



## On Import Growth Path of China's Bulk Agri-Products from Perspective of Ternary Margins

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### ***Authors' contributions***

*This work was carried out in collaboration between both authors. Author YD designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author JY managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

Based on the HS6 encoded agricultural trade data from 1995 to 2018, this paper uses the ternary marginal method to analyze the import path of China's bulk agri-products from the static and dynamic perspectives. The study finds that the import of bulk agri-products is mainly driven by the quantity margin with an average annual growth rate of 6.28 since china's accession to the World Trade Organization (WTO). This conclusion is robust in terms of time periods, major source countries and main varieties. Improvement of living standards of Chinese consumers, innate short of advantage in supply side, opening up policy facilitating foreign supplier and unnecessary import owing to price differential all explain quantity margin impetus. At present, the main problem in the bulk agri-products has switched from insufficient amount to structural imbalance. Therefore, it is urgent to adjust the production structure and manage the import structure of bulk agri-products.

***Keywords:*** Bulk agri-products; import; ternary margins; supply-side reform.

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## 1. INTRODUCTION

With the reduction of tariff and gradual elimination of non-tariff barriers on agricultural products since China's accession to the World Trade Organization (WTO) in 2001, the imports of agricultural products have increased from 11.85 billion US dollars in 2001 to 137.1 billion US dollars in 2018, with an average annual increase of 15.5%, and the trade balance has also changed from a surplus of \$4.2 billion in 2001 to a deficit of \$57.38 billion in 2018. During the period, the import value of bulk agri-products, the land intensive products, increased from 9.678 billion US dollars to 57.78 billion US dollars, with an average annual growth of 11.1%, and the trade deficit in 2018 is 54.67 billion US dollars, accounting for 95.28% of the total agricultural deficit. At present, bulk agri-products have fully entered the stage of net import; especially 80% of consumption of soybean is from import. The huge amount import is not only for adjustment of surplus and deficiency or for variety adjustment [1], it also directly affected the self-sufficiency of China's major food crops, as well as the food security of 1.4 billion population. The strategy of massive imports and massive exports beginning from 1990s is not suitable for current complex trade environment, and choose a strategy of quality imports & quality exports or mutually beneficial win-win will be a wise choice [2]. As a large country with huge population, the Chinese government attaches great importance to the imports of bulk agri-products, and has repeatedly proposed strengthening macro-control over the imports of bulk agri-products in its No. 1 Central documents. So, what is the growth path of China's bulk agri-products imports? Is import growth based on price inflation, quantity increment or variety expansion? What're the reasons behind China's import path of bulk agri-products? These issues are need to be deep studied since they're of great strategic significance for the structure reform of supply-side and the stabilization of agriculture production.

Scholars have also conducted a multi-angle studies about the imports of agri-products of China. As far as the quantity of import, some scholars put forward the China's grain import threat theory in 1990s. The theory suggests, with the development of industrialization, there would be a big gap between China's grain supply and demand, and China would import a large amount of grains from the international market, no enough amount left for other importers, which

would cause African poor countries under hungry [3]. Chinese scholars believe that China could achieve basic self-sufficiency with technological growth and will not buy out grains of world market [4]. Since then, China's bulk agri-products have maintained a basic self-sufficiency, only moderate import for variety adjustments. The appropriate imports of agricultural products are conducive to optimizing the allocation of domestic agricultural resources, meeting the diverse needs of residents, and better ensuring food security [5]. In recent years, the output, import and inventory of domestic agricultural products increase simultaneously. Since 2013 the central government put forward the reform of supply-side and emphasizes the imports of bulk agri-products should be moderate [6]. Scholars have also elaborated factors that affect the imports of agricultural products from various perspectives, such as the impact of tariff reduction and removal of non-tariff barrier [7,8], rising consumption level of Chinese residents, appreciation of RMB and US\$ exchange rate [9,10], increasing domestic demand and rising labor costs of agricultural products [11], decreasing domestic supply and lower import prices of agricultural products [12], changes in dietary structure of residents, declining international oil prices [13] and the effects of SPS measures and FTA rules of origin exception arrangements on agricultural products [14,15]. Regarding the path of agricultural import growth, Zhang and Zhu believed that quantity margin increase is the main reason of the surging import [16]. Ge and Li found that China's imports from Central Asia are mainly driven by the extensive margin [17], while Zhao hold that quantity margin is the main mover of rapid growth of feed import [18]. Sun and Li find that China's grain import grows along the intensive margin before entering WTO and along both extensive margin and intensive margin after joining WTO [19].

The above literatures have conducted a relatively comprehensive study on China's agricultural imports, and have given some remarkable policy recommendations. However, the following areas are in need of improvement: (1) Research objects of the existing literatures are either the whole agricultural products, or certain breed such as soybean, feed and so on, but there still lack research taking the bulk agri-products as a whole. In fact, the imports of bulk agri-products accounted for more than 80% of China's agricultural import, and directly affected China's food security strategy; (2) Regarding the research methods, although there are also

studies using binary margins or ternary margins for analysis, most of them only use static analysis and lack dynamic investigation, hence it'd hard to reflect the trends in different time periods. (3) Most literatures use trade data after China's accession to WTO, but China's imports of bulk agri-products, begin rapid growth since the mid-1990s. Data after China's accession to WTO couldn't reflect the real reality of agricultural trade. Based on these reasons, the main contribution of this paper is to examine the growth paths of China's bulk agri-products import from the static and dynamic perspectives using the data encoded by HS6 bits from 1995 to 2018 and the method of ternary margins. It tries to display the micro-structure and changing trend of China's import trade since the mid-1990s, expects to provide a basis for the future supply-side structural reform and for safeguarding of food security.

## 2. MODEL AND DATA

### 2.1 Model

At present, the decomposition framework of trade growth is mainly based on the heterogeneous firm theory proposed by Melitz [20] and Bernad [21]. They believe that trade is extended by along the path of developing new market or new product and (or) along path of keeping old market or old product. Then the binary marginal framework is widely used to decompose trade growth into two dimensions: breadth and depth. Breadth extension means along new market, new product, while the depth indicates old market or old product. Since depth extension still can't reveal quantity and price information, Hummels and Klenow put forward the analysis frame work of ternary margins [22], which further decomposes the intensive margin into price margin and quantity margin. This paper studies the extensive, price and quantity margin of China's import growth of bulk agri-products by using the ternary marginal method of Hummels and Klenow. The basic formulae are as follows:

$$EM_{jm} = \frac{\sum_{i \in I_{jm}} p_{rmi} x_{rmi}}{\sum_{i \in I_{rm}} p_{rmi} x_{rmi}} \quad (1)$$

$$IM_{jm} = \frac{\sum_{i \in I_{jm}} p_{jmi} x_{jmi}}{\sum_{i \in I_{jm}} p_{rmi} x_{rmi}} = P_{jm} \times Q_{jm} \quad (2)$$

$$P_{jm} = \prod_{i \in I_{jm}} \left( \frac{p_{jmi}}{p_{rmi}} \right)^{w_{jmi}} \quad (3)$$

$$Q_{jm} = \prod_{i \in I_{jm}} \left( \frac{q_{jmi}}{q_{rmi}} \right)^{w_{jmi}} \quad (4)$$

In the formula (1)-(4),  $EM_{jm}$  is the extensive margin, a ratio of China's import values that coinciding with the import varieties of world over world total import value. The larger the ratio, the more varieties China import.  $IM_{jm}$  stands for an intensive margin, a ratio of China's import value over world total import value among the varieties that China coincides with the world. The larger the ratio, the more values China import in same variety.  $j$ ,  $m$  and  $r$  represent China, exporting countries and world respectively, and the exporting country is the 59 import source countries/regions of China's bulk agri-products.  $i$  refers to varieties.  $p_{rmi}$  &  $x_{rmi}$  denote the price and quantity of products  $i$  that the world imported from country  $m$ , while  $p_{jmi}$  &  $x_{jmi}$  denote the price and quantity of products  $i$  that China imported from country  $m$ .  $I_{rm}$  &  $I_{jm}$  represent the variety aggregation of bulk agri-products that world/China imported from country  $m$ .  $P_{jm}$  &  $Q_{jm}$  denote price margin and quantity margin,  $q_{jmi}$  &  $q_{rmi}$  denote the quantity of product  $i$  that China and the world imported from country  $m$ .

$$w_{jmi} \text{ is the weight, } w_{jmi} = \frac{\frac{s_{jmi} - s_{rmi}}{\ln s_{jmi} - \ln s_{rmi}}}{\sum_{i \in I_{jm}} \frac{s_{jmi} - s_{rmi}}{\ln s_{jmi} - \ln s_{rmi}}} \quad (5)$$

$s_{jmi}$  and  $s_{rmi}$  indicate the share of import value of product  $i$  in the total value of bulk agri-products that China and the world imported from country  $m$ .

$$s_{jmi} = \frac{p_{jmi} x_{jmi}}{\sum_{i \in I_{jm}} p_{jmi} x_{jmi}} \quad (6)$$

$$s_{rmi} = \frac{p_{rmi} x_{rmi}}{\sum_{i \in I_{jm}} p_{rmi} x_{rmi}} \quad (7)$$

In order to analyze the import of China's bulk agri-products in general, it is necessary to sum up the import amount from different countries. The formulae are as follows:

$$EM_j = \prod_{m \in M} (EM_{jm})^{\alpha_{jm}} \quad (8)$$

$$IM_j = \prod_{m \in M} (IM_{jm})^{\alpha_{jm}} \quad (9)$$

$$P_j = \prod_{m \in M} (P_{jm})^{\alpha_{jm}} \quad (10)$$

$$Q_j = \prod_{m \in M} (Q_{jm})^{\alpha_{jm}} \quad (11)$$

Among them,  $\alpha_{jm}$  indicates the proportion of China's import value from country  $m$  ( $m < M$ ,  $M = 59$ ) over China's total import value.

For cross-period comparison, the import ratio in different periods is as follows:

$$\frac{R_{t+s}}{R_t} = \frac{EX_{t+s}}{EX_t} \times \frac{P_{t+s}}{P_t} \times \frac{Q_{t+s}}{Q_t} \tag{12}$$

By taking the logarithm of both sides of formula (12), we obtain the growth rate:

$$g_r = g_{ex} + g_p + g_q \tag{13}$$

Among them,  $g_r$  is the import growth rate of bulk agri-products,  $g_{ex}$ ,  $g_p$  and  $g_q$  are the growth rates of extensive, price and quantity margin respectively. The contribution rate of each margin is the proportion of each marginal growth rate in the total growth rate of import value. The formulae are as follows:

$$r_{ex} = \frac{g_{ex}}{g_r} * 100\% \tag{14}$$

$$r_p = \frac{g_p}{g_r} * 100\% \tag{15}$$

$$r_q = \frac{g_q}{g_r} * 100\% \tag{16}$$

## 2.2 Data source

There is no unified statistical caliber for bulk agri-products in countries or international organizations. According to the definition of the Ministry of Agriculture of China, this paper selects seven categories as bulk agri-products including wheat, corn, soybean, cotton, rice, vegetable oil and sugar. The data used in this paper are from WITS database, includes the amount and quantity of HS6-bit coded

agricultural products China and the world imported from 1995 to 2018. After excluding the unusual data, which are of zero values, 4,997,394 samples are left and will be used in the calculation.

## 3. EMPIRICAL RESULTS

We have the following finds after using the formulae in Section 2.

### 3.1 Import of Bulk Agri-Products is Mainly Driven by Quantity Margin

Table 1 shows the static ternary marginal result of China's bulk agri-products imported from 59 countries during 1995 to 2018, from that we find: (1) the extensive margin of China's import of bulk agri-products is basically stable at near 90%, with slightly fluctuation; while intensive margin increase by 170.89% during the samples period, with an average annual growth of 7.43%. We conclude that the import growth is mainly along the intensive margin; (2) the price margin experiences a process of rising first and then falling, with the total growth of 4.72%. However, it is noticeable that the price margin has remained above 100% since 1999 (except in 2011 and 2013), indicating that China's import price is higher than the world average; (3) the quantity margin shows a rapid growth trend, with a total growth of 144.38%, and the average annual growth is 6.28% since China accession to the WTO. We conclude that the growth of quantity margin is the main reason for the import growth of China's bulk agri-products, which is consistent with the import growth mode of China's

**Table 1. Analysis of ternary margin of China's import of bulk agri-products from 1995 to 2018**

Year	EM (%)	IM (%)	P (%)	Q (%)	Year	EM (%)	IM (%)	P (%)	Q (%)
1995	91.48	13.81	96.43	15.18	2007	86.92	19.95	103.92	19.41
1996	90.66	11.19	93.89	12.48	2008	88.92	20.03	100.72	20.06
1997	88.56	9.40	97.22	9.86	2009	91.41	23.07	100.04	23.16
1998	88.38	8.82	98.22	9.15	2010	92.31	24.41	101.03	24.27
1999	82.87	9.30	100.59	9.64	2011	89.93	23.84	99.94	23.96
2000	81.70	12.12	115.79	10.73	2012	92.92	28.76	100.45	28.79
2001	82.70	12.79	115.15	11.50	2013	93.93	28.96	99.53	29.19
2002	85.78	13.06	105.97	12.75	2014	94.48	27.57	101.25	27.30
2003	90.91	17.30	105.79	16.83	2015	93.63	28.00	101.29	27.72
2004	90.23	18.19	107.35	17.53	2016	92.06	29.00	101.31	28.66
2005	89.95	18.27	106.04	17.71	2017	91.15	30.41	100.18	30.52
2006	88.59	20.54	107.15	19.33	2018	94.58	37.41	100.98	37.09
T. G.R	3.39	170.89%	4.72%	144.33%	A.G.R	0.15%	7.43%	0.27%	6.26%

Source: The author calculates based on WITS data. T.G.R means total growth rate, A.G.R annual growth rate

agricultural products [23]. So we can easily conclude that the import of bulk agri-products in China from 1995 to 2018 is mainly driven by the quantity margin, while the price margin contributes a little and the extensive margin rarely contribute to the import growth.

### **3.2 The Growth of Quantity Margin Experiences Four Stages**

According to fluctuations combining the economic events, this paper divides the period of 1995-2018 into four stages: Pre-WTO (1995-2001), the rapid growth period after joining WTO (2002-2008), after the financial crisis (2009-2012) and the new normal period (2013-2018). The results show that (Table 2): (1) during 1995-2001, proportion of imports drop by 14.45%. Since then, China experience rapid growth (56.04%) after China's accession to the WTO and medium growth (26.37%) after the financial crisis, while proportion of imports also shows a medium growth (29.21%) in new normal period; (2) during 1995-2001, extensive margin are in a declining state. After China's accession to the WTO, the growth of extension margin is relatively fast, then it becomes slowly, with growth rates of 3.66%, 1.65% and 0.69% respectively. This result shows that the varieties of imported agri-products are increasing continuously after China joining the WTO, but they show slow down since 2008; (3) the most prominent features of the price margin is the sharp rise pre-WTO and the decline after that until the financial crisis. The rise may due to the Asian financial crisis, and the decline is attribute to the reducing the tariffs and cancelling the non-tariff barriers after China accession to WTO; (4) the change of quantity margin shows consistently with the change of import of bulk agri-products, and this result support the conclusion that the import of bulk agri-products is driven by quantity margin; (5) In the four stages, the contribution rate of quantity margin is between 92% to 167%, which is much higher than the extensive margin and price margin and the contribution of price margin changes from negative to positive, while the extensive margin from positive to negative. From the dynamic analysis, we find the conclusion that import of bulk agri-products is driven by quantity margin is consistence with the static analysis.

### **3.3 The Quantity Margin Grow Rapidly from Major Source Countries**

The import source markets of China's bulk agri-products are highly concentrated. According to

the analysis of the top five source countries (Table 3), this paper finds: (1) As far as the extensive margin is concerned, Argentina declines by 48.51% during the sample period, while Indonesia increases by 32.62%. (2) Only the price margin of US increases by 6.32%, while those of the other four countries have declined, of which Malaysia declines by 14.13%. (3) In terms of quantity margin, except Malaysia declining by 49.67%, and US declining by 16.51% because of the US-china trade war, other three countries increase rapidly. Argentina has increased by 6.58 times, the largest increase in all. One reason is China's increasing demand for soybeans and soybean oil with the economic development. Another reason is Argentina government cut export tax since 2015 to promote export. These jointly lead the result that Argentina export quantity to China increased from 105 tons in 1995 to 880 tons in 2018. Overall, Brazil's extensive margin increases by 5.76% during the sample period, while its price margin decreases by only 1.28% and its quantity margin increases by 325.21%. In 2013, Brazil surpasses the United States and becomes the biggest source of China's import of bulk agri-products and the great winner of Chinese market. In 2018, China imports 75% of its total imports of bulk agri-products from Brazil due to the trade war between China and US.

### **3.4 The Decreasing Price Margin of Soybean Leads to Its growing Quantity Margin**

Table 4 measures the contribution of each margin on import growth of seven bulk agri-products. (1) Overall, the contribution of quantity margin is the largest, reaching 94.68%, while the price margin and extensive margin contributes only 3.10% and 2.22% respectively. The conclusion is consistent with the results of static analysis that the increase of quantity margin is the main reason of the growth of China's import of bulk agri-products. (2) The imports of vegetable oil, wheat and sugar are declining, the main reason for which is the decrease of quantity margin. In addition, the import price of vegetable oil has decreased slightly, as well as the import varieties of wheat. However, compared with the quantity, the contribution of other factors is negligible. (3) The proportion of imports of soybean, maize, cotton and rice show increase, and soybean increase by 18.72 times, is by far the largest. The ternary margins of cotton and rice are all growing, but the great contributor, quantity margin for them, are 79.11% and

**Table 2. Growth rate and contribution rate of ternary margin over four stages**

Period	$g_r$ (%)	$g_{em}$ (%)	$g_p$ (%)	$g_q$ (%)	$r_{em}$ (%)	$r_p$ (%)	$r_q$ (%)
1995-2001	-14.43	-9.60	19.41	-24.24	66.53	-134.51	167.98
2002-2008	56.04	3.66	-4.95	57.33	6.53	-8.83	102.30
2009-2012	26.37	1.65	0.41	24.31	6.26	1.55	92.19
2013-2018	29.21	0.69	1.46	27.06	2.36	5.00	92.64

Source: The author calculates based on WITS data

**Table 3. Analysis of ternary margin of different import source countries in 1995 and 2018**

Country	1995			2018			Growth rate		
	EM (%)	P (%)	Q (%)	EM (%)	P (%)	Q (%)	EM (%)	P (%)	Q (%)
US	98.44	102.25	9.69	98.85	108.71	8.09	0.52	6.32	-16.51
Brazil	93.47	101.49	16.70	98.85	100.19	71.01	5.76	-1.28	325.21
Argentina	82.38	107.40	3.60	42.42	100.93	27.30	-48.51	-6.02	658.33
Malaysia	96.80	113.47	14.98	99.17	97.44	7.54	2.45	-14.13	-49.67
Indonesia	74.22	95.72	5.51	99.41	95.29	15.70	32.62	-0.45	184.94

Source: The author calculates based on WITS data

**Table 4. Growth rate and contribution rate of different varieties of bulk agri-products in 1995-2018**

Category	$g_r$ (%)	$g_{em}$ (%)	$g_p$ (%)	$g_q$ (%)	$r_{em}$ (%)	$r_p$ (%)	$r_q$ (%)
Overall	152.44	3.39	4.72	144.33	2.22	3.10	94.68
Soybean	1872.41	25.32	-2.91	1850.00	1.36	-0.16	98.80
vegetable oil	-31.73	6.59	-3.88	-34.44	-20.77	12.23	108.54
Cotton	69.61	2.35	12.19	55.07	3.38	17.51	79.11
Wheat	-53.65	-0.05	26.44	-80.04	0.09	-49.28	149.19
Maize	92.77	-0.75	-3.57	97.09	-0.81	-3.85	104.66
Rice	42.52	1.63	17.07	23.82	3.83	40.15	56.02
Sugar	-31.97	2.30	9.98	-44.25	-7.19	-31.22	138.41

Source: The author calculates based on WITS data

56.02% respectively. The import growth of soybean and maize is mainly caused by the growth of quantity margin while the price margin decreases slightly. This indicates that soybean and maize have high price elasticity so that a slight decline in prices led to a rapid increase in import quantity.

#### 4. REASON INVESTIGATIONS

This paper finds that the rapid import growth of bulk agri-products is mainly driven by the quantity margin, which is robust in terms of dynamic analysis, importing source-country analysis and main varieties products analysis. We explore the reasons from following perspectives.

Firstly, from demand side, the pursuit of higher life quality with the increase of consumers' income has resulted in the demand for bulk agri-products. From 1995 to 2018, China's per capita GDP increased from \$609 to \$9608. With the

improvement of living standards, people's dietary structure has changed. Instead of the direct consumption of grains, Chinese consumers increase the consumption of meat, eggs and milk that transformed from grain but consuming more grains such as a one kg beef consuming 7 kg grains. Soybean is the main raw material of edible oil, and also important sources of feedstuff. In 2018, China imported 88.03 million tons of soybeans, accounting for 74.60% of the imports of bulk agri-products and 62.88% of trade soybean in international market. Therefore, the import growth of bulk agri-products is mainly based on need of improving domestic living standards.

Secondly, from policy perspective, the reduction of tariff and remove of non-tariff barriers facilitate the foreign products entering Chinese market. After joining the WTO in 2001, China has cut import tariff and remove majority of non-tariff barriers, and implements quota management for wheat, rice and maize, the average import tariffs

**Table 5. Unit production comparison between China and US in 2018 unit (kg/mu)**

Varieties	Maize	Soybean	Rice	Wheat	Cotton
China	411	121	456	343	119
US	756	238	561	213	56
US/China	1.84	1.97	1.23	0.62	0.47

*Data source: USDA, China National grain and Oil Information Center*

within quota is only 1%, outside the quota is 65%. For example, the tariff is 1% for wheat within quota, but the general tariff is as high as 180%. Even though the maize is limited by quota, the great substitute of maize, sorghum and barley, the import tariffs are 2% and 3% respectively. The tariff of cassava is almost zero for the imports from Southeast Asia countries, with China has signed free trade agreements. Opening up policy has removed barriers and reduced import costs, strengthening the advantage of foreign exporters, partially explain the rapid growth of quality margin of bulk agri-products.

Thirdly, from supply side, China has less advantage for producing the land intensive products. China's agriculture had a weak innate foundation, reflected in the natural resources, such as little cultivated land per capita and deficient water, and the backward agricultural technology, which is far from the developed countries. The resource endowment determines China has low productivity but high price in producing land-intensive products, such as bulk agri-products. For example, the unit yield of Chinese soybean is only half of the US level (Table 5), lacking comparative advantage. The quality is also behind, as far as the soybean's oil yield is concerned. Therefore, the sown area of domestic soybean since 2009 has been sharply reduced year by year, result a big shortage in Chinese market. In addition, with the development of Chinese economy, the rising price of land, labor and other factors in agricultural production mean the increasing cost of bulk agri-production. In order to protect farmers' enthusiasm to grow grain, Chinese government raise the purchasing price, leading to a higher domestic prices than international market prices [24]. For example, Chinese domestic price of maize is 2200 yuan plus per ton, but the import CIF price is about 1600 yuan. The after-tax price of imported bulk agri-products become the ceiling of the domestic price of bulk agri-products [25].

Last but not least, from the perspective of market price, price differentials at home and abroad

induce a large number of unnecessary imports. At present, since the prices of China's bulk agri-products in domestic market are higher than that in the international market, domestic processing enterprises prefer to import a large number of low-price, high-quality products from abroad even though domestic production has exceeds demand, result in a large amount unnecessary import. Sometimes their import price is higher than international average, owing to large country effect, but still lower than domestic price. In Chinese market, there's a strange phenomenon, i.e. foreign goods enter the market but domestic goods enter into the warehouse. The production, import and inventory of bulk agri-products increase simultaneously. Unnecessary import has partly exaggerated the contribution of quantity margin.

## 5. CONCLUSIONS AND POLICY SUGGESTIONS

The land-intensive bulk agri-products change dramatically after China accession to WTO. Currently they account for majority import of China's agricultural products and nearly 95.28% of trade deficit. Nearly all varieties are net import even though the productions are increased continuously. The increase of non-essential imports and the over-import have resulted in the predicament of foreign goods entering the market but domestic produce entering the warehouse and the production, import and inventory of bulk agri-products increase simultaneously. In order to explore the impetus of bulk agri-products, this paper uses the method of ternary margin based on HS6-bit encoding agricultural trade data of WITS database from 1995 to 2018, to study the growth path of China's bulk agricultural import from static and dynamic perspectives respectively. The study finds that the growth of import of bulk agri-products is mainly driven by the quantity margin, and the contribution of price margin is small, while the extensive margin has few contributions. The conclusion is robust in term of time periods, major source countries and main varieties. The reasons for the import growth of bulk agri-products driven by quantity margin include the demand for improve living standards,

opening up policy facilitating foreign supplier, innate short of advantage in domestic production and non-essential import due to price gap at home and abroad.

Based on the above conclusions, this paper argues that the following two points should be strengthened: (1) Import moderately and decentralize the import risks. The risks of the market concentration and independence foreign supplier on bulk agri-products are quite high. One is large country effect, means China pay high price when she buy in international market. Even as a large country, China lacks the power of price and voice. Another is trade risk. If trade relationships between China and trade partners become worse, the trade would be greatly affected. Therefore, China needs to make full use of two markets, two resources to build an efficient and stable supply chain for importing bulk agri-products. China should broaden trade channels, diversify import markets, to reduce market concentration, and strengthen the construction of the futures market for bulk agri-products and enhance China's voice on the prices of bulk agricultural products. (2) Promoting the structural reform of domestic supply-side and improving the supply quality of bulk agri-products. The government needs to improve the agricultural innovation and technology level, to change the traditional extensive and decentralize mode of agriculture, for improving the efficiency of agricultural production, and supply quality of bulk agricultural products by practicing large-scale mechanized production of agriculture.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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