Evaluating Vietnam's Macroeconomic Statistics: A Data User's Perspective

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Abstract

How well does Vietnam's macroeconomic statistics reflect economic developments during the period of external liberalization and transition to market?   What role can consumers of macroeconomic statistics play to improve the quality of data?   The objective of this paper is to illustrate how the use of basic analytical tools to study structural change and macroeconomic dynamics also can provide information on strategies to improve data quality, by identifying key areas where better data is needed to guide policymaking.   It turns out that information obtained from transforming GSO national income data into variables that have economic meaning, in order to study macroeconomic change, can also be used to assess the probable quality of the data. This is because the intricate construction of certain well-defined economic indices, such as the relative price of non-tradable to tradable goods (the internal real exchange rate), makes them less vulnerable to manipulation by statistical agencies that on occasion are suspected of doctoring the data.   These techniques may be applied to assess the quality of macroeconomic statistics in other countries, and to prioritize areas where statistical agencies should focus their energies on improving data quality.   In the case of Vietnam, I conclude from the analysis that the GSO should concentrate its scarce resources on improving data coverage of investment, output, and employment by enterprises in both private and state sectors.

Keywords: Macroeconomic statistics, GDP, national income data, Vietnam, data quality, accuracy, reliability, policymaking, structural change, macroeconomic dynamics, private sector, investment, employment.

1.   Introduction

The quality of Vietnam's statistics has become a controversial topic.   In recent years, the International Monetary Fund (IMF) questioned the accuracy of Vietnam's national accounts statistics prepared by the General Statistical Office (GSO), and presented their own significantly lower estimates of the GDP growth rate for the 1998-2001 period.   The IMF's own estimates have been questioned in a paper analyzing the differences between the IMF's and GSO's estimates of GDP, which concluded that the IMF's estimates are implausible on a number of points (Vu Quang Viet 2002).

This is not a trivial dispute.   The reliability of national statistics is as critical to policymakers as the reliability of navigational tools to an airplane pilot.   For this reason, we should be concerned with the quality of Vietnam's macroeconomic statistics, and we should care about techniques and approaches to assess its accuracy.   At the international level, the Statistics Department of the IMF is working on a project to develop a framework for assessing the quality of macroeconomic data.   This paper hopes to add to thinking on this subject by taking the perspective of a consumer of macroeconomic data, and offers suggestions about how data users can contribute to assessing data quality.

The paper's objective is to explore how the use of basic analytical tools to study structural change and macroeconomic dynamics also can inform strategies to improve data quality, particularly the *relevance* dimension of data quality (defined in Section 2), by identifying key areas where better data is needed to guide policymaking.   The paper is organized as follows.   Section 2 reviews definitions of data quality and current approaches used to assess the quality of macroeconomic data.   Section 3 explores how consumers of macroeconomic data may contribute to this effort, and illustrates through a

set of "numbers crunching" exercises.   Through comparisons of like estimates and the transformation of national income data into variables that have economic meaning in order to study their interaction, I examine how well Vietnam's macroeconomic statistics reflect economic developments during the period of external liberalization and transition to market.   Section 4 presents the conclusions.

2.   Definitions and current approaches to assess data quality

Over the years, the concept of data quality has broadened to include "these aspects of statistical outputs that reflect their fitness for use by clients" (Brackstone 1999).   Put another way, statistical agencies have come to appreciate the need to monitor and track data that government policymakers, enterprises and other important economic agents require in order to make wiser decisions.

Attention to data quality traditionally has focused on two dimensions: *accuracy* and *reliability* (Carson and Laliberté 2002).   Accuracy is defined as the degree to which the information that is estimated is close to its "true" but unknown value.   The error of the estimate is decomposed into bias, or systematic error, and variance, or random error, components (Brackstone 1999).   Carson and Laliberté (2002) define reliability as the closeness of the initial estimated value to subsequent revised estimates.

Other dimensions of quality identified by Brackstone (1999) include *relevance, timeliness, accessibility, interpretability*, and *coherence*. Relevance refers to the degree to which statistical information meets the needs of data users ("clients").   Timeliness refers to the delay between the reference period for the data and its availability.   There is usually a trade-off between timeliness and accuracy that should be taken into account.

Accessibility refers to the ease with which users of statistical information "can learn of its existence, locate it, and import it into their own working environment" (Brackstone 1999).   The cost of data collection is considered to be one aspect of accessibility. Interpretability refers to the availability of supplemental information about the data, such as underlying concepts and classifications, the methodology to collect and compile the data, and measures of data accuracy, that allows the user to understand and evaluate the properties of the data.   Coherence is an important dimension of data quality in analysis involving cross-country comparisons, for it refers to the degree to which statistical information fits into broad frameworks and uses standard concepts, variables, classifications, and methods (Brackstone 1999).   Thus, the GSO's decision to publish estimates of the poverty line based on international criteria enhances the coherence dimension of data quality, because it facilitates cross-country comparisons.

National accounts and balance of payments data pose a special problem from the standpoint of assessing data quality due to the complexity of the estimation methods utilized and the variety of inputs (Carson and Laliberté 2002).   For this reason, the standard statistical approaches of error measurement such as sampling biases, variances, etc. cannot be directly employed at the aggregate level, although they are useful in evaluating specific data inputs.   Carson and Laliberté (2002) review four known alternative approaches to assess the quality of national accounts and balance of payments data in light of this difficulty.   They are: (i) statistical discrepancies that take advantage of basic accounting identities, (ii) comparison of like estimates, (iii) analysis of revisions to preliminary estimates, and (iv) judgemental evaluation.

Economists consider the size, sign, and variability of statistical discrepancies, the difference between two totals that should equal, in forming an opinion about data accuracy.   With respect to national accounts data, the statistical discrepancy that is often looked at in Vietnam is the difference between the sum of final expenditures and inventory change and the sum of the components of gross domestic product (output from the primary, secondary and tertiary sectors).   Because errors on the two sides of the accounting identity are not independent of each other (Carson and Laliberté 2002), and because the General Statistics Office, like other statistical agencies, tend to adjust national accounts estimates to reduce the size of the statistical discrepancy, the statistical discrepancy as a measure of error should be treated with considerable caution.

In a comparison of like estimates, the economist looks at variables that are the same or are related, but from different sources. For example, U.S. corporate profits in the National Income and Product Accounts (NIPA) can be compared with that provided by the Internal Revenue Service, and also with the S&P 500 profits (Carson and Laliberté 2002).   Information gathered from surveys can be compared to the administrative records of government ministries. Home country export data can be compared with import data from trading partners.   Section 3 compares two theoretically linked identities, whose definitions are relatively straightforward in theory but whose empirical construction turns out to be quite complex. Consequently, these identities cannot be easily manipulated or "doctored" by statistical agencies. One is the relative price of non-tradable to tradable goods, also referred to as the internal real exchange rate (IRER), which utilizes national accounts data estimated by GSO. The other is the external real exchange rate (ERER), which utilizes data from non-GSO sources.

Clearly, it would be helpful to identify additional methods to supplement the approaches described above.   The next section discusses possible contributions by data consumers to assess and validate national accounts data after the output stage.

3.   Illustration using Vietnam's national accounts data

As noted, Vietnam's GDP estimates have been questioned, and concerns have been raised about the need to correct deficiencies such as improving data collection from the non-state sector including the informal sector (IMF 2001).   A report by the U.S. General Accounting Office (GAO) suggested that the activities of small businesses, the services sector and overseas remittances were underreported while growth and foreign investment values may be overestimated (GAO 1999).

Moreover, one may surmise that there were difficulties to surmount in producing credible estimates of the constant value of GDP final demand components because the General Statistical Office (GSO) did not publish these estimates until January 2001.   The IMF's own efforts to estimate the expenditure side of GDP in constant value produced results that seemed questionable, perhaps due to difficulties in estimating expenditure deflators.   For example, although the ratio of exports of goods and services to GDP in current value estimated by GSO came to 45% in 1998, the implied ratio of exports to GDP in constant value estimated by IMF staff came to 88.9% (IMF 1999).   Similarly, the current value ratio of imports of goods and services to GDP estimated by GSO came to 48% in 1998, but the implied ratio in constant value estimated by IMF staff came to an improbable 100.6%.   This example also illustrates the value of ratio analysis as a component in the toolkit to assess the quality of national account estimates.   It is a useful

device to reveal patterns that seem to contradict our prior assumptions about the data, thus drawing attention to areas where further investigation may be warranted.

Given the concerns about data quality that have been raised, it is instructive to examine the degree to which the GSO's national accounts data is able to capture economic developments during the period of external liberalization and transition to market. What can we learn from using this data to analyze the evolution of structural change in the economy and its gradual responsiveness to market signals? For example, does the data reveal a relationship between shifts in the relative price of non-tradable goods to tradable goods (the internal real exchange rate) and the share of the non-tradable sector in the economy that lends itself to economic interpretation? And not least, can we use this information to assess the quality of the data itself?

To answer these questions, I construct an index, set to 100 in 1990, of the internal real exchange rate defined as the ratio of the domestic price of non-tradable to tradable goods. The price deflators are generated from GSO's real and nominal estimates of GDP by type of economic activity (the sectoral classification is summarized in **Table 1**). The tradable and non-tradable goods price indices are themselves weighted by the share of sectoral output associated with each deflator.   Similarly, I construct the index of the ratio of non-tradable to tradable output in the economy, also set to 100 in 1990, in order to examine the relationship between the two.   The empirical relationship between the "internal" and the "external" real exchange rate also is examined.

In order to provide a framework for analysis, I first present an overview of the changing structure of the Vietnamese economy pre- and post-reform using data produced by the GSO based on the UN System of National Accounts (SNA), focusing on issues

that have not yet received sufficient attention. *Figure 1* shows the evolution of the four main sectors (listed in Table 1) as a share of GDP. The data suggests that the economic crisis that sparked the 1989 reforms was accompanied by a steep fall in manufacturing output and employment. The manufacturing sector's share of GDP had climbed to nearly 19% in 1988 (towards the end of the "subsidy" period), but dropped to a low of 14% in

Table 1. Sector Classification and Aggregation

Four Sectors	*Eight Sectors*	*GSO GDP sectoral disaggregation*
Tradables		
I. Primary		
	1. Agriculture	Agriculture
		Forestry
		Fishery
	2. Mining	Mining & quarrying
II. Manufacturing		Manufacturing
Light industry	3. Food processing & tobacco	
	4. Consumer goods	
Heavy industry	5. Producer goods	
	6. Machinery	
Nontradables		
III. Social overhead	7. Social overhead	
	Construction	Construction
	Electricity, gas & water	Electricity, gas & water
	Transport, storage & communications	Transport, storage & communications
IV. Services	8. Services	
	Trade	Wholesale & retail trade
	Real estate	Hotels & restaurants
	Other services	Financial intermediation
		Scientific activity & technology
		Real estate
		Public administration & defense
		Education & training
		Health & social work
		Recreational, cultural & sporting activities
		Association
		Community, social & personal service activities
		Domestic services serving households

Sources: Chenery, Robinson & Syrquin 1986, GSO 2001

1990.   The reason: domestic manufacturers in light industry could not compete with imports from China, Thailand and Japan.   The state sector was especially hit hard; manufacturing output in this sector contracted by 19.5% in 1989, and by another 8.6% in 1990.

The manufacturing sector's share of GDP, both state and non-state, did not surpass its 1988 high until 2000, 12 years later, when it finally rose to 19.1%. To provide context, it is worth pointing out that in Chenery, Robinson and Syrquin's landmark comparative study of industrialization and growth (1986), the process of structural transformation typically sees the manufacturing sector's share in value-added rise from 15% in the initial stage to 36% in the final stage of industrialization.   By this measure, Vietnam's manufacturing sector is still in the early phase of industrialization (see Table 2).   One may judge from the data that the structural evolution of the social overhead and services sectors appears to be balanced and on track, with scope for further expansion of the social overhead sector's share.   One may also infer that the key adjustment in the

Figure 1. Structural change: evolution of sectoral shares of GDP.
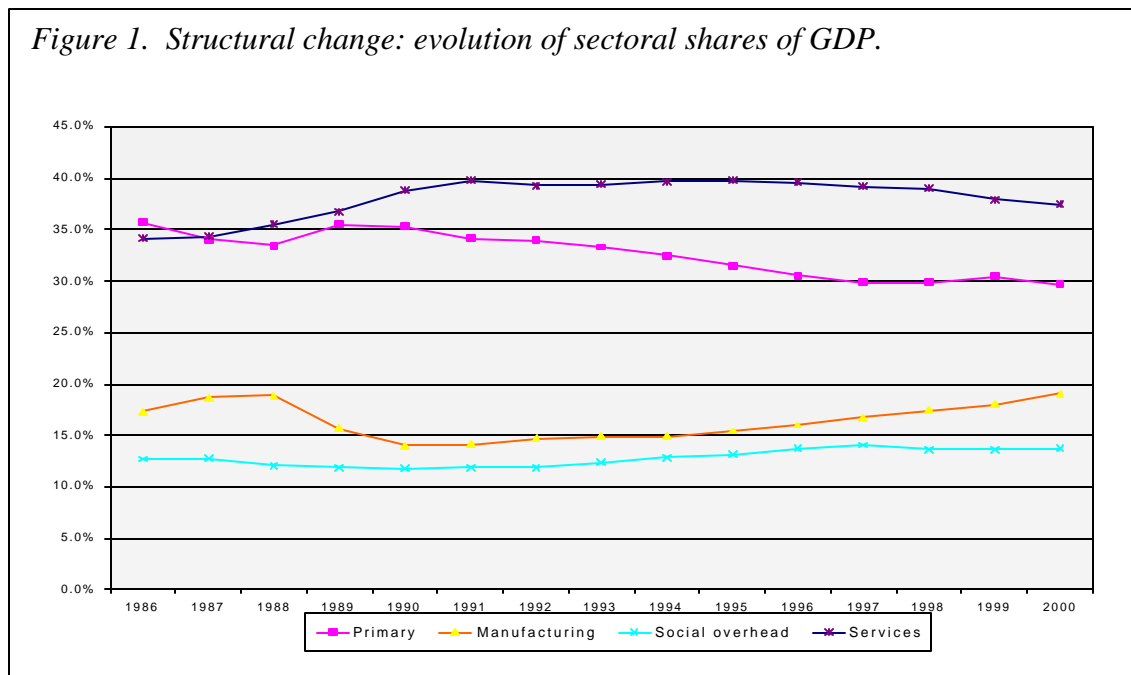
industrialization process that has yet to take place is the sizeable shift in the composition of output from the primary sector to the manufacturing sector.

Table 2. Structural Change During Process of Transformation (Percent Share of GDP)						
	Structural change in Vietnam: 1986 – 2000				Typical structural change during process of industrialization	
	1986-1988 "Subsidy" period	1989-1992 Econ crisis & reforms launched	1993-1997 VLSS92 – VLSS98 period	1998-2000 Financial crisis in Asia	Initial	Final
Primary	34.4%	34.7%	31.6%	30.0%	38%	9%
Manufacturing	18.3%	14.7%	15.6%	18.2%	15%	36%
Social overhead	12.5%	11.9%	13.3%	13.7%	11%	16%
Services	34.7%	38.7%	39.6%	38.1%	36%	39%

Sources: Chenery, Robinson & Syrquin 1986, author's calculations based on GSO 2001

These developments in the structure of output also are reflected in the structure of employment.   Thus, although the *level* of employment in industry and construction has risen, its *share* of total employment fell to 12.7% during the *Doi Moi* years (1989-1999) from 13.5% during the "Subsidy" period (1981-1988).   For this reason, the manufacturing sector's contribution to overall employment growth has been generally negative or small.   This is shown in *Figure 2,* which separates each sector's contribution to employment growth.   The exceptional years appear to have been 1993 and 1998, when the industry sector accounted for 34.9% and 17.3% respectively of total employment growth, although this pattern also may be due to data measurement error.   Thus, it is an area that merits further investigation.   News reports should be reviewed to determine if anything unusual happened during that period that could explain the jump in employment growth, and the GSO's disaggregated employment estimates should be cross-checked with data from the Vietnam Living Standard Surveys conducted in 1992-93 and 1997-98,

as well as with employment data from state-owned enterprises (SOEs), which may be obtained from government administrative records.

Figure 2 shows clearly that in general the low productivity primary sector, where underemployment is widespread, accounted for the bulk (60-80%) of Vietnam's employment growth. In other words, the primary sector basically served as the sink for the growing labor force. During the 1994-97 period, the services sector began to play an important role in generating employment, but the drop in FDI during the Asian financial crisis weakened employment growth in this sector. Meanwhile the contribution of the manufacturing and construction sector to overall employment growth was very weak throughout the 1990s. Thus, despite the high growth rates of the *Doi Moi* years, the economy continued to operate at below capacity because of the large reservoir of underutilized labor resources.

Figure 2. Sectoral Contribution to Overall Employment Growth
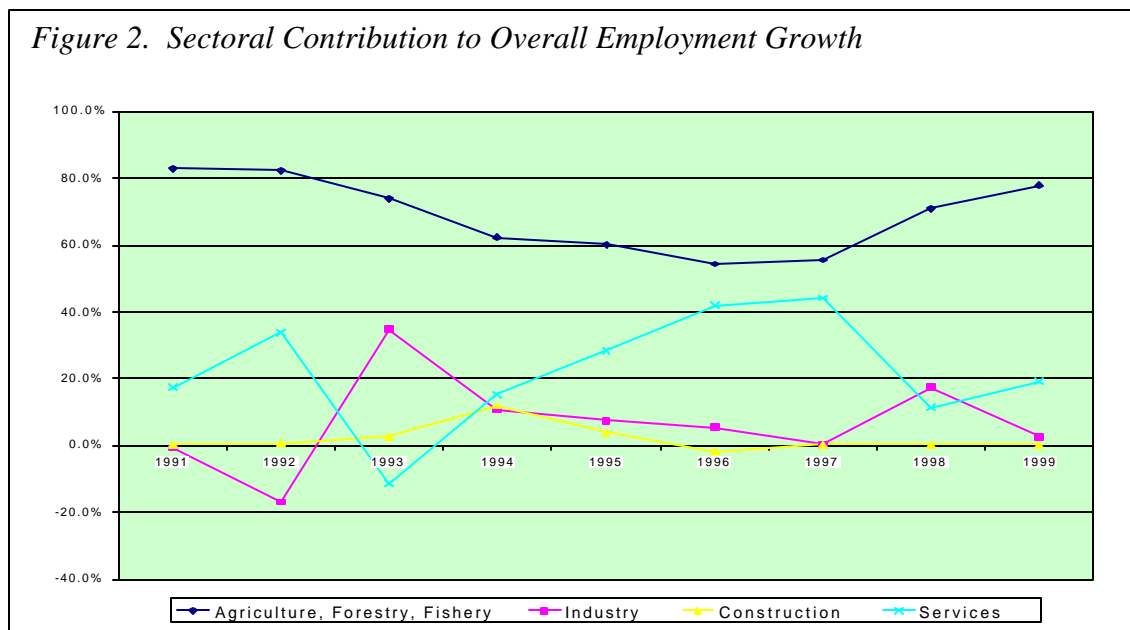
Typically, significant productivity gains from industrialization are realized when workers shift out of agriculture to higher productivity sectors such as manufacturing and

services.   Thus, a useful measure of progress with respect to industrialization is the contribution to overall productivity from labor reallocation between sectors (Chenery et al. 1986).   The above analysis of each sector's contribution to overall employment growth suggests that productivity gains from labor reallocation have not been significant in Vietnam because there has been very little movement of labor from agriculture to manufacturing or construction.   Can these observations, based on GSO data, be independently verified?   It turns out that analysis of the Vietnam Living Standards Surveys of 1992-93 (VLSS93) and 1997-98 (VLSS98), two highly credible datasets, provides strong indirect support. For example, Bales, Tung and Cuc (2001) use VLSS93 and VLSS98 to show that most of the gains in poverty reduction can be attributed to higher earnings *within* sectors, rather than to the movement of people *between* sectors. For example, higher earnings within the agricultural sector explained 55 – 60 % of the poverty reduction, while inter-sectoral shifts in hours worked contributed only 6 - 8.8 %.

As regards the economy's responsiveness to market signals, the data reveals a subtle but economically coherent relationship between movements in the internal real exchange rate (IRER) and shifts in the composition of non-tradable to tradable output during the Doi Moi decade (see *Figure 3*).   The IRER index, computed from implicit deflators produced by GSO, broadly indicates a trend rise in relative prices in favor of the non-tradable sector from 1988 to 1995, although with a dip in 1991.   It also shows a change in the index of relative output in response to the change in relative prices. This ratio of non-tradable to tradable output peaked in 1996.   In the latter part of the decade, the terms of trade slowly moved in favor of the tradable sector, and the index of relative

output moved accordingly, confirming at the macroeconomic level Vietnam's transition to a more market-oriented economy.

Figure 3. *Internal Real Exchange Rate and Relative Output of Non-traded to Traded Goods*
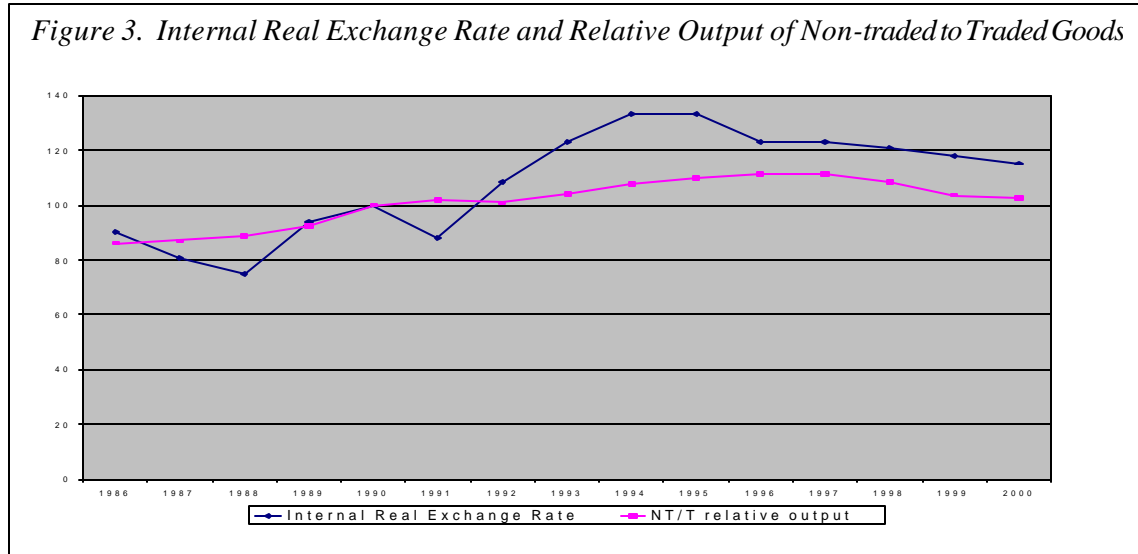
The information obtained from transforming GSO national income data into variables that have economic meaning in order to study their interaction – in this case, to examine the relationship between the IRER and the index of relative output of non-traded to traded goods – can itself be used to assess the probable quality of the data. It should be noted that the construction of these two indices involves a complex effort requiring a careful weighting of many subcomponents in the services category (see Table 1). While one must be careful to not overstate the case, there is intuitive appeal in the assertion that when an intricate parsing of raw data reveals relationships that are not only economically plausible but also reflect observed realities, the credibility of the raw data used in that construction is enhanced. These numbers crunching exercises in turn can contribute to improving data quality by identifying possible areas where a closer look at the raw data (with a view to its revision) may be indicated. While pattern recognition and

interpretation plays an important role, there are no mechanical formulas that can be usefully employed in this iterative and qualitative process. It requires careful judgement and empirical knowledge of the changing economy in order to arrive at a reasonable viewpoint about which GSO estimates may need to be revised and which estimates seem credible. Additional information, including comparisons with like estimates, will aid in the assessment of data quality.
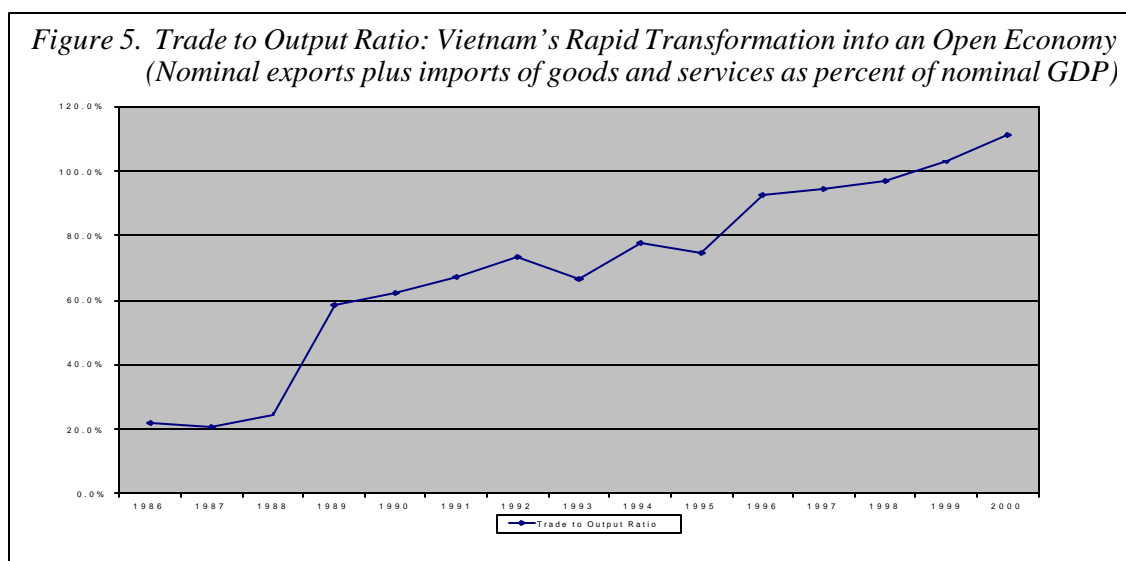
Turning now to the issue of comparing like estimates, let us consider the empirical relationship between the nominal exchange rate, the internal and two different measures of the external real exchange rate (see Figure 4). Data for the two measures of the real exchange rate index are obtained from a study for the World Bank on Vietnam's export competitiveness (Lord 2002). REER1 represents the purchasing power-based definition of the double-deflated nominal exchange rate of Vietnam with each of its trading partners, while REER2 represents the ratio of partner-country and domestic prices measured in terms of the CPI. To facilitate comparison, all indices are set to 100 in 1995.

Following the exposition presented by Hinkle and Nsengiyumva (1999), the simplified theoretical relationship between the IRER and the ERER – assuming for the moment that the law of one price applies to tradables and ignoring trade taxes and other transactions costs – can be roughly expressed as follows: the external real exchange rate (ERER) of the home country is the ratio of the home country's IRER to the weighted IRER of its trading partners. Consequently, there is not a fixed relationship between the IRER and ERER, and under certain circumstances the two may not move in the same direction (Hinkle and Nsengiyumva, 1999).

Figure 4. Evolution of the nominal, internal and external real exchange rate.
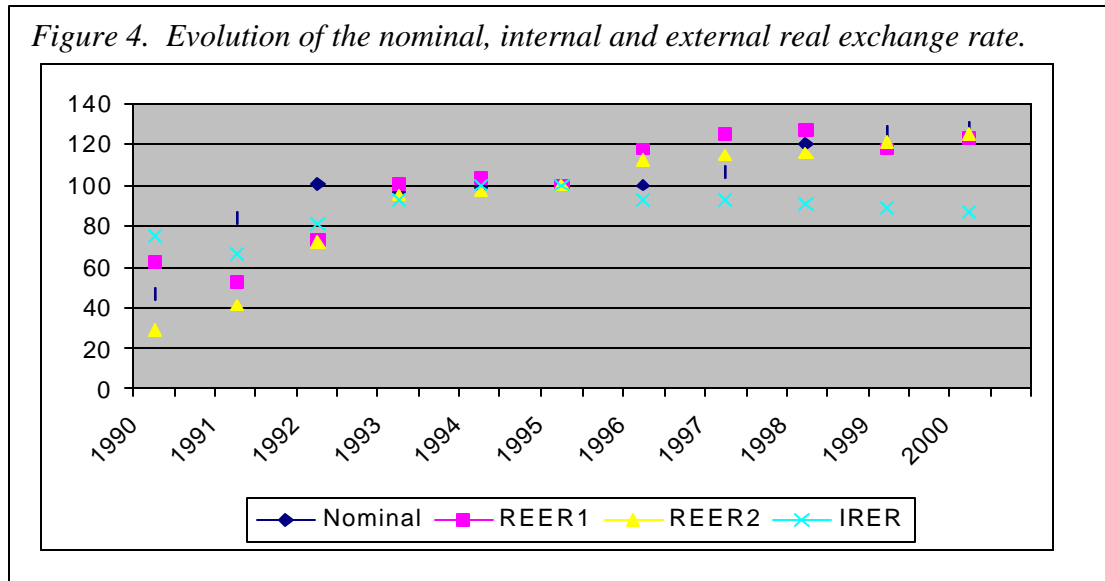
It is of interest to note that from 1990 to 1995, REER1 and IRER moved broadly in the same direction, which provides partial support for the accuracy of the underlying raw data.[1]   From 1996 to 1998, the external real exchange rate as measured by REER1 appreciated, and then depreciated in 1999.   In contrast, the IRER was depreciating throughout this period. The divergence between the IRER and the external real exchange rate (ERER) in the second half of the 1990s calls for further study, although it should be noted that the theoretical relationship between these two variables do not require that they move in the same direction.   A likely explanation is that the government's policy of import compression from 1997 on, a period characterized by high tariffs and various quantitative restrictions on imports, brought about a considerable divergence in the IRER and the ERER.

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[1]   At the same time, it must be cautioned that more steps are needed to assess the accuracy of the underlying data. For example, one would need to verify that there has not been a significant change in the weighted IRER of Vietnam's trading partners during this period, or other factors which may cause divergence in the IRER and the ERER.

Figure 5. Trade to Output Ratio: Vietnam's Rapid Transformation into an Open Economy (Nominal exports plus imports of goods and services as percent of nominal GDP)

On the demand side, the GSO's GDP expenditure data reveals Vietnam's remarkable transformation into an open economy as seen in the external sector's overnight rise to a dominant position. The trade to output ratio, defined as the sum of exports and imports to GDP, jumped from 24.7% in 1988 to 58.2% in 1989, and to 111% by 2000 (see *Figure 5*), or twice the average of all countries eligible for the IMF's Poverty Reduction and Growth Facility (IMF 2002).   Yet the foreign sector's net impact on aggregate demand was contractionary because of leakages from imports (see *Figure 6* and *Figure 7*).

Using techniques outlined in Berg and Taylor (2001), the sources of effective demand can be decomposed as follows:

$$X = \frac{s_P}{(s_P + t + m)} \cdot \frac{I_P}{s_P} + \frac{t}{(s_P + t + m)} \cdot \frac{G}{t} + \frac{m}{(s_P + t + m)} \cdot \frac{E}{m}$$

The above formulation, a variant of the Keynesian income multiplier function, provides insights about demand injections from the private, government and foreign sector scaled by each sector's leakage parameter.   Aggregate supply (*X*) is defined as the sum of

private incomes (Y_P), net taxes (T) and imports (M).   The leakage parameters defined relative to aggregate output are the private savings rate s_P (where $s_P = (Y_P - C)/X$), the tax rate t (where $t = T/X$), and the import propensity m (where $m = M/X$). I_P/s_P, G/t and E/m can be viewed as the direct "own" multiplier effects of private investment (I_P), government spending (G), and export (E) injections, with their overall impact scaled by the corresponding "leakages" which are, respectively, savings (s), tax (t), and import (m) propensities.

Figure 7 highlights the direct "own" multiplier effect of each of the demand components on aggregate supply.   It shows that from 1991 on, the most important demand stimulus came from the private sector, while the government and the external sector had a net contractionary impact.   As previously noted, Vietnam's high import propensity cut into effective demand, which explains the overall negative stimulus from the external sector.   With respect to the government sector, its overall dampening effects during the early part of the 1990s was due to the fact that real increases in government spending were offset by a rise in government revenues as a share of GDP.   From 1996 on,

Figure 6. Leakage parameters: private savings rate, tax rate and import propensity.
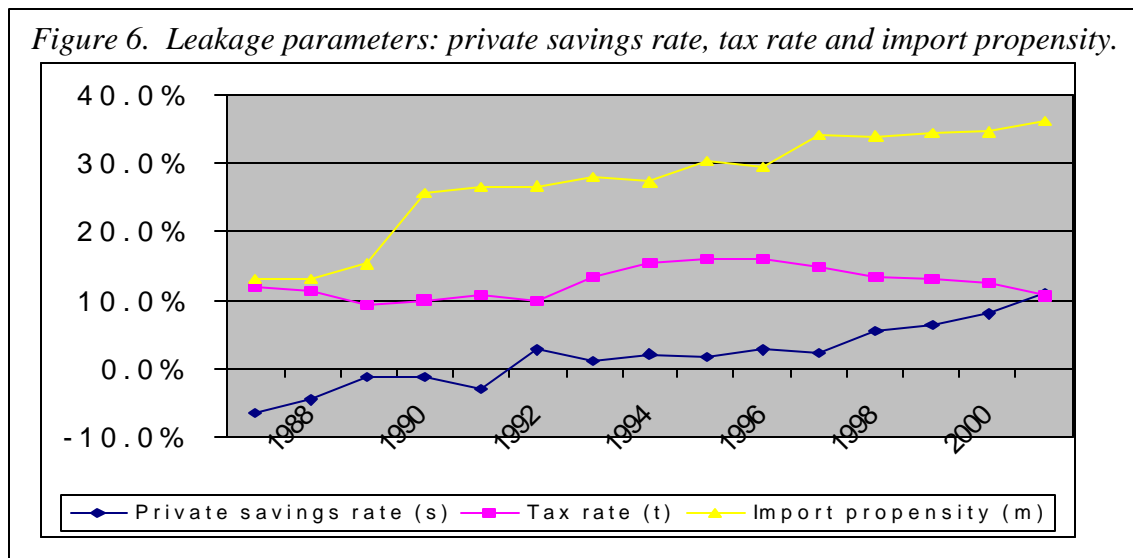
the gradual decline in the effective tax rate t was accompanied by a similar decline in both current and capital expenditures as the government sought to maintain a prudent fiscal stance (Packard 2002).

Figure 7. Direct effect of own multipliers (investment, government spending and exports) on output.
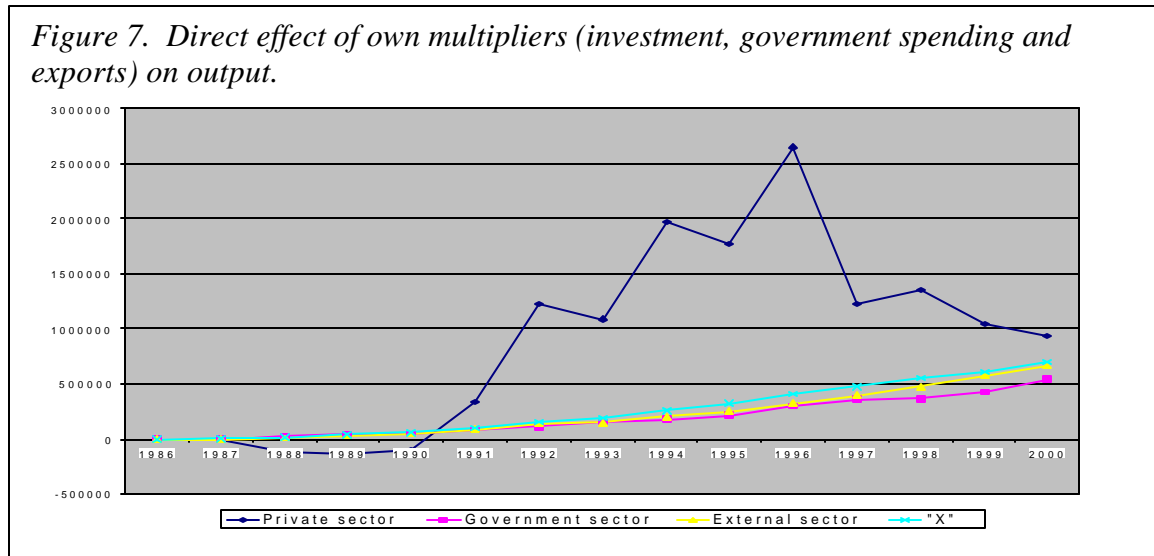
During the period of vigorous reform, non-state and FDI industrial investment spending soared. The private sector injection also was magnified by its very low savings propensity, which was calculated as negative prior to 1991 (Packard 2002). However, it is also highly likely that during this early period, the GSO underestimated the value of private investment and the actual savings rate probably was small but positive.   The demand injection from the private sector – assuming that the underlying GSO estimates are broadly accurate – highlights the critical but volatile role of investment spending throughout the 1990s. There is a possibility that this unstable pattern of demand stimulus driven by enterprise investment -- both private and state sector -- will be repeated during this decade. For this reason, an important priority for the GSO should be to focus on improving data coverage of enterprise investment, output, and employment as a guide to

policymakers seeking to mobilize private sector investment in order to promote sustainable economic growth.

4.   Conclusion

As noted by Carson and Laliberté (2002), new approaches are needed to expand our current limited toolkit to assess the quality of macroeconomic data. This paper illustrates how consumers of national account and balance of payments data, employing basic analytical tools to study structural change and factors that drive an economy, can contribute to the data validation process and identify areas where statistical agencies should focus on improving data quality.

Using Vietnam's national accounts data, Section 3 provided examples of how a qualitative parsing of economic variables can provide insights into where revisions of data estimates may be indicated. The non-mechanical use of these analytical tools to interpret patterns and assess data quality, supplemented by independent verification from other sources such as living standard surveys, is an improvement over alternative approaches, such as the use of statistical discrepancies.

The data validation exercises presented in Section 3 should be seen as a first step in the process of assessing data quality and identifying areas where further research is needed. Preliminary findings are as follows: first, the national income data tells a plausible story about the evolution of structural change in the Vietnamese economy and its gradual responsiveness to market signals, as indicated by the economically meaningful relationship between changes in the real exchange rate and corresponding changes in the share of the tradables sector in the economy. Second, the underlying national income

data used to construct the internal real exchange rate is broadly credible.   Support for this conclusion is based on a comparison of like estimates using the external real exchange rate.   Third, while the GSO's disaggregation of employment by sector appears to be accurate in the main, there may be a problem of data measurement error in certain years.

The decomposition of effective demand analyzed in Section 3 highlights the important but volatile role of investment spending during the 1990s.   There is a risk that this erratic pattern of demand stimulus will be repeated in this decade as well.   For this reason, the GSO should focus on improving data coverage of private sector activity in general, and enterprise investment activity in particular, to assist policymakers in their efforts to create an enabling environment for sustainable economic growth.   In summary, information obtained from a careful parsing of national accounts and balance of payments data can help to strengthen macroeconomic management capacity by identifying key areas where better data is needed to guide policymaking.

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