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by

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The Extensive Margin of International Trade in a Transition Economy: The Case of Mongolia*

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Abstract

Using the Kehoe and Ruhl (2013) methodology, we investigate whether the variety of traded goods, which is the extensive margin of trade, has actually changed in a transition economy, such as Mongolia, as predicted by recent theoretical models. Answering this question would be interesting especially for the transition economies that still have an observer status in the World Trade Organization (WTO). We find large increases in the extensive margin of Mongolia's trade with 10 major trade partners from 1997 to 2002, when Mongolia was undergoing significant structural reforms. We also find further increases in the extensive margin for the Mongolia-China and Mongolia-EU pairs after trade liberalizations due to China's accession to the WTO (2001) and Mongolia's eligibility for the EU Generalized Systems of Preferences (GSP+) scheme (2005). We, however, find no or relatively small further increases in the extensive margin for the Mongolia-Russia pair during the period 2002 to 2007, when there was no major change in the trade regime of these two countries. Our robustness checks indicate that methodologies other than that of Kehoe and Ruhl's overstate the extensive margin growth in Mongolia with small trade relationships.

Keywords: Mongolia, transition economies, extensive margin, structural change, trade liberalization, business cycles, small trade relationships

JEL classifications: F13, F14

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1. Introduction

Since 1990, Mongolia has been undergoing a dramatic transition from a centrally planned economy to a free market economy. During the period 1997 to 2002, Mongolia underwent significant structural reforms. To enhance and strengthen its trade relationships, Mongolia became a member of the World Trade Organization (WTO) in 1997 and applied for the Generalized Systems of Preferences (GSP) of several large economies.¹ As a result, in 2008, Mongolia was a beneficiary of preferential schemes of Japan, the U.S., the EU, and Canada.² Thus, the composition of Mongolia's trade most likely drastically changed during this transition period.

In fact, recent theoretical models (e.g., Melitz, 2003; Yi, 2003; Arkolakis, 2010) predict that significant structural changes and trade liberalization have an effect on the extensive margin of trade.³ Changes in the extensive margin of trade are changes in the variety of traded goods driven by countries starting to trade goods that they had not traded before. Changes in the intensive margin of trade, on the other hand, are changes in trade volumes of goods that were previously traded.

This raises the empirical question: Has the extensive margin of trade actually changed in response to structural reforms or trade liberalization in the transition economy of Mongolia? Answering this question would be interesting especially for the Central Asian transition economies such as Uzbekistan, Turkmenistan and Azerbaijan that still have an observer status in the WTO as well as other small economies that still have trade barriers.

This paper uses the Kehoe and Ruhl (2013) methodology to answer this empirical question. Kehoe and Ruhl (2013) have proposed a methodology for measuring changes in the extensive margin of trade. They measure the growth in the extensive margin by the growth in the least traded goods. They classify the set of goods, which accounts for only 10 percent of trade, as the least traded goods. Growth in the least traded goods indicates that a country started exporting

¹ See Milthorpe (1997) for Mongolia's commitments as a WTO member and the particular issues for transition economy applicants for accession to the WTO.

² Mongolia has not yet signed any regional or bilateral free-trade agreements (FTAs), but the government is considering several FTAs with its main trading partners.

³ The extensive margin has recently been proven useful in understanding firm-level export patterns (Melitz, 2003; Arkolakis, 2010) and the growth in aggregate trade volumes (Yi, 2003). Kurokawa (2011) demonstrates the possible importance of the extensive margin of imports in understanding the increase in skill premium in wages.

(importing) goods that it had not exported (imported) before or had exported (imported) only in small quantities, indicating that the variety of exports (imports) increased in this country.⁴

Applying their methodology, we find large increases in the extensive margin of Mongolia's trade with 10 major trade partners during the period 1997 to 2002, when Mongolia was undergoing significant structural reforms.⁵ We also find further increases in the extensive margin for the Mongolia-China and Mongolia-EU pairs after trade liberalizations due to China's accession to the WTO (2001) and Mongolia's becoming eligible for the EU GSP+ scheme (2005), respectively.⁶ We, however, find no or relatively small further increases in the extensive margin for the Mongolia-Russia pair during the period 2002 to 2007, when there was no major change in the trade regime of these two countries. The results support the Kehoe and Ruhl (2013) hypothesis that the extensive margin growth is driven by trade liberalization or structural change but not by the usual turbulence of business cycles. The results are also compatible with those of Helpman et al. (2008). Estimating a gravity equation, they show that the effect of the extensive margin of trade varies across country pairs according to the characteristics of trade partners.

Of course, there are other studies that also apply the Kehoe and Ruhl methodology to measure the extensive margin of trade, as does our paper. Mukerji (2009) studies the liberalization of trade in India in the 1990s. Sandrey and van Seventer (2004) study the liberalization of trade brought about by the Closer Economic Relationship agreement between Australia and New Zealand starting in 1988. Dalton (2014) studies the change in the extensive margin of trade between Japan and China after China's entry into the WTO in 2001. Dalton (2017) studies the change in the extensive margin of trade between Austria and the ten new entrants to the EU in 2004. Cho and Díaz (2018) analyze the role of the extensive margin in the Baltic countries' trade growth between 1995 and 2008. Cho et al. (2018) analyze the changes in the extensive margin of bilateral trade following the FTAs signed by Korea between 2004 and

⁴ One may be concerned that the total number of traded goods can decline if most of the traded goods become to be un-traded anymore as the least traded goods become to be traded more. We, however, confirmed that, in the episodes to be studied in our paper, there were much more births than deaths of traded goods when the share of the least traded goods increased.

⁵ Japan's share in the Mongolian total trade was 22 percent in 1996.

⁶ China's share in the Mongolian total trade was 40.5 percent in 2001, and the EU's share 11.3 percent in 2005. The EU GSP is the system of preferential trading arrangements through which the EU extends preferential access to its markets to developing countries and economies in transition. In 2005, the EU introduced a new GSP+ scheme that envisages additional tariff privileges. The GSP+ scheme includes approximately 7,200 descriptions of goods that are admitted to the EU market without customs taxes.

2008. As does our paper, all of these studies show that extensive margin growth coincides with trade liberalization.

There are also many studies that have determined the importance of the extensive margin using methodologies other than the methodology by Kehoe and Ruhl (2013).⁷ Evenett and Venables (2002), for example, find that one-third of the increase in exports of developing countries between 1970 and 1997 can be explained by the extensive margin growth. Kang (2004) shows that the extensive margin played a more important role in export growth than did the intensive margin in Korea and Taiwan. Hummels and Klenow (2005) investigate cross-country differences in trade and find that the extensive margin accounts for 60 percent of the increased exports of larger economies. Studying the growing varieties of U.S. imports from 1972 to 2001, Broda and Weinstein (2006) find that ignoring the increase in varieties leads to an overstatement of inflation by 1.2 percentage points per year, which is equivalent to an extra 2.6 percent increase in the GDP during the period. Felbermayr and Kohler (2006) find that the extensive margin was more important in the world trade growth between 1950 and 1970 and again in the mid-1990s, while the intensive margin was more important during the intervening period. Besedes and Prusa (2011) examine and compare the developed and developing countries based on their extensive and intensive export margins.

In this line of literature, our paper makes the following contributions. First, the methodology by Kehoe and Ruhl (2013) for measuring the extensive margin has been applied to developed countries or economically large developing countries with large trade relationships. Our paper now applies the methodology to the transition economy of Mongolia, which is an economically small developing country with small trade relationships. To the best of our knowledge, this paper is the first to apply the Kehoe and Ruhl methodology to Mongolia. In fact, it is the first to provide a comprehensive analysis of the extensive margin of Mongolia's trade.

Secondly, our paper provides a more detailed analysis of the extensive margin growth than that of Kehoe and Ruhl's (2013). The least traded goods may incorporate some traded goods in small trade relationships, and thus, the extensive margin growth, measured by the least traded goods growth, may come from the growth of these goods. Hence, by decomposing the least traded goods into three parts—zero traded, little traded, and relatively traded goods—we check if

⁷ In Section 2, we will explain the methodology by Kehoe and Ruhl (2013) and other methodologies for measuring the extensive margin.

the extensive margin growth in Mongolia, measured by the least traded goods growth, is actually a consequence of the increases in the trade volumes of previously zero or little traded goods. We also determine types of goods that contributed to the extensive margin growth. In particular, we find that mineral resources and resources coming from livestock herding contributed most to the increase in the extensive margin of Mongolia's exports across country pairs.

Thirdly, our robustness checks support Kehoe and Ruhl's (2013) prediction that country-invariant methodologies (Evenett and Venables, 2002; Hummels and Klenow, 2005; Broda and Weinstein, 2006) overestimate the extensive margin growth for countries with small trade relationships.⁸ In fact, our results show that the extensive margin growth measured by using country-invariant methodologies is much higher than that measured by using the Kehoe and Ruhl (2013) country-variant methodology.

The rest of this paper is organized as follows. Section 2 presents the Kehoe and Ruhl (2013) methodology that we apply in our analysis of the extensive margin. In Section 3, we show the extensive margin growth results for the three episodes—structural change episodes, trade liberalization episodes, and business cycle episodes—in the case of Mongolia with its main trading partners. In Section 4, we present the robustness check, that is, the decomposition of the trade growth consistent with the Hummels and Klenow (2005) methodology.⁹ Section 5 concludes the paper and mentions future work.

2. Data and Methodology

We study detailed annual trade statistics and more specifically, Mongolian bilateral commodity trade data with its main trading partner countries. The data were obtained from the Mongolian Custom's Office disaggregated at the six-digit level of the harmonized system (HS). The HS six-digit level is the most detailed level that can be compared internationally. As Hummels and Klenow (2005) argue, by using more detailed export data, we can do better job of assigning variety differences to the extensive margin. Here, we note that as will be mentioned later, it is

⁸ Section 4 will compare results from other methodologies with those from the Kehoe and Ruhl (2013) methodology.

⁹ Hummels and Klenow (2005), using detailed trade data, decompose a nation's trade into an extensive component and an intensive component for a large cross-section of countries. They find that the extensive margin is important in explaining why big countries trade more varieties of goods than smaller countries.

fortunate that the HS code consolidations that became effective in 2002 and 2007 have no effect on our results.

For a given pair of countries, we study the 1996 to 2007 disaggregated data on annual trade flow values by good. We define a good as a six-digit code of the HS. We study different time periods depending on the episode to be considered. To measure the extensive margin, we use the Kehoe and Ruhl (2013) definition of a non-traded good. Kehoe and Ruhl classify the set of goods that accounts for only 10 percent of trade as the least traded goods. The set of non-traded goods is defined by the least traded goods, which include goods with very small amounts of trade as well as goods with zero trade.¹⁰ The Kehoe and Ruhl definition of a non-traded goods takes into account the relative importance of a good in a country's trade, rather than imposing country-invariant dollar-value cutoffs for determining whether a good is traded or not.

According to Kehoe and Ruhl (2013), to construct the set of the least traded goods for a particular trade flow, we order the HS six-digit codes by their average value of trade over the first three years of the sample. By averaging over a few years, we eliminate the ordering's dependence on the choice of the base year. We cumulate the ordered codes to form 10 sets, each representing one-tenth of the total exports (imports). The first set is constructed, starting with the smallest codes, by adding codes to the set until the sum of their values reaches one-tenth of the total export (import) value. The next set is formed by summing the smallest remaining codes until the value of the set reaches one-tenth of the total export (import) value. The first set consists of the least traded goods: the codes with the smallest export (import) values, including all the HS codes with zero trade value.¹¹

Given this system of partitioning the codes, we study two features of the data. First, we compute the change in the trade share of each of the 10 sets of codes during the sample period. The resulting statistics show the change in the distribution of the goods being traded. Second, we compute the evolution of the set of the least traded goods to find the timing of the growth in

¹⁰ According to Kehoe and Ruhl (2013), there is no absolute concept of zero in trade statistics. For example, export shipments from the U.S. (import shipments to the U.S.) are, in general, required to be reported only if the value of the shipment is greater than 2,500 U.S. dollars (2,000 U.S. dollars). A good could have trade with a number of shipments smaller than this limit and be reported as having zero trade. The minimum reporting level tends to vary across countries.

¹¹ To create sets that account for exactly 10 percent of total trade, some codes had to be split.

these goods. Here, we note again that fortunately, the HS code consolidations that became effective in 2002 and 2007 have no effect on our results.¹²

Figure 1, for example, shows the values of the 10 sets of codes in 1996 for Japan's exports to Mongolia; the total value of each set of codes is equal to 0.10 of Japan's total exports to Mongolia by construction. The numbers above each bar in the figure are the number of goods needed to account for 10 percent of the trade flow. The distribution of trade is skewed, that is, it requires 1170.74 least traded goods, 526 codes (Table 1.a) of which have zero recorded export value in 1996, to account for 10 percent of the total exports from Japan to Mongolia.

The bars in Figure 1 are the fractions of trade in 2005, after 9 years, which include the period 1997 to 2002, which is the period of structural changes. To interpret these statistics, we consider the following two extreme cases. First, if the growth in trade were driven only by a proportional increase in the value of all the already traded goods, that is, if the growth in trade were entirely on the intensive margin, each set of codes would retain its one-tenth share in trade. Thus, the bars in Figure 1 would all be 0.10. Second, if the growth in trade were driven only by trade in goods that were not previously traded, that is, if the growth was only on the extensive margin, the set of least traded goods would gain trade share. The trade shares of the other sets, on the other hand, would decline.

As shown in Figure 1, the movements of the trade shares of the highest 9 sets of goods are not uniform, but the data have a very large positive spike in the share of trade accounted for by the least traded goods. The 1170.7 least traded goods that account for 10 percent of Japan's exports to Mongolia in 1996 account for 28.4 percent of those same goods in 2005.

In addition, in Table 1.a, we present the decomposition of the Kehoe and Ruhl extensive margin in three parts. These include zero traded goods, little traded goods or goods with positive traded values that are less than or equal to 50,000 U.S. dollars, and relatively traded goods or goods with a trade value that is greater than 50,000 U.S. dollars. In this way, we are able to present the origins of the actual growth. As Table 1.a shows, the increases in Japan's exports of the least traded goods to Mongolia are spread across many goods. The 526 least traded goods

¹² According to the HS consolidation check file provided by Cebeci (2012), if a specific HS six-digit code appears in the 'Sorted by original HS' sheet, the code was affected by the consolidation operations. Otherwise, the code did not change across HS 1996, 2002, and 2007 classifications and thus it was not affected by the consolidation operations. We checked that in our data, all of the HS six-digit codes that do appear in the 'Sorted by original HS' sheet were zero traded during the periods to be studied, and thus these codes do not affect the change in the trade share of each of the 10 sets of codes.

that have zero recorded export value in 1996 have positive recorded export value in 2005, and exports of these goods account for 12.0 percent of the exports from Japan to Mongolia in that year. The share of the 618 least traded goods that were little traded in 1996 increased from 6.1 percent to 10 percent in 2005.

Using the same division of codes, our second computation focuses only on the set of the least traded goods. For each of the sample years, we compute the share of the total trade flow accounted for by the codes included in the least traded goods. Figure 3, for example, shows the evolution of the least traded goods in 1996. As in the first computation, if there was an extensive margin growth, we would observe an increase in the share of the least traded goods. An increase in the share of the least traded goods that coincides with the implementation of structural reform or trade liberalization indicates the link between the reform or liberalization and the growth in the extensive margin.

It is worth noting that the method by Kehoe and Ruhl (2013) applied in our study for measuring the extensive margin is different from methods used in the few previous studies on the extensive margin. Hummels and Klenow (2005) and Broda and Weinstein (2006), for example, classify a good as not traded if the value of trade is zero, and Evenett and Venables (2002) classify a good as not traded if its yearly value of trade is less than or equal to 50,000 U.S. dollars (1985), regardless of the country being studied. According to Kehoe and Ruhl's definition of a non-traded good, goods with very small, but non-zero, amounts of trade can be considered, and the actual dollar value of the cutoff can differ across countries. In fact, as mentioned in the introduction, the method by Kehoe and Ruhl has been widely used. Sandrey and van Seventer (2004), Mukerji (2009), Kurokawa (2011), Dalton (2014, 2017), Atolia and Kurokawa (2016), Cho and Díaz (2018), and Cho et al. (2018), for example, use their method to measure the extensive margin of trade as do we.

3. Extensive Margin Growth

Following Kehoe and Ruhl (2013), in our analysis, we consider three types of episodes involving bilateral country pairs: (1) structural change episodes involve periods of rapid trade growth that are driven by significant structural transformation; (2) trade liberalization episodes involve a major change in the trade regime between country pairs; and (3) business-cycle episodes are

episodes in which neither country has a significant structural transformation nor a significant change in trade policy. The business-cycle episodes allow us to observe how the extensive margin responds to the usual turbulence of business cycles.

3.1. Structural change episodes

As mentioned in the introduction, recent theoretical models predict that significant structural changes are accompanied by a significant restructuring of the composition of a country's trade, that is, the extensive margin of trade.

Since abandoning the central planning in 1991, Mongolia has made real progress toward transforming itself into a market-based economy. Hence, the private sector share of the GDP has been increasing.¹³ Raising the living standards by finding ways to overcome the constraints of isolation, distance, and limitations of the domestic market due to the population size, however, remained Mongolia's continuing development challenge. Policymakers recognized both the need for further promoting private sector development and large-scale infrastructure investments as well as restructuring Mongolia's economy to make it more competitive and to enhance its growth. Hence, policymakers took a set of important regulatory and economic measures during 1997 to 2002 that led to a new transition process. As a result, by 2005, the private sector share of the GDP accounted for approximately 80 percent of the total economic output as compared with zero in 1991, and the foreign trade was done almost at 100 percent by private companies.

One of the measures was the opening of the country and its mineral resources to foreign trade and investment, which culminated in Mongolia's accession to the WTO and its adoption of the new minerals legislation in 1997 that was widely hailed throughout the global industry as a world-class, investor-friendly legislation. Another important legislative measure was the improvement of the foreign direct investment (FDI) law that accorded foreign investors greater security. The last amendment to the FDI law was added in 2002. Besides the overall liberalization, the government implemented social programs such as the Housing Program (1998-2005) to increase apartment supply in the capital city of Ulaanbaatar. The Housing Program had

¹³ Anderson et al. (1999) examine Mongolia's post-privatization developments, such as ownership changes and enterprise governance.

a significant impact on trade as many construction materials need to be imported due to the lack of their domestic production.

As a result of these measures, Mongolia's economy recovered by 2001, and the GDP returned to its pre-transition level of 1990. Mongolian mineral resources began to gain more attention within the country and internationally as the mining sector began to receive large FDIs. As a result, 1997 to 2005 was a period of rapid growth for Mongolian exports and imports. Exports of goods grew 6.8 fold from 155.5 million U.S. dollars in 1996 to 1,062.4 million U.S. dollars in 2005. Over this period, imports of goods grew 4.5 fold from 261.0 million U.S. dollars in 1996 to 1,173.7 million U.S. dollars in 2005.

In this section, we would like to investigate the impact of structural reforms on the extensive margin of Mongolia's trade with 10 major trade partners. We use the Kehoe and Ruhl's (2013) country-variant methodology and measure the extensive margin before and after the reforms. First, we focus on Japan. The size of trade between Mongolia and Japan represents 22 percent of the overall Mongolian trade turnover in 1996, which means that Japan was the third largest trade partner of Mongolia in that year (after Russia and China).

Figures 1 and 2 show the effect that these reforms had on the extensive margin in bilateral trade between Mongolia and Japan from 1996 to 2005. As we have mentioned in Section 2, the least traded 1170.7 goods of Japan's exports to Mongolia increased from 10 percent in 1996 to 28.4 percent in 2005 (Figure 1), which means that, as Mongolia liberalized and restructured, the composition of its imports from Japan changed. On the other hand, the least traded 286.2 goods of Mongolia's exports to Japan grew to 100.0 percent of over the same period (Figure 2), which indicates that all of the non-least-traded goods became to be un-traded over the period.

In addition, we report the shares of the least traded goods in total exports for the base (1996) and end of the period (2005) and their decomposition in Table 1.a. For example, the second line of Mongolia's exports to Japan in Table 1.a indicates that Mongolian zero traded goods of 105 grew from 0 percent in 1996 to 97.3 percent in 2005 and made the most contribution to the growth of the share of the least traded goods, whereas the share of little traded and relatively traded goods among the least traded goods fell during that period.

Figure 3 provides details regarding the timing of the extensive margin growth. It appears that structural reforms first affected Japan's exports to Mongolia. In fact, Japanese companies and companies with Japanese shareholders in Mongolia imported mining and construction equipment

such as heavy transporters and other transportation vehicles. The share of the least traded goods of Japan's exports to Mongolia increased dramatically during 1999 to 2000, while the set of least traded goods of Mongolia's exports to Japan rose from 2002 to 2004 as the mining sector started exporting. As Figure 3 shows, the share of the least traded goods of both exports significantly increased during the years of the structural reforms, ultimately reaching a higher level than before and maintaining at that level for the subsequent years. It appears that structural changes had a large effect on the extensive margin for both the exports of both countries.

This result is not unique only between Mongolia and Japan. The same growth patterns emerged for the bilateral trade between Mongolia and its other 9 main trading partners as evidenced in the results reported in Tables 1.a and 1.b. It should be noted that as the trade environment changed between Mongolia and China due to the China's accession to the WTO by the end of 2001, the extensive margin calculations between these two countries in this structural change episode were made only for the period from 1996 to 2001, thus isolating the effect of China's tariff reductions.

What were the specific growth areas? We identify the top 10 growth among the least traded goods at HS 2-digit level for Mongolia's imports and exports with its 10 main trading partners. In the case of the least traded goods in Mongolia's imports from main trading partners, the top 10 included oil, due to the large increase in the number of automobiles and mining vehicles, equipment, machinery, materials, and other consumer goods. The top 10 growth least traded goods of Mongolia's imports from main trading partners increased their share in total imports from 4.6 percent in 1996 to 9.2 percent in 2005. In the case of the least traded goods in Mongolia's exports to main trading partners, the top 10 included mineral resources, resources coming from livestock herding, and cashmere and wool textiles. The top 10 growth least traded goods of Mongolian exports to its main trading partners increased their share of 2.4 percent in 1996 to 6.3 percent in 2005.

In this section 3.1, we have described an increase in the shares of the set of the least traded goods in Mongolian trade with all of its main trading partners during the period of structural change, thus indicating the importance of these structural changes. In fact, almost all of the main trading partners produced goods related to the Mongolian policy changes from 1997 to 2002.

3.2. Trade liberalization episodes

It is difficult to specifically identify the partial impact of trade liberalization cases, such as Mongolia's accession to the WTO (1997) and Mongolia's becoming eligible for the GSP schemes of the U.S. (1999) and Japan (2000), from the impact of the structural changes during the period 1997 to 2002. Thus, in our analysis of trade liberalization, we consider two other episodes where there were further changes in the Mongolian trade environment after the structural reforms.

First, we consider a trade liberalization episode due to the accession of China to the WTO (2001). Next, we show the extensive margin changes in Mongolian exports to the EU as a result of becoming eligible for the EU GSP+ scheme (2005). A plausible hypothesis for these trade liberalization cases, according to prior research, would be that changes in the trade regime change the composition of trade.

China became a member of the WTO by the end of 2001. China's share in the Mongolian total trade was 40.5 percent in 2001. To meet the fundamental principles of the General Agreement on Tariffs and Trade (GATT) and the WTO, China committed to removing most tariff barriers by 2004, with some minor exceptions; however, all barriers were to be lifted no later than 2010. By 2004, China's average bound tariff level was to decrease to 15 percent for agricultural products, ranging from 0 to 65 percent, with the higher rates applied to cereals. For industrial goods, the average bound tariff level was to decrease to 8.9 percent, with a range from 0 to 47 percent, with the highest rates applied to photographic film, automobiles and related products.

For measuring the extensive margin in trade between Mongolia and China, we use the time period from 2001 to 2007.¹⁴ As can be seen in Figures 4 and 5, there is a significant extensive margin growth between Mongolia and China when we compare results for 2001 and 2007. The least traded 2,761.4 Chinese goods to Mongolia went from 10 percent of the total exports to Mongolia in 2001 to 78.0 percent in 2007. The least traded 479.7 Mongolian goods to China increased their shares from 10.0 percent to 40.0 percent of the total exports to China during the same time period. Figure 6 shows the dynamics of these changes. As can be seen, the increases were drastic just after China's accession to the WTO in 2001.

¹⁴ The year 2007 is chosen as an end-of-period to control the macroeconomic effects that may come from the global Lehman Brother's shock.

Table 2 summarizes the results of the trade liberalization episode between Mongolia and China. It should be noted that the Kehoe and Ruhl (2013) methodology measures the extensive margin as a set of the least traded goods and, thus, may allow some traded goods in the case of small trade relationships to account for the extensive margin growth. Therefore, we examine the decomposition of the Kehoe and Ruhl's extensive margin. Reported in Table 2 is the decomposition of the base and the end-of-period shares of the least traded goods in total exports and the number of goods that account for the shares. Upon analysis of this decomposition, we find that the extensive margin growth in trade between Mongolia and China following China's import tariff reductions comes from zero or little traded goods among the least traded goods.¹⁵

What were the specific growth areas? The data are examined to determine what accounted for the significant growth. We identify the top 10 growth among the least traded goods at HS 2-digit level for China's and Mongolia's exports where we observe an enormous increase in the traded value from 2001 to 2007. In the case of the least traded goods in China's exports to Mongolia, the top 10 included products of the printing industry, fuels, construction materials, and mining vehicles. China's top 10 growth least traded goods increased their share in total exports from 5.6 percent in 2001 to 12 percent in 2007. In the case of the least traded goods in Mongolia's exports to China, the top 10 included mineral resources and resources coming from livestock herding. Mongolia's top 10 growth least traded goods increased their share in total exports from 4.2 percent in 2001 to 14.1 percent in 2007.

Another trade liberalization case that we consider is the change in the Mongolian trade environment due to becoming eligible for the EU GSP+ (2005). The EU's share in the Mongolian total trade was 11.3 percent in 2005. We measure the Kehoe and Ruhl (2013) extensive margin by comparing 2002 and 2007, which are before and after the change in the trade regime only for Mongolian exports as it is a one-sided liberalization. Mongolia became eligible for the EU GSP+ by the end of 2005.¹⁶ Because the status is granted for the next three years only (2006 to 2008), we compare the trade statistics of 2002 and 2007. We do not consider 2008, thus eliminating the impact of the global financial crisis on the trade.

The results for the Mongolia-EU trade liberalization episode are summarized in Figures 7 and 8 and Table 2. Figure 7 shows that the least traded 519 Mongolian goods to the EU went

¹⁵ Only in the case of Mongolian exports of the least traded goods, we observe some traded goods (relatively traded goods) incorporated in the extensive margin. But the share of these traded goods declines, as shown in Table 2.

¹⁶ Practically all Mongolian export products are granted tariff-free access to the EU as a result of the GSP+.

from 10 percent of the total exports to the EU in 2002 to 33.8 percent in 2007. Figure 8 shows the timing of the increase in the extensive margin in Mongolian exports to the EU coincides with the change in the trade regime. Table 2 reports that the growth on the extensive margin comes from the growth in the share of zero or little traded goods among the least traded goods.

What were the specific growth areas? We identify the top 10 growth among the least traded goods at HS 2-digit level for Mongolia's exports to the EU where we observed an enormous increase in the traded value from 2002 to 2007. The top 10 goods included mineral resources, cashmere and wool textiles, and resources coming from livestock herding. Mongolia's top 10 growth least traded goods increased their share in total exports from 3.1 percent in 2002 to 24.4 percent in 2007.

3.3. Business-cycle episodes

We have, thus far, studied the country pairs in which there were significant structural changes or trade regime changes. We can also study country pairs in which there were no significant structural changes or trade regime changes so as to study the effects of normal business-cycle fluctuations on the extensive margin. We expect that unlike significant structural changes or trade liberalization, normal business-cycle fluctuations do not cause significant fluctuations in the extensive margin. To see how the extensive margin changes during the business cycles, we compute the same measures of extensive margin growth for the Mongolia-Russia pair during the period 2002 to 2007. Among the 10 main trade partners, only trade between Mongolia and Russia did not experience any type of liberalization during the time period that we consider.

Figures 9 and 10 demonstrate how the extensive margin changed between these two countries. As can be seen, there is little change in the share of the least traded goods in Russian exports to Mongolia during the period 2002 to 2007. In Mongolian exports to Russia, on the other hand, the share of the least traded goods increased during this period, although this increase is relatively small compared with the increases observed in other episodes. A possible reason for this increase could be the Northeast-Asian regional integration. In fact, the data show that used Korean and Japanese cars started to be exported from Mongolia to Russia during the period. Figure 11 shows that there is little or relatively small variation in the share of exports accounted

for by the least traded goods over this period. In Table 3, we show the decomposition of the changes in the share of the least traded goods.

As mentioned in Kehoe and Ruhl (2013), little or relatively small change in the extensive margin during the business cycles indicates that exporting decisions would not be trivial matters for firms. This is because firms usually face large sunk costs to establish an export operation as in Melitz (2003). Temporal changes, such as business cycles, may not induce firms to make (or abandon) large sunk investments. Large permanent changes, however, may induce firms to enter (or exit) the export markets. Ruhl (2008), for example, constructs a quantitative general equilibrium model of fixed costs under uncertainty and finds that much of the difference in the response of exports to business cycles versus trade liberalization can be accounted for by these factors.

4. Robustness Check: Decomposing Trade Growth

Using the Hummels and Klenow (2005) decomposition of trade margins, we check how the country-variant Kehoe and Ruhl (2013) characterization of the extensive margin differs from the country-invariant characterizations in the case of countries with small trade relationships such as Mongolia.¹⁷

Hummels and Klenow (2005) decompose the change in country i 's share of total imports to country j into that accounted for by the extensive and intensive margins.¹⁸ To compute this decomposition, we define a non-traded good. Thus far, we have used the Kehoe and Ruhl (2013) country-variant cutoff, that is, the least traded goods. We also use country-invariant cutoffs as in Evenett and Venables (2002), Hummels and Klenow (2005), and Broda and Weinstein (2006). We then compare the results of the decomposition under different definitions of a non-traded good.

We compute the decomposition of trade margins for the Mongolia-Japan pair in the structural change episodes and the Mongolia-China and Mongolia-EU pairs in the trade liberalization episodes and report them in Table 4. To compute the decomposition, we need data on the

¹⁷ Hillberry and McDaniel (2002) also use the Hummels and Klenow (2005) decomposition to examine the growth in U.S. trade with its North American Free Trade Agreement (NAFTA) partners, finding growth in both the extensive and intensive margins.

¹⁸ See Kehoe and Ruhl (2013) for the detailed procedure used to compute the Hummels and Klenow (2005) decomposition.

country's total imports by its six-digit HS code. Columns 1 and 2 report the decomposition when a good is non-traded according to a country-invariant cutoff value. Column 1 uses a zero cutoff value, as in Hummels and Klenow (2005) and Broda and Weinstein (2006), and column 2 uses a cutoff value of 50,000 U.S. dollars, as in Evenett and Venables (2002). The third column reports the decomposition using the country-variant 10 percent cutoff values implied by the Kehoe and Ruhl's definition of least traded goods.¹⁹

As can be seen in Table 4, the decompositions that employ different cutoffs show different results for the extensive margin growth. In contrast to Kehoe and Ruhl's findings for large trade relationships, the decomposition that uses the cutoff of strict 0 U.S. dollars presents the highest extensive margin growth while the Kehoe and Ruhl's 10 percent cutoff presents the smallest extensive margin growth among the three cutoffs. This finding reflects that countries with small trade relationships, such as Mongolia, trade less than 50,000 U.S. dollars in many of the goods, that is, there are many non-traded goods. Kehoe and Ruhl, on the other hand, find that countries with large trade relationships trade more than 50,000 U.S. dollars in almost every good, that is, there are no non-traded goods. There is thus an obvious contrast between Kehoe and Ruhl's (2013) findings for large trade relationships and our findings for small trade relationships. This supports Kehoe and Ruhl's argument that a country-invariant cutoff may understate the extensive margin in large trade relationships and overstate the extensive margin in small trade relationships.

According to Kehoe and Ruhl (2013), one possible resolution of this underestimation of the extensive margin in large trade relationships is to increase the cutoff value. However, if this increased cutoff value is country-invariant, this causes problems in small trade relationships. For example, Kehoe and Ruhl (2013) show that the country-variant 10 percent cutoff implies that any good exported from Canada to the U.S. at less than 76,122,400 U.S. dollars is non-traded, and a good exported in the amount of 76,122,400 U.S. dollars accounts for only 0.093 percent of the total trade flow. The country-invariant cutoffs, however, consider this good heavily traded. To classify these heavily traded goods as non-traded under a country-invariant cutoff, we need to increase the cutoff value. If this increased cutoff value is constant across country pairs, this creates problems measuring non-traded goods in small trade relationships. In the case of

¹⁹ Here, we take as the 10 percent cutoff value the average (over the first three years of the sample) amount of trade in the first good, which is not included in the set of the least traded goods. Of course, this 10 percent cutoff value varies across countries.

Mongolia, for example, the cutoff value of 76,122,400 U.S. dollars implies that a good valued at 64.0 percent of total Mongolian exports to the EU would be considered a non-traded good.

5. Conclusion

Using the Kehoe and Ruhl (2013) methodology, we examined Mongolia's trade data from several structural change and trade liberalization episodes in which theoretical models predict changes in the extensive margin of trade. We found large increases in the extensive margin in Mongolia's trade with 10 major trade partners during the period 1997 to 2002, when Mongolia was undergoing significant structural reforms. We also found further increases in the extensive margin for the Mongolia-China and Mongolia-EU pairs after trade liberalizations due to China's accession to the WTO (2001) and Mongolia's eligibility for the EU GSP+ scheme (2005), respectively. However, we found no or relatively small further increases in the extensive margin for the Mongolia-Russia pair during the period from 2002 to 2007, when there was no major change in the trade regime of these two countries. Thus, our findings support the hypothesis that the extensive margin growth is driven by trade liberalization or structural change but not by the usual turbulence of business cycles.

The new Kehoe and Ruhl's (2013) measure of the extensive margin may incorporate some traded goods in small trade relationships, and the growth of the extensive margin may come from the growth of these goods. Hence, we decomposed the least traded goods into three parts: zero traded, little traded, and relatively traded goods. Then, we indicated that the least traded goods growth comes from the growth of zero and little traded goods rather than from the growth of relatively traded goods. Hence, the Kehoe and Ruhl definition of non-tradedness is also consistent for the case of Mongolia.

To check the robustness of our results, we calculated Hummel and Klenow's (2005) decomposition of the import share using different cutoff values. Our results support Kehoe and Ruhl's (2013) claim that country-invariant cutoffs overestimate the extensive margin growth for countries with small trade relationships. In fact, the extensive margin growth measured by using country-invariant cutoffs is much higher than that measured by using the Kehoe and Ruhl country-variant 10 percent cutoff.

Based on our analysis, we conclude that policy measures taken by the government from 1997 to 2002 (the period of structural reforms) and the trade liberalizations have had an overall important effect on the extensive margin of trade. In particular, we find that mineral resources and resources coming from livestock herding contributed most to the increase in the extensive margin of Mongolia's exports across country pairs. Thus Mongolian government should keep the overall favorable environment for FDI to allow international market access of country's resources. On the other hand, Mongolian government should develop industries that process those resources and join with them the regional production network.

Finally, let us introduce briefly what we would like to do in the near future. As next, we would like to investigate whether the increase in the extensive margin of trade has an impact on changes in welfare in Mongolia. Arkolakis et al. (2012) show that Melitz-type models do not necessarily entail large gains from trade. Thus it would be interesting to test quantitatively whether this finding is true in the case in Mongolia.

We also would like to monitor carefully Mongolia's trade. This is important because many countries have recently begun to consider Mongolia as a new source of important materials, such as rare earth and other minerals. As a result, the extensive margin of Mongolia's trade may drastically change in the following years. In addition, it is worth to note that Russia became a WTO member in 2012. According to the Russia's commitments, Russia has agreed to lower its tariffs on trade and reduce its non-tariff barriers on a wide range of products. Hence, Mongolia and Russia may start to trade new goods, and growth in the extensive margin may contribute to the growth in trade between the two countries.

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Table 1.a. Share of least traded goods for the top 1-5 trading partners: Structural change episodes

Period	Trade flow	Share in total exports in base year	Share in total exports in end of period year	Number of least traded goods
1996:2005	Mongolia to Russia	0.1000	0.9683	278.7
	<i>Zero traded goods</i>	-	0.9491	154
	<i>Little traded goods</i>	0.1000	0.0192	124.7
1996:2005	Russia to Mongolia	0.1000	0.9949	986
	<i>Zero traded goods</i>	-	0.9926	473
	<i>Little traded goods</i>	0.1000	0.0023	513
1996:2001	Mongolia to China	0.1000	0.8822	251.1
	<i>Zero traded goods</i>	-	0.8615	124
	<i>Little traded goods</i>	0.0220	0.0064	109
	<i>Relatively traded goods</i>	0.0780	0.0143	18.1
1996:2001	China to Mongolia	0.1000	0.6597	1,420.9
	<i>Zero traded goods</i>	-	0.4934	561
	<i>Little traded goods</i>	0.1000	0.1662	859.9
1996:2005	Mongolia to Japan	0.1000	1.0000	284.16
	<i>Zero traded goods</i>	-	0.9734	105
	<i>Little traded goods</i>	0.0477	0.0109	171
	<i>Relatively traded goods</i>	0.0524	0.0157	8.16
1996:2005	Japan to Mongolia	0.1000	0.2837	1,170.74
	<i>Zero traded goods</i>	-	0.1203	526
	<i>Little traded goods</i>	0.0613	0.1001	618
	<i>Relatively traded goods</i>	0.0387	0.0633	26.74
1996:2005	Mongolia to Korea	0.1000	1.0000	144.87
	<i>Zero traded goods</i>	-	0.9986	109
	<i>Little traded goods</i>	0.0607	0.0014	30
	<i>Relatively traded goods</i>	0.0393	-	5.87
1996:2005	Korea to Mongolia	0.1000	0.6375	1,395.9
	<i>Zero traded goods</i>	-	0.4319	705
	<i>Little traded goods</i>	0.1000	0.2018	690.9
1996:2005	Mongolia to US	0.1000	0.8382	188.6
	<i>Zero traded goods</i>	-	0.6454	153
	<i>Little traded goods</i>	0.1000	0.1928	35.6
1996:2005	US to Mongolia	0.1000	0.6416	1,045.5
	<i>Zero traded goods</i>	-	0.2634	649
	<i>Little traded goods</i>	0.1000	0.3782	396.5

Source: Mongolian Custom's Office: Annual trade statistics

Table 1.b. Share of least traded goods for the top 6-10 trading partners: Structural change episodes

Period	Trade flow	Share in total exports in base year	Share in total exports in end of period year	Number of least traded goods
1996:2005	Mongolia to Germany	0.1000	0.9344	174.8
	<i>Zero traded goods</i>	-	0.8602	147
	<i>Little traded goods</i>	0.1000	0.0742	27.8
1996:2005	Germany to Mongolia	0.1000	0.7999	1,481.7
	<i>Zero traded goods</i>	-	0.5753	788
	<i>Little traded goods</i>	0.1000	0.2246	693.7
1996:2005	Mongolia to UK	0.1000	1.0000	62.96
	<i>Zero traded goods</i>	-	1.0000	58
	<i>Little traded goods</i>	0.1000	0.0000	4.96
1996:2005	UK to Mongolia	0.1000	0.9540	312.01
	<i>Zero traded goods</i>	-	0.7202	230
	<i>Little traded goods</i>	0.1000	0.2338	82.01
1996:2005	Mongolia to Italy	0.1000	1.0000	39.03
	<i>Zero traded goods</i>	-	0.9973	22
	<i>Little traded goods</i>	0.0153	0.0027	15
	<i>Relatively traded goods</i>	0.0846	-	2.03
1996:2005	Italy to Mongolia	0.1000	0.5311	375
	<i>Zero traded goods</i>	-	0.6998	210
	<i>Little traded goods</i>	0.1000	0.2366	165
1996:2005	Mongolia to Singapore	0.1000	0.4021	55.1
	<i>Zero traded goods</i>	-	0.4021	53
	<i>Little traded goods</i>	0.1000	-	2.1
1996:2005	Singapore to Mongolia	0.1000	0.4654	713.8
	<i>Zero traded goods</i>	-	0.3443	352
	<i>Little traded goods</i>	0.1000	0.1212	361.8
1996:2005	Mongolia to Hong Kong	0.1000	0.9993	70.1
	<i>Zero traded goods</i>	-	0.4533	39
	<i>Little traded goods</i>	0.1000	0.5461	31.1
1996:2005	Hong Kong to Mongolia	0.1000	0.5827	562.1
	<i>Zero traded goods</i>	-	0.5105	398
	<i>Little traded goods</i>	0.1000	0.0722	164.1

Source: Mongolian Custom's Office: Annual trade statistics

Table 2. Share of least traded goods: Trade liberalization episodes

Period	Trade flow	Share in total exports in base year	Share in total exports in end of period year	Number of least traded goods
2001:2007	Mongolia to China	0.1000	0.4000	479.7
	<i>Zero traded goods</i>	-	0.2459	321
	<i>Little traded goods</i>	0.0044	0.1019	110
	<i>Relatively traded goods</i>	0.0957	0.0522	48.7
2001:2007	China to Mongolia	0.1000	0.7800	2,761.4
	<i>Zero traded goods</i>	-	0.3141	1,606
	<i>Little traded goods</i>	0.1000	0.4659	1,155.4
2002:2007	Mongolia to EU	0.1000	0.3381	519
	<i>Zero traded goods</i>	-	0.2017	206
	<i>Little traded goods</i>	0.0337	0.0737	299
	<i>Relatively traded goods</i>	0.0663	0.0627	14
2002:2007	EU to Mongolia	0.1000	0.4107	2043
	<i>Zero traded goods</i>	-	0.2158	580
	<i>Little traded goods</i>	0.0351	0.1383	1075
	<i>Relatively traded goods</i>	0.0649	0.0565	247

Source: Mongolian Custom's Office: Annual trade statistics

Table 3. Share of least traded goods: Business cycle episode

Period	Trade flow	Share in total exports in base year	Share in total exports in end of period year	Number of least traded goods
2002:2007	Mongolia to Russia	0.1000	0.2662	427.6
	<i>Zero traded goods</i>	-	0.1404	253
	<i>Little traded goods</i>	0.0244	0.0922	158.6
	<i>Relatively traded goods</i>	0.0756	0.0336	16
2002:2007	Russia to Mongolia	0.1000	0.0920	1,562
	<i>Zero traded goods</i>	-	0.0104	218
	<i>Little traded goods</i>	0.0446	0.0389	1,344
	<i>Relatively traded goods</i>	0.0554	0.0427	170

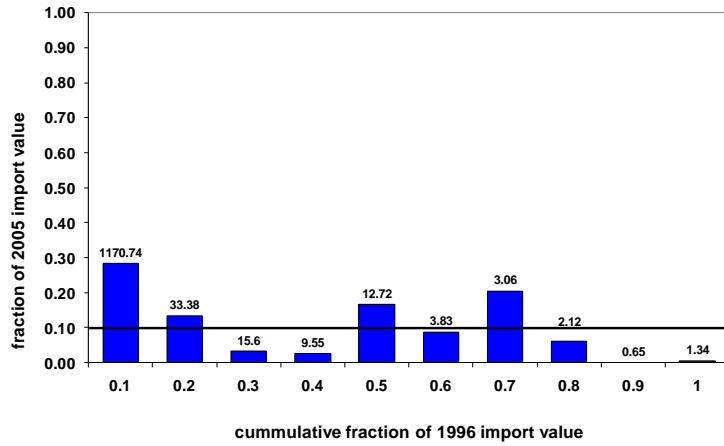
Source: Mongolian Custom's Office: Annual trade statistics

Table 4. Decomposition of trade growth under different cutoff values (growth)

Country pair	0 cutoff		50000 cutoff		10% cutoff	
	extensive margin	intensive margin	extensive margin	intensive margin	extensive margin	intensive margin
Mongolia to Japan 1996-2005	1.9647	0.4476	1.9613	-0.9979	1.9586	-1.6492
Japan to Mongolia 1996-2005	0.3546	1.3713	0.1331	0.4140	0.0251	-0.3040
Mongolia to China 2001-2007	0.4626	0.4963	0.4923	0.5662	0.1770	0.8640
China to Mongolia 2001-2007	0.4626	0.5785	0.3049	0.7362	0.3047	0.7364
Mongolia to EU 2002-2007	0.7125	1.4977	0.6785	0.6122	0.6125	0.2950

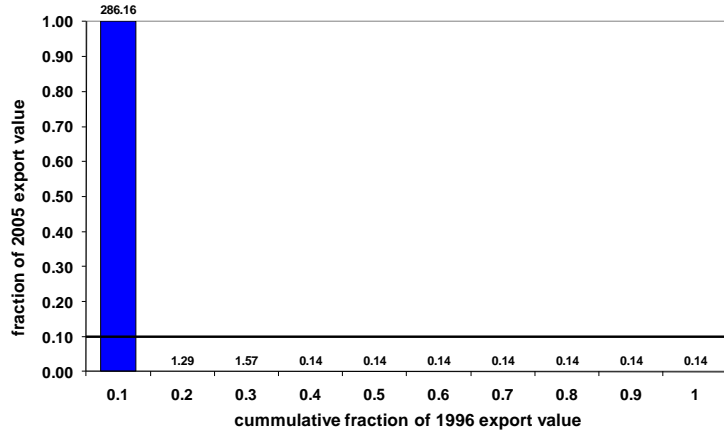
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Figure 1. Composition of exports: Japan to Mongolia



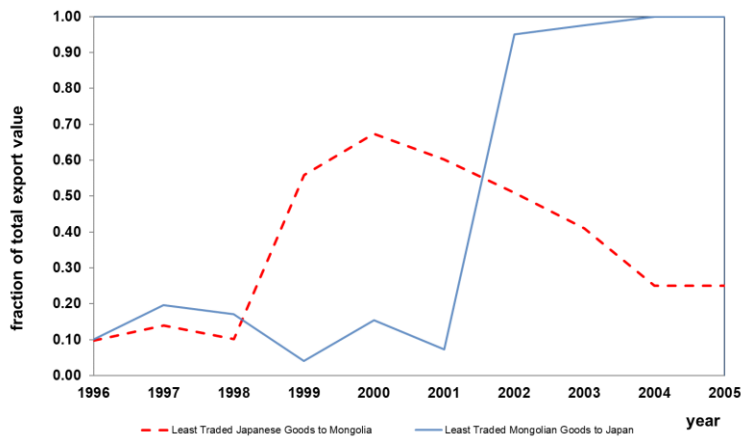
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Figure 2. Composition of exports: Mongolia to Japan



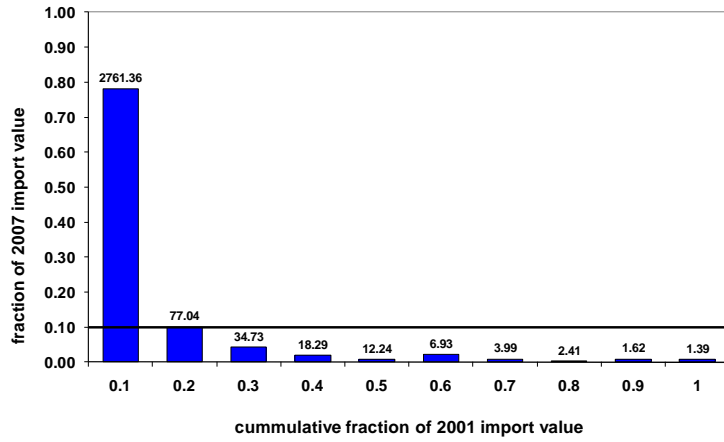
Source: Mongolian Custom's Office: Annual trade statistics

Figure 3. Least traded goods: Mongolia and Japan



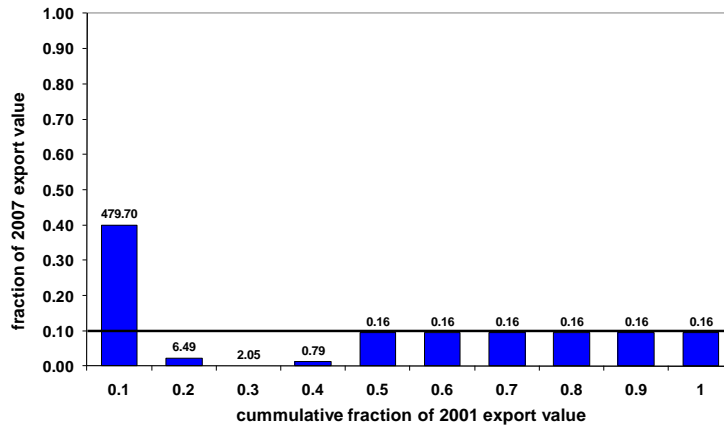
Source: Mongolian Custom's Office: Annual trade statistics

Figure 4. Composition of exports: China to Mongolia



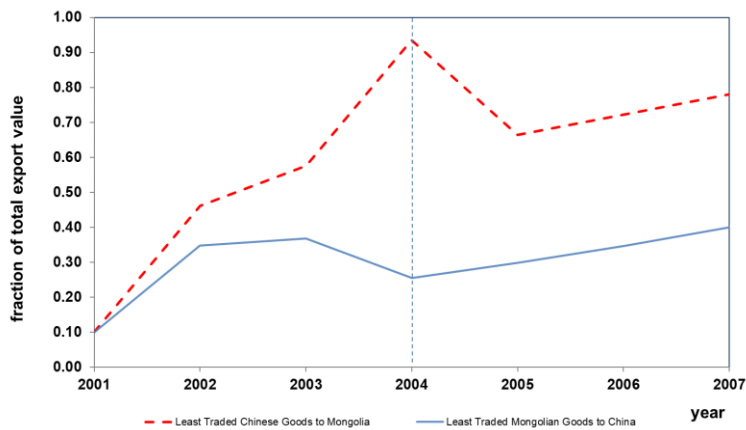
Source: Mongolian Custom's Office: Annual trade statistics

Figure 5. Composition of exports: Mongolia to China



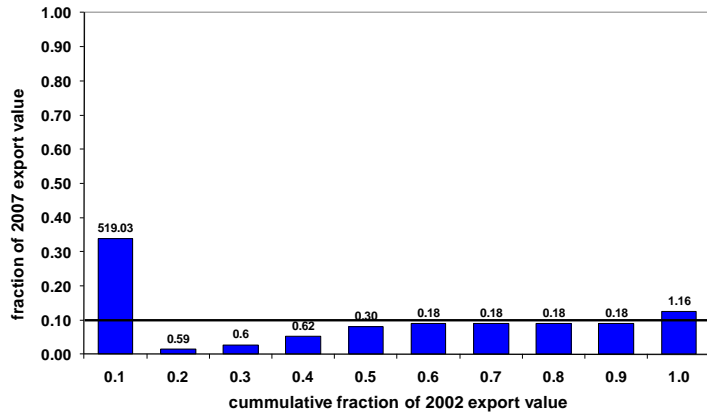
Source: Mongolian Custom's Office: Annual trade statistics

Figure 6. Least traded goods: Mongolia and China



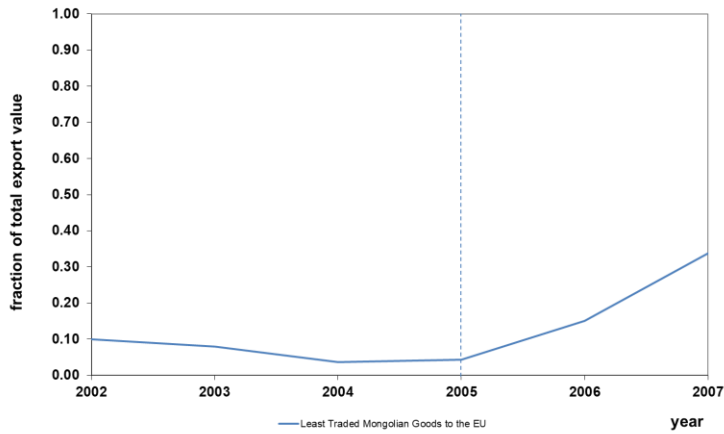
Source: Mongolian Custom's Office: Annual trade statistics

Figure 7. Composition of exports: Mongolia to EU



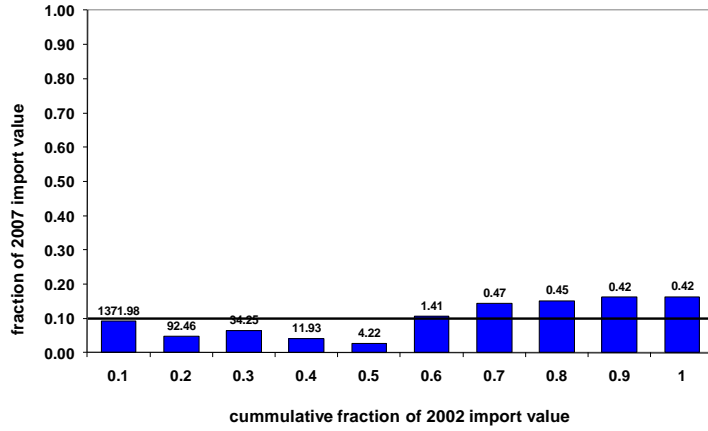
Source: Mongolian Custom's Office: Annual trade statistics

Figure 8. Least traded goods: Mongolia to EU



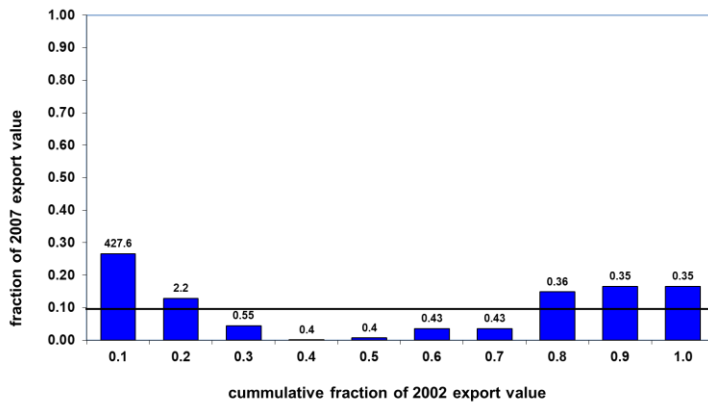
Source: Mongolian Custom's Office: Annual trade statistics

Figure 9. Composition of exports: Russia to Mongolia



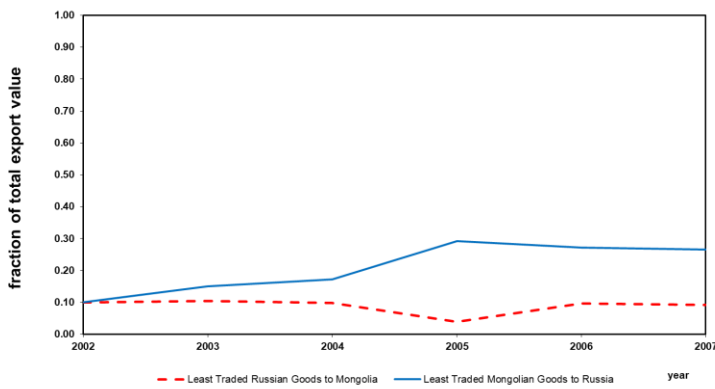
Source: Mongolian Custom's Office: Annual trade statistics

Figure 10. Composition of exports: Mongolia to Russia



Source: Mongolian Custom's Office: Annual trade statistics

Figure 11. Least traded goods: Mongolia and Russia



Source: Mongolian Custom's Office: Annual trade statistics