

A World Accounting Framework: Trade and Financial Flows between Developing Countries and the Rest of the World

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1. INTRODUCTION

The patterns of trade and financial flows between different parts of the world economy have changed dramatically over the last two decades. These changes have been accompanied by large increases in discrepancies in macroeconomic statistics. Published data sources on global macroeconomic aggregates may be highly misleading because of their lack of consistency. A first necessary step towards the analysis of changes in the patterns of international trade and finance is therefore to develop a consistent global accounting framework in which international finance can be placed in relationship to international trade and domestic accumulation: this framework we call the World Accounting Matrix (WAM).

The WAM is based on the concept that related variables – international trade, financial flows and stocks, and domestic saving and investments – should be presented in one framework that explicitly takes the relationships between the variables into account. It is an integrated data system centred around accumulation balances. It presents aggregates in matrix format, for groups of countries. The purpose of the WAM is (i) to bring data from various data sources together in one framework in order to make better use of existing statistics, (ii) to check for consistency and to disentangle discrepancies both within and between data sources and to make adjustments for the discrepancies, (iii) to provide an analytical framework for the analysis of the effects of different types of international capital flows and external shocks on economic growth and stability in developing countries and the role of international capital flows in the process of global adjustment.

The purpose of this paper is to explain how a series of WAMs, – for the years 1970, 1975, 1980 and 1985 –, has been constructed. In Section 2, the national accounting relations of trade, finance and accumulation are aggregated to global relations that serve as a basis for world economic accounting in the WAM. Section

3 clarifies the aggregation of transactors and transactions for the WAM. Section 4 discusses the major data problems in the construction of the WAMs. Section 5 explains how the WAMs have been constructed. As an illustration of the analytical usefulness of the approach, Section 6 gives a number of examples of analysis with reconciled WAMs.

2. FROM NATIONAL ACCOUNTING TO WORLD ECONOMIC ACCOUNTING

National accounting systems are based on the national income identity. The following identity shows how income is generated by expenditure on output:

$$GDP = C + I + X - m \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (1)$$

where:

- C = Total consumption;
- I = Total gross domestic investment;
- X = Total exports of goods and non-factor services;
- M = Total imports of goods and non-factor services; and
- GDP = Gross Domestic Product.

Identity (2) shows how income is disposed of:

$$GDP = C + S + R + Tr \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (2)$$

where:

- R = Net factor payments to abroad;
- Tr = Net transfers to abroad; and
- S = Total gross national savings

Deducting identity (2) from identity (1) gives:

$$S - I = X - M + R - Tr \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad \dots \quad (3)$$

Identity (3) is the balance between domestic savings and investment on the one hand and the balance on the current account of the balance of payments on the other hand. An external surplus, i.e. a surplus on the current account of the balance of payments, implies that savings exceed investment. A deficit on the current account of the balance of payments implies insufficient savings relative to investment. By definition, an external surplus (deficit) equals the net capital outflow:

$$F = \Delta A - \Delta L = S - I = X - M - R - Tr \quad \dots \quad \dots \quad \dots \quad (4)$$

where:

- F = Net capital outflow;
 ΔA = Net changes in foreign assets; and
 ΔL = Net changes in liabilities¹.

A world accounting framework can be constructed by aggregating the national income identities of individual countries into aggregates for groups of countries. The national income identities as defined in definitions 1 to 4 for a single economy are also true at a more aggregated level: for any group of national economies or for the world as a whole. Identity (4) shows that by definition, at every such level, the goods surplus ($S - I$), the balance of payments on current accounts ($X - M - R - Tr$), and net foreign savings (F) are identical.

World exports of goods, services and transfers should equal world imports of goods, services and transfers. Therefore, the world current account, the sum of the current accounts of all individual national economies, should add to zero. The current balances of individual countries are either in surplus or in deficit. Consequently, each year countries will be net borrowers or net savers, but the sum of the world foreign savings equals zero by definition. Similarly, global savings must equal global investment. Some countries may have excess domestic savings, while others receive foreign savings. The world total of savings, however, must equal the world total of investment. Summed over all countries i , these relations can be summarised as follows:

$$\sum F_i = \sum A_i - \sum L_i = \sum (X_i - M_i - R_i - Tr_i) = \sum (S_i - I_i) = 0 \quad \dots \quad (5)$$

Just as national income identities form the basis for national accounting, the relation summarised in identity (5), may serve as a basis for world economic accounting. In the WAM, countries and regions are linked both through trade and financial matrices. Contrary to other approaches, the WAM explicitly describes the structure, i.e. the geographical network, of financial flows between countries and regions. The WAM presents flows of goods and services and financial flows and stocks in matrix format, thus integrating various data sources and economic aspects in one accounting framework. The world accounting matrix consists of four submatrices (or quadrants):

- North-West quadrant: The submatrix that records all transactions on current account;

¹The net capital outflow is equal to net changes in the stock of foreign assets adjusted for valuation changes. Net changes in assets (or liabilities) is equal to total new disbursements minus total principal repayments.

- North-East quadrant: The submatrix that records domestic investment;
- South-West quadrant: The submatrix that records domestic savings; and
- South-East quadrant: The submatrix that records foreign lending and borrowing.

The system is supplemented with tables for stocks of foreign assets and liabilities and gross national products.

3. AGGREGATION OF TRANSACTIONS AND TRANSACTORS

One of the main purposes of the WAM is to construct an analytical framework for the study of international trade and capital flows of LDCs. To analyse shifts in trade and capital flows between LDCs and the 'rest of the world' the world has been subdivided into blocs that form the origin and the destination of trade and capital flows of LDCs. The country classification for the WAM distinguishes six non-LDC groups (US, Japan, EC, Rest OECD, CMEA and Major Oil Exporters). The classification of LDCs is based on the hypothesis that there is a difference in debt characteristics, economic structure and capacity to absorb shocks between countries that borrowed primarily from official sources and countries that borrowed primarily from private sources. On the basis of this criterion countries are classified as (1) Official Borrowers (OB); (2) Diversified Borrowers (DB); and (3) Private Borrowers (PB).

International transactions (matrices CT and F) are disaggregated into more detailed categories. The main categories are on the current account (1) merchandise trade, that is further split into (i) trade in food and beverages; (ii) crude materials; (iii) fuels; and (iv) manufactures; (2) nonfactor services; (3) investment income; and (4) transfers. Capital account transactions are disaggregated into (1) foreign direct investment (FDI); (2) other capital flows (OCA) split into flows (i) from official sources; and (ii) from private sources.

4. THE DATA SOURCES

The major data sources are: (1) World Bank, *World Tables*, (2) UNDIESA, (*United Nations Trade Matrices System*); (3) IMF, *Balance of Payments Statistics* (BOP) (4) World Bank, *Debtor Reporting System*; and (5) OECD, *Geographical Distribution of Financial Flows to Developing Countries*.

²The DRS includes a geographical network for LDC foreign debt and related flows that is not reported in regular publications (like the World Debt Tables), but matrices that fit our country classification have been made available by the International Debt Division of the World Bank.

There are three major data problems. First, there is the problem of missing data. The major 'missing data problem' is the lack of a geographical network for financial variables, in particular for flows between industrialised countries. For example, there is no international data source that gives a geographical breakdown of direct foreign investment by the US, or the destination of Japanese portfolio investment.

The second major data problem emerges when combining data from different sources in one framework. While the estimates in publications of international organisations have been harmonised, data from individual country sources differ strongly in terms of coverage, definitions and level and type of disaggregation. This makes it difficult to compare and combine similar variables from different sources; it also explains discrepancies between the data sources.

A third major problem are the discrepancies within one data source. On the global level a good example is the world current account discrepancy, that reached a peak of US dollar 114 billion in 1983.³ About one third of the discrepancy originates in the category international transport. The largest part of the discrepancy can be traced to private investment income on OCA. There has been a growing excess of investment income payments over received investment income. A similar bias in reporting is found on the capital account, where reported capital inflows exceed reported capital outflows.

5. THE CONSTRUCTION OF THE WAMs

There are several stages in the construction process. First the 'raw aggregates' are calculated for the groups of our country classification. This results in a set of submatrices and marginal totals, from (partially) overlapping sources, each describing a particular variable like the "trade in fuels 1975". Depending on the data availability, the 'raw aggregate' may take the form of matrix interiors and/or marginal totals of (unknown) matrices.³ In this stage, some adjustments are made for 'missing countries'. The adjustments are made on the basis of additional data sources, or they are estimated from group or world ratios. A next step is the identification of discrepancies, both within and between the sources. Subsequently, some manual adjustments are made on the basis of an analysis of the causes of the discrepancies, only if there is sufficient ground to do so.

The result of this process is a set of unreconciled WAMs for 1970, 1975, 1980 and 1985. Some cells of the matrices, for example (some) flows of other

³The world current account discrepancy has been analysed in IMF (1987) *Report on the World Current Account Discrepancy*, Washington, D.C.: IMF.

investment income between industrialised countries, are still empty. As a last step in the construction process the matrices are reconciled using a Stone-Byron type of adjustment method that has been adapted to fit the WAM.⁴ This procedure also fills in the empty entries. The procedure has three important characteristics: (1) The entire WAM can be reconciled simultaneously, taking all the accounting identities into account, (2) Different degrees of reliability of the data can be taken into account, and (3) 'Second estimates' can be taken into account.

6. STRUCTURAL SHIFTS IN THE RECONCILED WAMs

A first question is whether the reconciled matrices (RWAM) present a picture of the world economy that differs from the usual perception that is based on international statistics like the *Balance of Payments Statistics* of the IMF. A comparison of the accumulation balances in RWAM and in BOP shows that the most striking difference is a huge increase in the savings surplus of Major Oil Exporters in 1975 and 1980. For LDCs it is found that Private Borrowers (PB) had larger incomings on the current account than in the BOP, while the deficits for Official Borrowers (OB) were even larger than those reported in the BOP.

Secondly, RWAM gives a 'one-page' summary of the world economy for 1970, 1975, 1980 and 1985. RWAM reveals the structure in the world economy in each of the four years and comparison of RWAM over time gives some insight in shifts in the world economy over time. 'Structure' in RWAM in this section has three aspects: (1) the relative importance of categories of transactions and country groups in the world economy; (2) the pattern of directional flows of trade and finance; and (3) as a consequence of the first two aspects, the pairwise trade and financial balances between country groups.

The major trend in international transactions has been rapid growth in trade relative to world GNP between 1970 and 1980. In the same period capital flows increased even faster. One of the main conclusions from the analysis of the shifts in geographical composition is that LDCs have increased their shares in global current account transactions, but have hardly participated in the 'globalisation' of international capital flows: their shares in global capital inflows decreased sharply between 1975 (18 percent) and 1985 (7 percent), while their share in global capital account outflows remained low (1 percent to 4 percent), in spite of the small increase between 1980 and 1985 that is largely accounted for by

⁴See R. Stone (1977) Foreword in Pyatt, G. and A. Roe *Social Accounting for Development Planning with special reference to Sri Lanka*, Cambridge: Cambridge University Press. For the adapted method for the WAM see de Jong, Jellema and Vos (1991) 'Financial Flows in a World Accounting Framework' (mimeo) The Hague: ISS.

Private Borrowers (PB). Official Borrowers (OB) have clearly lagged behind world trends in growth in trade and finance. OB's share in global current account incomes (exports) decreased where the share for the other groups of LDCs increased. As mentioned above, these trends were stronger in RWAM than in BOP.

These types of shifts may also be studied from the standard international data sources, like the *Balance of Payments Statistics* of the IMF. Also shifts in directional trade flows have been described often, but for financial transactions the analysis of shifts in directional patterns has only been carried out on a partial level. A systematic approach has never been possible because financial flows by origin and destination have never been reported systematically. RWAM allows for a systematic approach which is comparable to the approaches developed in international trade studies. Thus, shifts in directional patterns in trade may be linked to those in finance. It was found that both for trade and finance, there is a 'bias' in directional patterns: the flows are not distributed proportionally over the country groups.⁵ In some cases a 'bias' in trade is matched by a similar bias in finance. For example, exports to the US of Diversified Borrowers (DB) account for a relatively large share of DB's total exports, and DB also receives a relatively large share of its foreign finance from Japan. In the analysis of pairwise current and capital account [balances similar observations were made. Here the question is: if country] group A has a current account deficit with country group B, is this deficit 'matched' by a capital surplus with country B? It was found for example, that the EC finances a disproportionately large share of the deficit of OB. These trends have been further explored by means of Constant Market Share analysis, a popular tool in the analysis of exports, that has been applied to both the trade and the financial matrices of RWAM.⁶

The exploration of the data base has revealed some interesting shifts in world patterns of trade and finance. The construction of financial matrices by origin and destination makes it possible to compare trade and financial linkages between groups of countries, and to explore the links between trade and finance. This sort of descriptive analysis does not appear to have been proposed before and in any case would not be empirically feasible without the construction of a WAM.

⁵ See FitzGerald and Luttkik (1991) 'A note on the measurement of trade and financial linkages in the WAM, *Institute of Social Studies Working Papers on Money, Finance and Development*, No. 40, The Hague: ISS.

⁶ See Luttkik (1992, forthcoming) *The World Accounting Matrix*, Ph.D. Dissertation, University of Amsterdam, Institute of Social Studies, Amsterdam and The Hague.

Comments on

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I would like to begin with a disclaimer. I feel that my situation is best described as one of an interested student of these matters, and one who is struggling to understand. In particular, I lay no claim to expertise in macroeconomic model building.

Dr Luttik's paper is very much at an exploratory stage in developing a macroeconomic accounting framework. My comments relate chiefly to two aspects: one, the hypotheses underlying the country classification adopted for purposes of using the framework for analysis; and, two, the nature as well as the likely uses of such work.

Joke Luttik's three hypotheses that underpin, respectively, the country classification, the disaggregation of trade flows, and the disaggregation of financial flows are:

- (i) Country classification: there is a difference in debt characteristics, economic structure and capacity to absorb shocks between countries that borrowed primarily from official sources and countries that borrowed primarily from private sources;
- (ii) Disaggregation of trade flows: there is a relation between the type of trade dependency and the debt problem via the level of diversification of exports and the terms of trade; and
- (iii) Disaggregation of financial flows: different type of financial flows have a different impact on the receiving economy.

These hypothesis warrant some reflection. With regard to the first hypothesis what we are talking about are presumably the economic shocks/debt/adjustment/stabilisation muddles of the 1970s and 1980s in relation to the developing countries. (I say muddles for want of a better word.) One point of contention in this respect is whether the troubles of these countries were owed largely to exogenous developments, or whether the 50 odd developing countries somehow simultaneously got their fiscal, monetary and exchange rate policies all wrong.

Now I have problems with that part of the first (as well as the third) hypothesis which suggests a link between the type of borrowing on the one hand and economic structures and the capacity to absorb shocks on the other. Let me explain the

problem as I see it, with the aid of a couple of examples. My first example concerns Chile and Peru. Both these economies would be considered to be predominantly private borrowers but one of the two (i.e., Chile) is considered a success (at absorbing external shocks, and more generally in the outcome for the economy in the 1980s), whilst the other is considered a failure. To take another example, Turkey along with most of sub-Saharan Africa would be in the predominantly official borrowers class; Turkey's economy though is seen as a success case but sub-Saharan Africa continues to present a sad picture. To my mind at least part of the explanation for these different outcomes seems to lie in the timely as well as continued availability of the required volumes of external finance (*vis a vis* disruption or non-availability of flows), rather than whether the debt was official or private.

With regard to the second hypothesis, I am uneasy about the analytical content of the words "trade dependency". I feel uneasy because trade dependence quite often exists in most cases when the trade of a particular country (or a block of countries) that is not continental in geography is considered *vis a vis* the rest of the world. One could say for example that Japan exhibits dependency: it imports most of its raw materials and a good part of its food supply; and the income elasticity for its exports is high.

It therefore seems to me that analysis of trade and financial linkages from which meaningful and reliable policy implications can be deduced should take account of the particular conditions in the specific countries.

One aspect of country classification not made clear in the paper is the implication of the changing status of specific countries for the analysis, i.e., a public borrower in one period could be a diversified one in another; this would suggest that economies making up a particular grouping could change over time. My question then is: how are the analytical results to be interpreted in such situation.

Continuing with the country classification issue, the major shocks of the 1970s and 1980s for the developing countries were the two oil price hikes and the interest rate hike. There was also the considerable fluctuation with a generally downward trend in the non-oil primary commodity prices, and the disruption in the flow of external capital for a large number of indebted developing countries. When considering the thrust of the analytical applications of WAMs in the context of the present day issues there are at least six considerations, or developments, of some importance (in addition to the limited availability, in some cases non-availability, of external funds to enable adjustment, stabilisation and economic expansion) which need to be kept in view.

First, there is the slowing of the world economy and hence a slackening of

export demand. Second, for a number of developing countries¹ a major shock lies in the disruption of long standing trade and financial relationships with the erstwhile CMEA members. Third the growth impulse today is felt most strongly in the 4 DAEs (or NICs) and the three southeast Asian economies² and has to do with for a large part with capital flows from Japan to these economies and from the 4 DAEs (NICs) to the three southeast Asian economies. Fourth, there is a growing emphasis on regional economic integration, as evident in EC's single market and EMU initiatives, and in the US-Canada-Mexico NAFTA proposals. Fifth, if the extent of magnitudes and the volume of literature is any guide, the debt crises of the 1980s was for the larger part a Latin American phenomenon (clearly so in relation to lending by private international banks); and it is increasingly being asserted at the annual IBDR/IMF meetings as well as elsewhere that this particular problem is now behind us. Sixth, a lack of understanding between the major developed economies over the functioning of the world economy, of which the interest rate controversy principally between Germany and the US is the most recent example, provides the background to the foregoing developments.

The point is that country classification should be kept sufficiently flexible to capture the turns in the world economy.

I now turn to the nature and the uses of the WAM macroeconomic framework. Clearly it is not an optimising model. Rather, it provides a set of coefficients for global aggregates in a general equilibrium framework. Dr Luttik identifies three uses (Luttik paper page 1):

- (i) Collate data from different sources (referred to as "collate" below);
- (ii) Check consistency of data (referred to as "consistency" below); and
- (iii) To enable analysis of the effects of different types of international capital flows and external shocks on economic growth and stability of developing countries and the role of international capital flows in the process of global adjustment.

There is little difficulty in seeing the usefulness of WAMs in the first two of the above three uses, i.e., "collation" and "consistency"; perhaps the WAMs could also help to gauge interrelations that may not be intuitively obvious. But with regard to the third of the uses suggested, that of analysis of trade and financial linkages, reliable policy conclusions are unlikely unless the specific conditions of individual economies are taken into consideration; substantial disaggregation of WAMs would therefore be required.

¹India and Syria, for example.

²Indonesia, Malaysia and Thailand.

This brings me to a more general point. Good data can perhaps be an end in itself. But more generally the purpose of refining the data importantly includes the facilitation of analysis, and the cost-benefit in improving a data set or series *vis a vis* the likely resulting improvement in analytical results needs very much to be kept in view for a better utilisation of our limited resources.

Coming to the findings of the paper, the result that there has been greater integration among the developed economies in terms of financial flows as a percentage of current account transactions (one of the results that the paper projects) could surely be obtained by using relatively summary methods on existing data. The outcome in terms of the specific percentages as between unreconciled data and WAMs would of course be different though.

In concluding my comments let me say that Joke Luttik's work WAMs is impressive and her paper is, indeed, only the small tip of a large iceberg. The usefulness of this work for "collation" and "consistency" purposes is not in doubt. To the extent the underlying coefficients (i.e., marginal capital output ratios, exports as a function of rest of the world's income, imports as a function of output, etc.) are stable, the WAMs could also be used to assess the implications of different policy proposals. The coefficients are unlikely to show stability in a situation where the world economy turns from recession to recovery.

However, the limitation likely in the case of WAMs is when using the framework for analysing trade and financial linkages with a view to deducing reliable policy conclusions; the versions needed for reliable policy conclusions would, in my view, need to be relatively disaggregate and hence require a substantial amount of data (the Luttik paper alludes to the poor state of some of this data). Hence while we do need models such as the WAMs to test consistency, etc., it may nevertheless be more practical for policy purposes to concentrate on more limited, partial approaches.

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