



# Modelling US-China relationship: A game theory perspective

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## Abstract

Relation between China and the US is one of the most complex relations among the major powers in the world. The aim of this paper is to model China and the US economic relations. We used the new system named Dynamic system of strategic games for this purpose.

*Keywords:* International relations, game theory, dynamic system of strategic games, Nash equilibrium.

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## 1. Introduction

Increasing economic power of China during the recent decades alongside with declining share of the United States in the global production and international trade in the beginning of the 21st century has led to a change in the geopolitical landscape of the world and emergence of the "Group of Two", or simply G2 [9]. According to evaluation by some of the Chinese scientists, China's national economic power had surpassed that of the US in 2014: China has been the world's low-cost manufacturing center and is becoming an export-oriented global technology hub [16]. Empirical studies with the use of econometric models have shown that China's economic influence has indeed increased, however, the America still holds leading position in all stock, credit, energy and commodity markets, and the US has remained the dominant power in the global economy. Therefore, there is still no unified understanding of the balance in the scale of the two economies in scientific literature [22]. At the same time, researchers point out that when trying to "make America great again" D. Trump led the US to a direct violation of international law and multilateral agreements, guided exceedingly only

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by national interests. The protectionist trade policy of the US has been referred to as the policy of national egoism within the framework of the economic patriotism concept [13] and even economic terrorism [7, 15]. The economic interests of the country's partners in the economic and political organizations and informal unions are neglected. It has become obvious that the US abandons the idea and the concept of free trade in order to preserve its status of the global leader which can result in spreading the de-globalization processes in the global economy, forming the regional mega-unions – as no country in the World can withstand the American protectionism without economic allies. The US is not interested in China's modernization, but the profound interdependence continues to contribute to development of the bilateral relationship [16, 19]. Zhang Ming's computable general equilibrium model to simulate the different levels of Sino-US trade war and found that Sino-US trade war was ultimately more detrimental than beneficial to both countries [10] and Wang Xuyang [20] thought it was less possible for trade friction to upgrade to trade war. Li Xin used improved GTAP multi-countries and multi-sectors [18]. Kuang Yan-xiang found that the probability of lower-level trade frictions would increase, but the probability of lower level trade frictions escalating to trade wars would decrease through constructing a multi-stage game model [1, 2, 21]. Zeyan Zhu and et al introduced China-US trade war and trade situation between them, then they researched the influences of trade war to China and US. They found that it will harm to both sides and other countries, including in economy, trade, diplomacy and many other fields [23]. Zhang Monan [11] analyzed Sino-US trade problems and proposed corresponding strategies from a theoretical perspective. Rafi Sheikh studies the US trade war with China and asks whether it is possible to win this war [14]. No trade war has the winner, but every trade war recognizes three losers: both trade partners and the global decline in trade, leading to a slowdown in the global economic growth. Carnegie addresses the issue of the escalation of Trump's trade war [4], Grossman and Helpman turn their attention to the issue of trade war and trade negotiations [8]. The current US-China trade war also involves negotiations which have led to many concessions, especially from a relatively highly protected Chinese market. Chunding, Chuntian and Chungwei address the economic impact of a possible trade war [5]. In his article, Bouët asks whether trade wars are beneficial and whether they can be easily won [3]. In the following, we are going to modeling the economic relation between China and the US with use dynamic system of strategic games.

## 2. Dynamic system of strategic games

We consider strategic  $2 \times 2$  games with perfect information.

**Definition 2.1.** *If a game produces other games, it is called a game-maker game. In general, if the games  $g_1, g_2, \dots, g_n$  generate games  $g'_1, g'_2, \dots, g'_n$ , then  $g_i$ - and  $g'_i$ -s are called producer and produced, respectively. We call the form of displaying game-maker games as dynamic system of strategic games.*

**Definition 2.2.** *If a game create one or more strategies is will be called strategy-maker game. The produced strategies can be dominant strategy, dominated strategy, weakly dominant strategy and weakly dominated strategy. If a game doesn't generate any strategy, the game isn't strategy maker. If a game with  $n$  players is strategy maker for  $k$  players ( $0 \leq k \leq n$ ) it is called strategy maker game of order  $(n, k)$  [6].*

In a strategic game with ordinal preferences, player  $i$ 's action  $a''_i$  strictly dominates her action  $a'_i$  if

$$u_i(a''_i, a_{-i}) > u_i(a'_i, a_{-i}) \quad \text{for every } a_{-i} \in A_{-i},$$

where  $u_i$  is a payoff function that represents players preferences (Osborne, 2004). If for player  $i$  the action  $a''_i$  is preferred to action  $a'_i$  per every choice of action of other players, it is called dominant strategy and is shown by  $S^j_i$ , where  $S^j_i$  shows  $j$ -th strategy of  $i$ -th player. In a strategic game with ordinal preferences, players action  $a''$  weakly dominates her action  $a'_i$  if

$$u_i(a'', a_{-i}) \geq u_i(a'_i, a_{-i}) \quad \text{for every } a_{-i} \in A_{-i},$$

and

$$u_i(a'', a_{-i}) > u_i(a'_i, a_{-i}) \quad \text{for every } a_{-i} \in A_{-i}.$$

If for player  $i$  the action  $a''_i$  is preferred over action  $a'_i$  for each action choice of other players, it is called weakly dominant strategy and will be represented by  $S^j_i$  [12].

**Definition 2.3.** A pair of actions is called rational if at least hold true in one of the following conditions:

- would be Nash equilibrium,
- pair of actions, would be Pareto dominant for both players over other pairs of actions,
- for each game that is strategy maker of order (2, 1), pairs of rational actions for one player is responses to dominant strategy or weakly dominant strategy produced for other player.

In a strategy maker game of order (2, 2) where both players have dominant strategy and the game hasn't Pareto action pairs over Nash equilibrium, the Nash equilibrium of game is the only rational actions pair [6].

**Definition 2.4.** Dynamic system of strategic games is a model to examine interaction between decision makers more exactly. Every decision maker is a player in this model. To describe this system, we use the games graph. In each node of graph there is a strategic game with perfect information in which players can make decisions. Each node of this graph can be generator of the next game through the two following methods and be connected to it:

- strategies,
- pair of rational actions.

Players to move from one node to another nod proceed by selecting strategy or pair of rational actions. Graph  $\mathbf{G}$  is binary of  $(G, M)$  that first coordinate,  $g_1, g_2, \dots, g_n$ , is a finite set of nodes that each node of this graph is a strategic game. Second coordinate is a finite set named edges that edges of this graph are produced strategies or pair of rational actions.

Set of all strategies produced by  $k$ -th game is represented by  ${}_k\mathcal{S} = {}_k\mathcal{S}_1 \cup {}_k\mathcal{S}_2 \cup \emptyset$ . Set of all pairs of actions Players' in  $k$ -th game is shown with  ${}_k\mathcal{A} = {}_k A_1 \cup {}_k A_2$ . Set of all pairs of rational actions for player  $i$  is shown with  ${}_k\mathcal{A}'_i$  that is a subset of  ${}_k\mathcal{A}$ , for all  $k \in \{1, 2, \dots, n\}$ .

Let  $\mathcal{A} = {}_1 \mathcal{A} \cup {}_2 \mathcal{A} \cup \dots \cup {}_n \mathcal{A} \cup \emptyset$  and  $\mathcal{S} = {}_1 \mathcal{S} \cup {}_2 \mathcal{S} \cup \dots \cup {}_n \mathcal{S}$  be two set. The set valued functions, rational actions pair  $\phi'_i : G \rightarrow \mathcal{A}$  and strategy maker  $\phi_i : G \rightarrow \mathcal{S}$  for players are defined as follows:

$$\phi'_i(g_k) = {}_k \mathcal{A}'_i = \begin{cases} \{(ka_{i,k} a_{-i})_i | (ka_{i,k} a_{-i})_i \in {}_k \mathcal{A}\} & \text{if } g_k \text{ has a pair of rational actions} \\ \emptyset & \text{if } g_k \text{ hasn't pair of rational actions,} \end{cases}$$

and

$$\phi_i(g_k) = {}_k \mathcal{S}_i = \begin{cases} \{{}_k S^j_i | {}_k S^j_i \in {}_k \mathcal{S}\} & \text{if } g_k \text{ is strategy maker for player } i \\ \emptyset & \text{if } g_k \text{ is 'nt strategy maker for player } i, \end{cases}$$

for all  $i \in N$  and  $j, k \in I = \{1, 2, \dots, n\}$ , where  $g_k$  shows  $k$ -th game,  $({}_k a_{i,k} a_{-i})_i$  shows rational actions pair of  $i$ -th player from  $k$ -th game and  ${}_k S_i^j$  shows  $j$ -th strategy of  $i$ -th player from  $k$ -th game (Eshaghi and Askari, 2017). Every move of system as a member of set  $M$  is as follows:

$$M := \left\{ m_k^j \mid m_k^j = {}_k S_i^j \text{ or } m_k^j = ({}_k a_{i,k} a_{-i})_i \text{ or } m_k^j = ({}_k a_{i,k} a_{-i})_{i,j} \ \forall \ {}_k S_i^j \in {}_k \mathcal{S}_i \right. \\ \left. ({}_k a_{i,k} a_{-i})_i \in {}_k \mathcal{A}_i, \ ({}_k a_{i,k} a_{-i})_{i,j} \in {}_k \mathcal{A}_j \right\},$$

where  $g_k^j$  shows  $j$ -th move of  $k$ -th game and  $({}_k a_{i,k} a_{-i})_{i,j}$  shows the pair of rational action selected by players  $i$  and  $j$  of  $k$ -th game. Players' move function  $\varphi_i : M \rightarrow G^2$  and  $\varphi_{i,j} : M \rightarrow G^2 \cup \emptyset$  with  $\varphi_{i,j}({}_k S_i^j) = \emptyset$  is defined as following:

$$\varphi_i(m_k^j) = \begin{cases} (g_k, g_p) = g_k g_p & \text{if } m_k^j = {}_k S_i^j \\ (g_k, g_q) = g_k g_q & \text{if } m_k^j = ({}_k a_{i,k} a_{-i})_i, \end{cases}$$

$$\varphi_{i,j}(m_k^j) = \begin{cases} (g_k, g_p) = \emptyset & \text{if } m_k^j = {}_k S_i^j \\ (g_k, g_s) = g_k g_s & \text{if } m_k^j = ({}_k a_{i,k} a_{-i})_{i,j}. \end{cases}$$

The above function shows by what move two play nodes have been connected to each other by one or both players. Consequently, it can be said that in move  $m_k^j = {}_k S_i^j$ , nodes  $g_k$  and  $g_p$  have been connected through the strategy selected by player  $i$  to each other. In move  $m_k^j = ({}_k a_{i,k} a_{-i})_i$  the nodes  $g_k$  and  $g_q$  have been connected by pair of rational action selected by player  $i$  to each other. In move  $m_k^j = ({}_k a_{i,k} a_{-i})_{i,j}$  the nodes  $g_k$  and  $g_s$  have been connected through a pair of rational actions selected by players  $i$  and  $j$  to each other [6].

Consider that  $H$  is a set including all series (finite and infinite) that hold true in the following conditions:

1.  $\emptyset \in H$ ,
2. Sequence  $\left\{ m_j^i, \{g_k, m_k^i\} \right\}$  for all  $i, j, k \in I = \{1, 2, \dots, n\}$ , is a member of  $H$ . Each member of  $H$  is called a history and is represented by  $h$ ,
3. History  $h = \left\{ m_j^i, \{g_k, m_k^i\} \right\}_{i,j,k \in I}$  is called final history if it is infinite or there isn't  $g_{k+1}$  that is a member of  $h$ .

The set  $H$  is called system history. Preferences of each node of a games system that are exactly the same preferences on the pairs of a strategic game actions are called node preferences or tactical preferences. Preferences on strategies set or set of rational actions pair of a game is called systemic preferences or strategic preferences [6].

**Definition 2.5.** (Dynamic system of strategic games) A dynamic system of strategic games with perfect information including:

- a set of players,
- for each player, a set of strategies,
- for each player, a set of rational actions pair,
- system history,

- *node preferences (tactical preferences) on set of all actions pairs,*
- *systemic preferences (strategic preferences) on strategies or pairs of rational actions.*

*In dynamic system of strategic games, players using conditions of producer game and generated strategies and pairs of rational actions decide what move they do along with their benefits and what game they design and where they stand. Also this system allows players to select among strategies and rational actions pair which result in his most benefits based on their abilities and future conditions using available information, according to their rationality and strategic preferences [6].*

### 3. Modeling economic relations between America and China

American and Chinese trade war is one of the most important issues that have occupied the minds of experts and analysts in both countries and other countries over the last years. China as the world's most populous nation with the highest economic growth rates at the level of the international system is among the countries which can stand against U.S. hegemony but it doesn't intend to directly confront with it. It tries to raise its position at the level of the international system without direct confrontation by increasing leadership costs of US. Given the rapid growth in the Chinese economy, many experts predicted that China's economy will turn into the world's second biggest economy by 2020 and China will overcome its only serious rival i.e. US until 2050 and become the second economy in the world. All of these alarmed America. As a result, the US constructive policy against China which had been designed based on constructive trust, was changed after 2010. US in the National Security Strategy document 2010 focused on Asia as its priority. Strategic Trust Strategy which had been enacted during Bush administration aimed to encourage China to play responsible role in governing international order. However, China growth went beyond what US expected. China trade surplus resulting from trading with US in 2011 exceeded 295 billions of dollars ( Fig. 1 ).

Year	US exports to China	U.S. Import from China	US trade balance deficit with China
1995	\$ 12 bn	\$ 46 bn	-\$ 34 bn
2000	\$ 16 bn	\$ 100 bn	-\$ 84 bn
2005	\$ 41 bn	\$ 243 bn	-\$ 202 bn
2010	\$ 92 bn	\$ 365 bn	-\$ 273 bn
2011	\$ 104 bn	\$ 399 bn	-\$ 295 bn

Figure 1: Trade Exchanges of US with China during 1995-2011

In 2015, the US trade balance deficit with china reached 367.2 billion, as the highest rate in the history of bilateral trade. But in 2016, the deficit in the US trade deficit with china was cut down by 5.5 percent to reach 347 billion. China, however, had the main contribution to the trade balance deficit in the US. In the course of the election, Trump called trade of America as unfair and said the current trade had destroyed jobs of millions of Americans. For this reason, one of his slogans was to increase the import of many commodities from some countries such as China and Mexico aimed at reducing the unfair trade. Now, with review of some indicators in that section, we can easily find

the roots of Trump's thoughts. The latest assessment of the US economic growth process showed that the country's gross domestic product in the last three months of 2016 was equal to 2.1 percent. This growth rate had ascending trend compared with the present assessments. Average economic growth rate of US in 2016 was also 1.6 percent which is regarded as the lowest economic growth rate since 2011. American economic activities also fell by about 1 percent compared to 2015. The review of America's GDP indicates that the GDP growth index has grown so far from 1960 up to now. In 2009 when the US was involved in a major economic crisis, it was accompanied by a decline in the GDP, which has returned to its growing trend since then. In 2000, at the beginning of the century, US experienced GDP of above 10,000 billion. GDP of America was 18,57,000 billion in 2016 and grew by about 3 in the first six months of 2017. At that time, it was predicted that this index would reach 19,42000 in 2017 and GDP of America would exceed 20,000 billion in 2018. Fluctuations of GNP index of America and also GDP prediction until 2022 are shown in Fig. 2 . Real GNP growth

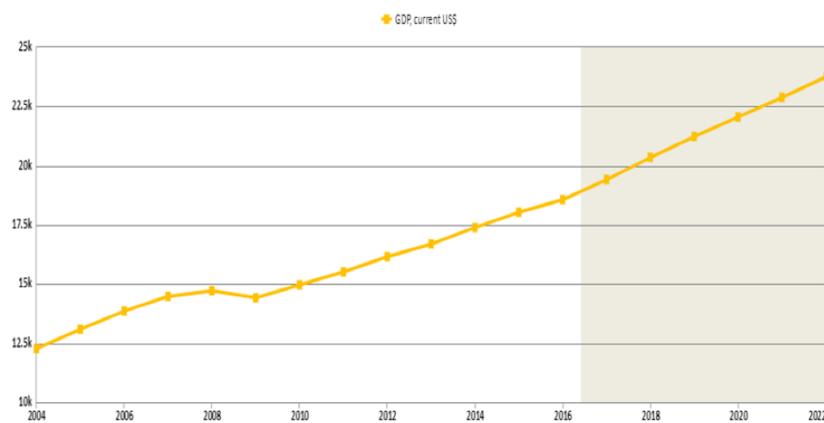


Figure 2: Fluctuations of GNP index

trend annual index in America has been 1.6 percent in 2016. This index has had descending trend in America between 2007 and 2009 so that this index has been  $-2.8$  percent in 2009. Economists believe that in the first half of 2017, the US economic growth was higher than the predicted rate. Fig. 3 shows growth rate of real GNP in US since 2004 to 2016 and also predictions until 2022.

To show economic status of America during that period, GNP of countries such as China (the second economy of the world), Japan (the third economy of the world) and Russia (as one of the military and economic powers in the world) can be compared. Fig. 4 and Fig. 5 indicates GNP of 20 top countries in the world in the first half of 2017. Fig. 6 presents status of commercial exchanges of America with the most important international partners. Report of the National Intelligence Council also confirms truth of our discussions. This report was presented to the new President between the Election Day and inauguration of the president to predict the most important issues and scenarios which America confronts with in the future years. The remarkable point of this report is to address the situation of China. The report underlined that China would surpass America in two decades as the world's biggest economy. The military, defensive, and security forces of China are cautionary. So, Donald Trump raised the issue of supporting domestic production, saying that he intended to impose

Source: knoema.com

Source: knoema.com

Source: World Bank

Source: OEC

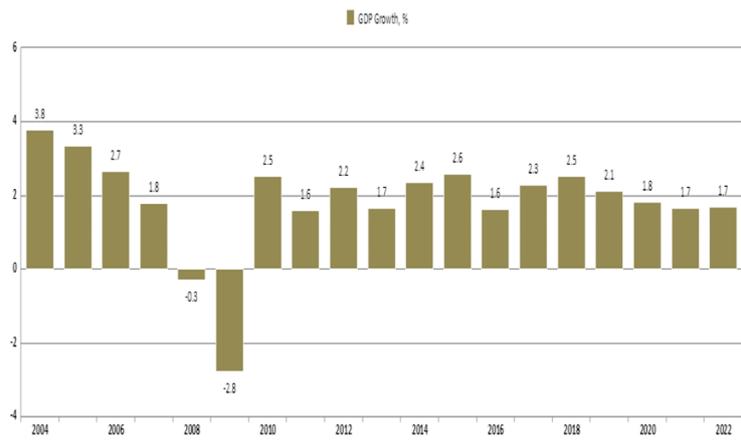


Figure 3: Growth rate of real GNP of US during 2004-2016

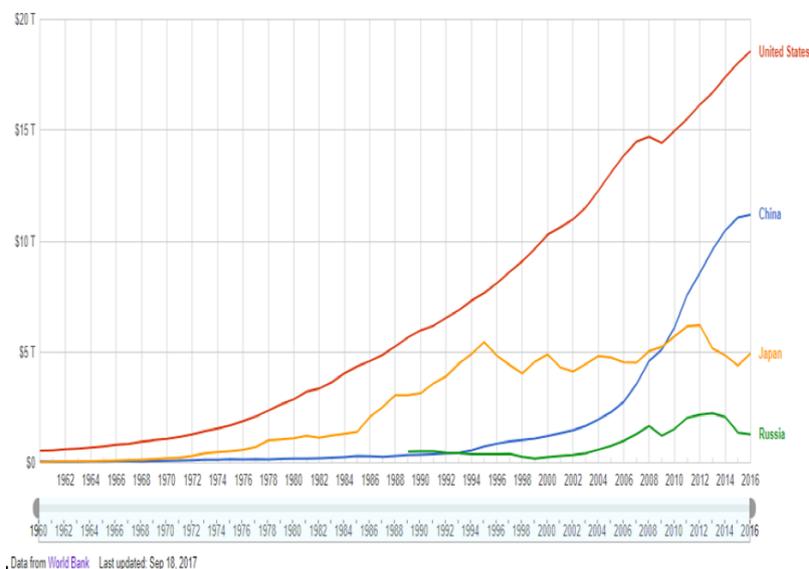


Figure 4: Comparing GNP of US and other powers in 2017

a new tariff of 60 billion on China’s exports to the United States to deal with the enormous Chinese import of goods into the United States. Trump’s decision started with tariff of 10 and 25 on steel and aluminum imported from China and made the global markets quivering, particularly regarding steel, the global price of this metal is affected by the Beijing market and Chinese steel prices. In the context of foreign trade, Donald Trump’s another action on foreign trade has been the exclusion of the United States from the Free Trade Agreement on two sides of the Pacific Ocean, which had been already concluded among 12 countries. As a result of the taken actions, U.S trade balance improved in the last month of 2016. According to the report of US Department of Commerce, import rate of this country totaled 44,2 billion which was higher than export rate in the last month of 2016, and the total deficit in the American trade balance has reached 502,3 billion in 2016. It is evident that the country’s trade balance deficit is less than that in the last month of 2016. But despite all efforts, the US had about 375 billion in trade with China in 2017. The American exports to China has been about 130 billion and its imports from the country has been about 506 billion. In early

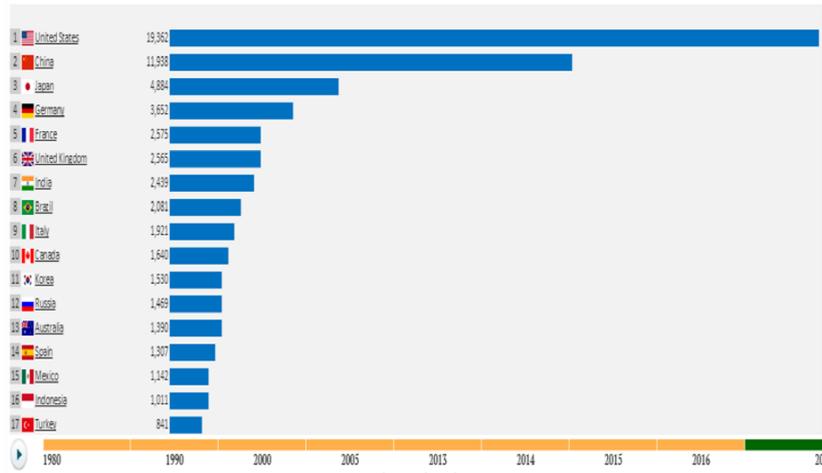


Figure 5: Comparing GNP of 20 countries in 2017

Commercial partner	Trading volume	Exports	Share of all Exports	Imports	Share of all Imports	The rate of advantage for US
Canada	551	268	19%	283	13%	-15
Mexico	527	230	16%	297	13%	-67
China	501	116	8.1%	385	22%	-265
Japan	198.2	63.2	4.4%	135	6.1%	-71.8
Great Britain	110.5	55.3	3.9%	55.2	2.5%	+0.1
Total exports and imports	3630	1420	100%	2210	100%	-790

Figure 6:

2018, Trump announced that he planned to apply the new tariff of 60 billion on Chinese exports to the US in order to prevent the enormous Chinese import into the United States. Meanwhile, Trump took action regarding imposing tax and charges against Chinese products at a value of 250 billion, including a 25% rise for a set of 50 billion goods and 10% rise including 200 billion. The domination over the huge oil and gas energy of Central Asia is an essential step in the domination over the world energy resources and stabilizing American hegemony at the international system level. It becomes more important when we recognize that China will become the world's largest energy importer with the current economic growth at global level in the coming years. The Chinese government had previously announced that it would retaliate for the US tariffs on Chinese goods. Beijing, however, made it clear that it didn't look for "trade war" but if its economy is damaged, it will not give up if its economy is damaged. China's retaliation and applying China's new tariff on American goods must be outbreak of trade war of which everyone feared. Considering what was stated, the Americans in their new doctrine have considered harnessing China to prevent it from becoming a regional hegemony. As a leading state in the international environment, the United States has interests so that the increase in the power of the aligned and close states of US can undermine the American position. For this purpose, US took prohibiting measures against China under which the policy adopted by US focusing on Asia is defined. In other words, the most important challenges of US to prevent emergence of China as the next pioneer government and occupation of position of

US are the strategic dimensions of China and America competition. It means that these areas are regarded as the considerable progress paths of Chinese power which clearly challenge dominance of America over the world as hegemony or the superpower. While US in this period doesn't get access to any of the options of war, change of regime and siege (or Containment strategy which was applied against the former soviet union) about China [17]. Slogan of the revival of USA by Donald Trump and also selection of China's grandeur revival "slogan by Xi Jinping, president of China are two important slogans that has made the puzzle of the future of China and the United States", more complex than ever. According to a recent agreement from Buenos Aires, the two countries have time of 90 days to resolve their disputes over Beijing's technological policies as well as the trade balance between both sides. If they can't resolve the disputes, the US increased tax on imports will be imposed at a value of 200 billion USD from China. As a result, the nature of the two-party game will be changed into play with the sum of zero sum. Although one cannot have express judgment in this regard, it can be said that the vision of bilateral relations between China and the US can be viewed in two optimistic patterns of cooperation continuity and the pessimistic paradigm of expanding the scope of competition and the bilateral conflict. The two countries are working together in broad areas and this could provide the ground for mutual trust. In this case, America should accept China as a new pole in the global relations. Therefore, two countries should apply the following ways:

- Focusing on mutual trust in the bilateral relations:  
Despite the disputes over the economic and security issues, the two countries cooperate with each other and this can provide the ground for mutual trust. In this case, America should accept China as a new pole in the global relations. In case of trust, the governing conflicting space for relations of two counties will be adjusted. As a result, two countries will abandon competition and will move toward constructive movements,
- Preventing Expansion of multilateral influence of China by US and retaliation of China:  
US tries to preserve its hegemony and prevent new pole causing the unipolar global system to remain. In this case, the conflicting space between two countries will be intensified and two countries will follow severe competition. As a result, there will be probability of outbreak of full-scale commercial war which will encompass the global economy.  
But there is the third way which contributes to global peace:
- Two superpowers i.e. US and China make coalition with several great powers including Europe, Japan, Russia and India and the system will be stable and the game rule will be limited and clear. In other words, the world will move to multipolarity.

In order to model game between US and China, we first note that bilateral policy of US against China indicates that this country follows its policy based on positive interaction with limitation. The strategic goal of US is to control and direct the world which is directly contradictory with Chinese strategy based on reinforcement of bipolar or multipolar system. Therefore, two countries entered conflict of interests game  $g_1$  ( Fig. 7). In this game, we regard China as player 1(row player) and US as player 2(column player). In game  $g_1$ , two counties have two actions; they either make cooperation  ${}_1C$  to protect economic relations or think about only its benefits or make no cooperation  ${}_1D$ . This game is not dominating for any of the action players. Thuse, action game  $g_1$  is of order (2, 0). Nash equilibrium and pair of the rational actions  $({}_1C, {}_1D)$  and  $({}_1D, {}_1C)$ . Therefore, set of the players' action M in this game includes pair of the rational actions  $({}_1C, {}_1D)$  and  $({}_1D, {}_1C)$ .

To continue the game, two countries can consider different tactics and design different games. US in the first place seeks to preserve hegemony in relations with other countries. In this case, choosing the

rational action pair  $({}_1C, {}_1D)$  by US causes two countries to enter hegemony game  $g_5$ . By designing the hegemony game, the game environment is converted into pure competition and US will try to force China to cooperate by adopting the contrast tactic. Game  $g_5$  produces non-cooperation dominant action  ${}_5S_2^2$  for player 2 and produces cooperation dominant action  ${}_5S_1^2$  for player 1.

Therefore, this action game is of rank(2, 2). Nash equilibrium and the only pair of rational action

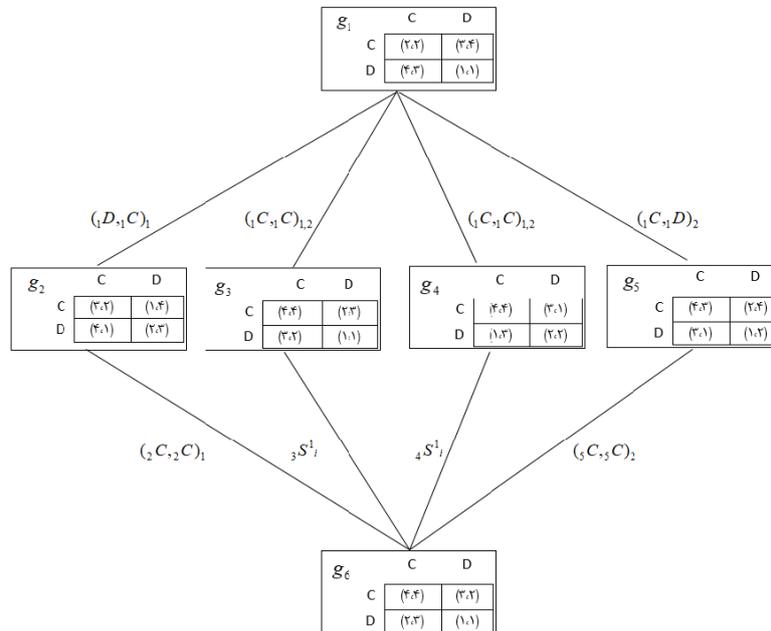


Figure 7: Dynamic system of strategic games between America and China

of this game is  $({}_5C, {}_5D)$ . China had threatened that if actions of America damaged its economy, it would retaliate. Therefore, if America in game  $g_1$  adopts non-cooperation action, China will also retaliate. China's choosing non-cooperation action  $({}_1C, {}_1D)$  leads to pure conflict game  $g_2$ . Game  $g_2$  produces dominant noncooperation action  ${}_2S_2^2$  for two players. Therefore, this game produces action of rank (2, 2). Nash equilibrium and the only pair of rational action of this game is  $({}_2C, {}_2D)$ . Mappings of the first player's movement from game  $g_1$  to game  $g_2$  are as follows: If the two countries make cooperation to avoid competition in game  $g_1$ , they will enter non-conflict game  $g_3$ . In this case, space of economic relations of two countries will be free of competition and state of players will be changed from conflict into non-conflict due to the system environment state. Game  $g_3$  produces dominant action of cooperation  ${}_3S_1^2$  for two players. Therefore, this action producing game is of rank (2, 2). Pair of actions  $({}_3C, {}_3C)_{1,2}$  includes Nash equilibrium and only pair of rational action of this game. Coalition with the second degree powers and creation of stable system and limited and clear game law cause two counties to enter combined coordination game  $g_4$ . This game producing action is the cooperation dominant action  ${}_4S_1^1$  for two players. Therefore, this game produces action of rank (2, 2). Pair of actions  $({}_4C, {}_4C)_{1,2}$  is Nash equilibrium and the only pair of rational action for this game. Since under the current situation, the monopolar system based on hegemony and unilateralism of US are not durable for long time since in this system, hegemony government tends to accept more duties and responsibilities which will weaken it in long term. The principle of Anarchy international system causes other countries to fear the runaway force of the centralized power even if the hegemony country behaves mildly. US knows that long-term conflict with China and performance of self serving game may lead to damage of American economy. Therefore, it tries to choose fully

controlled conflict. On the other hand, although many Chinese don't believe in longevity of American power, they reluctantly accepted monopolar nature of international system. However, they don't intend to directly confront with that country but try to gain their position at international system level by increasing leadership costs of USA without direct confrontation. Of course, Beijing believes that protecting commercial and economic relations with US will be highly beneficial ND China needs advanced American technology. Therefore, China tries to avoid direct confrontation with US as far as possible. Two countries know that outbreak of commercial war will provide ground for military war. As a result, two countries may have conflict in short term but in long term, it will be beneficial to two countries to move toward cooperation. All of these factors affect the environment of the system and state of players and cause two countries to take step toward coordination in future. Certainly, cooperation of two countries will lead to economic stability of the world and contribute to global peace. In this case, the effect of the second stage games causes two countries to enter coordination game  $g_6$  in the third stage. This game producing action is the cooperation dominant approach  ${}_6S_i^1$  for two players. Therefore, this game producing action is of rank (2, 2). Pair of action  $({}_6C, {}_6C)_{1,2}$  is Nash equilibrium and the only pair of rational action of this game. The system history is as follows:

$$H = \left\{ \emptyset, \{g_1, ({}_1D, {}_1C)_1, ({}_1C, {}_1C)_{1,2}, ({}_1C, {}_1D)_2\}, \{({}_1D, {}_1C)_1, \{g_2, ({}_2C, {}_2C)_1\}\}, \{({}_1C, {}_1C)_{1,2}, \{g_{3,3} S_i^1\}\}, \right. \\ \left. \{({}_1C, {}_1C)_{1,2}, \{g_{4,4} S_i^1\}\}, \{({}_1C, {}_1D)_2, \{g_5, ({}_5C, {}_5C)_2\}\}, \{({}_2C, {}_2C)_{1,3} S_i^1, {}_4S_i^1, ({}_5C, {}_5C)_2, \{g_6\}\} \right\}.$$

#### 4. Conclusion

Currently China has influence in most parts of the world, especially in the economic dimension. Increasing China's power will make it a hegemony in the world. This will naturally face the US opposition. Because this country doesn't want to see a power equal to its power in other parts of the world in its own right. Obviously, a hegemony of the same level can prevent the US influence in Asia. The policy of turning to Asia is the response that the US has shown to China's rising power and the reason for this change in US strategy should be to increase China's strength. Thus, if the two parties continue to pursue a competitive strategy in the economic area, the trade war will not be distant. In such a case, commercial warfare will be led to tension in other areas, including military, cyber and culture. Consequently, we must wait for two or more polar worlds.

#### References

- [1] G. Askari, M. Eshaghi Gordji and C. Park, *The behavioral model and game theory*, Palgrave Commun. 5(1) (2019) 1–8.
- [2] G. Askari and M. Eshaghi Gordji, *Decision making: Rational choice or hyper-rational choice*, Stat. Optim. Inf. Comput. 8(2) (2020) 583–589.
- [3] A. Bouët, *Les guerres commerciales sont-elles bonnes et faciles à gagner?*, <http://parisinnovationreview.com/article/les-guerres-commerciales-sont-elles-bonnes-et-faciles-a-gagner> (2018).
- [4] A. Carnegie, *Trump's trade war escalates*, <https://www.foreignaffairs.com/articles/2018-06-25/trumps-trade-war-escalates> (2018).
- [5] L. Chunding, H. Chuantian and L. Chuangwei, *Economic impacts of the possible China-US trade war*, Emer. Mark. Fin. Trade, 54(7) (2018) 1557–1577.
- [6] M. Eshaghi Gordji and G. Askari, *Dynamic system of strategic games*, Int. J. Nonlinear Anal. Appl. 9(1) (2018) 83–98.
- [7] M. Eshaghi Gordji and G. Askari, *Hyper-rational choice and economic behaviour*, Adv. Math. Fin. Appl. 3(3) (2018) 69–76.
- [8] G.M. Grossman and E. Helpman, *Trade wars and trade talks*, J. Political Econ. 103(4) (1995) 675–708.
- [9] L. Kapustina, L. Lipková, Y. Silin, and A. Drevalov, *US-China trade war: Causes and outcomes*, SHS Web Conf. 73 (2020) 1–13.

- [10] Zh. Ming, Zh. Liansheng, W. Yuzhe, Y. Xiaochen and Zh. Ji, *Unlikely full trade war between China and US*, China Forex, 6 (2017) 26–29.
- [11] Zh. Monan, *Research on Launching a new model of China-U.S Economic Cooperation and Reduce Trade Fictions*, Reg. Econ. Rev. 6 (2017) 99–104.
- [12] M.J. Osborne, *An Introduction to Game Theory*, Oxford University Press, New York, 2004.
- [13] A. Savinov, A.N. Zelenuk, E.V. Taranovskaja, G.A. Orlova and A.V. Skurova, *Increased protectionism in US trade policy*, Russian Foreign Econ. J. 1 (2019) 36–51.
- [14] S.R. Sheikh, *Les États-Unis ne pourront pas gagner la guerre commerciale contre la Chine*, <https://www.mondialisation.ca/les-etats-unis-ne-pourront-pas-gagner-la-guerre-commerciale-contre-la-chine/5626497> (2018).
- [15] I. Sinitzyn and P. Kuimov, *The economic terrorism of the USA with regard to Europe, Russia and other countries*, Vlast, 9 (2018) 236–241.
- [16] Z. Suisheng and D. Guo, *A New Cold War? Causes and Future of the Emerging US-China Rivalry*, Vestnik RUDN. Int. Rel. 19(1) (2019) 9–21.
- [17] A. J. Tellis, *Balancing without Containment: an American Strategy for Managing China*, Washington: Carnegie Endowment for International Peace, 2014.
- [18] L. Xin, *The scenarios of Sino-US trade war: Based on the GTAP CGE mode*, J. Int. Trade, 11 (2012) 50–65.
- [19] Zh. Xionga, Y. Sub and Zh. Xiong, *An analysis of the trade war between China and the United States*, Front. Econ. Manag. Res. 1(2) (2020) 15–22.
- [20] W. Xuyang, *When both are combined, the bucket will hurt-Sino-US economic and trade relations move forward in friction*, Modern Manag. Sci. 2018 (2) (2018) 54–56.
- [21] K. Yan-Xiang, *Economic interdependence and Sino-US trade frictions: A research based on multi-stage game model*, J. Int. Trade, 11 (2010) 36–43.
- [22] D. Zhang, L. Lei, Q. Ji and A.M. Kutan, *Economic policy uncertainty in the US and China and their impact on the global markets*, Econ. Model. 79 (2019) 47–56.
- [23] Z. Zhu, Y. Yang, and S. Feng, *Trade War between China and US*, Adv. Soc. Sci. Educ. Human. Res. Int. Conf. Adv. Soc. Sci. Sust. Dev. (2018).