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World War II to the Cold War: A Computer Simulation-Based Study of the Rise of the U.S. Military-Industrial Complex and the Changing Economic Landscape

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Abstract Between World War II and the Cold War, the United States, dominated by military-industrial capital, established a new form of capitalist world hegemony. Based on the knowledge of system dynamics theory, this paper determines the boundary conditions and causality of the simulation research program of the rise of the U.S. military-industrial complex and the change of the economic pattern, in addition to supplementing the three system dynamics model test. Using Vensim simulation and analysis software, numerical simulation simulation analysis of the model in this paper. Set the time period in 1931~1990, when the U.S. military-industrial complex productivity decayed from 0.8 to 0.4, produced the U.S. national per capita income and the emergence of a decline in the economic phenomenon, which directly affects the global economic pattern changes, but also highlights the U.S. military-industrial complex rise and international status.

Index Terms system dynamics modeling, computer simulation, U.S. military-industrial complex, causality

I. Introduction

The U.S. military-industrial complex has been integrated into all aspects of U.S. politics, economics, and society, and has had an impact on the international situation, with its origins dating back to the early 20th century [1], [2]. Initially, many early American politicians had reservations about the creation of a “standing army,” believing that it would be a waste of public money and would contribute to the expansion of government power. Because the United States was geographically well situated and rarely faced the threat of invasion after its founding, this opposition to the militarization of the United States took hold. After the First World War, which shifted the world's wealth and changed the international landscape, the United States was given the opportunity to promote “Pan-Americanism” throughout the world. At the end of World War II, the Soviet Union became the “primary threat” to the West. In order to curb the “expansion” of the Soviet Union, to ward off the “communist threat” and to fight for the Third World, the United States organized an unprecedented system of military-security alliances. Since then, the interventionist and “militaristic” tendencies of the United States have come to the fore in full force and have intensified throughout the long years of the cold war. Around the globe, the United States would not allow a single “domino” to fall and would not stand idly by while democracies were threatened by communism. As a result, the United States has recklessly meddled in international disputes and interfered in the internal affairs of other countries everywhere. In the process, the behemoth of the military-industrial complex emerged within the United States.

The U.S. military-industrial complex usually refers to a special interest group formed between military-industrial enterprises, the military and politicians, aiming to seek military security expenditures beyond reasonable defense needs [3]. From World War II to the Cold War, the U.S. accumulated a large military industrial base, and the related political and business interests continued to be tightly bundled after the war, forming a symbiotic economic system [4]-[6]. During the Cold War, this symbiotic relationship was even stronger, and the scope of influence was greater [7]. Currently, the military-industrial complex has fully penetrated into the political economy and social life of the United States, and has had a significant impact on military expansion, the industrial revolution, and other areas [8], [9]. For example, the U.S. government subsidized procurement will promote the rapid development of the military-industrial industry, the military-industrial complex will promote the acceleration of the pace of advanced technology from military to civilian to civilian participation in the military, as well as the military-industrial complex to influence government decision-making to promote the arms race, etc. [10]-[12]. Therefore, the study of the evolution and expansion of the U.S. military-industrial complex on the world economic pattern of the impact of the global tension is of great significance [13], [14].

This paper analyzes U.S. economic theory during World War II and the Cold War to understand capital and the rise of the U.S. military-industrial complex. In order to further explore in depth the relationship between the rise of the U.S. military-industrial complex and changes in the economic landscape. Within the scope of numerical analog simulation analysis, it is proposed to realize the simulation analysis of the U.S. military-industrial complex by constructing a system dynamics model oriented to the U.S. military-industrial complex. Before formally starting the analysis, it is necessary to determine the data sources, system boundaries, cause and effect relationships, select the main simulation and analysis tools for the study of this paper, and then carry out the validation analysis of the model of this paper, and after passing the validation analysis, take the U.S. military-industrial complex materials as an example to carry out the application of the model of this paper for simulation analysis.

II. Exploring the U.S. Military Industrial Complex

II. A.World War II to Cold War

During the period between World War II and the Cold War, the characteristics of the U.S. political economy and its changes are the basis for understanding and analyzing the establishment of U.S. hegemony under the dominance of capital [15]. After the end of World War II to the present day, the main political and economic changes presented by the U.S. society is the rapid expansion of military-industrial capital and occupy the position of the dominant capital. after the 1970s, the U.S. dominant position in the field of production is gradually lost, accompanied by the further development of military-industrial capital and the expansion of financial capital in the world, and since then the U.S. is more and more resort to the use of military and financial means to maintain its hegemonic position. This trend intensified after the end of the cold war, when both military-industrial and financial capital developed into transnational monopoly capital and gradually took precedence over nation States.

II. A. 1) Production, economy and military strength in the early post-war period

In the early years after the end of the Second World War, the United States was in an absolutely dominant position in the capitalist world in terms of economic strength, production capacity and military power. In terms of economy and production, the United States accounted for 3/4 of the world's gold reserves in the post-war period, and with 6% of the world's population and land area, it accounted for 2/3 of the capitalist world's industrial production and 1/3 of its foreign trade exports. Produces 1/3 of the capitalist world's wheat, 1/2 of its cotton, 70% of its corn. Mining 62% of coal and oil, smelting 61% of steel. It produces 48% of the electricity and 84% of the automobiles. On the military front, the United States monopolizes atomic energy production technology and possesses the world's largest, most advanced and powerful air force, and its aviation industry is far ahead of the rest of the world in terms of quantity and technology. With its powerful air force, the United States has almost monopolized intercontinental air transport and controls all the air routes in the capitalist world. By 1947, the tonnage of U.S. merchant ships exceeded the combined tonnage of capitalist countries' merchant ships, and the tonnage of naval vessels far exceeded that of Britain, becoming the world's largest maritime power by leaps and bounds, with every sea in the world basically under the scope of U.S. force projection. This was the material basis for the establishment of the hegemony of the United States in controlling global production after the war.

II. A. 2) Changes in the industrial structure of the United States after the war

Since the end of the Second World War, the industrial structure of the United States has undergone major changes, mainly reflected in the following three aspects: the proportion of agricultural output has been declining, and the labor force of the primary industry has decreased. The proportion of manufacturing industry has been declining, and a large number of enterprises have shifted to overseas investment and production, resulting in the phenomenon of “hollowing out of industries” in the country. The proportion of service industries represented by the financial industry has risen significantly. According to the U.S. Bureau of Economic Analysis (BEA) data, shown in Figure 1, after the end of World War II, the primary industry represented by agriculture showed a clear downward trend, especially in the early post-war period to the 1970s, the primary industry accounted for about 69.52%, and since then it is still in a more moderate trend of continued decline. In the early postwar period, the share of manufacturing industry was about 2.452 times higher than the share of finance and insurance business, but after the 1970s, the share of manufacturing industry showed a clear downward trend, and in the 1990s, its share fell below the share of finance and insurance business. In the post-war period, the share of finance and insurance in GDP has been on an upward trend, doubling from the early post-war period to the mid-1990s, and continuing to rise beyond the share of manufacturing in the early 1990s. Changes in industrial structure drive changes in the structure of social forces. Generally speaking, after the end of the Second World War, the United States society has shown a trend of military capital and financial capital growing and gradually dominating, while the real industry represented by agriculture and manufacturing industry has seen a trend of increasing weakening.

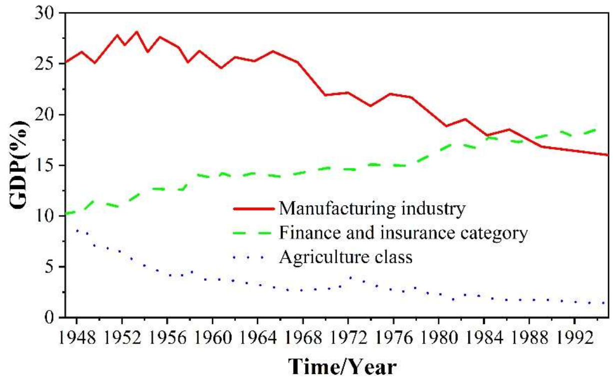

Figure 1: Graph of changes in GDP proportion

II. A. 3) Military capitalization

The rapid expansion of military production during World War II accelerated industrial-military cooperation and integration on an unprecedented scale and at an unprecedented rate, leading to the successful establishment of the military-industrial complex in the post-war period and its emergence as one of the dominant economic, political, diplomatic, scientific and technological forces during the Cold War. The military-industrial complex includes not only the traditional military group, but also energy, engineering, medicine, transportation, communications and other military-industrial enterprises and multinational corporations that undertake reconstruction projects during and after the war, as well as a group of professional politicians who want to obtain support from consortiums and build up their personal prestige through the war. The military-industrial corporations, through their financial operations, cultivate power in the U.S. Congress and defense research institutes to gather information to facilitate decision-making, and the relevant defense research institutes will provide support for the military-industrial corporations to influence decision-making, while military-industrial members of Congress will push for the passage of the Department of Defense's weapons research and development proposals in Congress so that the relevant military-industrial corporations and research and development institutes will receive appropriations, and at the same time, military-industrial interests use this as a means of influencing decision-making within and outside the United States, prompting At the same time, military-industrial interests use this to influence decisions inside and outside the U.S., prompting Washington to make decisions that are in line with military-industrial interests, such as increasing military spending through direct participation in wars or proxy wars, and increasing the sale of arms in order to make a lot of money. The military-industrial complex is deeply embedded in the U.S. economy and society and dominates the direction of national security policy in defiance of the will of the U.S. people, with important implications for U.S. society and its postwar U.S.-dominated world order. The combination of military power blocs and big military industries is new to the American experience, and its full impact-political, economic, and even spiritual-has permeated every city, every home, and every federal government agency. We know the necessity of this development. But we cannot ignore its significant implications. It involves our manpower, our resources, our lives, and even the very fabric of our society.

II. A. 4) The "consumption gap" in a period of military-industrial dominance

In the early post-war period, the United States had a huge production capacity, the domestic market was far from being able to absorb the production surplus, and from 1948 onwards, the United States experienced frequent economic crises, so the capitalists tried every means to expand the market. After the war, the United States expanded overseas markets and expanded the export of surplus products through foreign aid represented by the "Marshall Plan". The financial hegemony with the hegemony of the dollar at its core also "forces" other countries to import American goods, especially agricultural products, in order to absorb the surplus of domestic production in the United States, which is an important manifestation of the United States' control over global consumption. However, for the United States, which is dominated by military wages, the end of the war means that orders for the military industry will be rapidly reduced, and the market demand will shrink rapidly, which will form a sharp contradiction with the military industry that swelled during the war. Based on this, "consumption" has become an important "missing link" in the four major links of military production, and the already growing military wages will not "sit idly by"; in order to survive and continue to obtain high profits, military industrial interest groups are trying their best to seek opportunities to open up the arms market around the world to make up for this "missing link."

II. B.System dynamics

II. B. 1) System dynamics definition and characterization

System Dynamics (SD) is a computer-dependent approach to simulation [16], [17]. It addresses the complex dynamic feedback nature of the system by analyzing its structure and function, studying and solving system problems, studying the various feedback loops formed by many factors within the system, collecting and organizing system-related data and intelligence, and simulating and predicting them, and is therefore also known as the “Strategy and Strategy Laboratory Therefore, it is also called “Strategy and Strategy Laboratory”. The system dynamics are characterized as follows:

(1) Open systems are its main research objects, which are categorized into living and non-living systems. This method is widely used to analyze the complex and lack of data and information system problems. Meanwhile, sensitivity analysis and information inverse test are used to ensure its robustness, operability and rationality through repeated debugging of its system.

(2) In system dynamics, its research object is divided into multiple subsystems that are interconnected and interact with each other. Starting from the whole, instead of the past research perspective of considering only a single element, the dynamic causal relationship that may exist between each subsystem is analyzed and researched, and the complex linkage relationship is sorted out to solve the problem of its giant system.

(3) System Dynamics adopts a combination of qualitative and quantitative research methods to unify structural, functional and historical approaches.

It mainly utilizes computer simulation technology to construct a dynamic simulation model, a process that includes creating system equations as well as drawing system flow diagrams. Afterwards, the model is run for simulation tests and validity tests, and if the model passes the tests, scientific decisions and recommendations can be formulated.

(4) In terms of predicting the future, system dynamics emphasizes the provision of development strategies with long-term validity rather than accurate predictions of future trends and specific situations, and is therefore a conditional prediction.

II. B. 2) System dynamics modeling steps

The construction of the research model using the system dynamics approach must include the following basic steps, and the system dynamics modeling steps are shown in Figure 2. The details are as follows:

(1) Define the purpose of modeling

According to the characteristics of the study area itself and research data to analyze the specific problems to be solved in this paper, and then the purpose of constructing the model will be determined.

(2) Delineate the system boundary and analyze the causal relationship

First of all, before determining the purpose of constructing the model, the basic information is collected and sorted out, and the boundary of the whole giant system is delineated. After that, the variables are analyzed using qualitative research methods, and the variables of the system variables that are closely related to the research problem to be solved are listed one by one, while the variables that do not have much influence on the problem to be solved can be excluded from the scope of examination. Also determine the range and step size of the prediction time in the model. Based on the actual situation of the system, clarify its complex relationship with the subsystems, and classify the hierarchy and define variables for it. Based on the system information, analyze the variables of all subsystems and the causal relationship and feedback mechanism between them, and then make a preliminary judgment on the feedback relationship between their loops.

(3) Drawing the system structure

First a diagram of the model boundaries is created. Secondly, after a clear understanding of the overall structure of the system, the feedback mechanism of the system is dissected and a causal loop diagram is drawn. Finally, draw a flow chart of the system. The flow chart can clearly and intuitively depict the basic structure of the system, and the “stack” and “flow” in the chart represent the accumulation and flow of material and information in the system respectively.

(4) Construction of system dynamic model

After analyzing the feedback mechanism, loop and structure of the system, the type of variables and their mathematical relationships can be further determined, and parameter values can be set for the variables to construct the system equation, in which it is necessary to combine the trend extrapolation model, linear regression model, and other statistical models in order to complete the process.

(5) Simulation analysis and testing of the model

When using the constructed system model to simulate the operation of the system in the predicted time period, the system must be repeatedly debugged through sensitivity analysis and validity testing to verify the simulation results, and at the same time, the robustness, rationality and operability of the model should also be ensured. The testing process of the system is roughly divided into three steps: first, the mechanism error test is conducted to eliminate the mechanism errors. Second, robustness testing for screening and correcting the more subtle flaws in the model. Third, the reference behavioral pattern test conducted to test whether the model and the reference behavioral pattern in the process match each other.

(6) Evaluation and Application of Models

When improving the system design and evaluation, changing the model structure and strategy rules, regulating parameters, etc. are more effective methods. Different programs are designed according to different simulation results. Then run various system scenarios with different strategies, and continuously debug and improve the scenarios according to different responses and effects, which can find ways to optimize and solve the system problems, and then provide constructive strategies and suggestions for decision makers.

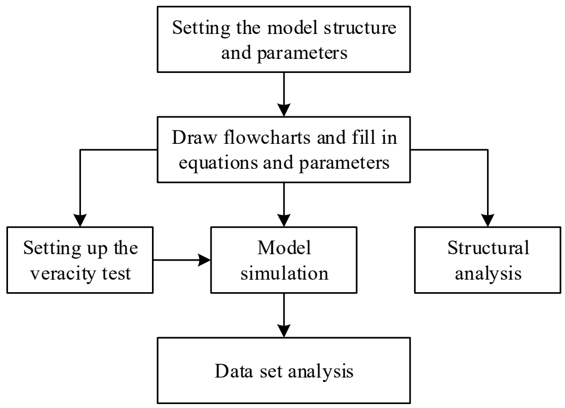

Figure 2: System dynamics modeling flowchart

II. B. 3) Introduction to System Dynamics Software

In the study of system dynamics, it is necessary to simulate the model dynamically with the simulation technology of computer software. In this paper, the professional software used in the simulation prediction and analysis of the model is Vensim DSS 5.8, which is developed by the American Ventana company, is a kind of software that can visualize, document, and dynamize the system model, and can be simulated, analyzed, and optimized. Vensim has the built-in software functions, such as table functions, mathematical functions, etc., which can solve mathematical and statistical calculation problems. Solve mathematical and statistical computational problems. The intuitive graphical interface and the ability to store calculations in a variety of formats, including images, tables, and files, simplify the modeling process. For example, the causal relationship between variables can be expressed and recorded by graphical arrow symbols connecting the symbols of each variable, and the quantitative relationship between parameters and variables can be written into the model by using the equation function. In the process of constructing the system model, drawing the causal loop diagram helps to determine the causal relationship between the main variables, while drawing the flowchart needs to connect the variables with each other, and at the same time use the equations to describe them, which is also the process of further refining and perfecting the causal loop diagram. In this modeling process, the causal relationships and feedback loops between the variables are reflected more specifically and clearly, and the special functions of the program can be used to study and analyze the input-output relationships of the variables and the results of the model, which also facilitates the continuous debugging and modification of the model.

II. C. Simulation and analysis program design

II. C. 1) Purpose of modeling

In order to investigate the rise of the U.S. military-industrial complex and the change of economic pattern during the period from World War II to the Cold War, a system dynamics model oriented to the rise of the U.S. military-industrial complex and the change of economic pattern was constructed with the support of Vensim software.

II. C. 2) System boundaries

The prerequisite for the construction of system dynamics model is to determine the boundary of the system, which usually includes the element boundary and time boundary. On the one hand, after determining the set of elements in the research scope, the influence of irrelevant elements on the system can be avoided to ensure the accuracy of the system modeling simulation process. On the other hand, only after determining the time boundary can the variables be accurately set to ensure that the system can realistically restore the historical behavior.

II. C. 3) Causation

Figure 3 shows a schematic representation of causality, and figuring out the causal relationships that exist within a system is the basis for modeling. Commonly used diagrams to express this are: causal loops, causal arrows and causal chains. Causal loop is an important tool to represent the feedback structure of the system. A causal loop includes multiple variables inside it and the variables are connected by arrows. Positive correlation: an increase (decrease) in X causes an increase (decrease) in Y, indicated by a positive correlation arrow (+). Negative correlations: an increase (decrease) in X causes a decrease (increase) in Y, indicated by a negative correlation arrow (-).

The elements associated with the U.S. military-industrial system are. Level of development of the army, level of health of military personnel, productivity of the army, advanced equipment of the army, bourgeois involvement, government policy, good army leaders, size of the army numbers. For example, the causality between the elements is analyzed, and the level of army development and the level of military health are influential variables for the size of army numbers.

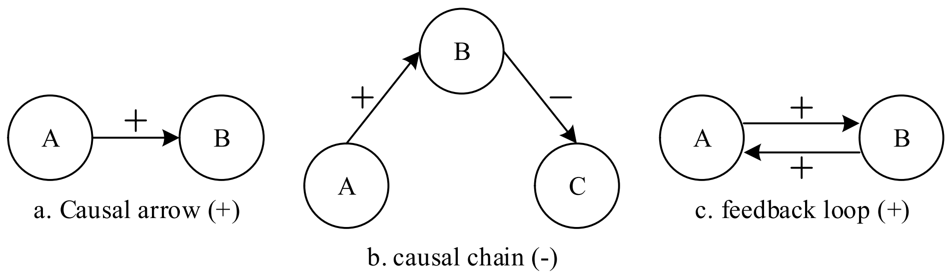

Figure 3: Diagram of causality

II. C. 4) Mapping the system structure

Generally plotted using the VENSIM software, flow diagrams are depictions of the causal relationships present in the feedback loop and are represented using character connections representing the variables. State, also known as stock, is the basic variable in the SD model. Reflecting the accumulation of matter, energy, and information over time, the value depends on the results of changes in the economic landscape of the U.S. military-industrial complex during the period from World War II to the Cold War, such as military productivity and the size of the military in terms of numbers. States are also known as stocks, e.g., inventory, population size, etc. Flows (inflows, outflows) are a reflection of the temporal changes in stocks. Flows (inflow rate, outflow rate) are variables that describe how quickly or slowly the effects of the system change. Examples include birth rate, death rate, etc.

The general mathematical description of the table function is: target quantity = Lookup Name((Xmin,Xmax)-(Ymin,Ymax)),(X1,Y1),(X2,Y2)......(XN,YN)), where X is the independent variable and Y is the dependent variable. The change in the range of values of the variables is generally determined by historical and forecast data. If there is insufficient historical data, it is formulated with reference to the trend of change.

II. C. 5) Modeling system dynamics

The flow rate variable equation is an equation that describes the flow rate variable and includes existing army management policies, and capital participation behavior. The flow rate equation is an equation that describes the flow rate variable, including the army remediation capacity, and the army reward system. The auxiliary equation is an equation that describes the auxiliary variables, mainly capital and government. Table function is the nonlinear functional relationship between variables can be expressed by table function in SD language, and other constants and initial values come from historical statistics, expert interviews and literature. Under the joint action of flow level variable equation, flow rate equation, auxiliary equation, table function, initial value equation and constant equation, the task of constructing kinetic system dynamic model is completed.

II. C. 6) Model testing

The prerequisite for model testing is to have sufficient data. General data are divided into three categories: numerical data, written data and subjective data.SD model testing has three kinds of numerical test, unit consistency test and sensitivity test. Numerical test is to output the resultant data to compare and analyze with the historical data, and the error is less than 10%. Unit consistency test is to use the Units Check tool in the VENSIM software to carry out the test Sensitivity test is to assume random changes in a certain interval for selected variables, run the model and observe the range of changes in the relevant outputs to determine the degree of influence of the variables.

III. Numerical simulation analysis

III. A. Model testing

III. A. 1) Numerical tests

An important indication of whether a model is set up correctly or not is that during a model run, given the initial values of the variables, it is determined by comparing the error between the results of the model run and the true values. The principle of numerical testing comes from this. In this paper, numerical tests have been performed on all the variables to be simulated, as illustrated below by the selected variable, the gross product of the U.S. military industrial complex. Comparison of the model simulation data with the real data is shown in Table 1, the simulation error of the GDP of the U.S. military-industrial body during the period from World War II to the Cold War (1931-1991) is kept within 15%, and in the beginning of the simulation stage, the data's error is relatively large, and with the systematic simulation constantly proceeding, the data's error is constantly decreasing, and the final error is basically controlled in the range of 5%, which achieves our expected purpose.

Table 1: Comparison of model simulation data with real data

Year	Real GDP value (billions dollars)	GDP simulation value (billions dollars)	Relative error	Year	Real GDP value (billions dollars)	GDP simulation value (billions dollars)	Relative error
1931	3297	2925.58	0.1127	1961	4731.58	4502	0.0485
1932	3347.63	3545.57	0.0591	1962	4762.1	4840.66	0.0165
1933	3383.24	3695.14	0.0922	1963	4773.65	4701.72	0.0151
1934	3383.35	3532.9	0.0442	1964	4898.72	5189.84	0.0594
1935	3423.89	3724.26	0.0877	1965	4946.94	5005.31	0.0118
1936	3445.76	3450.84	0.0015	1966	5015.22	4839.77	0.0350
1937	3464.07	3124.85	0.0979	1967	5028.57	5178.74	0.0299
1938	3544.34	3160.74	0.1082	1968	5038.85	5306.27	0.0531
1939	3553.68	3584.15	0.0086	1969	5061.46	5132.48	0.0140
1940	3564.23	3912.51	0.0977	1970	5075.17	5042.81	0.0064
1941	3676.88	3584.9	0.0250	1971	5090.23	5022.82	0.0132
1942	3746.05	3782.34	0.0097	1972	5117.88	4728.31	0.0761
1943	3758.48	3722.08	0.0097	1973	5146.7	4838.55	0.0599
1944	3764.89	3787.89	0.0061	1974	5244.83	5177.63	0.0128
1945	3776.96	3656.74	0.0318	1975	5266.8	5295.75	0.0055
1946	3835.42	4121.37	0.0746	1976	5307.91	4977.7	0.0622
1947	3869.68	3711.97	0.0408	1977	5449.63	5312.71	0.0251
1948	3899.94	3542.14	0.0917	1978	5477.77	5326.85	0.0276
1949	3906.03	4010.4	0.0267	1979	5518.64	5676.85	0.0287
1950	3985.48	3956.02	0.0074	1980	5523.78	5091.87	0.0782
1951	4068.19	3904.95	0.0401	1981	5545.06	5788.08	0.0438
1952	4070.03	4365.46	0.0726	1982	5677.47	5905.04	0.0401
1953	4091.01	3990.91	0.0245	1983	5725.89	5684.5	0.0072
1954	4144.36	4012.98	0.0317	1984	5730.63	5640.46	0.0157
1955	4264	4481.88	0.0511	1985	5777.79	5736.56	0.0071
1956	4415.3	4615.61	0.0454	1986	5908.37	6076.76	0.0285
1957	4459.4	4369.39	0.0202	1987	5998.33	5988.9	0.0016
1958	4578.83	4665.78	0.0190	1988	6001.2	5956.52	0.0074
1959	4610.18	4571.23	0.0084	1989	6196.94	6538.89	0.0552
1960	4707.58	4920.35	0.0452	1990	6270.01	6475.98	0.0329

III. A. 2) Sensitivity test

Sensitivity analysis in the system dynamics flow chart is to change the value of the parameter to determine the degree of response of other variables to such a change in the value of the system, usually we establish the system is stable, that is, if there is an external shock affecting the system, due to the system's own self-repair will make the external impact on the variables of the system will have little effect. However, if the variables in a complex system are very responsive or sensitive to external shocks, then there are policy action points where such external shocks are likely to have a large impact on the system. The sensitivity analysis of U.S. gross product to military-industrial productivity is shown in Figure 4, and the sensitivity analysis of U.S. per capita income to military-industrial productivity is shown in Figure 5. For the sake of illustrating this test and the brevity of the article, only the degree of responsiveness of Gross U.S. Product and Income Per Capita levels when varying the military industrial productivity from 0.8 to 0.4 are shown here. In this case, "Simulation 1" is the value of military-industrial productivity of 0.8, "Simulation 2" is the value of military-industrial productivity of 0.4. If the military-industrial productivity is reduced, it means that the U.S. national per capita income tends to decline, which is a good example of the phenomenon of reducing productivity. Per capita income decrease phenomenon. Through the theory of consumption in economics, an increase in per capita income will make the U.S. military-industrial complex economic enhancement, to a certain extent, to stimulate the United States of America's productive capital more investment, thus promoting the country's economic growth, reflected in the United States of America's gross domestic product increased, on the contrary, will inhibit the development of the United States of America's military-industrial complex of the economic pattern.

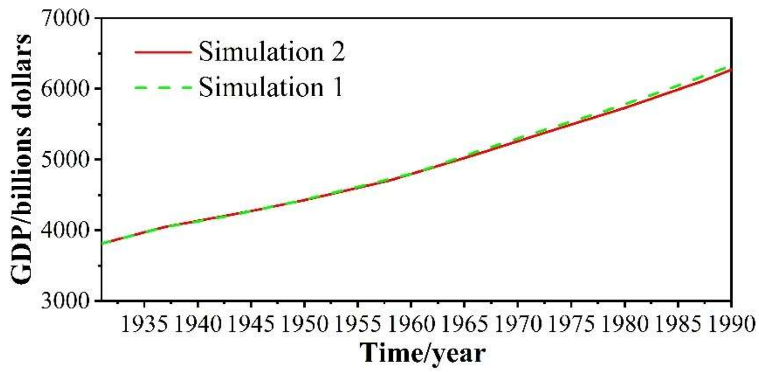

Figure 4: Analysis of the sensitivity of gross domestic product to productivity

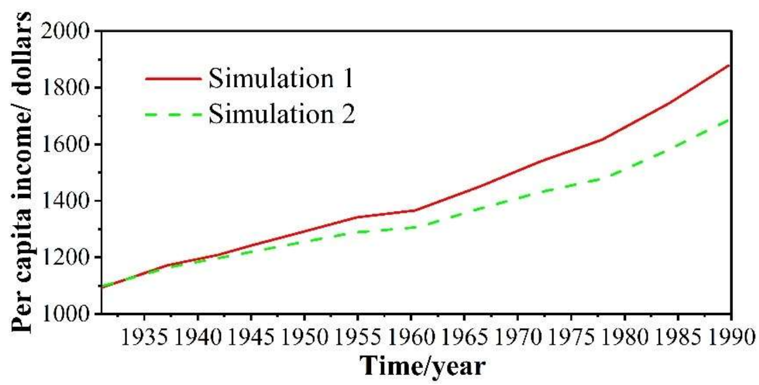

Figure 5: Analysis of the sensitivity of per capita income to productivity

III. A. 3) Consistency test

In order to test the practicality and reliability of the model, system simulation of the variables in the system should be carried out for different simulation steps in the system flow diagram to test the error relationship between the simulated and real values. If there is a large deviation between the values of the variables for different simulation steps, it means that the system consistency is poor, and vice versa, it means that the system consistency is good. In the following, we select the simulation step size of 2, 1, and 0.5 for the consistency test, i.e., the simulation process is simulated every other year according to the established flow chart. The results of the simulation data for the U.S. military gross body product under the consistency test are shown in Table 2. By analyzing the variables in the system (here take the U.S. military-industrial gross product under domestic as an example), it can be seen that the three curves are in the degree of close to overlap, and we think that the established system dynamics flow chart has good consistency.

Table 2: Consistency test results

Year	Simulation 1 Data (billions dollars)	Simulation 2 Data (billions dollars)	Simulation 3 Data (billions dollars)	Year	Simulation 1 Data (billions dollars)	Simulation 2 Data (billions dollars)	Simulation 3 Data (billions dollars)
1931	2925.58	2924.22	2923.16	1961	4502	4500.68	4500.02
1932	3545.57	3543.49	3543.98	1962	4840.66	4840.57	4836.79
1933	3695.14	3692.83	3694.94	1963	4701.72	4700.77	4699.38
1934	3532.9	3532.63	3529.11	1964	5189.84	5188.59	5185.88
1935	3724.26	3722.06	3720.43	1965	5005.31	5003.39	5004.59
1936	3450.84	3449.81	3448.78	1966	4839.77	4838.67	4839.55
1937	3124.85	3123.16	3120.87	1967	5178.74	5178	5177.61
1938	3160.74	3160.43	3157.06	1968	5306.27	5303.65	5306.02
1939	3584.15	3582.27	3582.34	1969	5132.48	5130.52	5131.08
1940	3912.51	3910.45	3909.25	1970	5042.81	5040.3	5042.36
1941	3584.9	3584.85	3582.72	1971	5022.82	5022.25	5020.19
1942	3782.34	3780.91	3778.43	1972	4728.31	4727.3	4727.74
1943	3722.08	3719.68	3721.14	1973	4838.55	4838.47	4838.02
1944	3787.89	3785.17	3786.33	1974	5177.63	5176.87	5176.76
1945	3656.74	3655.05	3655.56	1975	5295.75	5295.14	5292.25
1946	4121.37	4118.96	4119.04	1976	4977.7	4976	4976.2
1947	3711.97	3709.93	3710.98	1977	5312.71	5311.29	5310.21
1948	3542.14	3539.51	3539.13	1978	5326.85	5323.97	5326.34
1949	4010.4	4009.97	4007.14	1979	5676.85	5674.11	5674.4
1950	3956.02	3954.16	3952.73	1980	5091.87	5090.3	5089.78
1951	3904.95	3903.84	3903.21	1981	5788.08	5785.13	5785.31
1952	4365.46	4365.08	4363.71	1982	5905.04	5902.12	5901.58
1953	3990.91	3988.32	3990.13	1983	5684.5	5682.94	5683.28
1954	4012.98	4010.42	4009.2	1984	5640.46	5638.7	5640.19
1955	4481.88	4480.56	4479.07	1985	5736.56	5735.5	5735.39
1956	4615.61	4615.21	4614.86	1986	6076.76	6074.04	6074.96
1957	4369.39	4368.17	4368.18	1987	5988.9	5987.78	5986.4
1958	4665.78	4664.61	4662.9	1988	5956.52	5955.32	5955.48
1959	4571.23	4570.93	4567.89	1989	6538.89	6536.84	6537.55
1960	4920.35	4919.16	4919.97	1990	6475.98	6474.07	6472.68

III. B. System simulation of the model

The rise of the military-industrial complex, changes in the economic landscape of the most direct manifestation of wartime supplies, in the long history, the United States military-industrial body rise as an important reason for the provision of supplies to other countries. Based on the above point of view, this subsection to the Second World War to the Cold War period (1931 ~ 1990) military-industrial body supplies as an example, assuming that the unit needs to be issued every month to a unit of supplies, the use of the system dynamics software Vensim simulation, simulation of the simulation time of 60 years, the step size of 1 year, the model to make the following simulation.

III. B. 1) Inventory management

In terms of inventory, the change in inventory reflects the receipt and shipment of goods, with a falling curve representing shipments and a rising curve representing purchases. In the model, purchases are to be made once the inventory level is below the ordering point, the inventory change curve is shown in Figure 6, and the impact of the initial inventory is shown in Figure 7. The inventory model without the x-curve representation has an initial inventory of 5380 and the initial inventory with the x-curve representation has an initial inventory of 5050. Observing one curve, it can be seen that ordering and shipping alternate, i.e., after 2 shipments, a replenishment of inventory needs to be procured to satisfy the requirement that the inventory is greater than the ordering point. Initial inventory affects the rule of change of inventory in subsequent warehouses, if combined with different time periods in addition to the receipt and shipment of materials other than maintenance and maintenance costs, the initial inventory will provide an important basis for decision-making for procurement and inventory management, the United States military-industrial body to rationalize the use of wartime inventory management law, in time for the countries of the

Second World War, not only to make the military-industrial complex to rise, but also to further influence the global economic pattern changes, the initial presents a super multi-powered international relations.

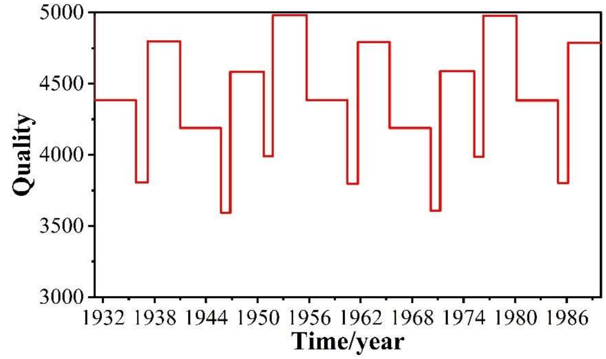

Figure 6: Inventory change curve ·

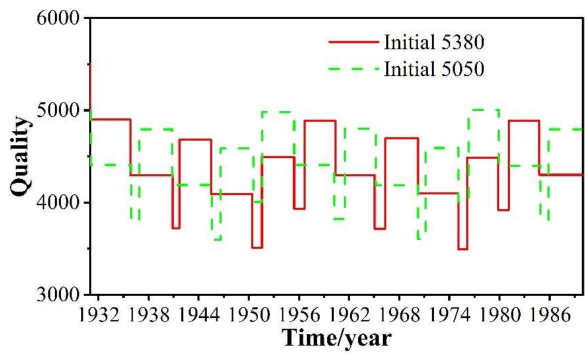

Figure 7: The impact of the initial inventory

III. B. 2) Changes in Ordering Volumes

The impact of changes in ordering quantity is shown in Fig. 8 to Fig. 13. The larger the ordering quantity, the lower the unit price of procurement, the change in ordering quantity will cause the change in the number of ordering times, under the premise of a certain amount of total demand, the ordering quantity increases, then the number of ordering times decreases, in the ordering process of the human and material costs incurred will decrease, the ordering cost thus decreases. The number of shipments by the shipper decreases, and the total fixed cost of shipments also decreases. As can be seen from Figure 8~Figure 13, an increase in the ordering volume will lead to an increase in the annual inventory cost of the warehouse, because an increase in the ordering volume, the number of times you need to purchase decreases, which means that the warehouse has a sufficiently large amount of inventory to cope with the number of shipments per month, so the inventory volume increases, resulting in an increase in inventory costs for the military in case of emergency, and at the same time, the U.S. military industrial complex can take this opportunity to first other armies to provide supplies (including weapons, food, etc.) to boost the economy of its own military-industrial complex to rise to the top.

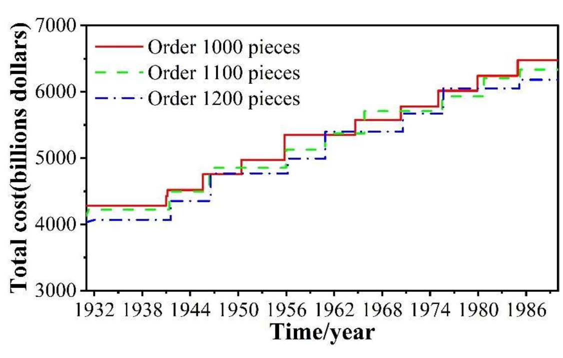

Figure 8: The impact on the total cost when the order quantity changes

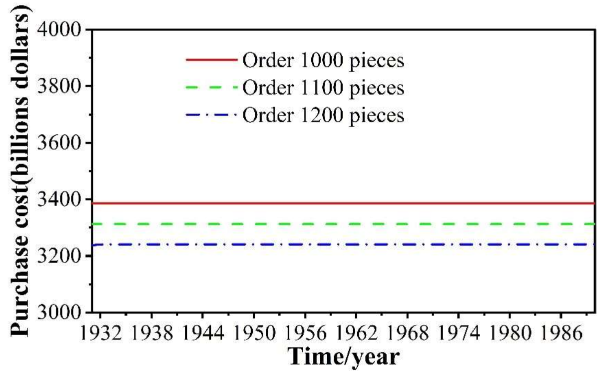

Figure 9: The impact on the purchase cost when the order quantity changes

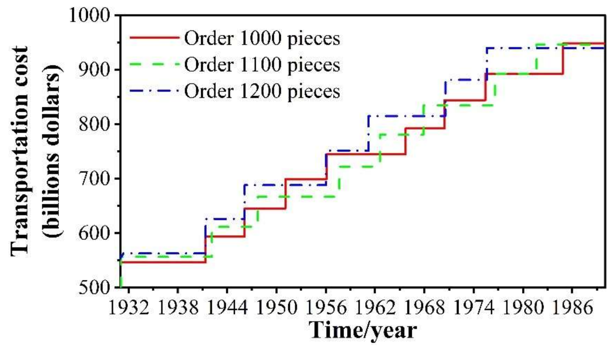

Figure 10: The impact on transportation costs when the order quantity changes

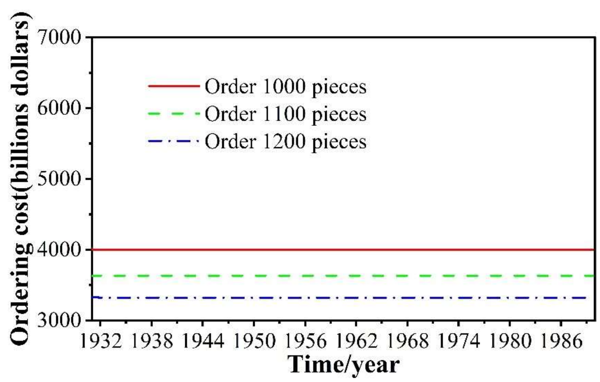

Figure 11: The impact on the ordering cost when the order quantity changes

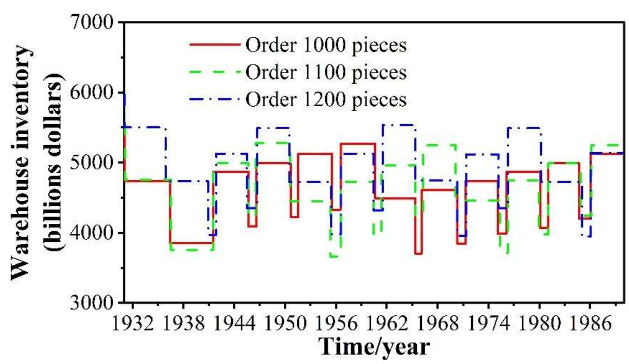

Figure 12: The impact on warehouse inventory when the order quantity changes

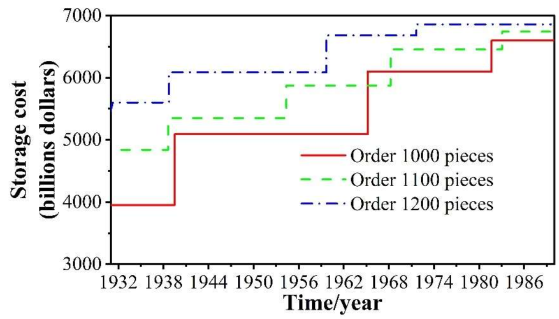

Figure 13: The impact on storage costs when the order quantity changes

III. B. 3) Transportation delays

The impact of transportation delays on inventory as well as the point of ordering is shown in Figures 14 to 15. In the model, the focus is on the purchasing side, i.e., the change in warehouse inventory and the change in the total cost of the warehouse due to purchasing, and thus the order delay and transportation delay are simplified and uniformly interpreted as the arrival delay of the inventory in transit. The direct impact of this delay is the change in the order point. In the model of this paper, because the delay time is smaller than the demand cycle, so the delay did not have a great impact on the change rule of warehouse inventory, and will not be further studied here. It should be added that in the second world war, the arrival delay will have an impact is: as the demand side, will be on the supply side has been asked to provide goods, so that the supply side will be misinterpreted demand-side requirements, multiple shipments. By the same token, the purchasing side will keep sending order demands to the supply side because of arrival delays, which is not reflected in the usual turnover of supplies, but is likely to occur in wartime emergencies due to lack of information. The fundamental solution is to realize full information control, and the military-industrial complex can take advantage of the lack of information to provide material transportation to other countries with backward military equipment, in order to strengthen its own military-industrial complex power and economy.

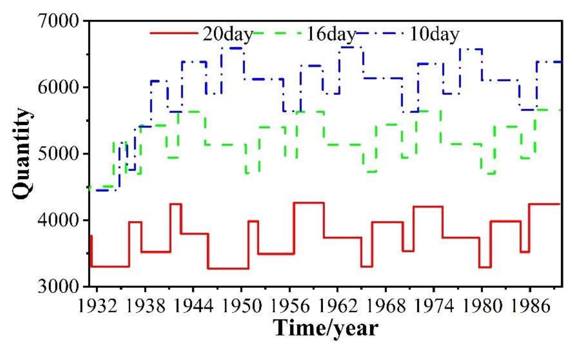

Figure 14: The impact of transportation delays on inventory

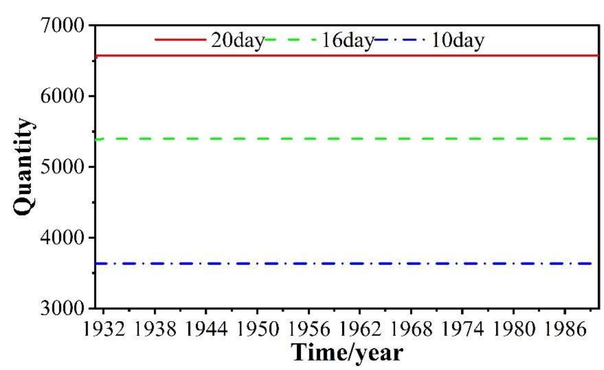

Figure 15: The impact of transportation delays on the order point

IV. Conclusion

Based on the existing research results, this paper constructs a system dynamics model for the U.S. military-industrial complex in order to investigate the rise and economic development of the U.S. military-industrial complex during the period from World War II to the Cold War. With the help of Vensim simulation analysis software, the system dynamics model constructed in this paper is analyzed by digital simulation simulation. When the productivity of the military-industrial complex during the period from World War II to the Cold War was reduced from 0.8 to 0.4, resulting in the per capita income of the U.S. nationals and the emergence of a downward trend, a full overview of the global environment of the rise of the U.S. military-industrial complex during the period from the Second World War to the Cold War and the change in the economic landscape. After the verification of the system dynamics model, the military industrial complex materials during the Second World War to the Cold War as an example, the model of this paper to carry out simulation and application analysis, with the growth of the transportation delay time from 10 to 20 days, so that the U.S. military industrial complex materials stockpile continued to grow in preparation for the war of the contingency needs.

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References

[1] Palley, T. (2025). The military-industrial complex as a variety of capitalism and threat to democracy: rethinking the political economy of guns versus butter. In The Political Economy of War, Peace, and the Military–Industrial Complex (pp. 34-73). Edward Elgar Publishing.
[2] Alic, J. A. (2021). The US Politico–Military–Industrial Complex. In Oxford Research Encyclopedia of Politics.
[3] Palacios, J. M. S. (2017). US–México border states and the US military–industrial complex: A Global Space for expanding transnational capital. Regions and Cohesion, 7(1), 87-121.
[4] Modarres, M., Khalili, R., & Atanegad, H. (2017). The role of military-industrial complexes in us foreign policy. International Relations Researches, 7(24), 185-214.
[5] GOFF, S. (2020). Public Policy and the Military-Industrial Complex. The Business of War: Theological and Ethical Reflections on the Military-Industrial Complex, 207.
[6] Goodman, N. P. (2024). The Military-Industrial Complex and the Militarization of Society. The Legacy of Robert Higgs"(edited by Christopher J. Coyne), Forthcoming.
[7] Smart, B. (2016). Military-industrial complexities, university research and neoliberal economy. Journal of Sociology, 52(3), 455-481.
[8] Auerbach, M. P., & Baker, J. (2017). US Politics: The Military-Industrial Complex. Research Starters; Sociology (Online Edition) Research Starters, EBSCOhost.
[9] Cox, R. W. (2023). Class Power and the Military-Industrial Complex in the United States. In Capitalism and Class Power (pp. 11-42). Brill.
[10] Dunne, J. P., & Sköns, E. (2021). New technology and the US military industrial complex. The economics of peace and security journal, 16(2).
[11] Uchitelle, L. (2017). The US Still Leans on the Military-Industrial Complex. International New York Times, NA-NA.
[12] DeVore, M. R. (2020). Military-industrial complexes and their variations. In Oxford research encyclopedia of politics.
[13] Bray, F. L. (2020). Neoliberalism and Empire: The American Military-Industrial Complex. Glendon Journal of International Studies, 11.
[14] WILSON, M. R. (2018). The Military-Industrial Complex. At War: The Military and American Culture in the Twentieth Century and Beyond, 67.
[15] Munro John. (2022). Sarah C. Dunstan, Race, Rights, and Reform: Black Activism in the French Empire and the United States from World War II to the Cold War. Cambridge: Cambridge University Press, 2021. 320 pages, £75 (hbk). Nations and Nationalism,28(4),1512-1514.
[16] Alyson L.P. Rodrigues,Liana Cipcigan,Dimitris Potoglou,Dominic Dattero,Peter Wells & Sônia Regina da Cal Seixas. (2025). Impacts of subsidy efficiency on bus electrification: A participatory system dynamic modeling. Transport Policy,167,210-221.
[17] Saeed Alinejad,Zahra Khoshsepehr,Javad Nazarian Jashnabadi & Samira Ebrahimi. (2025). Leverage points in the Bitcoin Ecosystem: Impact on price and climate change using dynamic systems and spherical fuzzy sets. Engineering Applications of Artificial Intelligence,149,110390-110390.