring between 1994 and 1995. However, the Asian monetary and financial crises erupted in 1997. At the end of 1997, the yuan was trading at 8.28 yuan per dollar versus the US dollar. The Chinese government restricted the range of variations in the yuan's exchange rate against the dollar in the aftermath of the Asia-Pacific financial crisis in order to prevent the economy from deteriorating.

As a result, monetary and exchange rate practices against the dollar have been less flexible. However, there were significant swings in the yuan's exchange rate against other major currencies, which harmed the stability of international trade. Taken together, this necessitated new monetary policy reforms in the PRC. In specific, the China Foreign Exchange Trade System (CFETS) started to emerge as a single national interbank foreign exchange market.

At this point of economic transition, monetary policy liberalization resulted in a 31 percent growth in Chinese exports and capital inflows in 2002. A substantial increase in foreign exchange earnings started to exert undue downward pressure on the yuan exchange rate, potentially leading to an increase in inflation, which fell to 1.2 percent in 2003 from 24.2 percent in 1994.

The start of the third phase of monetary policy liberalization (2005-2014) and the revitalization of the Yuan's internationalization strategy began on July 21, 2005, with the transition to a controlled floating Yuan's exchange rate dependent on market supply and demand against a basket of currencies. The reform in the control of the Yuan market supply and demand in relation to a basket of currencies was influenced by the policy of liberalization of international economic activity and foreign trade in accordance with the enforcement of the obligations assumed after China's accession to the WTO in 2001. As a result, the national currency's peg to the US dollar has weakened, and the yuan has been revalued by 2.1 percent.

Figure 1: The exchange rate of the Yuan against the US dollar



Source: *Author's own completion based on the exchange rate of the Yuan (CNY) per USD.*

At the same time, China's People's Bank declared that the Yuan would be pegged not only to the US dollar but also to a basket of major currencies that are important for the country's economy. There are 11 different currencies in the currency basket. Around the same time, it should be remembered that the yuan's depreciation ceased in 2005 as a result of the continuing currency reform. The Yuan's exchange rate against the US dollar increased by 5.99 percent at the end of 2006. On the one hand, the appreciation of the Chinese currency against the dollar was the result of its regulation by the People's Bank of China to maintain its equilibrium level, and on the other hand, it reflected pressure from China's major trading partners, which competed with it on world commodity markets and considered the Yuan to be undervalued. As a protectionist measure, the use of which violated the condition of equal access to the market and contradicted the WTO rules.

China's exports and economic growth stalled as a result of the cumulative negative effect of the 2008 financial crisis on global markets. The People's Bank of China implemented a fixed exchange rate system. The currency exchange rate was 6.83 yuan to one dollar. Bilateral variations in the yuan's exchange rate have been evident since 2012, and the exchange rate's stability has greatly improved. The Central Bank declared in April 2012 that the yuan's price band against the US dollar in the spot foreign exchange market would be increased to 1%. After the start of the exchange rate reform in 2005, there has been a qualitative shift from unilateral fixation of the exchange rate to control of its price volatility under restricted limits as a consequence of reforms in foreign exchange regulation.

The next step of the People's Bank of China towards the liberalization of foreign exchange regulation was from March 17, 2014, the expansion of the fluctuation limits of the yuan against the US dollar from 1% to 2% in the spot interbank foreign exchange market. Thus, from 2005 to 2012, the fluctuation ranges of the Yuan exchange rate increased from 0.5% to 1%, and in 2014, the fluctuation range of the RMB against the US dollar widened once again.

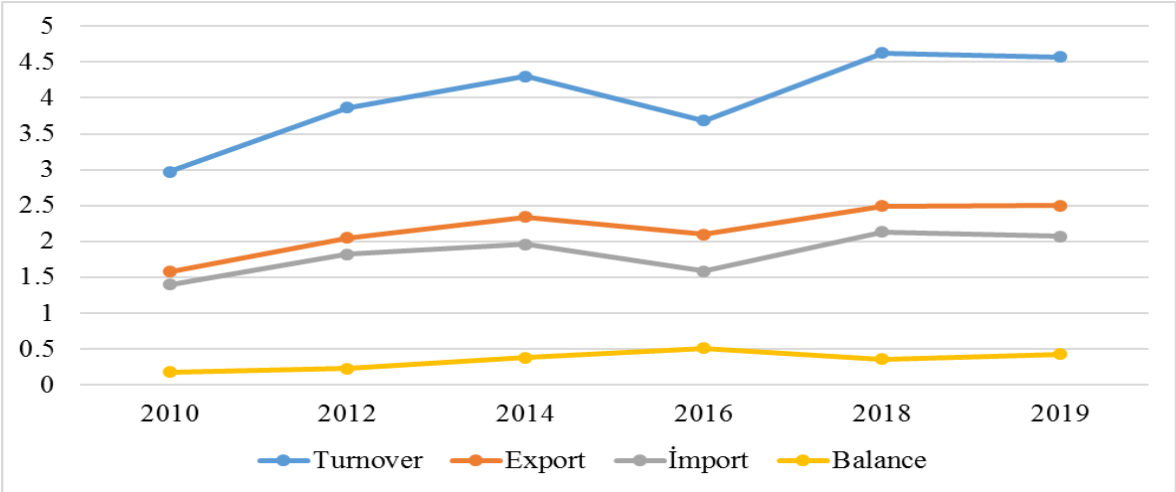
Thus, since the end of the 70s, the PRC has embarked on a course of economic reforms and a policy of opening up, but the monetary policy in relation to the exchange rate has not always been consistent. The flexibility of the exchange rate helps to liberalize the movement of capital in China. In general, the reform of China's monetary policy and improved regulation of the exchange rate have fully contributed to the growth of Chinese trade, the acceleration of the growth rates of the PRC's economy and the expansion of world cooperation.

3. FEATURES AND STRUCTURE OF CHINA'S EXPORT-IMPORT: MAIN TRENDS

The outwardly oriented model of China's economy presupposes the deep integration of national producers into production chains around the world. China is not only a global manufacturer but also one of the world's largest exporters and importers. Chinese exports rose from $ 1.58 trillion in 2010 (10.34% of global exports) to USD 2.50 trillion in 2019 (12.81% of global exports). The volume of imports for the same period increased from USD 1.40 trillion to $ 2.07 trillion, or from 9.09% to 10.86% of global imports. At the same time, the foreign trade balance for China is consistently positive.

The United States has been China's main trading partner on the world market throughout the past decade. It is the main sales market for Chinese products, with a 17-19% share in Chinese exports. At the end of 2019, however, the volume of exports to the United States decreased, and its further decline is expected in 2020 against the background of the escalating trade confrontation between the two countries. Despite this, it can be predicted that the United States will remain the most important and largely uncontested trade partner of China in the coming years. Other countries still occupy relatively modest positions in the structure of Chinese exports (Japan - 5.7%, South Korea - 4.4%, Vietnam - 3.9%, Germany - 3.2%).

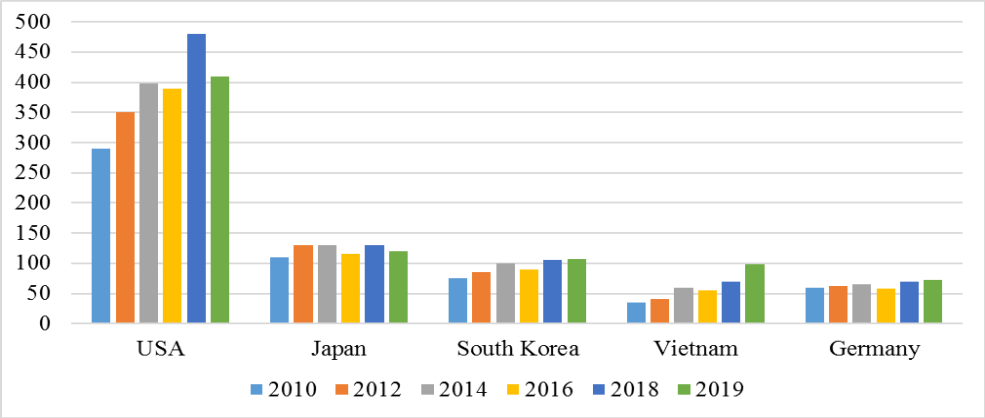
Figure 2: Dynamics of China's foreign trade in 2010-2019 (trillion USD).



Sources: *compiled by the author based data, 2019 (https://knoema.ru/atlas/topics/).*

China's exports are largely diversified, although there is a predominant commodity group in its structure. Against the background of dominance in the structure of exports of machinery, equipment and devices, the shares of other commodity groups are relatively low. However, it should be noted that the value in Chinese exports of high-tech industries.

Figure 3: Exports from China in 2010-2019 (billion USD).

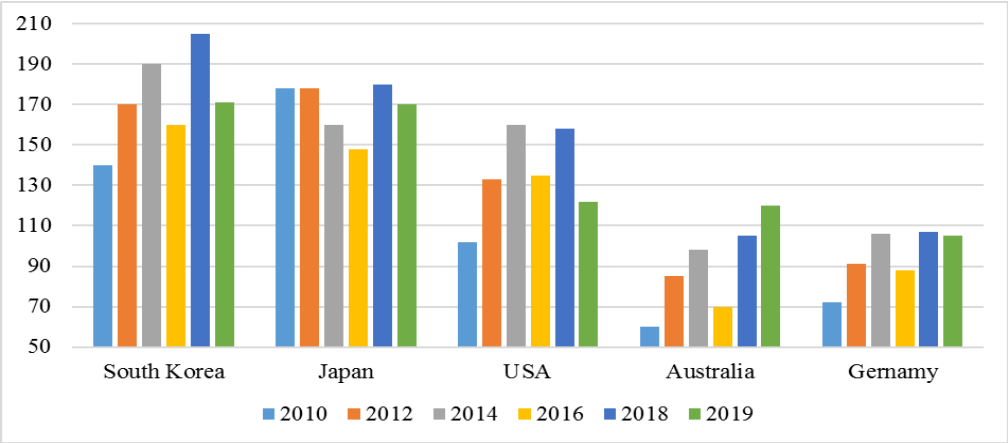


Source: *Author's own completion*

Such features of the technological development of the country in recent years could not but affect imports. Among the main suppliers to China are just the leading countries in the field of high technologies (South Korea, Japan, the USA and others). However, in comparison with the dominance of the American market as a direction of China's exports, the geography of import purchases is more diverse. A number of countries have approximately the same shares in imports to China. Hence, in 2019, against the background of a drop in imports from South Korea, the share of this country decreased to 8.4%. Imports from Japan also slightly decreased. Japan's share in China's purchases in the world market amounted to 8.3%. Due to the mutual exchange of trade restrictions between China and the United States during 2019, the volume of imports fell from USD 156.0 billion in 2018 to USD 123.2 billion in 2019. Among those that have increased their importance for China in relative terms, we should mention Australia (share growth from 4.4% to 5.8%), Brazil (growth from 2.7 % to 3.8%) and Russia (growth from 1.9% to 2.9%).

On the other hand, China's imports were dominated by machinery and equipment during 2010-2019, which indicates a significant degree of integration of the country into the world chains of production and supply of high-tech products. At the end of 2019, the volume of imports of various types of equipment, instruments and machinery amounted to USD 790 billion, which is 36.6% higher than in 2010.

Figure 4: Imports to China in 2010-2019 (USD billion).



Source: *Author's own completion.*

Since the development of production facilities requires the consumption of various types of energy, fuel and other resources, China imports them in large quantities. Fuel, electricity and minerals together account for a quarter of China's imports, and their share in imports is increasing. Detailing the main commodity groups in Chinese imports, one can note the dominance of integrated circuits in the structure of the machinery, equipment, devices commodity group (USD 305.9 billion in 2019).

Summarizing the review of the main indicators of China's foreign trade activity, we state that the past decade was extremely successful for the country in terms of expanding its presence in the world market and, in general, strengthening its role in the world economy. Modern value chains in most industries rarely do without China's business representatives. It is obvious that the upward trend in the country's foreign trade activity will be corrected in a certain way under the influence of the COVID-19 pandemic and its macroeconomic consequences in 2020 and for some future. Also, it is still uncertain, but in general, negatively for China's exports, the impact of the ongoing trade confrontation with the United States and the general growing level of protectionism in world trade may turn out to be. However, even taking into account these factors, it is possible to predict further strengthening of China's position as one of the leading players in the world market.

4. DATA AND EMPIRICAL METHODOLOGY

4.1. Variables and descriptive statistics

The study uses yearly data for the period of 1991-2020. The exchange rate of the Yuan is the primary independent variable. Simultaneously, China's total export and imports, as well as the country's trade with the US are considered as the dependent variables in empirical analyses. Therefore, the impact of the Yuan's devaluation over the international trade of China has been examined from multiple aspects.

A brief definition of the model variables is given below, while table 2 presents primary descriptive statistics.

- **China's total export** (*Export_total*) denotes the total exports of China with the countries of the world;
- **China's total import** (*Import_total*) presents total imports of China with countries of the world;
- **China's export to US** (*Export_to_US*) represents the total exports of China to the USA;
- **China's import from US** (*Import_from_US*) displays the total imports of China from the USA;
- **China's GDP** (*China_GDP*) shows China's GDP, included as the control variable.
- **US GDP** (*US_GDP*) denotes the GDP of China's primary trade partner – the United States.
- **Yuan to USD exchange rate** (*Yuan_USD*) displays the exchange rate of the Yuan per dollar, which is the primary explanatory factor in the analyses.

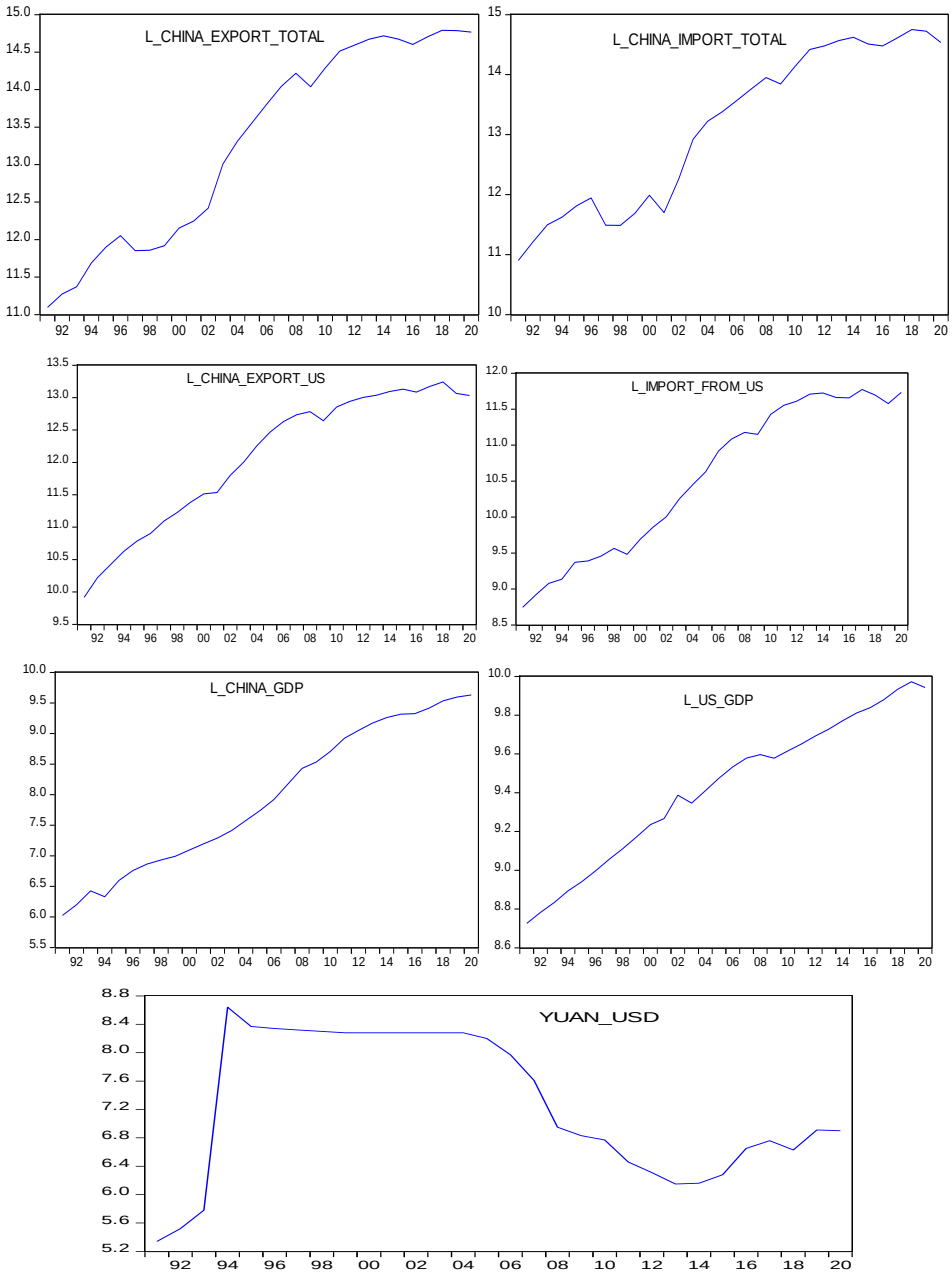
Table 2: Descriptive statistics of variables

	No. Obs.	Mean	Min	Max	Std.dev.
Export_total	30	1134811.	65898.00	2651010.	1002752.
Import_total	30	990223.6	54297.00	2548007.	902840.6
Export_ to_US	30	264317.4	20276.39	563203.1	187260.9
Import_from_US	30	59450.49	6278.338	129797.5	46884.16
China_GDP	30	5108.028	413.2200	15222.16	4969.650
US_GDP	30	13237.95	6158.130	21433.23	4664.404
Yuan_USD	30	7.261000	5.340000	8.640000	1.015437

Source: Author's own completion

Number of observation for empirical analyses equals 30 which is relatively enough period to investigate the problem. Figure 5 depicts profile of all variables in natural logarithm, except the exchange rate of Yuan.

Figure 5: Profile of variables



4.2. Model building

To estimate the impact of Yuan's devaluation over China's international trade, dynamic multiply regression models are estimated. Because the issue is analyzed from different perspectives, overall, four models are estimated. Functional specifications of the models are given below:

$$Log(Export_{total})_t = \alpha'_0 + \alpha'_1 * \log(Export_{total})_{t-1} + \alpha'_2 * \\ * Yuan_{USD_t} + \alpha'_3 * \log(China_{GDP})_t + \alpha'_4 * trend + u'_t \quad (4)$$

$$Log(Import_{total})_t = \alpha''_0 + \alpha''_1 * \log(Import_{total})_{t-1} + \alpha''_2 * \\ * Yuan_{USD_t} + \alpha''_3 * \log(China_{GDP})_t + \alpha''_4 * trend + u''_t \quad (5)$$

$$Log(Export_{toUS})_t = \beta''_0 + \beta''_1 * \log\left(Import_{fromUS}\right)_{t-1} + \beta''_2 * \\ * Yuan_{USD_t} + \beta''_3 * \log(China_{GDP})_t + \beta''_4 * \log(USA_{GDP})_t + \beta''_5 * trend + v''_t \quad (6)$$

$$Log\left(Import_{fromUS}\right)_t = \beta'_0 + \beta'_1 * \log\left(Import_{fromUS}\right)_{t-1} + \beta'_2 * \\ * Yuan_{USD_t} + \beta'_3 * \log(China_{GDP})_t + \beta'_4 * \log(USA_{GDP})_t + \beta'_5 * trend + v'_t \quad (7)$$

Equations (4-7) are estimated by using the Ordinary Least Squares (OLS) estimation method in EViews10 software. Before estimating regression models, the Augmented Dickey-Fuller (hereafter ADF) test is used to identify the order of integration of model variables.

5. EMPIRICAL RESULTS

While working with time-series data, the first step in an empirical analysis is to examine the order of integration for each variable. Table 3 displays ADF unit root test results.

Table 3: ADF unit root test results

	I(0)		I(1)	
	Intercept	**Trend and intercept**	**Intercept**	**Trend and intercept**
Export_total	0.249	-2.022	-4.049***	-3.989**
Import_total	-0.091	-2.250	-4.050***	-3.847**
Export_ to_US	-0.812	-1.341	-4.712***	-4.679***
Import_from_US	-1.923	-0.097	-4.193***	-4.515***
China_GDP	-0.881	-3.966**	-4.574***	-4.600***
US_GDP	0.140	-3.081	-5.457***	-5.333***
Yuan_USD	-2.311	-0.525	-4.837***	-5.048***

***Note**: ***, ** and * denote statistical significance at 1%, 5% and 10% level, respectively.*

According to table 3, none of the model variables is I(0) at level. The result also does not change even after including the trend to the model. Therefore, the test examines the stationarity of series at the first difference and find all variables to be I(1). This is a satisfactory result to apply the appropriate methods and estimate the existence of long-run association or the cointegration relationship among the model variables.

Table 4: Empirical results

	Eq. (4)	**Eq. (5)**	**Eq. (6)**	**Eq. (7)**
$\log(Export_{total})_{t-1}$	1.113*** (0.155)	-	-	-
$\log(Import_{total})_{t-1}$	-	0.88*** (0.188)	-	-
$\log(Export_{ToUS})_{t-1}$	-	-	0.824*** (0.15)	-
$\log(Import_{FromUS})_{t-1}$	-	-	-	0.96*** (0.230)
$Yuan_{USD_t}$	0.005 (0.05)	-0.038 (0.072)	-0.022 (0.03)	-0.022 (0.036)
$\log(China\_GDP)_t$	-0.426 (0.420)	-0.095 (0.561)	0.045 (0.228)	-0.08 (0.392)
$\log(US\_GDP)_t$	-	-	1.362* (0.745)	0.757 (0.68)
@Trend	0.035 (0.039)	0.022 (0.056)	-0.053 (0.04)	-0.022 (0.048)
Constant	1.488 (1.917)	2.387** (2.84)	-10.063 (6.19)	-5.501 (5.986)

Note: ****, ** and * denote statistical significance at 1%, 5% and 10% level, respectively. Standard errors are in ( ).*

According to the empirical findings, it becomes clear that China's exports significantly depends on its value of one period before. The same is valid for the one-lag dependence of China's imports in total. Simultaneously, there is a one-lag significant correlation for China's international trade with the US. In all cases, the coefficients of the one-lagged dependent variable are positive and statistically significant at 1% level.

However, an interesting finding is that there is no empirical support about the significant direct impact of the exchange rate of Yuan or China's GDP and US's GDP. The coefficient of $Yuan_{USD_t}$ variable is statistically insignificant ($p < 0.1$).

6. RELIABILITY CHECK

It is important to check for the reliability of the empirical findings. Here, the problem of heteroscedasticity and serial correlation existence in the models may affect the reliability of the findings. Due to this reason, all models are tested for the existence of both problems.

For this purpose Breusch-Pagan-Godfrey heteroscedasticity test and Breusch-Godfrey Serial Correlation LM Test are applied accordingly. The results are reported in Table 5. According to test results, none of the models has heteroscedasticity or serial correlation problems. In all cases, the p-value is greater than 10%. Therefore, the models are reported to be satisfactory reliable.

Table 5: Residual diagnostics test results

Eq. (4)						
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F	Obs*R-squared	Prob. F(2,24)	Prob. Chi-Square(4)	Scaled explained SS	Prob. Chi-Square(4)
	0.321381	1.4743	0.8608	0.8312	1.817	0.7692
Breusch-Godfrey Serial Correlation LM Test:	F-statistic	Obs*R-squared	Prob. F(2,22)	Prob. Chi-Square(2)	-	-
	0.474921	1.20024	0.6282	0.5487	-	-
Eq. (5)						
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic	Obs*R-squared	Prob. F(2,24)	Prob. Chi-Square(4)	Scaled explained SS	Prob. Chi-Square(4)
	1.066948	4.37833	0.3945	0.3572	4.813491	0.3070
Breusch-Godfrey Serial Correlation LM Test:	F-statistic	Obs*R-squared	Prob. F(2,22)	Prob. Chi-Square(2)	-	-
	1.032657	2.48881	0.3727	0.2881	-	-
Eq. (6)						
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic	Obs*R-squared	Prob. F(5,23)	Prob. Chi-Square(5)	Scaled explained SS	Prob. Chi-Square(5)
	0.646840	3.57517	0.6666	0.6120	2.0711	0.8392
Breusch-Godfrey Serial Correlation LM Test:	F-statistic	Obs*R-squared	Prob. F(2,21)	Prob. Chi-Square(2)	-	-
	0.865563	2.20854	0.4353	0.3315	-	-
Eq. (7)						
Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-statistic	Obs*R-squared	Prob. F(5,23)	Prob. Chi-Square(5)	Scaled explained SS	Prob. Chi-Square(5)
	0.863363	4.58280	0.5204	0.4689	3.6944	0.5942
Breusch-Godfrey Serial Correlation LM Test:	F-statistic	Obs*R-squared	Prob. F(2,21)	Prob. Chi-Square(2)	-	-
	0.380609	1.01443	0.6881	0.6022	-	-

CONCLUSION

In its policy of regulating foreign trade, China has changed several strategies subordinate to the logic of the policy of reform and opening up. From import substitution and intensification of exports based on labor-intensive production, China switched to a strategy of import substitution without exports, which led to a stagnant economy, and therefore, in the early 90s, exports returned against the background of liberalization of margin trade. By the early 2000s, China was in the midst of trade liberalization.

After joining the WTO, seeking a balance between foreign trade and the security of the national economy, China came to a model of the simultaneous development of the domestic market and subordination of the structure of exports and imports to a general strategy of economic development aimed at the transition to high technologies. Today, the main methods and instruments of China's foreign trade regulation, along with customs tariff and non-tariff regulation, are measures to stimulate exports.

This research investigates the impact as a whole and the extent of the impact of this devaluation on the Chinese economy, to what extent it is beneficial for the country. It was determined

that the devaluation of the yuan in the period 1987-2020 had an impact on China's foreign trade, but this effect was not statistically significant. This study does not take into account the tariff restrictions imposed by countries on each other during the devaluation, so it may not be possible to see the impact of devaluation accurately. Henceç we can draw a general conclusion that the main preventive tool for increasing the competitiveness of the country's economy is the strengthening of world economic ties, namely free trade and settlements in the national currency.

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