INEQUALITY OF VALUE IN INTERNATIONAL TRADE: AN INPUT-OUTPUT APPROACH

UTZ-PETER REICH
Mainz University of Applied Sciences, Germany

International trade may be defined —in contrast to interregional trade— as trade involving, besides goods, an exchange of national currencies, the transactions of which are collected on, and described by, national balances of payment. The exchange of currencies not only distinguishes international from national trade, but brings in an additional factor of influence, in that trading prices can be determined only at given rates of exchange of the involved currencies. The choice of a national currency as means of payment must be settled between two international trading partners, and in the aggregate it may determine where the gains from trade finally accrue. Money is not an invisible veil, but a very impressive hand of control, in international trade.

The choice of a currency is governed by its value, and this again is based on expectations about its future value, just as with any other financial asset, a highly self-referential system of markets managed by international banks and national monetary authorities. There are two ways of determining the value of a currency. It may be expressed in terms of another currency, in its rate of exchange and may thus be treated like the price of a commodity when this is expressed in terms of another commodity (relative price). Or the value of a currency may be expressed in terms of the amount of products it buys, and this is its purchasing power parity (absolute price). The paper is concerned with the deviation between the two measures of value when applied to traditional trade balances.

1 The background: New institutional economics

Can trade be unequal? Ignoring allusions to common sense such as expressed, perhaps, in Grimms' tales[1], in professional economics the answer is not fully unanimous. While the economic main-stream voices a clear "no", critical writers bring up differing hypotheses for an affirmative position, every once in a while. Mainstream denies inequality, because it is the market that determines value. The value of two commodities is equal if the commodities are exchanged against each other, by definition, so that under condition of free trade, at least, inequality is logically impossible. Hence it is also no issue in standard literature.

[1]The tale of "Jack in good luck" (Hans im Glück) goes about a country farmer who setting out to the town to sell his horse returns home after a series of trades, each of which increase his individual utility, a happy man and with no money.

Motivation for digging into the question comes rather from outside of academia. Political concerns about persistent underdevelopment in spite of global market integration naturally transform into a question of this type, dressing it, in this way, although non-voluntarily, with a taste of normativity and unscientific intention. Well known is the school of thought that developed in Latin America around Raoul Prebish and Hans Singer, who were men of politics just as much as of science, indeed, and the African writer Samir Amin is not far from them either.

In retrospect the cleavage of non-communication separating the mainstream from the outsiders had a certain rationale. The mainstream was securely contained in the bed of the general equilibrium market model of an economy, working on the assumption that these markets were perfect. Inequality theorists had thus no community-accepted theoretical ground for building their hypotheses, but had to work with ad hoc constructs such as terms of trade or differences in profit rates. This gave their analysis a touch of arbitrariness adding to the suspicion of political interest, and depriving their arguments of the force that would have been required for entering into a comprehensive dialogue with the mainstream.[2]

The situation has changed today. Perfect markets are no longer considered as the only useful model of economic analysis. The increasing attraction of economists to what is roughly called new institutionalism paves the way for rigorous analyses of imperfect markets within the mainstream. The concept of transaction costs generated in organising and using markets gives rise to new ideas such as bounded rationality and non-pareto-optimal outcomes that were not accepted before. This paper is placed in the framework of new stream of institutional economics, drawing on its results where it is convenient. It is helpful, for instance, to point out that the definitorial equality of the value of two commodities at mutual exchange resides on the assumption that markets are perfect. All partners are fully informed about the contract in question and share a common knowledge of all relevant facts. Under this condition, their values are defined equal. But what happens if information is asymmetric, and if control is incomplete? Then clearly, inequality of value is not excluded, on logical grounds, but becomes a sensible matter of investigation. The particular asymmetry of control studied in this paper relates to the means of payment employed in international transactions. If the value of this money is fully determined endogenously by the conditions of production, consumption and trade it need not be considered separately. If, however, money has a market of its own with intrinsic forces determining its value, it cannot be considered as neutral, but may exert a significant influence on the setting of trading values.

Apart from theory, inequality of value is an accepted phenomenon of every-day observation even in traditional economics. Everyone knows the effect of a commodity tax or a sales tax which splits the price of a commodity in two, the price the purchaser pays, on the one side, and the price the seller

[2] As was brought about at the occasion of a problem of much lesser importance by way of the Cambridge capital controversy.

actually receives, on the other side. What is the true value of the good under these conditions, is not an easy question, the producers' or the purchasers' price, or something in between? Commodity taxes do not fit the perfect market model, and are looked at unfavourably in economic theory. But they exist, and provide a first hand demonstration that inequality of value in exchange is not an out-of-the-world phenomenon.

On the political side the problem of fair trade, or its opposite, in a way, the problem of dumping practices are every-day-concerns in international trade as witnessed by the corresponding regulations of the GATT. And Fair Trade shops spreading out over the developed world selling products of the developing world insinuate a similar concern. From a methodological point of view there are only two positions tenable in this respect. Either one considers such views as value judgements, and thus inaccessible to scientific investigation. Then there is no room for a theoretical statement about the possibility or impossibility of inequality in world trade. Or one makes such a statement. Then one implicitly admits that at least part of the question lies outside value judgement and is suitable for scientific investigation. This is what we endeavour now. Previous research on inequality in world trade will not be dealt with in this paper for reasons of brevity.[3] Individual features will be drawn upon in brief for purposes of comparison.

2 Explanation of national price levels

The fact that purchasing power parities differ from exchange rates in a persistent and systematic way has been established ever since the completion of phases I–III of the great United Nations International Comparison Project, initiated and carried out by Kravis, Heston an Summers. Yet, the observation of Kravis and Lipsey in 1983 that "It would only be a slight exaggeration to claim that a theory of comparative price levels does not exist", still holds, today. The theory of international trade works with the general assumption that price levels between countries tend towards equality through the exchange rate mechanism of currencies (see, for example, Winters 1991). Kravis and Lipsey challenge this "law of one price" on the basis of the empirical data of the ICP project, and in a small, thoughtful paper they look for factors of influence that may explain their empirical observation. Their findings represent an important step in the determination of asymmetry in trade. *Table 1* is reproduced directly from their paper.

Table 1 demonstrates two fundamental facts. Nominal exchange rates sit far from purchasing power parities in international trade, and currencies of poor countries are systematically under-valued. The finding is a challenge to international trade theory in that it forbids speculation about the advantage or disadvantage of such trade on the assumption of neutrality of the involved operation of currency exchange.

[3] For an overview and critical assessment see Raffer, K. (1987).

Income Class	Number of Countries	Mean Nominal GDP per Capita	Mean Real GDP per Capita	GDP Price Level
1	8	3.7	9.0	40.7
2	6	12.1	23.1	51.7
3	6	24.2	37.3	64.5
4	4	38.7	52.4	73.6
5	9	82.3	76.0	107.4
6	1	100.0	100.0	100.0

Source: Kravis and Lipsey (1983), p. 2.

Table 1. National Price Levels for 34 Countries. Classified by Real GDP per Capita, 1975. (US = 100)

On the contrary, the lower the productivity of a country the less it can rely on this mechanism. The question comes to mind of whether the mechanism determining exchange rates might not produce terms of trade not in accordance with its own domestic price system so that a poor country exchanges goods less favourably, an impossibility under the assumption of perfect markets, of course, but given the degree of imperfection displayed by Table 1 the question cannot be suppressed.

The observed correlation between price level and real income per capita is what Kravis and Lipsey undertake to measure and to explain. The correlation of the two variables is so obvious from Table 1 that it requires no econometric corroboration. Nevertheless Kravis and Lipsey perform the calculation finding:

$$PL = 0.3081 + 0.9365\, r \,, \tag{1}$$

where PL are the price level and r the real GDP per capita of a country, both measured in relation to the United States. The regression predicts a price level of 30.81 percent of the level of the US for a country with zero GDP per capita, and for the US itself, with $r = 100$ the price level would come out at 1.2446. The explained variance $R^2 = 0.801$ and both coefficients are highly significant. A percentage point difference in real income translates almost one-to-one into a percentage point difference in price level. Crude and linear as this estimate is, it carries an enormous significance. If the purchasing power of the dollar is inversely dependent on the income per capita of a country, buying abroad is so much more advantageous for the rich country as it is disadvantageous for the poor one.

The explanation of the phenomenon adhered to by Kravis and Lipsey, which has meanwhile become standard in textbooks, goes under the name of differential productivity model. Assume that not all products can be internationally traded, but only some. For the tradable products holds the law of one price, i.e., the nominal price based on exchange rates is the same in every country. They are commodities of the world market. The non-tradable goods are produced and consumed only internally in an economy, and their prices may thus differ between countries. With similar prices for tradable goods in all countries, wages in the industries producing tradable goods in each country depend on productivity. The wage level established in the tradable goods industries prevails also in the non-tradable goods industries, but international productivity differences are smaller for the latter. This means that

in poor countries the low wages established in the low-productivity tradable goods industries apply also to the not-so-low-productivity non-tradable-goods industries. The consequence is low prices in low-income countries for non-tradable goods (Kravis and Lipsey 1983, p. 5). Indeed, partitioning their price sample in tradables and non-tradables Kravis and Lipsey find *Table 2.*

Income Class	Number of Countries	GDP Price Level	Price level of Tradables	Price Level of Non-tradables
1	8	40.7	60.0	24.9
2	6	51.7	70.7	37.2
3	6	64.5	86.6	46.5
4	4	73.6	97.9	53.4
5	9	107.4	118.5	96.7
6	1	100.0	100.0	100.0

Source: Kravis and Lipsey (1983), p. 12.

Table 2. Price Indices for Tradable and Nontradable Goods 34 Countries, 1975 (U.S. = 100)

Table 2 verifies the distinction between the two sorts of goods in that the price level of non-tradables is roughly on half that of tradable goods for all countries under investigation. And indeed, the regression of the price level of non-tradable goods comes out favourably:

$$PN = 0.0502 + 0.9893\,r + 0.1733\,OP\,. \tag{2}$$

The absolute term is reduced to insignificance, the linear terms increase from 93 to 99 percent, with a higher significance and more variance explained which indicates that the model of wage level determining the price level of non-tradables might well be holding. The variable OP stands for openness of an economy measured by the ratio of foreign trade to GDP. It is tested by the authors, but comes out with little significance, and is therefore ignored here. Now if the connection of the labour market mechanism to foreign trade holds as exposed in the differential productivity model, the law of one price should apply for the tradable products in as much as it does not hold for the others. The price level of tradables should be independent of income per capita, forming as it were the driving lever in the model forcing national wages down. Table 2 however, contradicts this hypothesis. The price level of tradable goods clearly varies with real income per capita, the corresponding regression being

$$PT = 0.4732 + 0.7619\,r + 0.1590\,OP\,. \tag{3}$$

So the question remains of why is the national price level strongly correlated to income per capita. The question is even framed more sharply now, since for tradable goods the law of one price should surely hold, even without any differential productivity model.

But the fundamental problem arising from this analysis lies on the theoretical level. If the differential productivity model assumes low productivity in the tradables sector, then, apart from the necessity of this proposition being

empirically tested, it evokes the question of why a country should participate in international trade at such terms at all. If a country deploys resources to an export sector that works at lower productivity than the rest of the economy this is an inefficiency or a disadvantage in allocation of resources as against fully domestically oriented production. The differential productivity explanation of national pricel levels, it seems, is not in line with the Ricardian comparative advantage theory. Thus in order to clarify the productivity argument it is necessary to look into the meaning of the term productivity more closely and to study the methods by which it is being determined. This will be done in the next chapter.

3 A simple input-output account of international trade

Input-output technique is predominantly applied to describing the production structure within a country, leaving exports and imports as additional rows and columns (or matrices), which are detailed in their commodity composition but have only a one-sided link to production. They either come from nowhere, — imports as primary inputs, or they go to nowhere, — exports as final outputs. Globalisation calls for a table of the whole world where commodities serve as identical stores of value between any two countries linked by trade, showing the overall interrelationship of this trade. In *Table 3* such an interrelationship has been estimated for the year 1997 on the basis of readily available information and in a crude form. Partitioning the countries of the world into 6 groupings the table describes the value of trade between them in current US$.

Table 3 is denominated in US$ and it should add up to a total trade balance of naught under the assumption of a global market for the traded commodities. Trade balances should correspond to the figures shown in the national balances of payment, in principle, showing the need for, or the surplus in, external finance. Actually the aggregation in Table 3 grossly underestimates the needed finance, because it shows only the balances between these groupings of countries. These are, however, fictitious, because only individual country's have trade balances, and not any of their statistical groupings, and the aggregated balances suppress the flows within each aggregate. In order to gain a correct impression of the means needed to finance international trade a flow table between all countries coining their own currency must be established. This is beyond our means here. Table 3 serves just as an illustration of the larger and correct exercise.[4]

[4]It also may serve as a kind of political grouping, because trade imbalances occuring between members of different groupings might be treated in a different way than imbalances within each of these groupings.

Exports from \ Exports to	[1]	[2]	[3]	[4]	[5]	[6]	All exports
1 Developed countries – Europe	1453	275	42	76	81	267	2194
2 Other developed economies	251	606	6	5	34	522	1424
3 Former USSR – Europe	35	8	20	13	1	27	104
4 Other Eastern European economies	56	3	7	12	2	8	88
5 OPEC	53	74	3	2	10	57	199
6 Other developing economies	247	480	14	10	52	532	1335
All imports	2095	1446	92	118	180	1413	5344
All exports	2194	1424	104	88	199	1335	
Trade balance	99	−22	12	−30	19	−78	

Source: IMF (1998) and own estimates

Table 3. World Trade by Regions (in billion U.S. dollars f.o.b.)

The main finding of international price comparison being that national price levels are correlated to national income per capita we begin our input-output accounting in such a way so as to investigate only this effect, bringing in other effects at a later stage. We distinguish three goods and three production processes. Two goods are tradable, T1 and T2, the third one is not, NT. We look at two countries A and B. To further simplify the matter we assume that country A produces T1 as its export good (EX), while country B produces and exports T2. Consumption (C) in both countries consists of their non-tradables, and their production uses the imports (IM) as intermediate input. One might think of energy (T1) and software (T2) as two possible inputs in services (NT). L is the value of labour input, which we assume to be the only production factor. This is an extremely simple model, but in its simplicity it highlights the subject in question. An input-output account of this international trade might look like *Table 4*.

Country A produces A$ 420 worth of T1 which it exports to country B, and it imports the same value of T2 in return from country B. Consumption makes up GDP from the expenditure side with A$ 1400 and B$ 600 in each country respectively, while value added figures add up to the same values, showing GDP under the output aspect. Foreign trade is balanced in both economies in their respective national currencies.

Type of Good	T1	T2	NT	C	EX
Country A (in A$)					
T1					420
T2			420		
NT				1400	
IM		420			
L	420		980		
Country B (in B$)					
T1			60		
T2					60
NT				600	
IM	60				
L		60	540		

Table 4. A simple input-output account of international trade

Roughly as the table is, it shows an important law. Two input-output tables balanced in their respective national currencies imply one and only one exchange rate in order to balance against each other. In this case the implied exchange rate is A$ 7 to 1 $B. The law is important because it derives from nominal variables only, and holds without any information about underlying prices and productivities. In particular, any inverse price-quantity movement of elasticity 1 in either economy leaves the nominal exchange rate unaffected.

In order to study the balancing problem more closely, let us assume some prices and their derived quantities. In country A:

$$P1 = 1 \text{ A\$/unit } 1, \qquad P2 = 2 \text{ A\$/unit } 2, \qquad P3 = 3 \text{ A\$/unit } 3,$$

where the first two prices stand for the tradable and the last price for the non-tradable product, each measured in A$ per respective physical unit. Dividing these prices into the nominal values shown in Table 4 yields an input-output table in quantities, the normal point of departure for quantity input-output models.

The choice of prices and quantity units in country A has an implication for county B. Given the values of Table 4 it follows that in country B the prices are now also given, namely

$$P1 = 1/7 \text{ B\$/unit } 1, \qquad P2 = 2/7 \text{ B\$/unit } 1, \qquad P3 = 3/7 \text{ B\$/unit } 3\,.$$

Otherwise the system would not balance, again an important accounting constraint. It says that if a balanced economy wants to incur balanced international trade with another economy, the prices in both economies must be the same, after application of the implied exchange rate, of course. This is the law of one price. And equally so for changes in these variables, of course. Applying the Geary-Khamis index for comparison of purchasing power parity (SNA 1993 par. 16.92) to our account is simple, because GDP, the commodity basket employed as the value standard of the national currency contains only one good in each country namely the non-tradable good. One obtains $PPP\$A/PPP\$B = 1/7$, the purchasing power parity is thus one, the exchange rate reflects the purchasing power of the two currencies. How then can we construct a case of differing purchasing power parities from this model?

Wages are equal in both countries, as the model now stands. This expresses the situation of a common labour market for the two economies. International trade is defined, however, as a trade when labour markets do not merge. We have barriers between the national labour markets segregating the national labour force into their national markets each. The global labour market is imperfect, by definition. Consequently our model becomes truly international if we assume different wage rates in each country. If the wage rate in country A is 4 A$/man-year that of country B must necessarily be 4/7 B$/man-year under a homogeneous labour market. From the data in Table 1 it may not be an exaggeration to cut the wage rate of country A in half, say 2 A$/man-year. If the cut is introduced simply on the one line of labour input of country A in Table 1, this table will not be balanced anymore.

Balance along columns is achieved if prices in country A are cut in half. In order to simplify the argument and avoid cumbersome recalculations let us assume that balance along rows is achieved by a corresponding increase in quantities. Twice as much labour is employed as before, and with the same technology twice as much quantity of each product is produced. This leaves the nominal table unchanged, and hence the nominal exchange rate of 7 A$ to 1 B$ remains the same, too. The nominal accounts are the same for both situations. But in quantities, the figures of situation A' are twice those of situation A. In particular country A' now exports twice the quantity of T1 to country B in return for the same quantity of T2 as before. *Table 5* compares the full accounts.

How are the two economic states to be interpreted? The difference between situation A and situation A' is that all internal prices have dropped to half, while internal quantities have doubled. Only the import quantity into A has not changed so that, at an equal exchange rate as before, double the quantity of T1 is exported from A'. Terms of trade have deteriorated for A, obviously, and we are interested in the effect on purchasing power. Due to the simplicity of the model the purchasing power effect is easy to determine. When a citizen of country B exchanges B$ into A$ he can buy as many units of NT in country A as at home, but twice as many in country A'. The purchasing power parities are 1 and 2, respectively. The traded goods T1 and T2 do not count in the purchasing power calculation, because their trade is balanced. GDP consists of consumption C only.

Note that we are working in terms of comparative statics. We are not stating that due to a wage drop in country A the economy changes to state A'. We are simply comparing two different quantity situations corresponding to the same nominal figures. Situation A' is different from A in several aspects. The wage rate is half, labour input doubles, so does output in goods T1 and NT. Technology is also different between the two situations in that in situation A' less of good T2 is used for production of a unit NT than before. Thus the deterioration of terms of trade is being matched by an increase of productivity. Furthermore, this production is less capital intensive and more labour intensive than before. Traditional theory holds, however, that the lower wage in developing countries is due to a low level of productivity. The argument of productivity must thus be submitted to a closer scrutiny, which we will undertake in the next chapter.

	Country A Wage rate equal to country B					Country A' Wage rate half of country B				
Type of Good	T1	T2	NT	C	EX	T1	T2	NT	C	EX
T1 (in units 1)					420					840
T2 (in units 2)			210					210		
NT (in units 3)				487					974	
IM (in units 2)		210					210			
L (in man-years)	105		245			210		490		

Table 5. Quantity input-output table for country A under different wage regimes

A first conclusion from this chapter can already be drawn. The differential productivity model explains purchasing power imparities first of all by differing productivity between countries in the sector of tradables. It seems that the model simply assumes this difference. Neither low productivity in tradables nor relatively higher productivity in non-tradables are necessary to produce differing purchasing power parities in correlation with differing wages. Our investigation has shown that a low wage level in terms of exchange rates corresponds to a low price level, and is not necessarily caused by, or an indicator of, low productivity. It then reflects not an internal production structure, but a relationship of external exchange. Put the other was around, it is possible that industries or countries of even productivity may still be linked together in a relationship of uneven exchange. For, compared to situation A, situation B is uneven in that A delivers twice as many goods T1 in exchange for its imports of T2 than before, and, yet, concerning productivity it is not worse.

This analysis seems to incorporate a subjective judgement in the sense that the opposite interpretation might also be tried. Situation A - B may be defined as uneven, and favourable for A, and situation A'- B be called the fair or even situation. So it looks as if there were arbitrariness in assumptions to be resolved only through moral judgement. But there is a purely economic argument behind. Economic efficiency in the allocation of resources is achieved through markets, in particular those in goods and services. In international trade, these markets are separated through national currencies. But an even purchasing power parity of the national currencies may be taken as an indicator of equilibriun in the sense that the national markets function in co-ordination as if they were one market. If purchasing powers are not at par, markets are obviously not co-ordinated, overall equilibrium is not attained, hence there is room for inefficiency and misallocation of resources, and one-sided advantages and disadvantages going hand in hand with it. Our intention is to measure the inefficiency.

On the assumption that situation A - B, and not A' - B, is the equilibrium state a loss of real resources through international trade can be calculated for Tables 4 and 5. In situation A' country A exports twice the real resources to B as under conditions A of equal purchasing power parity. Its nominal exports of A$ 420 are worth twice this sum in terms of real resources. Consequently country A' exports another A$ 420 or 30 percent of its GDP abroad without compensation. Note that this finding does not contradict Ricardo's theory about the reason for trade. It may still be that the decision of A to export T1 to B, and to import T2 from it is based on differences in comparative costs, however slight they may be. But Ricardo's theory stops short of the determination of the actual terms at which trade is then to be performed. So even if his conditions are satisfied, uneven trade due to imperfection in the corresponding markets is possible.

It is also interesting to observe that the cutting in half of the wage is compensated by a double participation of the labour force, the real income of which has not changed. They produce twice as much NT as before, only at

half the international value. In this sense uneven trade 'generates' employment, indeed, and applies the export multiplier.

Finally, the little exercise enhances the role of purchasing power comparisons in international trade. Comparing the nominal tables of the two countries reveals no information about value inequality, balanced as they are in every respect. Even the price comparison between the two traded goods T1 and T2 would not raise doubts, because prices between different goods cannot be compared anyhow. It is only after compiling, from these prices, an index of purchasing power parity of the means of payment and storage of value that an evaluation of foreign trade in terms of value inequality is at hand.

4 An analytical table of resource flows in international trade

The Purchasing Power Comparison of countries participating in international trade raises two questions:

a) Why does purchasing power vary between countries?

b) Why is the variance mainly correlated to the national standard of living?

As said above the main argument explaining international discrepancies in purchasing power parities is based on productivity. Low productivity in the tradables sector combined with a nationally homogeneous labour market depresses general wages so that even high productivity sectors sell under value. Our input-output account has shown that low productivity is not a necessary condition of differing purchasing power parities. In other words even under conditions of equal productivity purchasing power imparities may occur. But Table 2 shows that the premise of the explanation does not hold. The premise is that there exist a unified world market for the goods that are tradable. A unified market is characterised by a unique market price. Poor countries, however, earn 40 percent less for their products than rich countries. Even between the high income countries, which are mainly U.K., France, Germany, Japan, on the one side, and U.S. on the other, price differences of almost 20 percent exist for tradable goods on the average. This is a clear indication that there are barriers to entry for consumers to buy at the cheaper source, and, more likely, for producers to reap profits from the more favourable markets. It is an inefficiency in resource allocation, and a disadvantage for the low price countries' producers, and in as much as production creates income also for their consumers.

Another reason for the observed variation of purchasing power may be found in the markets determining factors exchange rate of national currencies. A national currency is not just a means of payment, but it performs this function in connection with its ability to serve as a storage of value. The

expectation of the future selling price of an asset determines its demand today. Without going into the details of monetary economics it is plausible that strong economies attract more investors than weak ones. Investing in financial assets of a strong currency may entail risk of devaluation, of course, but for weak economies the risk is generally higher. The financial interest in a currency as a store of value dominates the forces that work on the exchange rate from the production side, and this may explain, why purchasing power parity deviates from the market exchange rate in correlation with the living standard of a country. For the world's product markets this financial factor creates another imperfection, of course, and constitutes a barrier to entry for those countries that have to pay highly valued foreign products with low valued domestic products.

If we interpret variance in purchasing power of national currencies as caused by market imperfections we can measure these distortions by means through an analytical revaluation. This does not mean to find the exchange rates that would prevail in case equilibrium between countries were installed, a question that could only be answered by means of a full fledged general equilibrium model. We simply assume that the average is the equilibrium, more precisely we assume that the purchasing power GDP measures the average productivity of a country and the real value of the resources it employs, and that this productivity includes the exports of a country so that their real value must also be measured in terms of purchasing power. Countries of equal purchasing power are thus in mutual equilibrium, exchanging an even share of real resources. Countries of unequal purchasing power are not in equilibrium with each other, and the purchasing power parity measures the degree of disequilibrium. Re-valuing all exports in this way using purchasing power estimates from Table 1 changes Table 4 in the following way:

GDP Price Level (estimated from Kravis and Lipsey 1983)	[1] 1,10	[2] 1	[3] 0,7	[4] 0,6	[5] 0,5	[6] 0,4	
Trade in real terms (valued at equal purchasing power of currencies)							
Exports to / Exports from	[1]	[2]	[3]	[4]	[5]	[6]	All exports
1 Developed countries – Europe	1321	250	38	69	74	243	1995
2 Other developed economies	251	606	6	5	34	522	1424
3 Former USSR – Europe	50	11	29	19	1	39	149
4 Other Eastern European economies	93	5	12	20	3	13	147
5 OPEC	106	148	6	4	20	114	398
6 Other developing economies	618	1200	35	25	130	1330	3338
All imports	2439	2220	125	142	262	2261	7449
All exports	1995	1424	149	147	398	3338	
Resource balance	−444	−796	23	5	136	1077	

Table 6. Resource flows in world trade 1997 (billions of US$)

Comparing *Table 6* to the Table 3 of nominal flows the imbalances ruling world trade become quite revealing. Countries of low productivity are punished not by low wage levels, - that would be natural, but in addition by low prices they receive for their resources when they devote them to exports. Purchasing power parity analysis leads to a revival of the discussion about inequality of trade, as contained in the classical Prebisch-Singer hypothesis. But contrary to that method of looking into the change of terms of trade, the result of which is dependent on the choice of time interval and inconclusive in dealing with the effect of productivity improvements, an analysis in terms of purchasing power, which yields a direct comparison in terms of standard commodities, a more consistent picture of resource flows through the world can be drawn.

You also find that the weight of developing countries in international trade is much larger when measured in nominal exchange rates. So there is a case for renegotiating the terms of trade if these are to reflect resource use an their productivity. This is not to say that market exchange rates are wrong and purchasing power parities are the correct exchange rates, in their place. Both together are the results of disequilibrium. The question of how to pave the way for equilibrium of production and exchange in world trade cannot be answered through this analysis.

It is clear that the figures in Table 6 are far from being exact. They are very rough estimates serving only the purpose of illustrating the structure of the argumentation. A thorough investigation would have to deal with each country and its currency, separately, and work in a detailed break-down of commodities, probably with an elaborated labour-input matrix, distinguishing different qualifications (social accounting matrix). This is another project.

References

1. IMF (1998), International Monetary Fund, *Distribution of Trade Statistics Yearbook*, Washington D.C.
2. Kravis, I. B. and Lipsey, R. E. (1983), *Toward an Explanation of National Price Levels*, Princeton UP, Princeton. N. J.
3. Raffer, K. (1987), *Unequal Exchange and the Evolution of the World System*, Macmillan, Basingstoke, England.
4. Winters, L.A. (1991), *International Economics*, fourth edition, HarperCollins-Academic, London, UK.