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Assessing Bilateral Trade Potential at the Commodity Level: An Operational Approach

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Abstract

We propose a methodological framework to assess trade potential between trading partners at a product level. While econometric estimation is usually limited to sectoral analysis due to data limitations, the methodology proposed in this paper allows reasonable inferences at a disaggregate level. Our approach can be easily adapted to suit individual's needs, but this depends very much on the availability of information. This paper also highlights the importance of key determinants of trade potentials and of factors which play a role in the short and medium run.

This note should prove to be a useful tool to complement the analysis of trade potentials using market analysis tools such as TradeMap or Market Access Map. We demonstrate our approach 'hands-on' using a real world example. This example was used initially in a study (German Development Co-operation) investigating bilateral trade potential at the commodity level between Mongolia and a selected number of trade partners. All examples are based on the analysis of Mongolian exports to China

Possible extensions to our approach include the combination with Input/Output tables, in which case even cautious general equilibrium inferences are possible.

1. Introduction

Robert Solow (Nobel-Lecture, 1987)

[...] To believe that empirical economics begins and ends with time series analysis, is to ignore a lot of valuable information that is encapsulated in the qualitative inferences made by expert observers, as well as direct knowledge of the functioning of economic institutions. Skepticism is always in order, of course. [...] But we are not so well off for evidence that we can afford to ignore everything but time series of prices and quantities.

This note proposes a methodology enabling the assessment of export potential at the product-level based using a combination of various quantitative and qualitative indicators of trade costs. Our approach uses a number of data sources readily available, such as TradeMap[1], Market Access Map[2] and The World Integrated Trade Solution (WITS)[3]. Moreover, additional information, often more complex to gather, is also used in this analysis.

Overall, this methodology attempts to overcome two main difficulties encountered during the assessment of trade potential at the disaggregate product-level. First of all, while trade data are easily accessible at the disaggregate level[4], the availability of data on key determinants of bilateral trade such as for example trade costs, local consumption and production - is restricted to the industry-level. This sets a tight constraint to econometric modeling. The precise effects cannot be singled out if one assumes that a *product's* trade cost is a function of its value, its particular characteristics, and of its specific market environment. Trade cost measures at the industry-level may hide important differences. If such measures are used at the product-level, this may prove to be highly misleading. Secondly, the quality of available data at the disaggregate level is often poor. Certain trade costs can only be captured very roughly in a quantitative form at the product-level or may only be available in qualitative form. This explains the use of often very imprecise proxies. Feeding such approximate data into an econometric model would very likely lead to inaccurate results.

The approach suggested in this note relies on an overall qualitative approach so as to include the most complete range of information. In this sense, this methodology should prove to be a useful tool to support econometric modeling techniques[5] and to serve as an analytical tool when dynamic modeling techniques cannot be applied. Yet, when Supply/Use (S/U) or Input/Output (I/O) tables are combined with our methodology, restricted general equilibrium predictions can be made on an economy's expected changes following quantity, export, import and price changes following export/import changes[6].

The methodology is illustrated using a real world example, which was initially used in a study undertaken by the GTZ German Development Co-operation which investigates bilateral trade potential at the commodity level between Mongolia and a selected number of trade partners. All examples are based on the analysis of Mongolian exports to China. This also enables us to preview the possible difficulties when composing the table.

It has to be pointed out at this stage that this note is a *proposal* for a new methodology. Hence, it should be seen as a 'working paper', whose objectives are to promote the proposed methodology and to engage discussions relating to its applicability and usefulness.

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[1] *See www.trademap.org.*
[2] *See www.macmap.org.*
[3] *See wits.worldbank.org*
[4] *For example in TradeMap data is available at the HS-6 and Tariff-Line level.*
[5] *See for example Helmers and Pasteels (2005).*
[6] *For an example see the specific application for Mongolia, Helmers (2006).*

The remainder of this note is organized as follows. Section 2 discusses briefly the difficulties encountered when composing an econometric model at the commodity level. Section 3 describes in detail the composition of this methodology - the different indicators used as determinants of bilateral trade potential. Section 4 explores the possibilities of summarizing the information gathered and described in section 3. Finally, section 5 concludes by summarizing our methodology and by putting forward proposals for the future.

2. Limitations of econometrics at the commodity level

Different numerical techniques can be used for the assessment of bilateral trade potential. Computable General Equilibrium (CGE) models are often used as a way to simulate bilateral or regional trade agreements' impact on bilateral trade. For a discussion of CGE used for trade policy analysis, see for example Piermartini and Teh (2005). According to these authors, applying a CGE model enables ex-ante simulations but due to its inherent complexity, the results tend to be very sensitive. Hence they are used to give an order of magnitude rather than to provide precise numbers[7].

Gravity models[8] are less complex to implement than CGE models. They have also proven to perform very well empirically. The gravity approach is however limited to ex-post trade analysis as it is based on a *conditional general equilibrium* approach. In other words, the gravity equation describes trade as a function of trade costs *conditional* on the observed production and consumption allocation (Anderson and van Wincoop, 2003). This property makes the use of the gravity equation practical in applied work. However, the use of the conditional equilibrium nature is more appropriate to estimate trade costs than to analyze changes in trade barriers. As a consequence, applications of gravity equations are commonly used to assess the ex-post impact of non-tariff barriers on trade or of accession to the WTO on trade. Correctly interpreted, the Gravity Equation can also be used to estimate trade potentials, as demonstrated in Helmers and Pasteels (2005).

Changes in the trading environment, such as changes in trade policy, affect allocations of resources through relative price changes. In this case, it is more appropriate to use the CGE approach to measure trade potential as it allows feedback incorporation when there are changes of relative prices within an economy. Applying CGE modeling is, however, extremely demanding in terms of data requirements. Not only does it require I/O tables, but it also necessitates price- and income-elasticities.

At the commodity level, the use of the gravity framework may be prohibitive due to the extensive data requirements. The standard formula [1] of the Gravity Equation used at the macro level (Anderson and van Wincoop, 2003) is the following:

$$\ln(\frac{X_{ij}}{Y_i Y_j}) = \rho(1-\sigma)\ln d_{ij} + (1-\sigma)\tau_{ij} + \ln(\tilde{p}_i)^{(\sigma-1)} + \ln(\tilde{p}_j)^{(\sigma-1)} + (1-\sigma)\varepsilon_{ij} \qquad [1]$$

where
X_{ij} are exports of country i to country j,
Y_i and Y_j are country i's and country j's GDP respectively (to capture the size of the economies/domestic markets),
τ_{ij} is the measure of the 'border effect' (includes tariff and non-tariff measures),
d_{ij} is the distance between country i and j (proxy for transport costs),

[7] *See also GTAP (https://www.gtap.agecon.purdue.edu/https://www.gtap.agecon.purdue.edu/).*
8 We do not derive the Gravity Equation here in detail, for a detailed treatment see Feenstra (Chapter 5, 2005) from which we borrow freely throughout this section.

$\tilde{p}_i$ and $\tilde{p}_j$ are the implicit price indices[9],

ε_{ij} is a randomly distributed error term,

σ represents the elasticity of substitution as defined by the CES utility function.

Other variables can be added to this basic equation such as the existence of conflicts between nations, binary variables capturing cultural proximity, common language, past colonial links and other geographic characteristics of countries.

At the commodity level, some of these variables are more difficult to collect. For example, the output of commodity *k* in country *i* and information on its consumption in country *j* are required to undertake our analysis rather than making use of GDP data which is easily obtainable. This type of data only exists for a limited number of industries and a limited range of countries (usually OECD countries). At the commodity level, distance represents a poorer proxy of transport costs than at the industry level. More accurate information is needed.

In addition, at the product-level there are key marketing aspects (consumer preferences, product quality, trade complementarities counter season products, etc.), which are not captured within the gravity equation.

Our approach should be seen precisely as a solution to this dilemma, as it incorporates the information included in a gravity equation and complements it through a number of quantitative and qualitative indicators reflecting supply and demand. This point is further elaborated in the following section.

3. A framework for evaluating trade potentials and their determinants at the commodity level

In this section, we propose to use and combine indicators of macro- and micro-economic nature capturing the widest range of trade determinants at the commodity level. The strategy pursued in our approach consists in gathering as much information as possible on trade determinants as a way to reflect the trading environment. This includes information of quantitative and qualitative nature.

Figure 1 illustrates how we have structured the different data elements and it provides an overview of our methodology. It shows a decision tree showing how to arrive to a conclusion concerning trade potential using the different data elements. This aspect is further elaborated below. The figure starts at current trade, an information easily accessible, which enables us to obtain a first indication of trade potential. Building on the indicative trade potential, additional data on trade costs and supply-demand conditions are explored to derive conclusions on trade potential - as indicated in the boxes W1,W2, W3 and S1, S2 and S3.

For example, cases W1, W2 and W3 reflect a weak potential in the short-run. This can be explained by several factors. While the simple analysis of trade flows is sufficient to conclude that potential is limited for case W3, additional information is needed to assess cases W1 and W2. On the one hand, demand in the import destination does not match supply in the exporting country for W1, and on the other hand, while supply and demand conditions are met for W3, trade costs as account for the predominant obstacle for expanding bilateral trade.

The same principle applies for cases with strong trade potential, S1, S2 and S3. For S3, the absence of current trade implies more extensive market research to assess trade opportunities. S3 is a very

[9] *Anderson and van Wincoop (2003) refer to these price indices as 'multilateral resistance terms'. Econometrically, these estimated price indices can be obtained through the use of exporter and importer fixed effects, which facilitates tremendously the estimation.*

interesting case in terms of trade promotion, as it shows that marketing activities and trade fairs can have a strong impact on bilateral trade. In the case of product S2, a 'success story' already exists and the emphasis should not be put on trade promotion activities but rather on securing the continuity of this success story. This may be achieved through the analysis of the growth of supply capacities, the dynamics of imports in the target market or the possible emergence of new competitors, e.g. within the framework of the erosion of preferences.

It is worth mentioning that for ease of presentation, we have omitted any nuanced/intermediate assessments in Figure 1, such as for example 'average' current trade (instead of significant or negligible) or 'average' trade costs (neither low nor high). Note also, 'Ind. Trade Potential' in Figure 1 stands for an indication of trade potential combining both, the Indicative Trade Potential (ITP) and the Relative Indicative Trade Potential (RITP). This point is discussed in the following sub-section.

Figure 1 illustrates the simplicity and intuitiveness of our approach. It allows a stepwise decision-taking by using a general-to-specific / simple-to-complex approach introducing gradually more detailed information on the trading environment governing trade flows. In the following sub-section, we present the approach and all data components in detail.

3.1 Structuring the information and sequences of analysis

The first step in our methodology is to define the adequate level of disaggregation of the trade data. It is recommended to analyze the export structure of heavily specialized, small developing economies at the most disaggregated level possible. Moreover, to ensure international comparability of the data, the bottom-level of the HS nomenclature should be set at HS-6.

Broadly speaking, the indicators used in our methodology are grouped into 4 categories:

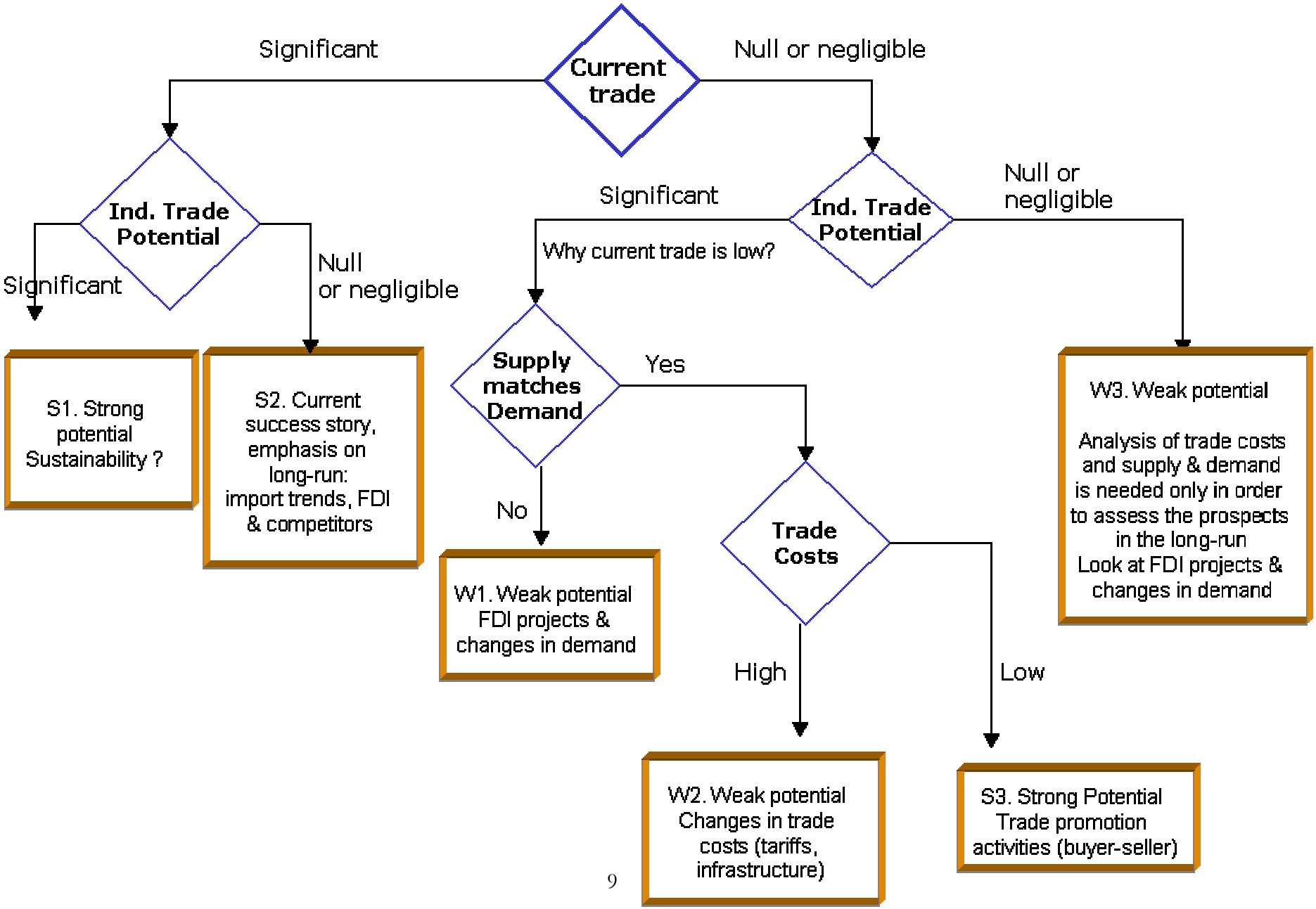
A) **Trade potential at the sector level**, based on the gravity equation specification
B) **Trade flow analysis** at the commodity level
C) **Trade costs** at the commodity level
D) **Supply and Demand conditions** at the commodity level

It is useful to keep in mind that variables have a different impact on trade. There are some prerequisites (necessary conditions) for trade to take place. For example, high freight costs will not necessarily pose an obstacle to trade if costs at the border (tariff and non-tariff measures) are low and if the competitors also face high trade costs. On the contrary, a prerequisite for bilateral trade to take place lies in the existence of a sizeable target market. Appendix 1 explores how this aspect is tackled within the gravity framework.

Some determinants are stationary, others may evolve over time. For example, some barriers to trade, such as tariffs, can be perceived as non-permanent in the framework of on-going multilateral and regional negotiations. Others, such as market size, may take a long time to change significantly, especially for goods that are destined to final consumers.

Finally, it should be remembered that several of the indicators presented below are interrelated. This might be due to either a high correlation among the variables or due to endogeneity problems, where the term endogeneity is used in an economic sense, i.e., describing the fact that a variable is determined within the environment subject to analysis. However, as this methodology is purely static, there is a priori no reason for concern about multicollinearity or endogeneity. Yet when interpreting the data, interdependencies have to be taken into account (see section 4).

Figure 1: Sequence of analysis (from simple to complex & costly information)



3.2 Four Categories of Information

3.2.A Trade potential at the sector level, based on a gravity equation

The trade potential indicator is based on ITC's *TradeSim* gravity model (Helmers and Pasteels 2005). The predictions of export potential calculated in this publication are available on-line[10]. As TradeSim uses the ISIC classification, a correspondence table is needed to find which sector corresponds to the selected code of the Harmonized system nomenclature[11]. The information on industry-level trade potentials can be used as a rough quantitative indicator of whether sector exports behave according to the gravity equation's predictions.

Table 1, Trade Potential at the sector level from Mongolia to China, selected commodities

Product code HS6	Product description	Export potential at the sector level		
		ISIC Sector the commodity belongs to	Relative Trade potential	Average tariff applied by China to Mongolia
260300	Copper ores and concentrates	Mining and quarrying	Strong current trade (above predicted)	1.6%
261390	Molybdenum ores and concentrates nes	Mining and quarrying	Strong current trade (above predicted)	1.6%
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	Agriculture and hunting	Strong current trade (slightly above predicted)	7.3%
080290	Nuts edible, fresh or dried, whether or not shelled or peeled, nes	Agriculture and hunting	Predicted=current trade	7.3%

Source: TradeSim

While the trade potential predicted by TradeSim takes into account many factors such as tariffs, market size, conflicts and cultural proximity variables, the results are only valid at the sector level and might not reflect the reality at the commodity level. Actually, the determinants of trade at the commodity level under analysis might be entirely different from the determinants observed for the sector the commodity belongs to. For example, the tariffs applied by China to Mongolian exporters may be low at the sector level but there might be a tariff peak for the commodity under analysis, restricting the access of Mongolian exporters to the Chinese market.

Hence, the evaluations in Table 1 should be interpreted as indicative only. They need to be validated by an analysis of the determinants of trade flows at the commodity level.

3.2.B Trade flow analysis at the commodity level

Examining trade flows between Mongolia and China is essential in order to investigate whether the supply capacity of Mongolia matches the import demand of China. This kind of analysis is relatively straightforward, since several indicators are directly available from TradeMap or can be derived easily from trade data from other applications - such as UN COMTRADE[12]. Information on trade flows is of particular value if production and consumption data are not available for the countries under

[10] *http://www.intracen.org/menus/countries.htm*
[11] *For more information on the nomenclatures ISIC and HS see RAMON Eurostat's Metadata Server http://ec.europa.eu/eurostat/ramon. Correspondence tables can be provided upon request.*
[12] *http://unstats.un.org/unsd/comtrade/*

analysis. In that context, export data are a kind of proxy variable for the production of Mongolia and import data can be viewed as a proxy for demand in China. The trade data category of our methodology comprises three major components:

Table 2: Trade flows at the commodity level

		Mongolia's exports to China	Mongolia's exports to world	Share of China in Mongolia's exports, in %	China's imports from world	Market share of Mongolia in China's import, in %	Indicative potential trade (ITP)	Relative Indicative potential trade in %	Overall Assessment
	Column	A	B	C=A / B	D	E	F=min(B,D)-A	G=F/B	H
	Source	TradeMap	TradeMap	calculated	TradeMap	calculated	TradeMap	calculated	computed
HS code	**Product description**								
050400	Guts, bladders and stomachs of animals except fish whole or in pieces	743	26,188	3%	592,508	0%	25,446	97%	High ITP and RITP / Large market size
570110	Carpets of wool or fine animal hair, knotted	2,398	3,257	74%	2,398	100%	0	0%	Strong current trade / Small import market.
740311	Copper cathodes and sections of cathodes unwrought	2,464	14,688	17%	10,225,353	0%	12,224	83%	High ITP / Large market size

Source: TradeMap and own calculations. Figures are in US$ thousand, unless specified

i) Current trade

Table 2 lists basic indicators derived from trade data obtained from TradeMap. The most important indicator, in column A, is current trade in $ values[13], as it describes the present situation. Hence it may be regarded as the point of departure of our investigation as highlighted previously and illustrated in Figure 1. When there is no trade at all, this may be an indication that trade costs are very high (e.g. high tariffs or transport costs) or that there are significant supply-side constraints, e.g. supply does not meet the demand conditions in the target market due to inadequate product quality.

ii) The indicative trade potential

The other key indicator from table 2 is the **Indicative Trade Potential** *(ITP)*, displayed in column F. It is a purely mechanical indicator defined as $ITP_{ijk} = \min(X_{ik}, X_{jk}) - X_{ijk}$, where $X_{i.k} = \sum_{j=1}^{J} X_{jik}$ and $X_{.jk} = \sum_{i=1}^{I} X_{ijk}$. The idea behind this indicator is to identify the products for which there is the highest trade complementarity between the exports of a country and the imports of the target country. The trade potential indicator assumes that the importing country could in principle absorb perfectly all imports from the exporter. With such a strong underlying substitution assumption, the resulting figures are only indicative but can nevertheless be used in order to rank the products.

[13] *In this case the data is based on Chinese import data, since Mongolia data was not available for that year. It is however recommended to look at both figures (Mongolia exports to China and China's imports from Mongolia), in order to better assess the level of current trade.*

The other indicators in Table 2 complement the analysis, as they allow to express the ITP in relative terms and to assess whether the trade potential is high or low, based on the size of the respective markets.

Indicators in columns C, E and G in Table 2 express trade values in relative terms, as a percentage of exports of the country and help to complement the assessment of the trade potential. For example, the RITP gives a different result compared to the ITP. The closer the RITP value is to 0, the more Mongolia depends on the Chinese economy. What can be concluded from our example exposed in Table 2 is that Mongolian exporters of carpet depend strongly on the Chinese market.

A summary assessment, based on the intensity of current trade and absolute trade is presented in column H of Table 2.

The second product presented in Table 2, HS-570110 (wool carpets), is an example of a successful niche for Mongolian exporters since China's imports are sourced exclusively from Mongolia. In that context, the trade potential in the short run lies in the stability and growth of the Chinese market. In that respect, the analysis of historical trends (Chinese imports over the recent years) and of future prospects for the Chinese market is critical.

For the first product, HS-050400 (guts, etc.), the emphasis is more on the supply side, since Mongolia has a very small share in the Chinese market, which is estimated at more than US$ 590 million. Finally, for the third product of Table 2, HS-740311 (copper cathodes), the situation is more balanced, with Mongolia exporting 17% of its cathodes to China but still with a very low market share in a sizeable market.

The existence of a high ITP is a necessary condition for trade to take place between the two countries in the short run. Given the importance of the ITP, it is an indicator which is used in the framework of ITC's South-South trade promotion, in order to identify products with strong trade potential. Within the South-South trade promotion, there are two further stages after this initial ITP analysis to identify and translate intra-regional trade opportunities into transactions. These further steps are elaborated in Appendix 2.

In the medium run, however, a low ITP is not necessarily an indication that no trade potential exists, since the commodity might be produced in the country but not yet exported. Alternatively, there might be some ongoing FDI projects that would develop a competitive industry in the country or adapt local production to international needs. The analysis of supply and demand conditions would help to refine the medium-run trade potential prospects.

iii) Other indicators derived from trade flows

Other indicators, of less importance than the ITP and the RITP can be used to complete the analysis. These include the average annual growth rates, which reveal important trends in export and import performance, as well as unit values as shown in Table 3. This information is not always available, since there might be some time series break or data on volumes may not be available for the product under review.

Table 3: Additional indicators on trade flows at the commodity level

		Mongolia's exports to China		China's imports from world	Mongolia's exports to world
Product code HS6	**Product description**	Unit value US$ / ton	Average annual growth in value between 2000-04, %	Annual growth in value between 2000-04, %	Annual growth in value between 2000-2004, %
260300	Copper ores and concentrates	342.17	20.11%	33.41%	18.30%
510530 / 531	Fine animal hair, carded or combed	45.10	-6.80%	N/A	19.12%
261390	Molybdenum ores and concentrates nes	3.62	40.27%	45.90%	40.97%
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	9.96	-86.44%	53.63%	-85.27%
410210	Sheep or lamb skins, raw, with wool on, nes	4,76	-59.55%	25.01%	-35.25%

Source: TradeMap, Comtrade, own calculations

The unit value of the exported product is the result of the ratio of the aggregate figure of exports in values over the aggregate volume of exports. It is interesting to compare this unit value with the unit values obtained for other pairs of countries as this enables to have an indication of the market segment and the overall offer of the traded goods.

The annual average growth rate[14] of exports from Mongolia to China, for the specific HS-6 good, helps to assess the changes in bilateral trade over the recent years. It is interesting to compare it with China's annual average growth rate of imports from the world, of the same good in order to assess the competitiveness of Mongolian exporters in this market.

It is also interesting to set the trend of the bilateral trade in perspective with the trend of Mongolian exports to the world, to see if the share of Mongolia exports to China in Mongolia's exports to the world is stable for that product.

Trends **in volumes terms** would also need to be analyzed since they shed light on the movement of goods in real terms, while trade flows in value terms are affected by changes in exchange rates and prices. This data is, however, not systematically available, as is illustrated in our examples.

[14] There are different ways of calculating average annual growth rates (see ITC 2001 for example). In TradeMap for example, a least squares trend is used. We have used the unweighted annual average growth rate, also known as the arithmetic average of annual growth rates: $\left[\sum_{t=1}^{T}(X_{t+1}-X_t)/X_t\right]/T$.

iv) A brief description of the exporting country's main competitors:

Table 4 shows a simple analysis of competition in the Chinese market for the product HS-261390 (Molybdenum) based on trade information derived from TradeMap, illustrated in Appendix 3.

Table 4, Analysis of Mongolia's main competitors with regard to its exports to China for HS-261390 (Molybdenum)

Product code HS6	Product description	3 Main Competitors		
261390	Molybdenum ores and concentrates	(Russia, Peru, Chile)		
Type of competition		Emerging supplier	Share in decline	Relative position of Mongolia
Global & Regional		Russia	None (volatile pattern)	Major supplier with Russia

Source: TradeMap

The result emerging from Table 4 is that Russia is Mongolia's closest competitor. Russia has expanded most its exports to China relative to Peru and Chile over the period 2000-2004. None of the three competitors identified in Table 4 are really losing market shares, since the export values to China over time are very volatile and do not follow any clear pattern.

The analysis of a country's main competitors with regard to the export target market can be deliberately expanded with additional information on the main competitors. It would be sensible to gather data on these countries' export performance similar to the data presented in tables 2 and 3. Particularly regional competitors might be interesting to analyze.

3.2.C Trade costs at the commodity level

The third component covers trade costs at the commodity level, such as bilateral tariff rates, preferential margins, and transports costs. Trade costs, such as export taxes or other regulatory impediments, are also included in this section. It must be noted that tariff barriers, preferential margins, export taxes and other regulatory variables are an expression of the specific country's trade policy, while transport costs reflect the infrastructure and geographic characteristics of that country. Sources of information on trade costs and non-tariff barriers have been reviewed recently by Bagai and Wilson (2006). We have subdivided trade costs into three components: import tariffs, other trade policy instruments and transport costs.

i) Import tariffs

This sub-section provides the reader with a description of import tariffs, which reflect direct trade policy measures, for which all data necessary can be derived from ITC's Market Access Map[15]. The data used contains a description of applied and bound tariffs the exporting country is facing in the specific export destination and a description of tariffs in the target market for the three main competitors. More precisely, the following data are used:

15 For detailed information on the methodology see www.macmap.org.

- The total *ad valorem* equivalent applied tariff in the target market. This is the sum of the applied *ad valorem* equivalent tariff and the *ad valorem* equivalent of specific tariffs.
- The number of tariff lines summarized under the HS-6 product level.
- The applied *ad valorem* equivalent tariff.
- The *ad valorem* equivalent of specific tariffs.
- The maximum *ad valorem* bound tariff if the partner country is a WTO member.

The picture conveyed by the bilateral market access data shows that no tariffs are levied on HS-260300 (Copper) and HS-261390 (Molybdenum). Hence, if the goal of this exercise were to estimate potential export gains following a bilateral trade agreement, these products would be excluded from the further analysis despite their overall attractiveness revealed in the trade data in tables 2 and 3. Other products exhibit high tariff rates, such as the HS-80290 product. As is the case with China, including the main competitors identified in table 4 is not very insightful, as China has not granted any bilateral tariff exemptions. In other cases, such an analysis may reveal important competitive disadvantages with regard to market access conditions.

Table 5, Market Access Conditions (Tariffs)

Product code HS6	Product description	Market Access (Tariffs) HS6						
		TOTAL ad valorem equivalent tariff in target market	Trade regime description	Nb of tariff lines	Ad valorem tariff	Ad valorem equivalent of specific tariff	Maximum bound tariff	TOTAL Ad valorem equivalent tariff in target market for main competitors
260300	Copper ores and concentrates	0%	General tariff	1	0%	0%	0%	Chile=0.00% (General tariff), Peru=0.00% (General tariff), Australia=0.00% (General tariff)
261390	Molybdenum ores and concentrates nes	0%	General tariff	1	0%:	0%	0%	Russia=0.00% (general tariff), Peru=0.00% (General tariff), Chile=0.00% (General tariff)
410210	Sheep or lamb skins, raw, with wool on, nes	7.4%	General tariff	1	7.4%	0%	7.0%	Australia=7.40% (General tariff), France=7.40% (General tariff), New Zealand=7.40% (General tariff)
080290	Nuts edible, fresh or dried, whether or not shelled or peeled, nes	18.9%	General tariff	6	18.9%	0%	0%	Russia=18.90% (General tariff), Hong Kong=18.90% (General tariff), Australia=18.90% (General tariff)
720711	Semi-fin steel prod,i/nas,rect/sq cross-sect cntg by wgt<.25% c,wdth<2X thk	2.0%	General tariff	1	2.0%	0%	2.0%	Turkey=2.00% (General tariff), Russia=2.00% (General tariff), Ukraine=2.00% (General tariff)
410221	Sheep or lamb skins, pickled, without wool on	11.5%	General tariff	2	11.5%	0%	9.0%	New Zealand=11.50% (General tariff), France=11.50% (General tariff), Iran=11.50% (General tariff)

Source:ITC UNCTAD/WTO MAcMap

ii) Other trade policy instruments

In addition to import tariffs, other trade policy measures reflected in the regulatory environment should be taken into account. These include in particular:

- An indication of whether the specific HS-6 product is subject to an export tax. If a tax is applicable, the exact value per export unit is given.

- An indication of whether the exported product is subject to any regulatory impediments in the export destination.
  If information is available, an indication of whether alike products are subject to regulatory restrictions, which might induce a substitution effect (i.e., the exported product serves to some degree to avoid the regulatory restrictions). If available, information on SPS (Sanitary- and Phytosanitary) barriers should also be included.

- An indication of the relevance of the specific product within the national trade policy. This indicates therefore whether the specific HS-6 product has been identified as a relevant product within the national export promotion strategy.

Table 6, Other trade policy instruments

Product code HS6	Product description	Restrictions		Ind. Pol.
		Export tax	Import prohibitions of alike products in target market (substitutability)	Target product according to MIT**
260300	Copper ores and concentrates	None	None	X
261390	Molybdenum ores and concentrates nes	None	None	X
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	TOG* 4'000/kg	None	
410210	Sheep or lamb skins, raw, with wool on, nes	None	None	
080290	Nuts edible, fresh or dried, whether or not shelled or peeled, nes	None	None	
720711	Semi-fin steel prod,i/nas,rect/sq cross-sect cntg by wgt<.25% c,wdth<2X thk	None	None	

Source: MIT
* Mongolian Tukrig
** Mongolian Ministry of Industry and Trade

This data raises crucial issues. For example, export taxes as identified above, may raise important questions concerning the underlying strategic trade policy. Import prohibitions in the target market are also an important factor as they might distort trade flows, which cannot be inferred from any other indicator presented.

iii) Transport costs

Now, lets us turn to the description of transport costs, which tries to reflect the costs involved in physically shipping the commodity from its production site to its export destination. An additional variable, which we do not cover in our treatment, is distribution channels. One could imagine that additional costs may arise due to a large number of intermediaries involved in the marketing process of a specific commodity. Hence, while actual trade barriers may be low, trade costs may still be high as the good goes through many different stages until it reaches the consumer. If specific knowledge on such cost is available, it would certainly be highly valuable to include it.

Table 7 includes the total transport costs per container of either 20' or 40' size of the specific HS-6 product as well as the currency unit used for the transaction and the size of the container. Here, however, any other available measure can be applied. Measuring transport costs using standardized container size has simply the advantage of international comparability. Also note that we have collected data on the transport costs from the Mongolian capital, Ulan Baator to the Chinese border, which does not capture the full transport costs.

Table 7 also includes the transport cost per-unit value. The unit value has to be multiplied by the approximate quantity transported per container:
$TC/(UV \times Q)$, TC, denoting transport costs, UV, being the unit value (which is the result of the ratio of the aggregate figure of exports in value over the aggregate volume of exports) and Q denotes the quantity transported per container.

The transport cost per unit value reveals how important trade costs are in percentage of the total price. In Table 7, transport costs vary between 1.4% and 12.2% of the shipped goods' value.

Table 7, Transport Costs

Product code HS6	Product description	Transport costs	
		Transport costs (direct): freight costs*	Transport cost in US$ per unit value
260300	Copper ores and concentrates	937'500	7.16%
410140	Equine hides and skins, raw	464'100	1.40%
080290	Nuts edible, fresh or dried, whether or not shelled or peeled, nes	505'000	1.38%
510121	Degreased shorn wool, not carded, combed or carbonized	450'700	2.05%
720711	Semi-fin steel prod,i/nas,rect/sq cross-sect cntg by wgt<.25% c,wdth<2X thk	996'000	12.21%

Source: Mongolian Railways & MIT for unit values
*: Mongolian Tukrig per ton. Carriage from Ulan Baator to the Chinese border

Alternatively, if detailed data on transport costs are not available, transport costs can also be approximated by dividing the exports expressed in c.i.f. terms by the exports expressed in f.o.b. terms (c.i.f./f.o.b. ratio), when such information is available[16].

3.2.D Supply and Demand conditions at the commodity level

The fourth component reflects the production and demand of the specific product. As outlined in section 2, this factor is essential to reflect the general equilibrium structure of an economy. Hence, the information assembled in this section replicates the production performance and capacity - which are captured by a range of variables, such as production efficiency or share of total production exported - of the exporting economy and the current demand of the export destination country at the commodity level. However, our approach takes the classical supply and demand analysis one step further by incorporating product quality in a large sense as an additional criterion. Therefore, the information of this section also tries to capture whether the characteristics of the exported product match the corresponding demand in the target country. This however, implies that certain indicators are of purely qualitative nature, as the characteristics they aim to capture are extremely hard to quantify.

Another important determinant of production and possibly also demand is foreign direct investment (FDI). The impact of FDI on exports has been the issue of extensive research[17]. While the actual impact of FDI may vary from case to case, it however is an important force in driving trade flows through influencing the production side of an economy and its linkages within multinational production chains. Hence, overall the production and demand side is reflected through four categories of variables.

i) Quantitative data on production

Table 8 displays production data, in volume terms, gathered at the product level. It also includes the export share of domestic production. Obviously, to be able to obtain this indicator, both production and export data have to be recorded in the same unit of measurement, which is not always the case.

Table 8, Production Data

Product code HS6	Product description	Supply side			
		Production 2000-04 of commodity	Exports of commodity to China 2000-2004	unit	Export share
510530 / 531	Fine animal hair, carded or combed	7.7	4.2	1'000 t	54.1%
261390	Molybdenum ores and concentrates nes	15.5	15.4	1'000 t	99.4%
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	7.7	4.2	1'000 t	54.2%
410120	Whole hides and skins	894.9	894.0	1000 pieces	99.8%
510211	Of cashmere goats	7.7	3.69	1000 t	47.6%

Source: National Statistical Office of Mongolia

[16] *Such information is available for example for many OECD and Latin American countries.*
[17] *See for example Markusen (2002).*

Production data on the commodity level is often very difficult to obtain. However, if feasible, calculating the export share of domestic production is very informative. It shows to which extent domestic production is targeted at export markets. The above table demonstrates that Mongolia's production of the enumerated products is geared heavily towards exporting. When this information is combined with other data, for example the indicators of Table 2 on concentration and dependency, one can conclude that certain domestic sectors are entirely dependent on exporting to a specific market.

ii) Other data on the production side

It is also essential to gather information on the production capacities and the efficiency of the production. For the rate of utilization of production capacities, quantitative information is often available. In the case of Mongolia, we however had to rely on qualitative or judgmental information provided by experts.

Table 9 includes an assessment on the possibility of expanding the domestic production using available capacities[18]. The value of this indicator ranges between 1 and 5; a value of 1 indicates that domestic production is completely depleting available production capacities. A value of 5 indicates that production disposes of substantial scope to increase production in the short term.

The table also presents an indicator of efficiency of domestic production, as assessed by industry experts. This indicator is either of the value of 1, 3 or 5. A value of 1 indicates that domestic production should be regarded as little efficient, a value of 3 means average and a value of 5 indicates that production can be regarded as highly efficient. It is advisable to judge production efficiency relative to the world average *and* above all with regard to the main competitors identified previously. Note, broadly conceived, efficiency is defined as the ratio of input to output. As in our example, the values are obtained through expert's judgment, a broader understanding of efficiency might be applied.

Table 9, Qualitative Indicators of Production

Product code HS6	Product description	Supply side	
		Rate of utilization of production capacities (1=fully used, 5=large scope for expanding)	Efficiency of production (1=low, 5=high)
510530 / 531	Fine animal hair, carded or combed	4	1
261390	Molybdenum ores and concentrates nes	3	5
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	2	3
410120	Whole hides and skins	2	5
510211	Of Kashmir (cashmere) goats	2	3

Source: GTZ Office Mongolia, experts opinion

[18] *Ideally, the proportion of the actual and potential output could be used as an indicator for the 'production frontier'.*

The information of Table 9 shows that there is considerable scope for increased production in these commodities with the exception of HS-510530/531. This means that the domestic production is in principle capable of increasing its output following increased demand through positive changes in the trading environment. Production efficiency indicators show that the domestic production seems to be reasonably competitive (again with the exception of HS-510530/531).

iii) Product characteristics and consumer preferences

This section both includes information on the supply and demand side. Some of the indicators proposed in Table 10 are of purely qualitative nature and would have to be determined on the basis of experts' judgment. They are however essential in order to determine if the supply of Mongolia matches the demand of Chinese consumers.

The indicator of product quality in Table 10 assumes three possible values: 1 (poor quality), 3 (average quality) or 5 (high quality). It should be obvious that product quality is measured both according to the quality required in the target market and the quality provided by the country's main competitors.

Obtaining information on product standards may result in extreme spadework. As highlighted in Table 10, we have simply analyzed if the domestic products follow an ISO norm. The ISO norm only applies to manufactured goods while the SPS regulations and the Codex Alimentarius[19] are applied to crops, animals, and fishery products. Ideally, this variable should be an indicator of whether there exists a difference in product standards among the exporting and importing country, which would levy potential barriers to exportation. This measures therefore to a certain extent the presence of Technical Barriers to Trade (TBTs).

The same table also includes an indicator on consumer preferences and marketability of the specific HS-6 product in the target market. This indicator assumes either the value 1, 3 or 5; a value of 1 indicates that consumers in the target country do not appreciate the product (i.e., its marketability is low). A value of 3 is average. A value of 5 indicates that consumers have a pronounced preference for the product in question; hence, no difficulties in terms of marketability should be assumed.

Table 10, Product characteristics and consumer preferences

Product code HS6	Product description	Product characteristics		
		Product quality (1=low, 5=high)	Product Standard	Consumer preferences (1= product not appreciated, 5= product highly appreciated)
510530 / 531	*Fine animal hair, carded or combed*	3	n.a.	5
261390	Molybdenum ores and concentrates	5	National standard ≠ ISO	5
510210	Fine animal hair, not carded or combed (cashmere and camel hair)	3	n.a.	5
410120	Whole hides and skins	3	n.a.	5

Source: GTZ Office Mongolia

[19] *http://www.codexalimentarius.net/web/index_en.jsp*

Table 10 illustrates that all products attain high values in terms of product quality and consumer preferences. Hence, according to the experts' opinion, these products should be easily marketed in the target country.

iv) Foreign direct investment in the sector

This section describes inward foreign direct investment (FDI). In addition, as far as information is available, outward FDI is also very useful information and should be included. For Mongolia, inward investment exceeds largely outward investment; this explains why outward data is not yet available.

Table 11 includes the total value of all FDI inflows[20] for the last available year into the relevant industry in the exporting country. The information on FDI data, when available at the industry level[21], is based on nomenclature of activities such as ISIC, NACE or NAICS and is never available at the 6-digit level of the HS. Hence more research is needed in order to assess if the foreign presence in the industry concerns the product under analysis or not.

The total number of foreign investment companies in Mongolia for the corresponding industry, as shown in Table 11, is also very useful as it indicates whether the investments have been undertaking by a small or large number of foreign companies. More research on these companies would allow to identify the type of products/services delivered in the host country.

Table 11, Inward FDI and Commercial Presence

Product code HS6	Product description	Inward FDI		
		Industry	Inward FDI flow in 2004	Commercial presence (total number of foreign companies present)
260300	Copper ores and concentrates	Mining sector	US$ 259 million	73
410510	In the wet state (including wet-blue) (Leather product)	Processing of animal originated raw materials	US$ 17.8 million	105
510530 / 531	Fine animal hair, carded or combed	Processing of animal originated raw materials	US$ 17.8 million	105
261390	Molybdenum ores and concentrates nes	Mining sector	US$ 259 million	73

Source: FIFTA

Data on inward FDI at the industry level as provided in Table 11 is only a rough indicator of potential cross-border linkages. However, if the industries are heavily concentrated on few commodities, as is the case in Mongolia, then inward FDI can effectively serve as an indicator of the importing country's interest in these commodities. Equally the number of foreign firms present in the market shows the link between the domestic market and the export target country. In the case of Mongolia and China, the considerable amounts of inward FDI and

[20] *Also note that if data on FDI stocks (estimation of accumulated FDI at a given time) are available, they also need to be taken into account, since flows in a given year can be very volatile.*
[21] *See www.investmentmap.org for more information on the availability of FDI data*

commercial presence in the sectors, to which the commodities listed belong, may indicate a strong export potential in both the short and long-run.

Finally, one could easily think about a number of indicators concerning the production side of the economy, which may have an important impact on the responsiveness of exports to changes in trade costs. For example studies using micro-data show that depending on the market structure, producers may choose different ways of marketing their products, which certainly has an important impact on how production responds to changes in export volumes and prices.

4. Final assessment - Summarizing the information

The preceding section presented a large number of indicators, which comprehensively reflect the trading environment ultimately determining trade flows. A summary assessment has been presented at the end of each section.

The challenge in providing an overall assessment is to evaluate each of the items discussed above to provide a summarized overview by which (a) the future export potential of the specific product is evaluated and (b) the likely responsiveness of the product to changes in trade determinants, above all in market access, can be assessed.

One simple way of achieving this is by combining all summary information presented in the previous section in a straightforward way, as in Table 12.

We have opted for this approach rather to develop an index of bilateral trade potential. The construction of such an index would be difficult since there are many missing values and problems related to endogenous variables. The indicators listed in Table 12 allow following the relevant path indicated in Figure 1. The point of departure is the summary assessment on current trade performance. According to the findings, the indicators of indicative trade potential are consulted. In some special instances, this analysis is sufficient to conclude that there is strong export potential. In the normal case, however, one would need to proceed with the analysis of supply and demand conditions and trade costs. Analyzing gradually the proposed indicators as described in Figure 1, allows to arrive at one of the boxes W1-3 or S1-2 and hence to make some qualitative statement on bilateral export potential.

Table 12, Summary assessment

Information		HS – 260300 Copper ores and concentrates	HS – 410121 Bovine hides
	A. Trade potential at the sector level	Strong current trade – above predicted	Strong current trade – above predicted
	B. Trade flow analysis at the commodity level		
	Current trade	Strong current trade / Large market	Average current trade / Large market
	Indicative Trade Potential	High ITP and RITP	Low ITP and RITP
	Trends	Strong bilateral export growth, demand growth even stronger	Negative export growth, high demand growth by China
	Unit values	Very high	Low
	Competitors	Main competitor Chile, but good relative performance	Main competitor USA, weak relative position
	C. Trade costs at the commodity level		
	Tariffs	Zero (no preference)	Low (no preference)
	Transport costs	Relatively low	Low
	Regulatory export restrictions	None	None
	Trade policy target	Yes	No
	D. Supply and Demand conditions at the commodity level		
	Export share of production	n.a.	High
	Production frontier	Average	Close to exhausted
	Production efficiency	Very good	Average
	Product quality	Very good	Average
	Product standards	No obstacle	No obstacle
	Consumer preferences and marketability	Very high	Very high
	Inward FDI	Very high	High
	Commercial presence	Very high	Very high
Overall assessment		**S2 (Success story)**	**S2 (Limited success story)**
Comments		Trading environment very favorable. Only possible constraint on the supply side, but unlikely.	Friendly trading environment, main obstacle domestic production

5. Conclusion

Analyzing export potential at the product level is a difficult task. In general, standard numerical techniques cannot be used as available data does not allow inference at a disaggregate, i.e., product level. In this note, we presented a possible way out of this dilemma; notably, in our methodology, we take the standard gravity approach as a point of departure and build stepwise a more detailed picture of the trading environment at the commodity level, moving from broad and easily accessible quantitative data to more specific pieces of quantitative and above all qualitative information, which are usually more difficult to collect. In this way, our methodology is able to yield predictions of export potential at the product level. By the nature of our approach, we do not arrive at single numbers, indicating precisely the magnitude of export potentials, but at broad qualitative conclusions. Nevertheless, these qualitative assessments allow for identification of products that bear potential and to narrow down the products under analysis. The results may motivate further in-depth study focusing on the limited number of products identified through our approach. This is particularly useful when products with high potential have to be filtered out of a large number of products. Obviously, any application should seek to expand our proposed methodology by introducing more nuanced cases and conclusions. Our approach is certainly flexible enough to comfortably accommodate such extensions

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Appendix 1: Necessary conditions for trade and gravity models

The necessary conditions for trade to take place can be formulated conceptually within a stripped-down form of the gravity model equation. Indeed, the necessary conditions for trade to take place enter the gravity equation in a multiplicative form, while simple trade determinants are formulated in an additive form. In a multiplicative form, as in the basic formulation of the gravity equation [2], where T_{ij} is an unobservable measure of trade costs, if one determinant is close to zero (for example exporter GDP), trade potential will also be near zero.

$$X_{ij} = Y_i Y_j (\frac{1}{T_{ij}}) \qquad [2]$$

The unobservable measure of trade costs is commonly formulated in an additive form, such as in [3].

$$T_{ij} = \tau_{ij} + freight_{ij} \quad [3]$$

where $freight_{ij}$ equals the tariff equivalent of freight costs.

In this form, high freight costs will not necessarily pose an obstacle to trade if costs at the border (tariff and non-tariff measures) are low and if the competitors of the exporting country *i* also face high trade costs. Equation [3] can further be developed as represented in equation [4], where $tariff_{ij}$ and NTB_{ij} are the tariff rate and the tariff equivalent of a non tariff barrier respectively. This additive form has been advocated notably by Anderson and van Wincoop (2003), since NTB generate an extra cost to comply with technical standards imposed by the importer.

$$T_{ij} = tariff_{ij} + NTB_{ij} + freight_{ij} \qquad [4]$$

In brief, there are certain trade determinants that represent necessary conditions for trade potential to exist. Other determinants also have an important impact, but the existence of trade potential is not crucially dependent on these indicators.

Appendix 2 – The South-South trade promotion programme: identifying and translating intra-regional trade opportunities into transactions

The ITC South-South Trade Promotion Programme (SSTP) promotes regional trade integration among developing countries and economies in transition. There are three broad stages for identifying and translating intra-regional trade opportunities into transactions:

- **Indicators of export potential**. This initial step identifies products that are currently exported by one or more countries in the region to the rest of the world, and simultaneously imported by that same region from the rest of the world. The simple fact that such products are imported into the region provides an indication of existing demand, and that those same products are exported by countries in the world, provides a further indication of existing supply under competitive conditions.

  The results of this initial research are disseminated to relevant trade related organizations in a given region for review and for a "short listing" of products that are importantfor their national economic development objectives.

  Subsequently, at a product selection workshop, participating countries collectively agree on priority products and sectors on which intra-regional trade promotion activities will focus.

- **Supply and demand surveys**. Statistical data obtained from the trade flow analysis are validated and refined through supply and demand surveys. Supply surveys provide information on exporters and their products, including technical features, packaging, export availability, prices and commercial conditions. Demand surveys include information on importers, their requirements, and the dynamics of the markets.

- **Buyers/sellers meetings**. These meetings provide a platform for business negotiations and transactions among importers and exporters of a specific product group. Buyers/sellers meetings are structured one to one interfaces between enterprises. During the meeting, existing opportunities and obstacles to trade expansion are also identified.

Appendix 3 : Analysis of competitors in the Chinese market (TradeMap screenshot)

List of supplying markets for a product imported by China
Product : 261390 Molybdenum ores and concentrates nes

Exporters	Imported value 2004 in US$ thousand	Imported quantity 2004, tons	Imported value 2003 in US$ thousand	Imported quantity 2003	Imported value 2002 in US$ thousand	Imported quantity 2002	Imported value 2001 in US$ thousand	Imported quantity 2001	Imported value 2000 in US$ thousand	Imported quantity 2000
World	109,510		43,515	15,931	40,371	14,162	49,474	22,948	34,709	16,345
Russian Federation	50,946		15,399	3,241	18,562	6,048	18,595	8,642	3,735	1,726
Mongolia	26,959		19,731	3,641	10,695	2,983	6,939	3,101	6,169	2,513
Peru	17,815		2,433	439	393	63	3,350	1,506	8,272	3,417
Chile	8,493		1,334	228	1,572	730	9,645	4,329	1,278	629
Korea, Dem. People's Rep. of	1,429		398	230	205	130	133	76	112	40
Belgium	1,342		1,312	1,539	847	1,346	653	835	263	540
Canada	729		205	64	669	347	6,240	2,825	1,141	452
Japan	613		176	85	106	96	64	53	135	86
United States of America	454		422	393	343	141	110	90	2,363	1,874
Indonesia	192		48	163	0		0		0	
Netherlands	142		124	228	0		744	351	809	357
Korea, Rep. of Korea	131		225	1,302	36	344	871	374	491	272
Saudi Arabia	85		0		0		0		0	