A NEW MODEL FOR THE ECONOMIC RISE OF CHINA

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ABSTRACT

Based on economic mechanics and Chinese time series data from 1978 to 2018, this paper has measured and analyzed production forces, transaction capacity and consumption power to determine how they impact the growth of national wealth in China. We found that all three significantly influence the national fiscal revenue. The drivers of economic growth include developing manufacturing processes; improving production forces; increasing finance and investment to improve infrastructure, logistics and telecommunication; improving human capital and social institutions to enhance transaction capacity; and boosting the consumption power through a range of efforts to elevate the production force, although consumption power lost its statistical significance in this paper. These factors all impact the fiscal revenue growth and lead to economic rise in China.

Contribution/Originality: This study offers a new index system to measure transaction capacity, production forces and consumption power from a new theoretical viewpoint of transaction capacity. These methods have not been used in previous studies in this field and can assist in better comprehending how national wealth increases by using the example of economic rise in China in a new model.

1. INTRODUCTION

An interesting phenomenon in economic development theory is the economic rise of a country, and China is a good example. Many researchers call it the Chinese model (Bell, 2015; Wildau, 2018) that analyzes data from a political viewpoint. Like the Beijing Consensus, some try to analyze data from a Chinese culture perspective (Confucianism) (Junxue, Qingwang, & Jing, 2011) or ideology, such as Marxism (Zhao & Belk, 2008). Others try to explain it from a business or company level, especially state-owned corporations and import–export trade (Cheong, 2018; Kau, Marsh, & Kau, 2016; Yuan, 2017), most of which are criticized (Youwei, 2019). In the west, there are many theories to explain the development of economy in history, beginning with Adam (1776), then the Malthusian theory (Malthus, 1798; Quamrul & Galor, 2011), the classical growth theory (Murphy, Shleifer, & Vishny, 1989), the Solow–Swan model (Solow, 1956), the revised endogenous growth theory (Baker, 2016; Lucas, 1990; Warsh, 2006), and the unified growth theory (Galor, 2011). These theories hold that the determinants of GDP per capita growth are productivity and the accumulation of land, capital and labor. Other factors influencing growth are consistently found to be human capital, political institution (Gali, 2015), entrepreneurs and new products (Gordon, 2016), and even structure change.

All these explanations may be reasonable but are only part of the picture. The reason for the rise of a nation or organization lies in political, economic, cultural, technological and even educational aspects, and while these explanations lack the integration of theory, they are sometimes hard to understand, misleading, or even incorrect. The explanation theories of economics has been called the death of west economics (Colander, 2000; Pingjian, 2005).

In this study, we try to integrate all information into a new and relatively systemic model to explain from an economic system viewpoint how and why the Chinese economy rose. On the basis of social dynamics (Michael & Robert, 2008; Rahim, Hawari, & Abidin, 2017; Sterman, 2001), the research method of economic mechanics or economic dynamics for theory should analyze the real strength of the economic system. Economic behavior mainly consists of production (supply), exchange (transaction) and consumption (demand) (Johnson & Koyama, 2017; Nakamura & Steinsson, 2018; O'Rourke, 2019). This study uses production, transaction capacity and consumption power as variables to explain the growth of wealth (fiscal revenue) in China.

2. THEORY BASE, LITERATURE REVIEW AND HYPOTHESIS PROPOSAL

Aside from the economic mechanics viewpoint used in this study, the basis for China's economic rise lies in economic development or the national wealth increase theory. Below, the literature about the formation of national wealth is discussed.

2.1. Production Forces and Wealth Increase

Wealth increase theory is based on understanding individual and national wealth. Regarding the understanding of physiocracy, wealth is purely generated from agricultural products, so the growth in national wealth means that agricultural products have increased and, here, the labor put into the land is the key to wealth growth. Physiocracy pays more attention to the understanding of individual and national wealth growth from the field of production. During the classical period, Adam Smith explored the cause of national wealth from the social division of labor, which promotes productivity. British economist William Senior thought that Say's wealth source consisted of three basic factors: labor, abstinence (capital) and nature force (land). British utilitarian Mill, and American marginal economist Clark, took advantage of the factor value theory and regarded the labor, capital and land factors as production forces, which are all means to create wealth. After industrial society, scholars seem less interested in national wealth and instead are more interested in how to create wealth and economic development, which focuses more on problems regarding sources and methods to increase national wealth. In modern economics and finance conception, national wealth increase is almost equal to economic growth.

Since the 1940s, research on economic growth and national wealth increase has been consistently building and includes topics on old production factors (labor, capital and land), and more recent researchers have added new production factors, such as entrepreneurship (Alfred, 1890), technology (Acemoglu & Zilibotti, 1999; Basu & Weil, 1998), knowledge (Atkinson & Stiglitz, 1969; Lucas., 1988), and information (Grossman & Stiglitz, 1976; Joseph, 2002; Joseph, 2017; Milgrom & Stokey, 1982). All these factors comprise the production forces, forming the origins of national wealth. Cobb and Douglas (1928), Houthakker (1955) and Felipe and Adams (2005) continuously modified the production function, but their basic idea is that economic growth is determined by production forces. Based on the literature mentioned above, we propose the hypothesis below:

H1: Production forces positively and significantly impact economic growth (fiscal revenue).

In dialectical materialism, so called production forces have the power to conquer and modify nature, enabling nature to meet the needs of society. The relationship between production and economic growth is determined by production forces, and superstructure (politics, law, etc.) is determined by the economic base (the economic relationship as the core), so fundamentally, the production forces are the determinant powers that promote economic growth and social development.

Information economics (OECD, 2017; UN, 2019) and technological economics (Tufano, Valente, Graziano, & Matarazzo, 2018) implicate a basic idea that information and technology as production factors are able to greatly enrich national wealth and improve economic growth. In an information economy, information transfers to knowledge and knowledge transfers to technology; they are not only the channel of survival but also a way for companies to succeed from the viewpoint of R&D. The exchange of intellectual property helps companies, such as Microsoft, Google, Huawei and Amazon, to thrive, and helps developed economies, such as the USA, and developing economies, such as China, to achieve high R&D input and exchange huge amounts of intellectual property.

Song, Storesletten, and Zilibotti (2009) demonstrated that the redistribution of capital and labor from low productivity sectors to high productivity sectors is very important to maintain the high-speed growth of the Chinese economy.

However, apart from the old theory about using production forces to explain national wealth, especially the growth of Chinese economic wealth, this study explains it by way of transactions and exchanges. The reason for choosing this method lies in basic and real economic problems, which are not problems caused by using modern technology, but problems caused by production surplus. Production surplus not only means overproduction and over-storage of products, but also indicates financial or economic crisis. In materialism, economic crisis in capitalist societies is an overproduction crisis. Interestingly, the so-called production surplus isn't due to insufficient demand, in fact, demand in remote areas cannot be satisfied in China, and even in many areas in Middle East and Africa, there are still hungry and poor people and a lack of goods and materials (UN, 2020).

2.2. Transaction Capacity and Wealth Growth

Transactions are a basic characteristic of economic systems. As the core of new institutional economics, Williamson takes advantage of transaction costs to explain the rise of the west world, which includes economic development and wealth increase. Due to reducing the transaction costs in organizations and institutions, organizations in western countries can improve their competitiveness and rise continuously. However, transaction cost theory faces a lot of challenges. Jiaming and Weidong (2000) state that there are big limitations in transaction cost theory, such as ignoring income, technology and contract relationships, and using non-dynamic analyses.

Taking intangible assets as an example, Xiugang (2013) pointed out that the limitation of transaction cost theory lies in the function of transaction costs becoming lower in a knowledgeable economy. Non-cost factors, such as income, capability, technology and institution, play an increasingly significantly function in transactions of intangible assets, and economic growth is unable to be completely explained by transaction cost because ignoring revenue is a blind spot in transaction cost theory. Property rights, however, play a basic function in transactions, yet non-property rights and over-property rights (from the so-called Beyond Property-Right Argument (Jacek, 1996; Martin & Parker, 1997) such as a shareholding system, non-property rights of currency, technological readiness, business sophistication, market efficiency, empowerment and agency systems, and market competitiveness, all reduce the function of property rights regarding earning income. In contrast, the roles of non-property rights and over-property rights become more and more important in revenue. The protection of property rights is more to lift transaction capacity than to reduce transaction cost. Regardless of transaction theory or property rights theory, their limitations show that the ability of mainstream institution economics should be improved.

Regarding economic growth theory, this paper offers a transaction capacity conception, which is shown in Figure 1, as a tool to explain national wealth increase. Transaction capacity is the ability to innovate, and it criticizes the limitations of mainstream institution economics.
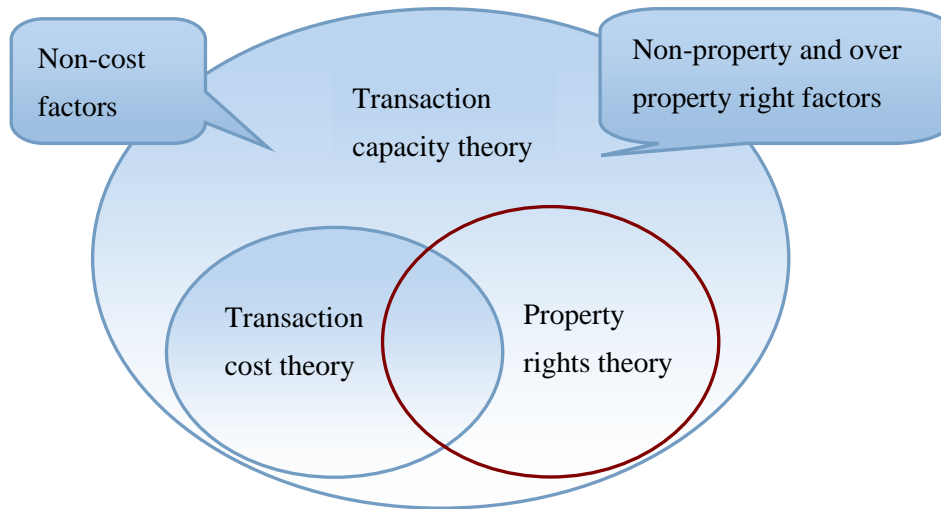
Figure 1. Transaction capacity with criticisms and innovations.

Figure 1 shows that property rights theory and transaction theory overlap. Both theories have a blind spot, and transaction capacity includes transaction cost theory and property rights theory, which pay more attention to non-cost factors and over-property rights.

This article considers transaction capacity as the ability to divide or transfer property rights and raise funds aimed at earning profits or adding value and meeting needs when both sides exchange assets, value or wealth. Transaction capacity consists of cashability and fundraising ability; the real definition in this paper is shown below in Figure 2.

Transaction capacity is a circular flow process. By connecting production or supply in the front and linking spending or consumption at the back, the middle section comprises supply and demand. One side guides production or supply and on the other side is purchase or consumption, where providing services and making profits is realized. This is a concatenation of power to bridge production forces and consumption ability, and manifests as cash flow change and market efficiency.
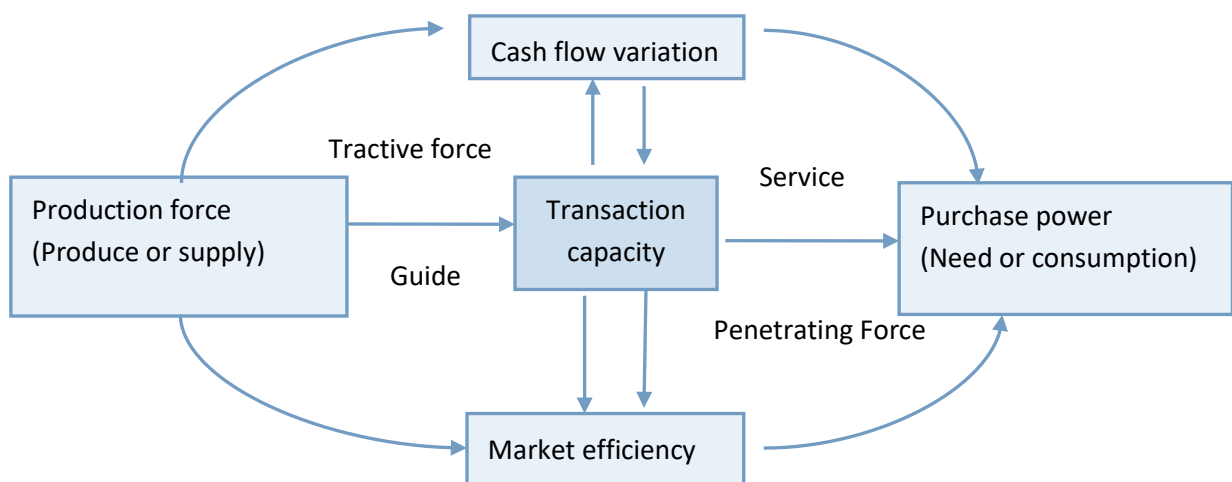

Figure 2. Definition of transaction capacity.

From a macroeconomic viewpoint, based on the data available, this paper uses four dimensions to measure transaction capacity: logistics ability, telecommunication capacity, human capital level and institutional quality. Property or non-property rights, knowledge, technology, and so forth, are all included in the above four dimensions; the details are shown in Table 1.

Transaction capacity is based on the available infrastructure. An improvement in the quality and quantity of infrastructure, such as roads, railways, waterways, airlines and so on, means more efficient logistics making goods easier to transport. E-commerce is based on logistics, and increased logistics ability promotes the transaction of goods, which increases wealth on both sides of the exchange. Zhang and Gao (2007) researched the importance of infrastructure in transactions. They hold that, compared with India and other undeveloped countries, the good quality of infrastructure in China has supported direct productive investment and economic growth.

Also, transaction capacity manifests as tools of exchange, the basic tools in an information economy being cell phones, computers, internet, etc. These telecommunication tools reduce the cost of searching for information, enable better use of information, decrease the cost of bargaining or reneging, make bills easier to pay, and even promote trade both home and abroad, adding to fiscal revenue and national wealth.

Transaction capacity is also related to the ability of humans and is determined by people's qualities and education, which is equal to the human capital level. A higher level of human capital means higher ability. This paper takes human capital level as one dimension of transaction capacity. Research by Liao (2013) has shown that growth of GDP per capita is promoted by human capital accumulation under the one child policy. Guo, Jingwen, and Liutang (2013) also pointed out that skilled workers are more effective in promoting economic growth than unskilled workers.

Cashability embodies transaction capacity in the market. When taking M2 as a measure of transaction capacity, it includes the currency and the amount of deposit in bank. Here, M2 not only reflects the size of investment and finance, but also reflects the speed of exchange and even the ability to cash (to get money from) products and services of a company.

In addition to the above, system or institutional quality is another indication of transaction capacity. New institution economics focus on the role that system change plays in economic growth (North, 1993). Chinese special formal and informal institutions (culture, etc.) play a very important role in economic growth. Qiang and Yue (2011) discussed the government competition framework to help Chinese economic growth under the condition of a special relationship among central and local governments. They hold that there are certain conditions that promote economic growth for governments: soft constraint of institutions, the external development model, and even the centralization of state power. Junxue et al. (2011) researched how traditional Confucianism impacts economic growth as an informal institution based on data from 1980 to 2005 in 42 countries or areas. The results presented that social security plays a negative role in long-run economic growth, and traditional Confucianism beliefs are in favor of reducing negative impacts on economic growth from social security.

Regarding the influence of transaction capacity on wealth increase, early commercialism valued the function of exchange on the growth of national wealth. Due to understanding wealth as bullion, commercialists believe that the wealth growth of individuals or nations should rely on the expansion of trade both home and abroad. Commercialists also pay special attention to the increase of national or individual wealth by way of international trade. New institution economists, such as Williamson, explain the rise of the west world from transaction costs (including economy and wealth growth). He believes that western social economies or wealth growth come from reduced transaction costs that save resources and money based on firm organization and social institution. Jijun, Zongyi, and Yunying (2007) demonstrated, by using data from 1978 to 2003, that market-oriented reforms of economic systems are beneficial for Chinese economic growth.

Modern financial theory believes that financial development and financial power are in favor of economic growth. Here, the development or lift of transaction capacity (financial ability as the core) promotes wealth increase and economic growth. Yong and Da (2010) researched how financial market development contributes to economic growth through a change of efficiency in resource distribution and found that financial development promotes a high degree of transformation in economic growth by reducing the critical value of the growth pattern. According to the literature above, this paper proposes Hypothesis 2 below:

H2: Transaction capacity positively and significantly promotes national wealth increase or economic growth.

The works by British economist (Malthus, 1798), "An essay on the principle of population", and Keynes (1963) "The General Theory of Employment, Interest and Money", discuss the insufficiency of effective demand (investment and consumption shortage) leading to economic recession. Here, social deposit plays key but different functions for both income and consumption because investment comes from social deposit. We clearly see that the relationship among income, investments and finance, contributes to the circle of currency and exchange in the market, so the financial system is a core factor in transaction capacity. Financial theory confirms that financial systems or virtual economies are able to support the real economy through investment or international trade. Economic growth will be promoted quickly, and consumption, investment, and imports and exports become the three most important drivers of economic growth.

Investment and imports and exports under the umbrella of the financial system represent national transaction capacity. In this sense, transaction capacity (including investment ability and financial power) is a kind of improved force to push the national wealth forward and increase economic growth. Since the size of investment and finance manifests as a total of currency and quasi-money (equal to M2, including money and deposits from individuals or organizations), M2 (representing liquidity) is a sort of transaction capacity by nature. By taking a measure of investment and finance, the economy will improve and the national wealth should increase. Jieming, Yongmei, and Qizi (2015) estimated the sources of Chinese economic growth from 1978 to 2013 by building a non-parametric model, showing that input factors, especially capital input, are a source of economic growth. All of these viewpoints should be tested through Hypothesis 2.

2.3. Consumption Power and Economic Growth (Fiscal Revenue Increase)

Effective demand theory has demonstrated that both consumption and investment demand influence employment and national income. This theory was developed based on three drivers of economic growth: size of investment, consumption and import–export trade, that is to say, consumption power is one of the engines for economic growth, and consumption can help to increase wealth. Early classical economist Sismondi (French) found that consumption plays an important role in national wealth growth. He holds that consumption is a sort of promoter for wealth, and when researching the problems of the British social economy, he pointed out that enjoyment of life (consumption) reduced as British social production increased. He questioned what led to people in Britain to accumulate so much wealth. Did national wealth really increase? He pointed out that this result was due to wrong economic policy, though saving is one way to accumulate money, enjoyment is the main goal for this accumulation. Problem solving doesn't lie in the development of production but in reasonable use of wealth and its fair distribution.

In the scope of marketing and management, basic social economic organization is where products and services from suppliers are sold in the market, and the sales volume is the source of revenue or profit. Taking the textbook "Managerial Accounting" (Maozhu, Guangwei, & Wangui, 2015) as an example, many accounting books will present well-known formulas:

Sales income = sales volume*unit price

Profit = sales income-sales cost=sales income-fixed cost-variable cost

Those formulas have clearly shown that the most important factor is customers' consumption power, which determines sales amount or volume, and if a product or service meets the needs of consumers and consumers have purchasing ability, it will form effective demand, leading products and services to be effectively supplied and firms will earn a profit. Without consumption, there is no business income, so the consumption power of customers is the precondition for a firm to realize profits. So, we clearly see that enhancement of consumption will improve the economic growth or national fiscal revenue.

Again, in the cost parts of formulas, regardless of direct materials or direct labor cost, they both stand for consumption power. In B2B business models, when firms supply materials, payment from their customers becomes the consumption of goods, and is also used to pay for labor or salaries, which forms the consumption power of other products, such as life goods, etc., and drives growth of national wealth. Based on the above, this article proposes Hypothesis 3:

H3: Better (or worse) consumption power will higher (or lower) national economic growth (fiscal revenue) significantly.

In historic literature on wealth and national economic growth mentioned above, we can survey three powers to determine national economic growth: the first focuses on production fields, such as physiocracy, and explains the source of national wealth growth with productivity growth; the second pays more attention to circle fields, such as mercantilism, stating that the growth of national wealth is brought by trade, exchange, or transaction capacity; the third concentrates on consumption fields, in the views of Sismondi and Keynes, who clarified the growth of national wealth from social welfare, enjoyment or consumption. So, we easily get a basic dynamic economic system model or research framework to explain the growth in national wealth or the economy as follows:

National wealth growth = f (x, y, z) = k + a*production forces + b*transaction capacity + c*consumption power.

Here, *k* is the intercept; *a*, *b and c* respectively stand for the slope of production forces, transaction capacity and consumption power.

All hypotheses are based on theory or literature, but practice is quite different. The data and model will be used to test the theory or literature, but first, the measurement of the variables and research method problems are considered.

3. VARIABLE MEASUREMENT AND RESEARCH METHOD

To study and understand the Chinese economic rise, the research method in this study mainly takes advantage of a combination of statistical analysis and historic dynamic analysis in light of economic mechanics, which comes from social system dynamics in philosophy. First, we propose the hypotheses and build the research framework from the literature review, then build a matched indicator system based on the available data to measure all variables. Next, we combine the data into dimensions and combine the dimensions into variables. Finally, we use a state–space model, which is suitable to dynamically analyze and test the hypotheses to reach a conclusion.

The details of the research method on HOW and WHY are listed below:

3.1. Why to Use the Index

This paper takes the index system shown in Table 1 to measure all variables. Production forces is gotten from GDP divided by total energy consumption yearly, which shows how much GDP a unit of energy consumption can produce.

Consumption power comes from the yearly total consumption divided by total residents, meaning per capita consumption expenditure, and represents the purchase level of products and services. It is defined as national consumption power or effective demand.

Transaction capacity comprises five dimensions: market liquidity, telecommunication capacity, logistics ability, human resource level and institution quality. Market liquidity reflects the size of deposit, investment and finance, clarifying the turnover speed of transactions. As the base of exchange in e-commerce, logistics ability and telecommunication capacity are tools for transactions, which reflect how powerful the transaction capacity is. Human capital reflects people with transaction capacity. Institution quality can be defined as the environment factor of transaction capacity. Logically, we describe transaction capacity as market liquidity, infrastructure, and human and environmental factors, and even measure it by them.

Table 1. Variable measurement and index system.

Variable	Dimension	Description	Data source
Consumption Power	Consumption Level	Residents' per capita consumption	China Statistical Yearbook
Transaction Capacity	Logistics Ability	Miles of railroad line in operation	China Statistical Yearbook
		Miles of road (10,000 kilometers)	China Statistical Yearbook
		Waterways (kilometers)	China Statistical Yearbook
		Airway (10,000 kilometers)	China Statistical Yearbook
		Oil line (kilometers)	China Statistical Yearbook
		Post office business portfolio	China Statistical Yearbook
	Telecommunication Capacity	Telecom traffic (one hundred million)	China Statistical Yearbook
		Telephone penetration rate (per million)	China Statistical Yearbook
		Volume of mobile telephone switches (per 10,000 families)	China Statistical Yearbook
		Base station of mobile telephone (10,000s)	China Statistical Yearbook
		Length of optical cables(kilometers)	China Statistical Yearbook
	Market Liquidity	Level of investment and finance (M2)	China Statistical Yearbook
	Human Resource Level	Rate of teachers in college	China Statistical Yearbook
		Rate of graduated college students	China Statistical Yearbook
		Rate of post-graduate students	China Statistical Yearbook
		Rate of students studying abroad who have returned	China Statistical Yearbook
	Institution Quality	Economic freedom	The Heritage Foundation
		Corruption index	Transparency International
		Openness of system	World Bank/China Statistical Yearbook
		Index of marketization	Gang Fan: Marketization Index of China
Production Force	Production Efficiency	Productivity of unit energy cost	China Statistical Yearbook
National Wealth	Fiscal Revenue	Personal income tax	China Statistical Yearbook
		Corporate income tax	China Statistical Yearbook
		Domestic value added tax	China Statistical Yearbook
		Domestic consumption tax	China Statistical Yearbook
		Business tax	China Statistical Yearbook
		Tariff tax	China Statistical Yearbook

It's easy to use GDP growth to represent or measure national economic rise or national wealth growth. Fiscal revenue relates to the tax system, and in the long run, it truly represents national wealth due to the short and temporal influence of the tax system on the economy. Finally, income from tax also comes from economic growth or national wealth increase.

3.2. How to Combine the Index

The variable index combination is divided into three steps:

Step 1: Collect primary data for each item. First, we standardized the data through calculating its Z-score. The formula is: $z_{xi} = (x_i - \overline{x})/\sigma$.

Step 2: Form the dimension index by calculating the average of the Z-score in matched items.

Step 3: Based on the dimension index, we get the variable comprehensive index by calculating the mean of the matched dimension index.

The results of variable comprehensive index are listed in Table 2.

Table 2. Complex data of variables.

Year	Transaction Capacity (x)	Consumption Power (y)	Production Force (z)	Fiscal Revenue (r)
1978	-0.951	-0.824	0.064	519.28
1979	-0.930	-0.820	0.070	537.82
1980	-0.893	-0.816	0.076	517.7
1981	-0.871	-0.811	0.078	629.89
1982	-0.848	-0.805	0.081	700.02
1983	-0.794	-0.799	0.086	775.59
1984	-0.748	-0.794	0.100	947.35
1985	-0.679	-0.788	0.119	2040.79
1986	-0.675	-0.777	0.128	2090.73
1987	-0.659	-0.766	0.142	2140.36
1988	-0.647	-0.755	0.169	2390.47
1989	-0.634	-0.744	0.182	2727.4
1990	-0.631	-0.733	0.192	2821.86
1991	-0.610	-0.691	0.212	2990.17
1992	-0.580	-0.648	0.249	3296.91
1993	-0.687	-0.606	0.307	4255.3
1994	-0.652	-0.564	0.396	5126.88
1995	-0.626	-0.522	0.460	6038.04
1996	-0.595	-0.483	0.524	6909.82
1997	-0.542	-0.444	0.580	8234.04
1998	-0.459	-0.405	0.615	9262.8
1999	-0.441	-0.365	0.636	10682.58
2000	-0.420	-0.326	0.674	12581.51
2001	-0.342	-0.289	0.703	15301.38
2002	-0.281	-0.245	0.710	17636.45
2003	-0.182	-0.202	0.693	20017.31
2004	-0.070	-0.127	0.701	24165.68
2005	0.086	-0.038	0.712	28778.54
2006	0.226	0.053	0.765	34804.35
2007	0.409	0.216	0.869	45621.97
2008	0.562	0.375	1.002	54223.79
2009	0.685	0.489	1.035	59521.59
2010	0.860	0.686	1.138	73210.79
2011	1.007	0.998	1.249	89738.39
2012	1.169	1.218	1.336	100614.3
2013	1.367	1.428	1.411	110530.7
2014	1.545	1.651	1.508	119175.3
2015	1.723	1.879	1.590	124922.2
2016	1.948	2.145	1.691	130360.7
2017	2.256	2.377	1.828	144369.9
2018	2.600	2.668	1.933	156402.9

3.3. Method of Dynamic Analysis using the State–Space Model

With the data in Table 2, this paper carries out a dynamic analysis using the state–space model. The formulas are listed below:

$$r = a + sv1 * x + sv2 * y + sv3 * z + \varepsilon \qquad (1)$$

$$sv1 = b + \beta_1 * sv1_{-1} + \mu \qquad (2)$$

$$sv2 = c + \beta_2 * sv2_{-1} + \delta \qquad (3)$$

$$sv3 = d + \beta_3 * sv3_{-1} + \upsilon \qquad (4)$$

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Equation 1 is the testing equation or signal formula; Equations 2, 3 and 4 are all state equations; *SV* is the estimated coefficient; *r* stands for fiscal revenue; variables *x*, *y and z* respectively represent transaction capacity, consumption power and production forces.

4. RESEARCH RESULTS ANALYSIS AND DISCUSSION

EViews software was used to analyze the data with the following commands:

@signal r = c(1) + sv1*x + sv2*y + sv3*z + [var = exp(c(2))]

@state sv1=c(3)*sv1(-1) + [var = exp(c(4))]

@state sv2=c(5)*sv2(-1) + [var = exp(c(6))]

@state sv3=c(7)*sv3(-1) + [var = exp(c(8))]

The command in the first row is the signal equation, and commands in the remaining rows are all matched state equations. *C(1)* to *C(8)* are all matched estimate parameters. The results are shown in Table 3 by choosing filtered state estimates.

Table 3. The results of the filtered state estimates from the state–space model (observations: 41).

	Coefficient	Std. Error	z-Statistic	Prob.
C(1)	0.017	2205.037	7.78E-06	1.000
C(2)	-0.202	482676.2	-4.19E-07	1.000
C(3)	1.057	0.060	17.745	0.000
C(4)	0.020	192841.5	1.01E-07	1.000
C(5)	0.013	0.875	0.015	0.988
C(6)	-0.096	738627.3	-1.30E-07	1.000
C(7)	1.033	0.032	31.855	0.000
C(8)	15.606	0.331	47.088	0.000
	Final State	Root MSE	z-Statistic	Prob.
SV1	9062.298	4295.019	2.110	0.035
SV2	-5.09E-06	0.953125	-5.34E-06	1.000
SV3	71663.10	6150.194	11.652	0.000
Log-likelihood	-367.2104	Akaike info criterion		18.303
Parameters	8	Schwarz criterion		18.637
Diffuse priors	3	Hannan–Quinn criterion		18.425

Note: The method is the maximum likelihood (Newton–Raphson/line search steps).

In the testing equation, intercept *C(1)* and disturbance term *C(2)* have no statistical significance. *SV2* is almost equal to 0, but *SV1* and *SV3* have statistical significance, i.e., transaction capacity and production forces at the 0.05 significance level have a positive correlation with fiscal revenue (national wealth or economic growth). The increase of transaction capacity or production forces will significantly promote the total fiscal revenue or national wealth. Here, Hypotheses 1 and 2 are supported and pass testing. However, consumption power doesn't play a promoting role during this period of time, thus rejecting Hypothesis 3.

4.1. Coefficients of Transaction Capacity (Picture 1) Impacting Fiscal Revenue

The filtered estimate coefficients in the testing equation matched in Table 3 are shown in the first picture in Figure 3.

First, the coefficients of transaction capacity (picture 1) impacting fiscal revenue are positive, which means that transaction capacity promotes the increase of fiscal revenue and is statistically significant.

Second, the coefficients of transaction capacity impacting national fiscal revenue are historically non-convergent and continue as time goes by, i.e., transaction capacity's influence on national fiscal revenue becomes more and more significant, and this influence lasts for a long time.

Third, from the viewpoint of historic dynamic analysis, filtered state estimate coefficients are divided into four stages.

Stage1: Before 1985, *SV1* went from negative to positive. The speed of the function of transaction capacity on national fiscal revenue increased rapidly before 1985. In 1978, Deng Xiaoping came back to government and restored things to order. He modified economic policy, getting rid of the national strategy to use class struggle as a key link, confirmed a national policy of placing economic construction at the center, and persisted in reforming and opening up the economy. This policy is outlined below. In rural China, the household contract policy (as a social test) was reformed and recovered in 1962, and the commune system was abolished. Cities tried to decentralize power and transfer profits of state-owned enterprises and put forward regional decentralization institutions. The household contract policy in rural areas helped the economic level return to that of the 1950s, and policy in cities and state-owned enterprises is in favor of development in exchange and transaction capacity, greatly improving the national economy and increased national fiscal revenue. Yang, Wang, and Wills (1992) described in detail the change of system in rural areas of China. They calculated the transaction efficiency by defining three types of property rights: land, labor and financial assets; right to use; and benefit of cession and usufruct. Institutional change in the 1980s can be divided into three steps. Step 1 is to define the right to use and usufruct in products, land and labor, which improves the transaction efficiency. Step 2 is to define the benefit of cession in production and labor, as well as in land, which promotes transaction efficiency. Step 3 defines all rights regarding financial assets, again revising the benefit of cession in land, which enhances the transaction. The comprehensive index of transaction efficiency increased from 0.384 in 1979 to 0.642 in 1987, and the degree of commercialization in Chinese rural area increased from 0.455 to 0.645 in the same period, according to the property rights model by Xiaokai (2001). A higher degree of commercialization means higher transaction capacity and also improves production forces. Throughout the 1980s, the real revenue per capita in rural China increased by 9% per year.
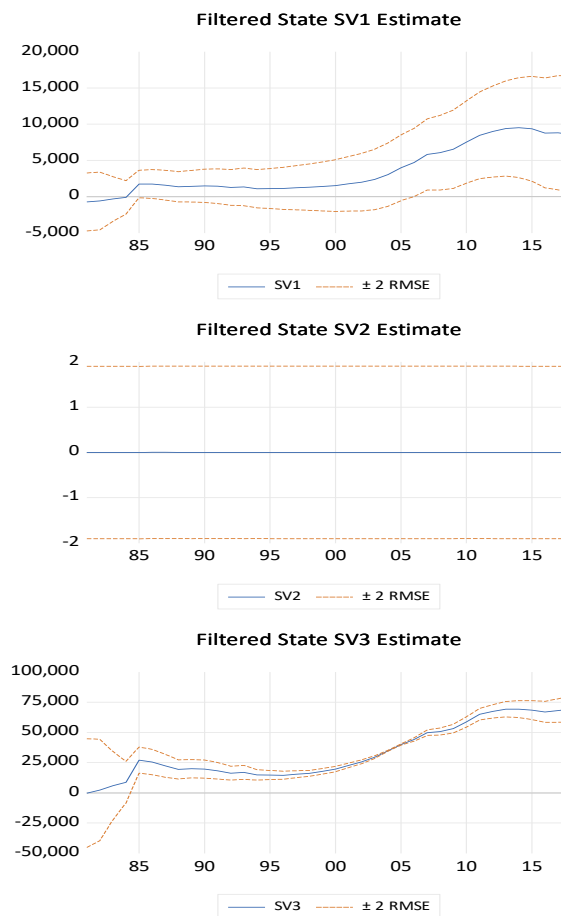

Figure 3. Historical trends of filtered estimate coefficients

Stage 2 is from 1985 to 2000. During this period, transaction capacity played a positive role on national fiscal revenue, but the tendency is comparatively stable. There are two points in time to consider; the first is in October of 1984, when a planned commodity economy was advocated.

The Center of the Chinese Communist Party on the Reform of the Economic System pointed out that the basic task of reform is to build a special Chinese economic system based on socialism, aiming at the development of social production forces. To reform the planned system, the government should break the traditional idea of conflict between a planned economy and a commodity economy and recognize that a social planned economy should depend on and take advantage of the law of value, although a planned commodity economy is based on public ownership.

In practice, a planned commodity economy is shown in a double-track system reform of agriculture, industry, and commerce after.

The other point in time to consider is in 1992. Since Deng Xiaoping's South Tour speeches, China advocated a market economy of socialism. In the report at the 14th party congress, the new aim of reform was to build a socialist market economy, and in the report at the 15th party congress, the government proposed development of the mixed economic system that mainly consists of public ownership and all types of private ownership systems, which are permitted to be developed together as a basic economic system in the primary stage of socialism. At the beginning of the twenty-first century, over 95% of products and resources were distributed by markets when the market economic system was established.

These two periods of reform and execution from 1985 to 2000 brought both development and problems. The Chinese government crossed the river by feeling stones to solve the problems in the development process, so the function of transaction capacity (and production forces) on economic development was stable and positive due to the co-existence of problems and economic increase. Here is the detail:

Since 1984, the land property rights reform quickly promoted production forces in agriculture due to the freedom of the agriculture section and the household contract responsibility system. However, problems occurred alongside this, and one came from the uncertainty around the rights of land use for peasants; it repressed the input or improvement of land, such as dug wells, drainage irrigation systems, organic fertilizer, and so forth (Prosterman, Hanstad, & Li, 1996). Another problem stemmed from the enhancement of national acquisition and circle monopolies in grain and food; a monopolistic circle system leads to waste and corruption, such as price control, quotas for grain acquisition, and issuing IOUs with white strips (Sachs & Woo, 1997; Wing, 1999). The third problem is the reduction of investment in agriculture infrastructure, which is accompanied by a reduction in human resources and a slow-down of production forces in agriculture; for example, the real investment of agricultural infrastructure in 1994 was only 58% of the level in 1978.

In industry, through development of the planned commodity economy, there is a stronger market stimulation in township enterprises than in state-owned enterprises. Local governments have more motivation to maximize profits of township enterprises due to the need for the development of counties and towns, as well as salary, and even the promotion of all officials, which is determined by the development performance of township enterprises (Oi, 1995; Sachs, Wing, & Xiaokai, 2000).

Double-track systems manifest as state-owned enterprise reforms and price freedom (Sachs et al., 2000). Since 1985, state-owned enterprises have maximized profits and given a certain income per year to upper officials in management. This stimulation enhances the transaction capacity, including the cashability or market-oriented ability of township and state-owned enterprises (even production forces and total factor productivity), in favor of economic growth and national wealth increase.

At the same time, state-owned enterprises meet more potential risks and bigger losses when expanding (Lardy, 1998), and there is even corruption of power (Qinglian, 1997). Under the anonymous deposit system, extremely high deposits are not a power to develop but a potential risk of finance, which protects from plunder (the money of corruption) by the government, and also protects from corruption and money laundering.

Although there were problems in these two times of reform and its execution from 1985 to 2000, enhancement of transaction capacity (and production forces) promoted economic growth and national wealth increase; the combination of problems and increases make the slope stable but positive.

Stage 3 is from 2000 to about 2013. Transaction capacity influenced national wealth more day by day, and the degree of increase was significant.

In 2000, the American network economy bubble was broken, while in China, the network was just beginning. Entrepreneurs, such as Chaoyang Zhang, Jack Ma, and Hongyan Li, got involved in the field of the internet. Websites such as SOHU, Alibaba, and BAIDU, and other internet companies appeared one after another, with the online economy surging forward. After a short time, smart mobile phones were developed, which brought mobile internet, and many mobile phone brands, such as Apple, Xiaomi and Huawei, developed quickly in the Chinese market. The internet, mobile phones, and 4G and 5G technology became powerful transaction tools, bringing convenience to investment and finance, education, human resources, and monetary and fiscal policy. The economic system improved, enhancing national wealth increase more than before.

As the success of e-commerce is based on infrastructure, such as transportation and logistics, China has invested in fixed assets, such as roads, railways, ports or waterways, airways, oil lines, and so on, as well as telecommunications and the internet. In the China Statistical Yearbook, from 1978 to 2000, the ability of logistics and transportation was stable and increased slowly. After 2000, the ability of logistics and transportation increased quickly, and this transaction capacity supported e-commerce and the internet economy, enhancing them and promoting the increase of national wealth. The national fiscal revenue rose from 1258.151 billion in 2000 to 11053.07 billion in 2013.

Stage 4 is from 2013 until 2018. The function that transaction capacity plays on national wealth is high and stable. This stage shows that the function of transaction capacity on national wealth is positive but limited; it meets expectations due to the law of decline on transaction capacity. The peak was in 2014, and then slightly declined in 2015, but kept a stable high position until 2018.

4.2. Consumption Power (Picture 2) Doesn't Play Its Deserved Function in China

In the second picture, consumption power does not affect national wealth.

In literature or theory, consumption power should enhance the increase of national wealth, but in practice, consumption power (picture 2) doesn't play its deserved function in China, and the reasons are explained below.

For a long time, society in China had been keeping high savings rates and deposits, which correlates with history and traditional culture. In history, there have been long periods of poverty and disasters. People worked hard to survive, and they saved money with high deposits to prevent disaster, prepare for illness and aging, and invest in their futures. At present, the high cost of housing and real estate (due to land fiscal policy of local government) leads to a lot of deposits and debt ready to buy a house but without real money to spend, which declines the power of consumption. Income is relatively low in the labor market, which is another reason why people don't spend money. Because of the large population, competition in employment is fierce and salaries are reduced. This leads to a low level of consumption, and a low level of consumption is unable to support economic growth and national wealth increase. In the long run, the function of consumption power on economic growth and national wealth increase is non-existent and is without any statistical significance.

4.3. Production Forces' Function on Nation Wealth

The third picture shows that the function of production forces on the nation's wealth is active and positive.

The tendency of production forces (picture 3) is similar to the tendency of transaction capacity (picture 1) in the filtered estimate of Figure 3, but with a higher intercept. A higher intercept means that the function of production

forces on economic growth or national wealth is more fundamental, with higher beginnings than those of transaction capacity.

The increase of production forces is shown in the improvement of technology, enhanced human quality and the efficiency of production instruments, etc. Regarding the improvement of technology, China has been the leader in high-speed rail, aerospace, biopharmaceuticals, 5G and AI. In the enhancement of human quality, the spread of education, college student proportions and the number of well-educated people have all increased. The China Statistical Yearbook states that the human resource index increased from 3.86 in 1978 to 74.03 in 2018, increasing 21 times. Regarding production instruments, fixed assets investments, such as production equipment, in the China Statistical Yearbook increased from 96.1 billion of 1981 to 64,567.5 billion in 2018. Both production instruments and fixed assets investment link with the fiscal revenue increase from 51.928 trillion in 1978 to 15,640.286 trillion in 2018, increasing 300 times. Therefore, the impact of production forces on national wealth is active and positive.

The production forces affecting national wealth growth can be divided into four steps:

Step 1 is before 1985, and though China had set up the industry system with the help of the former Soviet Union in the 1960s and 1970s, many technologies were in their infancy. At that time, many state-owned companies took extensive management under the wrong policies of the Great Leap Forward and the Great Cultural Revolution. Lots of waste was generated and production forces failed, so productivity was low. Deng Xiaoping came back to lead the government in 1978, and until 1985, the national strategy of taking economic construction as the center was established and implemented. By holding reforms and opening up policy, the planned economic system transferred to a planned commodity economic system; agriculture and industry improved, and even many military technologies had been applied in private companies for service folk. Property rights reform promoted the activity of production for people, and production forces were released from the obstruction of property rights. All of these changes quickly increased the function of production forces on national wealth and economic growth from 1978 to 1985.

Step 2 is after 1985 when the planned commodity economy gradually changed to a mixed ownership economic system. In 1992, the economic system was confirmed to be a market economic system in socialism, which was run according to international standards. Until 2000, production forces and productivity improved with a relatively high switch cost, such as D&R input, training of employees, improvement of production equipment, etc., but the switch cost and production effectiveness balanced out, leading to the function of production forces on national economy or wealth remaining stable but positive from 1985 to 2000.

Step 3 is from 2000 to 2013, which was a time of technology and network economy rise. Many kinds of production equipment or instruments improved, and new machines and instruments continuously replaced the old through the international trade market, transforming China into a huge manufacturing country. At same time, industry fed back to agriculture, city fed back to rural areas by policy, surplus rural production forces (labor as core) transferred to secondary or service industries, and the Lewis turning point occurred in 2013. Development of industry promoted the development of productivity in agriculture and the development of cities, and also helped the rural areas of China, so production forces in both industry and agriculture were enhanced, growing the national economy and increasing national wealth.

Step 4 is from 2013 to 2018 when production forces played a role in economic growth and wealth was maintained at a high level. During about 20 years of development, the function of production forces on wealth increase obeyed the law of decline in marginal utility, when production costs equaled marginal revenue and the influence of production forces remained relatively high. Increasing the economy or wealth will constantly depend on the development of production forces from industrial internet, 5G, AI and intellectual industry, as well as technology.

Based on a dynamic analysis of the filtered estimates, regardless of the elevation of production forces or transaction capacity, both promote the national economy and increase wealth over time. This promotion constantly

keeps a high level over a long period, but consumption power unfortunately doesn't play its deserved function on the national economy or wealth and loses its statistical significance due to the high deposit rate in banks because of history, social culture and, nowadays, the housing market.

4.4. The Findings

There are three findings in study:

The first finding shows that the functions of transaction capacity and production forces on national wealth or the economy are non-convergent over a long period.

The influence of transaction capacity and production forces is divergent and non-convergent; once the transaction ability functions or is enhanced from market liquidity, logistics, telecoms and so forth, the influence is long-lasting and distant.

The second finding is that the influences of transaction capacity and production forces are synchronous, and the trend of their coefficients in the filtered estimates is about the same.

The trend of the coefficients of the filtered estimates, both in transaction capacity and production forces, looked synchronous. Taking one year as a term, it is easy to see that the process of production included purchasing and all kinds of expenditure (for example, the purchase of materials). In other words, the process of production is unable to escape from exchange and covers the transaction. This is one reason why they are synchronous. Apart from this, products include life consumption goods (exchanges and human quality or capital) and middle goods production (exchanges and even production forces), as well as production tools (increased production forces and transactions), so production forces become enhanced and transaction instruments become more precise and transactions become more frequent. These two factors cause their functions on economy or wealth to be synchronous.

The third finding is that the roles of production forces and transaction capacity on national wealth are at different levels and production forces are more fundamental and broader. The intercept of standardized production forces is more than transaction capacity; it shows that the start point of influence from production forces is higher than that of transaction capacity. Furthermore, in Figure 3, the total slope of production forces that influences national wealth in the filtered estimate is more than that of transaction capacity, and it also shows that the power of production forces is greater than transaction capacity in impacting the increase of national wealth.

5. CONCLUSIONS AND SUGGESTIONS

All the test results are shown in Table 4.

Table 4. Summary of test results.

Hypothesis	Content	Test results
H1	Production forces positively and significantly impact economic growth (fiscal revenue).	Supported
H2	Transaction capacity positively and significantly promotes national wealth increase or economic growth.	Supported
H3	Better (or worse) consumption power will higher (or lower) national economic growth (fiscal revenue) significantly.	Unsupported
Findings	Both transaction capacity and production forces affect national wealth and the economy and are non-convergent over a long period.	
	Influence from transaction capacity and production forces are synchronous; the trend of their coefficients from the filtered estimate is about the same.	
	Production forces and transaction capacity affect national wealth at different levels; the functions of production forces are more fundamental and broader.	

Results from the above analysis are summarized below.

Hypothesis 1 and Hypothesis 2 are shown to be supported, and Hypothesis 3 is rejected. According to the results and findings, we propose the following:

First, it is necessary to motivate and enhance the level of consumption power for residents. From the results of the data analysis, consumption should have a deserved function on the growth of national wealth. High deposit rates are not only due to buying houses but are also precautionary and preventative. Simulating consumption or increasing consumption power for residents is a system project. Apart from solving problems of unemployment and low salaries, the government should solve the problem of residences (low house prices should be built into certain policies), and address aging problems by fiscal policy, currency policy or industrial policy, etc.

Second, government and firms ought to develop the manufacturing industry rapidly to enhance the production forces of firms.

Production forces play more important roles than transaction capacity, and they should be developed based on scientific research and technological innovation. Nations and firms should connect industry with scientific research, building intangible asset exchange centers and innovation incubation centers, shortening the transfer time from scientific research and patents to the production forces of firms. A nation should deepen the reform of the supply side to optimize the resources of land, human power, capital and technology.

Third, transaction capacity should be increased to take advantage of its function of enhancing national wealth.

A transaction system is a transmission system linking supply and demand. Just like a production system, a transaction system is a fundamental junction that an economic system can't exist without. To improve transaction capacity, institutions should be arranged in two levels:

At the national level, it's necessary to have well designed, basic transaction tools, such as logistics, transportation and telecoms. The financial system should match the liquidity in markets; meet the needs of the real economy, service and support for the transaction to guide development of the real economy; avoid the step to the virtual from the real, and even avoid transaction risk and enhance the financial transaction capacity. At the institutional level, the government should optimize the transaction system and promote the freedom and openness of institutions, making institutions market-driven in favor of reducing corruption.

At the firm level, a firm should provide good quality products and services that are easy to sell in the market. Firms should manage their investments and finance effectively to enhance cashability, they should train their employees to improve the market dynamic ability when producing or transacting, and they should reduce the cost of transactions and enhance transaction capacity. Business strategies should be planned and carried out carefully based on capacity. Overall, nations and firms should focus on improving three aspects—consumption power, production forces and transaction capacity—to enhance and increase the national wealth.

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