

16

Proposal to Carry Out a Survey in Order to Use Exchange Rates as Proxy PPPs for Machinery and Equipment

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Table of Content

Summary	3
Using Exchange Rates as PPPs for Machinery and Equipment	3
Second hand goods	5
Can internet sources be used?	6
2005 Questionnaire.....	6
Questions	8
Annexes	9
Annex I: Information available from the Internet.....	9
Annex II: Draft questionnaire on imported machinery and equipment	11

Summary

1. The standard procedure used in ICP 2005 for estimating PPPs for machinery and equipment involved collecting prices for about 100 core products that had been selected by the Global Office and had been specified in SPDs (Standard Product Descriptions).
2. The standard procedure proved difficult for many countries because the SPDs referred to items that were not commonly used in their countries. It is also expensive to collect prices for machinery and equipment because national statistical offices do not usually have the necessary expertise in-house. Some had to hire equipment experts to identify the types of equipment specified in the SPD or close substitutes if what was specified in the SPD was not available in their countries. In some cases, outside experts also had to be consulted to determine the price.
3. In most countries in Asia, Africa and Latin America almost all machinery and equipment is imported so the question arises whether it may be possible to use exchange rates as proxies for PPPs. This report suggests how exchange rates can be adjusted to approximate purchasing power parities for machinery and equipment. The adjustment is based on the various costs that are added to the ex-factory price of the machine or piece of equipment in the exporting country to arrive at the cost of that item when it is installed and ready to use in the importing country.
4. Some of the information required for the adjustment of exchange rates is available on the Internet. Below we examine what information is available and conclude that it would be difficult to use that information and that it will therefore be necessary to collect the information directly from participating countries.
5. A draft questionnaire is appended to this report. The questionnaire collects the information required to adjust exchange rates so that they approximate PPPs. It is proposed that this questionnaire should be completed by all countries participating in ICP 2011, including those countries that will estimate PPPs for machinery and equipment using the standard procedure.

Using Exchange Rates as PPPs for Machinery and Equipment

6. The relationship between the PPP for an imported item of machinery and equipment and the Exchange Rate is examined in Chapter 9 the ICP Handbook. It is there shown that the bilateral PPP is equal to the exchange rate between the two countries *times* an adjustment factor as shown in (1) below:

$$PPP_{A/B} = XR_{A/B} \left(\frac{1 + \sum_{i=1}^n a_i}{1 + \sum_{i=1}^n b_i} \right) \dots\dots\dots(1)$$

Here:

$PPP_{A/B}$ is the bilateral PPP using B as the base country;

$XR_{A/B}$ is the exchange rate between countries A and B, specifically the number of units of currency A that can be purchased by one unit of currency B; and

a_i and b_i , are the n costs that intervene between the ex-factory price of the good in the countries of production, and the final cost of the good when it is installed and ready for use in the importing countries A and B. Both a_i and b_i are expressed as ratios of the ex-factory price.

The costs that constitute a_i, b_i through a_n, b_n are shown in *italics* in Table 1.

7. The term “ex-factory price” needs some refinement. Formula (1) above only works if the adjustment ratios a_i, b_i , are all based on the same ex-factory price. In other words the producer must offer the machine or piece of equipment at exactly the same price (in the producers’ own currency unit) to both importing countries, In practice that may not be the case and some producers may adjust their price for the same piece of equipment to what they believe to be each importing country’s ability to pay. For that reason, the “**standard**” ex-factory price in the exporting country is shown as the starting point in Table 1. The “standard” ex-factory price is, by definition, exactly the same for all importing countries and this price is the denominator for calculating the adjustment ratios.

Table 1. Components of the price of a machine or piece of equipment, installed and ready for use in an importing country	
	“Standard” ex-factory price in exporting country
<i>plus</i>	<i>Surcharge less discount for country or region</i>
<i>plus</i>	<i>Product taxes less subsidies in exporting country</i>
<i>plus</i>	<i>Trade margin in exporting country</i>
<i>plus</i>	<i>Drayage (transport from the factory to the wharf) in exporting country</i>
<i>plus</i>	<i>Wharfage (fee for using the wharf) in exporting country</i>
<i>plus</i>	<i>Fee for customs documentation in exporting country</i>
<i>equals</i>	F.o.b. price in exporting country
<i>plus</i>	<i>International freight</i>
<i>plus</i>	<i>Insurance costs</i>
<i>equals</i>	C.i.f. price in importing country
<i>plus</i>	<i>Fee for customs documentation in importing country</i>
<i>plus</i>	<i>Customs duty in importing country</i>
<i>plus</i>	<i>Wharfage (fee for using the wharf) in importing country</i>
<i>plus</i>	<i>Product taxes less subsidies in importing country</i>
<i>plus</i>	<i>Trade margins in importing country</i>
<i>plus</i>	<i>Drayage (transport from the wharf to the place of use) in importing country</i>
<i>plus</i>	<i>Installation costs at the producer’s establishment</i>
<i>equals</i>	Installed, ready-to-use price in importing country

8. Several of the costs listed in Table 1 may be zero or small relative to the initial ex-factory price. These could be ignored. Specifically

- product taxes are rarely levied on goods for export;

- trade margins in the exporting country are not relevant if producers export the machines or pieces of equipment directly to their agents in the importing country or directly to the importing enterprise.
- fees for customs documentation are small relative to the value of the goods being traded;
- wharfage in the United States is US\$ 2-3 per metric ton and can be assumed to be equally small in other countries;
- drayage depends on the distance between the factory and the port in the exporting country and the port and the producer's establishment in the importing country. To simplify, it is assumed that both the producing and purchasing establishments are located near to the port so that drayage will be small and can be ignored.

9. Table 2 identifies the **main costs** that intervene between the standard ex-factory and installed prices of machinery and equipment. The problem, therefore, is to measure the seven italicised items in Table 2 below.

Table 2. Main components of the price of a machine or piece of equipment installed and ready for use in an importing country	
	Standard ex-factory price in exporting country
<i>Equals (approximately)</i>	F.o.b. price in exporting country
<i>plus</i>	<i>Surcharge less discount for country or region</i>
<i>plus</i>	<i>International freight</i>
<i>plus</i>	<i>Insurance costs</i>
<i>Equals (approximately)</i>	C.i.f. price in importing country
<i>plus</i>	<i>Customs duty in importing country</i>
<i>plus</i>	<i>Product taxes in importing countries (e.g. VAT)</i>
<i>plus</i>	<i>Trade margins in importing country</i>
<i>plus</i>	<i>Installation costs at the producer's establishment</i>
<i>Equals (approximately)</i>	Installed, ready-to-use price in importing country

Second hand goods

10. Countries in several regions habitually import used capital equipment from richer countries. Fiji, for example, imports a substantial amount of used machinery and equipment from Australia and Yemen imports much of its transport equipment second-hand from Saudi Arabia and other rich Gulf states. In ICP 2005 second hand goods were not included in the SPDs because of the difficulty in defining used equipment in such a way as to ensure comparability in second-hand prices. This meant that countries like Yemen and Fiji were required to price new machines and other equipment even though these were not representative of the types of equipment actually imported by these countries.

The exchange rate method of estimating PPPs can be adapted to deal with second hand equipment by treating the difference between the new and second-hand price as a discount – the second entry in Table 2 above.

Can internet sources be used?

11. Internet sources are available for two of the components in Table 2 – namely international freight and customs duties. Annex I gives details of what the author has been able to find but the conclusion is as follows:

1. At least one website gives the costs of international freight from various ports in the United States to ports worldwide. It is possible that there are similar websites for exports from other major countries producing machinery and equipment but the author has not found them. It would therefore be necessary to write directly to shipping companies in other countries and ask for freight quotations of different kinds of goods to various importing countries.

Even if this were done the information would not be directly useable because freight costs are calculated according to the weights of the goods shipped and do not depend on their f.o.b. values.

2. The World Customs Organisation (WCO) maintains a data base of customs tariffs according to the Harmonised System but it does not cover all countries. The main problem in using this data base is that countries generally have two or more tariffs for each HS product which are applicable to various groups of countries. The WCO data base does not indicate which tariffs apply to which countries so it would be necessary to enquire from each importing country which tariffs apply to which HS products.

12. It is therefore recommended that the information needed for the components in Table 2 above should be collected directly from participating countries using a questionnaire.

2005 Questionnaire

13. For the 2005 ICP a questionnaire was sent to all participating countries about international freight, insurance and other margins on imported machinery and equipment. Table 3 gives some results for countries of the Africa and the Asia Pacific regions. Note that there was no systematic follow-up to the survey. It is easy to identify some questionable responses in Table 3. Réunion and United Arab Emirates are almost certainly not source countries for machinery and equipment imported by Comoros Islands. Nepal reports that less than 25% of GFCF in machinery and equipment comes from imports. And the 100% customs duties reported by Kenya should have been questioned.

14. The 2005 survey does nevertheless suggest that most countries do have the information required and that with systematic follow-up useable information could have been obtained for most if not all countries.

Table 3. Summary of 2005 Questionnaire on Machinery and Equipment: Africa and Asia

	Percent imported						Three most important source countries			Margins (as % of cif value of imports)				
	0 to 24	25 to 49	50 to 69	70 to 79	80 to 89	90 to 100				Customs	VAT etc	Trade	Transport & installation	Total
AFRICA														
Cameroun			x				France	USA	Japan	18	9	58	..	85
Comoros	x						France	UAE	Réunion	13	1	..	..	14
Kenya					x		UK	Japan	Germany	100	16	20	10	146
Mali			x				France	USA	Germany	5	18	20	25	68
Mauritania		x					France	USA	Germany	4	11	..	15	..
Senegal		x					France	EU	USA	11	18	..	29	..
S. Leone					x		UK	USA	Belgium	..	..	..	0	..
Tanzania		x					Japan	S. Africa	UK	13	..	..	13	..
Uganda						x	Japan	Germany	UK	19	..	..	19	..
ASIA														
Bangladesh			x				USA	UK	China	9	7	29		45
Bhutan			x				India	Japan	UK	5		27	18	50
China,PR		x					EU	Japan	USA	10	17	6	3	36
Fiji							Australia	N.Zealand	Japan	..	..	..	..	..
Hong Kong					x		China	Japan	Taiwan	0	0	23		23
India		x					USA	Germany	Japan	25	0	10	3	38
Iran		x					Germany	Austria	Spain	22	24			48
Macao					x		China	Japan	Korea	0	0	10	..	..
Malaysia		x					USA	Japan	China	5		17	5	27
Maldives					x		Singapore	Sri Lanka	India	20				20
Mongolia					x		Russia	Japan	China	5	15	10		30
Nepal	x						India	China	..	..	..	..	..	..
Pakistan	x						China	USA	Italy	..	..	..	..	..
Philippines		x					Japan	USA	Singapore	7	0	9	9	25
Singapore			x				Malaysia	USA	Japan	..	..	..	..	..
Taiwan			x				Japan	USA	Germany	..	..	..	..	..
Thailand		x					Japan	..	..	3	7	10	..	..

15. Drawing on the experience with the 2005 survey a new questionnaire is attached in Annex II. Unlike the 2005 survey it is proposed that:

- The questionnaire will be pilot tested in the course of the next few months in about ten countries from different regions. Countries will be selected in consultation with the regional coordinators.
- Visits to some countries may be required to solve problems in answering particular questions. These visits may be undertaken by the Global Office consultant or by staff of the regional offices.
- After pilot testing the survey will be undertaken on a regional basis, with the regional coordinators responsible for editing and validating replies. Involving the regional co-ordinators is expected to produce much higher response rates as well as more reliable data.
- The survey will be carried out in 2010, 2011 and 2012 collecting data for 2009, 2010 and 2011 respectively. Only the 2011 data will be used for ICP 2011 but data for other years will be used to test the survey methodology and the proposed adjustment procedure.

- All participating countries in all regions will be asked to complete the questionnaire. This will facilitate good comparisons between results obtained by the standard procedure and the exchange rate approximation proposed here.

Questions

1. Is it agreed that we should collect this information from all participating countries? (Including countries in regions where the standard procedure will be used)
2. Should the survey be carried out by the regional offices under the supervision of the regional coordinators?
3. The questionnaire is very basic. Should it collect additional information?
4. Are the instructions clear?
5. Is it agreed to carry out the survey for three years – 2010, 2011, and 2012?

Annexes

Annex I: Information available from the Internet

a) International freight and insurance.

1. International shipping companies all have websites but generally they do not publish information on freight costs. These are supplied on request when the customer explains what is to be transported, where from and where to. One exception is an American company, *Shipping Worldwide*, whose web-site rates@shipping-worldwide.com can be used to obtain quotes for any weight of any type of machinery and equipment from the main ports in the United States to destinations world-wide.

2. Table I.A shows the cost of shipping 20 000 lbs of agricultural machinery in a 20' container from Los Angeles to 10 destinations in Asia. Costs generally vary with distance but there are some exceptions; Haiphong is nearer to LA than Bangkok but the rate is substantially higher. Presumably the efficiency of port handling and turnaround time also play a part.

Destination	Cost in US\$	Destination	Cost in US\$
Bangkok	1474	Hong Kong	1048
Chennai (Madras)	2061	Jakarta	1473
Chittagong	2368	Karachi	2411
Colombo	2061	Shanghai	1082
Haiphong	1873	Singapore	1373

Source : rates@shipping-worldwide.com <rates@shipping-worldwide.com>

3. There are two obvious problems in using this information to estimate international freight costs.

- First the costs shown in Table 3 are calculated by reference to weights and not the ex-factory value of the goods being shipped.
- Second, the United States is only one supplier of machinery and equipment. Japan, Russia, India, China, Brazil, Canada and Western Europe are the other main sources and there are no easy-to-use websites to obtain shipping costs from these countries.

b) Customs duties

4. The World Customs Organisation (WCO) <http://www.wcoomd.org/tariff/> maintains a data base of customs tariffs for most member countries. Tariffs are listed according to the 7-digit codes of the Harmonised System – the standard classification used by virtually all countries for foreign trade statistics. Table I.B shows the rates currently in force for fuel pumps for filling stations; clearly

customs duties vary greatly between countries and are relatively high in many of them. They are therefore an important component of the adjustment factor in equation (1) above.

Table I.B. Customs tariffs as percent of c.i.f. value of imported “Pumps for Dispensing Fuel of the Type Used in Filling Stations” (HS 8413.110)			
Country	Rate (% of C.i.f. value)	Country	Rate (% of C.i.f. value)
Malaysia	0	Azerbaijan	15
Hong Kong	0	Cambodia	15
Indonesia	0	Nepal	15
Philippines	1	Brunei Darussalam	20
India	9	Bangladesh	25
China PR	10	Thailand	30

Source: WCO data base and national websites of customs authorities.

5. The WCO tariff data base does not cover all countries. For example two large countries in Asia are missing - India and Bangladesh. However, most countries maintain their own customs office websites with tariff information.

6. Some countries – e.g. Cambodia - have rather simple tariff structures – just three or four rates depending on the degree to which imported goods have been processed. Other countries have more complex rate structures with different rates for specific HS headings depending on the country of origin. In addition, for countries with complex tariff structures it would be necessary to calculate average rates weighted according to the composition of imports and their origin.

Annex II: Draft questionnaire on imported machinery and equipment

Country _____ Currency _____ Units ('000, million, etc) _____

		Year _____	
Item No.	Description	Metal products and equipment	Transport equipment
1	Surcharge or discount applied to the standard ex-factory price	_____ %	_____ %
2	C.i.f. value of imports in national currency		
3	International freight costs in national currency		
4	International insurance in national currency		
5	Customs duties in national currency		
6	Non-deductible VAT or other product taxes in national currency		
7	Trade margins (wholesale and retail combined): <i>either</i> amounts in national currency <i>or</i> estimated margin (% of c.i.f. value)	_____ _____ %	_____ _____ %
8	Installation costs: <i>either</i> amounts in national currency <i>or</i> estimated margin (% of c.i.f value)	_____ _____ %	_____ _____ %
9	What percentage of imported machinery and equipment is second-hand?	_____ %	_____ %

Instructions

Metal products and equipment

This is Group 15.01.10.0 in the *ICP Classification of Final Expenditure on GDP*. It consists mainly of machinery and includes both general purpose machines, such as lifting and handling equipment, pumps and compressors, as well as machines designed for specific kinds of activities such as agriculture, metallurgy, food processing, textiles and clothing. Also included are computers, office machinery and telecommunications equipment.

Transport equipment.

This is Group 15.01.20.0 in the *ICP Classification of Final Expenditure on GDP*. It includes ships and aircraft as well as road transport equipment. Note that agricultural tractors and trailers are not included under transport equipment even though they may be used for both freight and passenger transport in some countries. They are classified as special purpose machinery for use in agriculture under *Metal products and equipment*

Item 1. Surcharge or discount applied to the standard ex-factory price for machinery and equipment exported to your country.

Many types of equipment are sold at the standard ex-factory price no matter where the purchaser is located. This is the case for example with most road transport equipment, computers and related equipment, off-the-shelf software and small, relatively inexpensive, machine tools. Prices of these items are published by the producers on their web-sites and there is no price discrimination between purchasers in different countries or regions. However for some types of special purpose equipment – earth-moving equipment, large machine tools, aircraft, and lifting equipment are examples– manufacturers may offer the same item at different prices depending on the country or region where the purchaser is located. The prices of these items are not published on the producers' websites.

There are three possible replies to item 1 of the questionnaire:

If you believe that producers either add a surcharge or grant a discount to purchasers from your country, indicate here what you believe to be the average surcharge or discount. Sources for that information include purchasing managers in government public works departments and officials of trade associations and chambers of commerce for manufacturers and construction and mining companies.

If you believe that surcharges or discounts are not significant in your country, reply “**not applicable**”.

If you think that they may be significant but you have no information, reply “**not known**”.

Item 2. C.i.f. value of imports in national currency

The c.i.f. price (i.e. cost, insurance and freight price) is the price of a good delivered at the frontier of the importing country, including any insurance and freight charges incurred to that point but before the payment of any import duties or other taxes on imports or trade and transport margins within the country. C.i.f. is the standard method for valuing merchandise

imports so that the c.i.f. value of imported machinery and equipment can be obtained directly from the regular statistics on international merchandise trade.

The imports to be included here are those that form part of Gross Fixed Capital Formation (GFCF). Goods that form part of GFCF in machinery and equipment can be identified using either the SITC (*Standard International Trade Classification*) or the HS (*Harmonised System*) classifications of merchandise trade. A few goods are imported both for capital formation and for final consumption by government or households. Countries that use some version of the commodity flow method for estimating GFCF will already have a key for assigning codes of the import classification to GFCF or final consumption.

Item 3. International freight in national currency

This is the cost of transporting the goods by air sea, rail or road from the exporting country to the port of entry in your country. This information is usually entered in the import document.

Item 4. International insurance in national currency

This is the cost of insuring the goods while being transported from the exporting country to the port of entry on your country. This information is usually entered in the import document. This item and international freight account for the difference between the f.o.b and c.i.f. value of imports.

International insurance on merchandise is usually between 0.5 and 0.7% of the f.o.b. values.

If you only have a single estimate for international freight and insurance combined, enter that amount here.

Item 5. Customs duties in national currency

The amount shown here should be customs duties *due* on imports although amounts *actually paid* will usually be a good approximation and can be reported here. There are two ways in which this item can be estimated – either from records of customs duties collected or by applying the rates of customs duties to the c.i.f. values of imports:

Most customs authorities classify their receipts according to the *Harmonised System*. The amounts collected on machinery and equipment can therefore be obtained by identifying the relevant HS codes. As noted above it is necessary to distinguish duties collected on goods for GFCF from those collected on goods for final consumption expenditure. The main problem here will affect motor vehicles, computers, hand-tools and metal furniture.

If a single rate of customs duty is charged for all imports of investment goods, this item can easily be estimated by applying that rate to the value of imports shown in the previous line. If different rates apply to different types of machinery and equipment it will be necessary to calculate a weighted average of these rates using the c.i.f. values of the relevant imports as weights.

Item 6. Value added taxes (VAT) or other product taxes in national currency

The amount shown here is the total amount of value added taxes, sales taxes or other product taxes paid by the final purchaser of the imported item of machinery and equipment.

In some countries VAT and other product taxes are reimbursed or not charged on goods for GFCF. In such cases there will be no entry in this item.

Item 7. Trade margins

For this item countries may report these costs *either* as amounts in national currency *or* as percentages of the c.i.f. values of imported machinery and equipment.

No distinction is made between wholesale and retail margins

Many countries use some form of the *commodity flow method* to estimate GFCF in machinery and equipment. Use of this approach requires estimates of trade margins on imported machinery and equipment.

Item 8. Installation costs

For this item countries may report these costs *either* as amounts in national currency *or* as percentages of the c.i.f. values of imported machinery and equipment.

Note that in the case of transport equipment, costs of transport and installation may be very small if not zero.

For metal products and machinery the costs of installation should include all costs of putting the item in place, connecting it to the power source, calibrating and running in the piece of equipment so that it functioning correctly.

Item 9. Second-hand goods

For this item you should report your best estimate of the percentage of imported machinery and equipment that is “second-hand” i.e. it has already been used in production by the exporting country. In many countries only a very small percentage of total imports are second-hand and in this case you can report 0%. In some countries however, a large part of total imports of machinery and equipment are second-hand and these countries are asked to give their best estimates of the percentages for “metal products and equipment” and “transport equipment” separately.

Questionnaire completed by:

Mr/ Mrs/ Ms _____

Job title _____

e-mail _____

Telephone _____

Address _____

Country _____

Date _____