POLICY RESEARCH WORKING PAPER

Measuring Aggregate Welfare in Developing Countries

How Well Do National Accounts and Surveys Agree?

Martin Ravallion

The two sources of data on aggregate economic welfare—household surveys and national accounts—can yield different results. How large is this divergence? How is it changing over time? And how does it vary by region?

Summary findings

In a data set for developing and transition economies, Ravallion finds that private consumption per capita based on national accounts deviates on average from mean household income or expenditure based on national sample surveys. Growth rates also differ systematically, so that the ratio of the survey mean to the national accounts mean tends to fall over time. But there are revealing exceptions to these general findings. The

aggregate difference in the levels is due more to income surveys than to expenditure surveys. And there are strong regional effects; for example, the severe data problems in the transition economies of Eastern Europe and Central Asia mean that there is negligible correlation in that region between growth rates from national accounts and those from household surveys.

MEASURING AGGREGATE WELFARE IN DEVELOPING COUNTRIES: HOW WELL DO NATIONAL ACCOUNTS AND SURVEYS AGREE?

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Key words: Consumption; national accounts; household surveys

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I. Introduction

In practice one finds two quite distinct, and largely independent, sources of data on the average economic welfare of the residents of a given country. On the one hand, there is the level of what is typically called "private consumption expenditure" (PCE) per capita from the national accounts (NAS). On the other hand, for a smaller number of countries, and less regularly over time, measures of household consumption and/or income are available from household sample surveys.

How closely do these two sources of data on aggregate economic welfare agree? This question has received rather little attention from economists who routinely use these data. The main reason is probably that the two types of data tend to be used for quite different purposes, roughly corresponding to macroeconomic versus microeconomic applications (NAS for the former, surveys for the latter). This is natural, given that survey data are micro data.

However, in at least one area of recent applied work, the relationship between these two data sources is of considerable interest. In assessments of the effects of economic growth, or growth-promoting policies, on the extent of absolute poverty, the "growth side" typically comes from NAS-based analyses (such as growth regressions) while the "poverty" side comes from the analyses of household survey data. Any poverty measure can be thought of as a function of the mean of the distribution on which poverty is measured and the extent of "inequality" in that distribution, which determines the share received by the poor. Given a growth rate, it is straightforward to predict (analytically or numerically) the impact on measured poverty assuming that distribution does not change. Alternatively, one can estimate empirical elasticities of poverty measures with respect to

growth in the survey mean, consistent with whatever changes in distribution are found in the data (Ravallion and Chen, 1997). A common practice in past efforts to predict poverty impacts of growth has then been to assume that the survey mean grows at the same rate as the predicted change in PCE from the national accounts (often equated with the growth rate of GDP per capita). For example, this assumption has been used in making forecasts of how aggregate poverty measures are expected to evolve in the future, given projected NAS growth rates (World Bank, 1990, 2000), and in estimating aggregate poverty measures for a given date, noting that survey dates differ (Chen and Ravallion, 2001). Is that assumption justifiable? If not, then projections of the impact of economic growth on measured poverty could well be way off the mark.

Motivated by these concerns, this paper compares the levels and growth rates from the two data sources across developing countries. Discrepancies between these two sources have been observed for specific dates and countries. For example, the most recent data indicate that aggregate household expenditure from India's National Sample Survey (NSS) accounts for about 60% of private consumption from the NAS — a seemingly large discrepancy in the levels. The ratio has also been declining over time (Srinivasan, 2000), suggesting a bias in the growth rates too, with the NSS mean growing at a persistently lower rate than PCE.[1]

This paper tries to assess how common it is to find such divergence between these two sources of data on aggregate economic welfare. Two questions are addressed: Firstly, do these two data sources agree in the aggregate, and within specific regions? In the

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[1] A qualitatively similar pattern is found for the United States, in comparisons of PCE with the US Consumer Expenditure Survey; the survey mean is lower, and has had a lower growth rate in the 1980s and '90s (Triplett, 1997; Slesnick, 1998, 2000).

context of the aforementioned concerns about monitoring poverty, the question also arises as to whether consumption gains in the NAS are passed on one-for-one in the mean from household surveys. This motivates a second question: Is the ratio of the two measures a constant (even if not unity)?

The following section discusses the two types of data in general terms. Section 3 presents bias tests on the levels using a data set for 90 countries and for growth rates using panel data covering 60 countries. Section 4 concludes.

II. Alternative data sources on aggregate economic welfare

The two types of data to be compared here could hardly be more different in terms of the way they are obtained. National budget and living standards surveys are typically designed to measure the mean expenditure and/or income of households. The measure of average consumption in a household budget survey is typically based on the self-reported expenditures (cash and imputed values from own stock) in household interviews.[2] The questions usually aim to cover all the commodities consumed (for example, 700 items are identified in the 1993-94 questionnaire from India's National Sample Survey). Income surveys often obtain reasonably detailed income components (earnings, profits from own enterprises, income in kind) which are then aggregated, though this is by no means straightforward (Deaton, 1997). Survey and processing

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[2]   We know of one micro data set in which one can use the "commodity flow" method of estimating consumption (common in national accounts) as well as the more common survey method based on reported transactions, namely in the village-level data for India set studied in Ravallion and Chaudhuri (1997). The discrepancies between the two sets of consumption estimates found in that study resemble those evident in the far more aggregate comparisons presented below.

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practices vary greatly, with implications for the comparability of results over time and across countries.

There is also heterogeneity in national income accounting practices; although standards are set internationally they are implemented unevenly.[3] NAS consumption numbers are rarely based on household consumption surveys.[4] In traditional measurement practice, households are essentially the "residual claimants" of output in the national accounts (Ruggles and Ruggles, 1986). In a many developing countries, aggregate consumption in the NAS is simply the residual obtained by subtracting other (measured) forms of domestic absorption from aggregate output.[5] The preferred and now more common "commodity flow" method does essentially the same thing at commodity level. The method begins with estimates aggregate output for each commodity group. After adding imports, one then tries to account for domestic absorption by firms and governments (the increase in inventories held by firms as well as their purchases and those by the government). The remainder is then called the "private consumption" of that commodity in the NAS which is then aggregated.[6] In practice, the resulting estimates

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[3]   See for example Kulshreshthra's (1998) description of the problems that India's Central Statistics Office has faced in implementing the current international standards set for NAS as set out in European Commission et al., (1993).

[4]   In some countries, survey-based estimates (when available) are use as a cross-check, and NAS estimates for specific consumption components are sometimes based on the survey data.

[5]   Schmidt-Hebbel and Serven (1997) give the method used for estimating PCE for 71 countries. Of the 48 developing countries in their list, 19 estimated private consumption as a residual.

[6]   The term "household final consumption expenditure" is sometimes used instead of "private consumption"(see, for example, , World Bank, 2001, p.239). The former term is also used in the national accounts standards set out in European Commission et al., (1993, p.216) to refer to consumption expenditure by resident households (as distinct from the spending by non-profit organizations). To avoid confusion I will use the term "private consumption" to refer to the sum of expenditure by households and non-profits, as typically measured in the national accounts for developing countries.

might be adjusted in an ad hoc way to make them accord better with other data sources for specific commodities, such as retail sales statistics and household budget surveys when available. But for the most part NAS consumption are not based on household consumption surveys, and the two methods of estimating consumption can be treated as largely independent.

There are four main reasons why levels and/or growth rates from these two sources might not agree. Firstly, there is noise in both data sources due to measurement errors. These errors are probably uncorrelated between the two sources, given the differences in methods. However, even independent (zero-mean white noise) measurement error in the consumption numbers from the national accounts will still yield an attenuation bias in the regression coefficient of the survey mean on NAS consumption. There are well-known problems in measuring illegal, informal, household-based and subsistence outputs in the NAS for developing and transitional economies. As an economy develops, the household-based production activities that are not measured in the NAS sector becomes "formalized," imparting an upward bias to measured NAS growth rates of output (Thomas, 1992). Also some non-household components of domestic absorption are very hard to track, such as capital flight, which will clearly lead to over-estimation of consumption in the NAS, though the extent of the error could vary considerably over time. There is no obvious reason to think that the errors will cancel out in calculating consumption as a residual in the NAS (in either the aggregate or at the commodity level). On top of this problem, there will be noise in the empirical relationship because of imperfect matching between survey dates (which also vary between types of commodities, according to assumed recall periods) and the accounting

periods used in the NAS. The NAS consumption numbers are also of varying accuracy according to whether the year in question is a "benchmark year" (usually the decennial or quinquennial censuses) for which better data are available. For other years, PCE data often rely heavily on extrapolations. Imprecision must be presumed in measuring growth rates from such data, especially in non-benchmark years.

Secondly, even aside from measurement error, there is a difference in coverage. Probably the most important difference is that PCE includes spending on goods and services by unincorporated businesses and non-profit organizations (such as charities, religious groups, clubs, trade unions and political parties). Although a theoretical separation is made between consumption by households and non-profit organizations serving households in the standards for national accounts set out in European Commission et al., (1993), in practice it has proved difficult to implement this separation in most developing countries, so as to identify household consumption.[7] The countries for which the separation has been possible appear to be almost solely in Europe. In countries with a large and rapidly growing non-profit sector (not uncommon it seems in developing countries over recent decades), the growth rate in PCE could deviate substantially from the underlying growth rate in household consumption. Another difference that is likely to matter in developing (primarily) rural economies is that grain consumed by farm animals owned by farm-households is hard to distinguish from human consumption in the NAS;

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[7]   Lützel (1996) reports that in the expert group meetings leading up the 1993 revisions to the standards for national accounts in European Commission (1993), representatives from the developing countries lobbied for separating non-profits from households even though it was recognized that the split was generally no feasible. Their argument was that identifying this separation in the standards for national accounts would foster better data collection on spending by non-profits in the future.

again, the distinction is clear in theory, but it is difficult to implement in practice in developing countries.

Thirdly, household surveys may well underestimate income and expenditure. There are numerous problems in obtaining credible estimates from standard survey instruments (see, for example, the discussion in Deaton, 1997). Compliance by well off sampled households is a well-known concern amongst those implementing surveys; it is not uncommon for the rich to systematically refuse to participate in the survey, or be impossible to interview for other reasons (getting past the guard dogs alive, for example). One expects that they will be replaced by more compliant but less well-off respondents. Or interview respondents can forget, or prefer not to reveal, items of consumption or income sources in the survey schedule. Amongst survey specialists, underestimation is generally thought to be a greater problem for incomes than for expenditures (see, for example, Deaton and Grosh, 2000), though evidence is naturally scarce. However, one study found that the mean income of the 10 highest income households in each of 18 surveys for countries in Latin America was generally no more than the average salary of the manager of a medium to large sized firm in that country (Székely and Hilgert, 2000). This suggests underestimation of incomes. While that may be unavoidable, survey design matters greatly. For example, attempts to shorten the survey questionnaire (to obtain a quick income or consumption estimate from just a few questions) can be expected to produce substantial bias, and there is supportive evidence.[8] Yet there are

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[8] Deaton and Grosh (2000) compare the estimates of consumption obtained by various survey designs drawing on the experience of the World Bank's Living Standards Measurement Study. For evidence on measurement error in self-reported incomes in surveys see Rendtel et al. (1998), using data for Germany.

many surveys in use (including in the data sets used in this paper) that use worryingly short questionnaires. There is considerable heterogeneity across countries in what is included as "household income" (Smeeding and Weinberg, 2001).

Finally, analysts of the two data sources do not, as a rule, use the same deflators. PCE has its own implicit deflator. Comparisons of survey means over time generally use a Consumer Price Index of some sort, often using weights calibrated from the survey. There is no guarantee that these different deflators will agree.

It is evident that when the levels or growth rates from these two data sources differ there can be no presumption that the NAS is right and the surveys are wrong, or vice versa, since they are not really measuring the same thing, and both are prone to errors. No attempt is made here to determine which of the two data sources better measures the average standard of living; rather the issue is to what extent these two sources agree with each other, on average, and (in particular) how much NAS consumption growth is reflected in the surveys. Nor does the paper explore the implications of any bias, which will depend on the reasons for the discrepancy. That is beyond the scope of this paper.

III. Tests for systematic differences

First we will see whether there is bias in the levels, i.e., whether the ratio of the numbers from the two data sets is unity on average. After that, tests will be presented for bias in the growth rates i.e., whether the ratio is constant, even if not unity.

A. Levels

The tests for bias in the levels are from a data set for 88 developing countries compiled for this paper and available from the author. (The Appendix summarizes coverage of the data set.) The most recent available nationally representative survey was used, and matched to the closest NAS. The countries and dates are listed in the Appendix.

If private consumption in the national accounts gives an unbiased estimate of mean household income or expenditure from nationally representative surveys then the ratio of the two should be unity on average. This is not the case. Figure 1 summarizes the results. The average ratio of the survey mean to consumption from the NAS is 0.826, which is significantly less than unity (t-statistic=4.41; the standard error of the mean is 0.039). The median is 0.768. There is huge dispersion, within a range of 0.21 to 2.25. The survey mean is lower than consumption per capita in 77% of cases.

The ratio tends to be significantly higher for surveys that use expenditures rather than incomes; 52 observations are for mean expenditure, 36 are for income. For expenditure surveys, the mean ratio is 0.931 which is not significantly different from one (t=1.21). For income surveys, however, the mean ratio is 0.674 (median of 0.684) and is significantly less than one (t=8.37). The mean difference in the ratios of 0.257 is significantly different from zero (t=3.40).

There are some marked regional differences. Table 1 gives regressions of the ratio of the means on regional dummy variables. The ratio is significantly lower than unity in Eastern Europe/Central Asia (EECA), Latin America and South Asia. This ceases to be true for Latin America when one controls for whether the survey mean is for expenditure

or income; a large share of the divergence between the two data sources for Latin America is attributable to the more widespread use of income in measuring household welfare from surveys in that region. The significant South Asia effect stems from India and Pakistan, both of which have a ratio of survey mean to PCE around 0.55, despite the fact that they use expenditure surveys.

The fact that, over the sample as whole, one cannot reject the null hypothesis that PCE is an unbiased estimate of the mean from expenditure surveys may be surprising given that PCE has broader coverage (as typically estimated in developing countries) and so should exceed household consumption. However, 7% may not be an unreasonable number for the average contribution of spending by non-profit institutions to PCE. The only evidence I know of is for the U.S. for which Slesnick (1998) estimates that the share of PCE accountable to nonprofit institutions was 5% in 1960, though rising to about 11% in 1993. However, the divergence for expenditure surveys seems too large to be plausibly attributed to this factor in EECA and South Asia. And the data convincingly reject the null hypothesis that PCE is unbiased for income surveys, which yield a mean that is only two-thirds of PCE. There must be a strong presumption of sizable income underestimation in surveys.

As an aside, it is of interest to see if the extent of divergence between the two sources of data on aggregate welfare is any greater for developed countries. For 21 industrialized countries, I found that the mean ratio of the survey mean to PCE was 0.899 (standard error of 0.039). This is higher than for the developing countries as whole, but the difference is not statistically significant (t=1.27).

B. Growth rates

Is the ratio of survey mean to PCE roughly constant over time? Naturally, the

lack of surveys over time and comparability problems entail that this comparison is not

possible for as many countries used in the last sub-section. Problems of survey

comparability over time also loom large. The tests on growth rates are based on the data

set for developing and transitional economies described in the Appendix and available on

a World Bank web site.[9]

To measure each growth rate of the mean between two surveys for a given

country I have used the same welfare indicator (either expenditure per person or income

per person) for both surveys; thus a survey-based income measure at one date is not

compared to an expenditure measure at another date. The Consumer Price Index is used

as the deflator. The surveys used to construct each spell (formed by two surveys) are

nationally representative, the means are population weighted, and include imputed values

for consumption or income-in-kind from own production. If there is known to be a

serious comparability problem then the spell is dropped. However, there are undoubtedly

problems remaining, adding noise to the measured changes in survey means. Overlaps

between survey years and calendar years were dealt with by linear interpolation.

We need to compare the measured survey-based growth rates between survey

dates with the growth rate in PC from the NAS, matched as closely as possible to the

survey periods. Let the growth rate in the survey mean be denoted *GSM* and let the

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[9]   See http://www.worldbank.org/research/povmonitor/. This paper is based on the data set
in the Fall of 2000 (the countries and coverage is described in the Appendix.

growth rate in PCE over the same period be *GPC*. The test for bias entails running the regression:

$$GSM = \alpha + \beta\, GPC + residual \tag{1}$$

where the residual has zero mean. If $\alpha = 0$ and $\beta = 1$ then on average the two growth rates are equal; this is what one expects to find if the NAS growth rate is an unbiased estimate of the growth rate in the survey mean.

From the data set described in the Appendix and more fully in Chen and Ravallion (2001), 142 "spells" have been constructed between successive household surveys for 60 countries in the 1980s and '90s. Taking the sample as a whole, the estimate of α is not significantly different from zero (t-statistic=0.55). However, the estimate of β is 0.52, which is significantly positive (t=2.37, significant at the 2% level) and significantly less than one (t=2.20, significant at the 3% level).[10] Figure 2 plots the data points. So about one half of the growth rate in PCE is reflected in the survey-based growth rate, on average. A true value of $\beta = 1$ would require that half the observed variance in *GPC* is due to measurement error.

There is a marked difference between expansions and contractions. On interacting *GPC* with a dummy variable for expansions, the test equation becomes:

$$GSM = \alpha + [\,\beta_d\,(1\text{-}D)+ \beta_u\,D]GPC + residual \tag{2}$$

where $D=1(GPC>0)$ (where $1(.)$ is the indicator function). Thus β_d is the slope when PCE per capita is falling, and β_u is the slope when it is increasing. With this

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[10]   All tests reported in this paper are based on White standard errors.

modification, β_d is estimated to be 0.13 and is not significantly different from zero (t=0.30) while β_u is 0.84, which is significantly positive (t=3.15) but not significantly different from one (t=0.58). Thus one cannot reject the null hypothesis that the growth rate in consumption from the national accounts is unbiased for expansions; but one certainly can reject the null for contractions.

This asymmetry may well be spurious, however. The statistical systems of the transitional economies of Eastern Europe and Central Asia (EECA) are known to have been in upheaval, and have faced severe problems, such as in measuring the outputs of illegal and/or informal activities in the NAS (for an overview of the data problems in this region see Bloem et al., 1998). The region has also seen sizable economic contraction as measured in the NAS. I repeated the bias test in equation (1) taking out EECA. One again finds that the estimate of α is not significantly different from zero (t=-1.00), but the estimate of β rises appreciably to 0.84 which is significantly positive (t=5.74, significant at better than the 1% level) but is not significantly less than one (t=1.13). Figure 3 plots the data points for the restricted sample. On doing the test in the form of equation (2), there is no significant difference between the estimated values of β_d and β_u (t=0.15). Excluding EECA, these data suggest that the growth rate in PC from the NAS is an unbiased estimate of the growth rate in the survey mean.

However, for EECA (and contracting economies generally, though EECA accounts for most of these), the NAS data and the survey data appear to be virtually orthogonal. Across the 27 EECA observations, there is no correlation between the growth rates in survey means and the growth rates in the consumption component of the

NAS. For EECA, the estimate of α is not significantly different from zero, but nor is the estimate of β, which is a remarkably low 0.01 (t=0.02). This did not change when the sample was truncated to exclude "pre-transition" surveys. (This was tested in two ways, both excluding surveys for the 1980s, and including only the more recent half of the data set.) Nor was there any difference between the countries of the Former Soviet Union (about half the EECA sample) and the rest.

The fact that results for EECA are so different to the rest of the sample, begs the question of whether any other regions stand out. Table 2 gives the test by region. (Estimates of β are also given with α set to zero.) Naturally this greatly reduces the number of observations, and makes it harder to obtain precise estimates. However, the results of Table 2 suggest that EECA is a clear outlier in terms of the divergence in growth rates. While (excluding EECA) the estimates of β in Table 1 are quite similar between regions, the relationship is clearly rather weak within both South Asia and Sub-Saharan Africa, which together account for the majority of the world's poor (Chen and Ravallion, 2001).

In contrast to the result obtained with levels (section 3.1), there is no sign that income surveys are more biased for changes than consumption surveys. Again excluding EECA, the estimate of β is not significantly different between the two types of welfare indicators (t=0.18); nor are the estimates of α significantly different (t = -0.21).[11]

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[11]   Nor is there any significant difference in the result of the bias test between consumption and income surveys in EECA, though that is a moot point given that there is no correlation between changes in surveys means and the consumption growth rate from the NAS.

As noted in section 2, there are a number of possible reasons why we find estimated values of β less than unity. One possibility is an over-estimation of the growth rate of consumption from the NAS. There is no basis for a general presumption of over-estimation, but there are reasons for believing this to be the case for at least one country, namely China.[12] In an attempt to correct for the likely upward bias in official growth rates for China, Maddison (1998) estimates that China's GDP grew at 7.5% per annum over 1978-95, as compared to the official rate of 9.9%. Using essentially the official data for China, the estimate of α is not significantly different from zero (t=0.08), while the estimate of β is 0.72 (setting α=0), which is significantly positive (t=7.41) and significantly less than one (t=2.89). If (consistently with Maddison's results) the true growth rate of PCE was uniformly three-quarters of the official rate then correcting for this would imply a value of β very close to unity.

IV. Conclusions

While divergence between these two sources of data on aggregate economic welfare is indicated in the sample as a whole for the levels, there is an important qualification. One cannot reject the null hypothesis that the level of private consumption per capita from the national accounts is an unbiased estimate of mean household expenditure per person from nationally representative sample surveys. The overall bias indicated for the levels is due to income surveys, for which the survey mean is significantly lower than private consumption in the NAS, on average. There are marked

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[12]   Wu (2000) identifies two main reasons why the GDP growth rate has been overestimated in China. The first is a likely bias in the GDP deflator, and the other is that state-controlled enterprises have an incentive to over-estimate output growth.

regional differences, only partially attributable to the tendency for income surveys to be more popular in some regions than others.

Nor is the NAS growth rate in private consumption an unbiased estimate of the growth rate in mean household consumption or income from household surveys. On average only about half of the growth rate in consumption from the NAS is reflected in the growth rate of survey means. Whether it is an expenditure or income survey makes no significant difference.

Here too there is a qualification to the finding of overall bias. The main source of bias is in predicting how much of a contraction in NAS consumption is reflected in the survey mean; indeed, when the NAS consumption growth rate is positive it is an unbiased predictor of the rate of increase in household living standards, as measured from surveys. It is notable, however, that the asymmetry vanishes when one takes Eastern Europe and Central Asia out of the analysis. So this may not be a genuine asymmetry but rather the effect of the (severe) data problems found in this region, which has also seen sizable economic contraction, as measured by the national accounts.

Appendix

      The countries in the data set for the test on levels are: Albania (1997), Algeria (1995), Armenia (1996), Bangladesh (1995/96), Bolivia (1990/91), Botswana (1985/86), Brazil (1997), Bulgaria (1995), Burkina Faso (1995), Burundi (1992), Cambodia (1997), Central Africa Rep. (1993), Chile (1994), China (1998), Colombia (1996), Costa Rica (1996), Cote d'Ivoire (1995), Czech Rep. (1993), Djibouti (1996), Dominican Rep. (1996), Ecuador (1995), Egypt (1995), El Salvador (1996), Estonia (1995), Ethiopia (1995), Gambia (1992), Georgia (1997), Ghana (1997), Guatemala (1989), Guinea (1994), Guyana (1993), Guinea-Bissau (1993), Honduras (1996), Hong Kong (1996), Hungary (1993), India (1997), Indonesia (1998), Jamaica (1996), Jordan (1997), Kazakhstan (1996), Kenya (1994), Korea (1993), Kyrgyz Rep (1997), Latvia (1998), Lesotho (1993), Lithuania (1996), Madagascar (1993), Malaysia (1995), Mali (1994), Mauritania (1995), Mexico (1995), Mongolia (1998), Morocco (1990/91), Mozambique (1996/97), Namibia (1993), Nepal (1995), Nicaragua (1993), Niger (1995), Nigeria (1996), Pakistan (1996/97), Panama (1997), Paraguay (1995), Peru (1996), Philippines (1997), Poland (1996), Romania (1994), Russian Federation (1998), Senegal (1995), Sierra Leone (1989/90), Slovak Rep. (1993), Slovenia (1993), South Africa (1993/94), Sri Lanka (1995/96), Tanzania (1993), Thailand (1998), Trinidad and Tobago (1992), Tunisia (1990), Turkey (1994), Turkmenistan (1993), Uganda (1993), Ukraine (1996), Uruguay (1989), Uzbekistan (1993), Venezuela (1996), Vietnam (1998), Yemen (1998), Zambia (1996), Zimbabwe (1990/91).

      The countries in the data set for the test based on growth rates are: Algeria (1988, 1995), Bangladesh (1984-85, 1988, 1992, 1996), Belarus (1988, 1993, 1995, 1998), Bolivia (1990, 1997), Brazil (1985, 1988-89, 1993, 1995-97), Bulgaria (1989, 1992, 1994, 1995, 1997), Chile (1987, 1990, 1992, 1994, 1996), China (1985, 1990, 1992-1998), Colombia (1988, 1991, 1995-96), Costa Rica (1986, 1990, 1993, 1996, 1997), Cote d'Ivoire (1985-88, 1993, 1995), Czech Rep. (1988, 1993, 1996), Dominican Rep. (1989, 1996, 1998), Ecuador (1988, 1994-95), Egypt (1991, 1995), El Salvador (1989, 1995-97), Estonia (1988, 1993, 1995, 1998), Ethiopia (1981, 1995), Ghana (1987, 1989, 1998), Guatemala (1987, 1989, 1998), Honduras (1989-90, 1992, 1994, 1996, 1997),

Hungary (1989, 1993, 1998), India (1983, 1986-90, 1992, 1994-97), Indonesia (1984, 1987, 1990, 1993, 1996, 1999), Jamaica (1988-90, 1993, 1996), Jordan (1987, 1992, 1997), Kazakhstan (1988, 1993, 1996), Kenya (1992, 1994), Korea (1988, 1993), Kyrgyz Rep. (1988, 1993, 1993, 1997), Laos (1992, 1997), Latvia (1988, 1993, 1995, 1998), Lesotho (1986, 1993), Lithuania (1988, 1993, 1994, 1996), Madagascar (1980, 1993, 1997), Malaysia (1984, 1987, 1992, 1995), Mali (1989,1994), Mauritania (1988, 1993, 1995), Mexico (1984, 1989, 1992, 1995, 1996), Moldova (1988, 1992, 1997), Morocco (1985, 1990, 1999), Nepal (1985, 1995), Nicaragua (1993, 1998), Niger (1992, 1995), Nigeria (1985, 1992, 1997), Pakistan (1986/87, 1990/91, 1992/93, 1996/97), Panama (1989, 1991, 1995-98), Paraguay (1990, 1995, 1998), Peru (1985, 1994, 1996), Philippines (1985, 1988, 1991, 1994, 1997), Poland (1985, 1987, 1989, 1990, 1993-96, 1998), Romania (1989, 1992, 1994), Russian Federation (1988, 1993, 1996, 1998), Senegal (1991, 1994), Slovak Rep (1988, 1992), Slovenia (1987, 1993, 1998), Sri Lanka (1985, 1990, 1995), Thailand (1981, 1988, 1992, 1996, 1998), Trinidad and Tobago (1988, 1992), Turkey (1987, 1994), Tunisia (1985, 1990, 1995), Yemen (1992, 1998), Turkmenistan (1988, 1993, 1998), Uganda (1988, 1992, 1996), Ukraine (1988, 1992, 1995, 1996, 1999), Uzbekistan (1988, 1993), Venezuela (1981, 1987, 1989, 1993, 1995-97), Zambia (1991, 1993, 1996, 1998).

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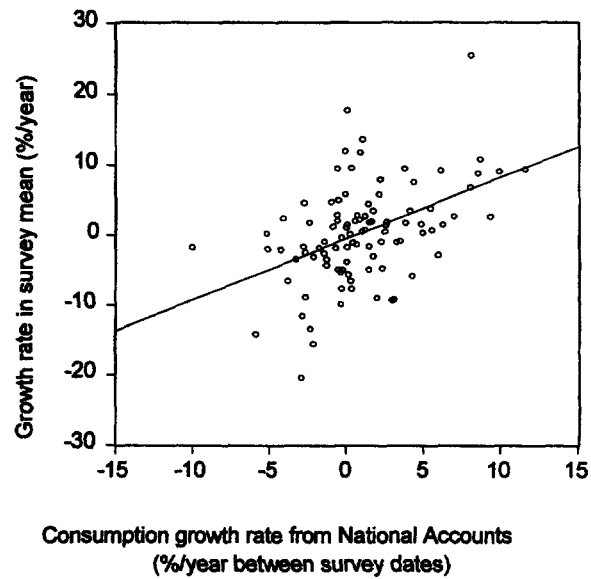**Figure 1: Histogram of the ratio of survey mean to private consumption per capita from the NAS for 88 developing countries**
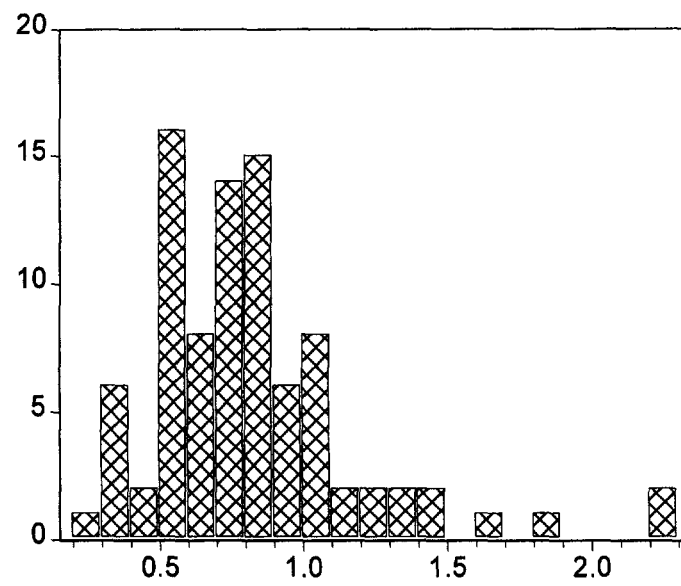
Figure 2: Growth rates for full sample

Consumption growth rate from National Accounts
(%/year between survey dates)
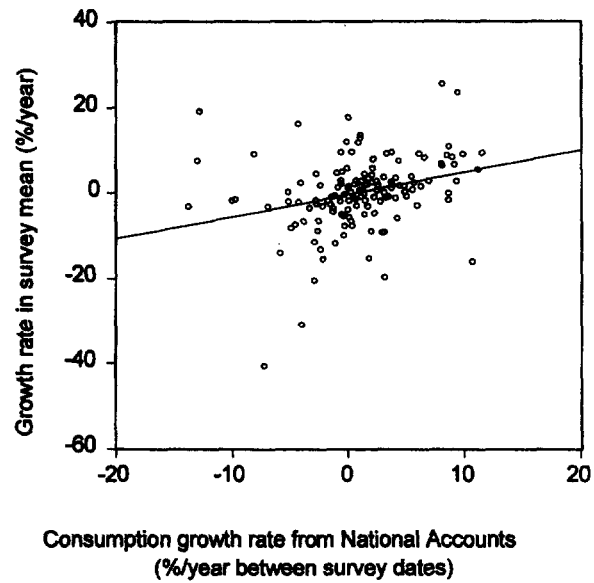
Figure 3: Growth rates excluding Eastern Europe and Central Asia

Consumption growth rate from National Accounts
(%/year between survey dates)

23

Table 1: Regressions for the ratio of survey mean to national accounts consumption

	Regional effects only	With a control for type of survey
Intercept	1.031* (0.094)	0.848* (0.109)
Consumption survey (consumption=1; income=0)	-	0.220* (0.075)
East Asia	-0.163 (0.119)	-0.080 (0.116)
Eastern Europe and Central Asia	-0.307* (0.111)	-0.223* (0.111)
Latin America & Caribbean	-0.343* (0.118)	-0.218 (0.129)
South Asia	-0.355* (0.115)	-0.392* (0.116)
Sub-Saharan Africa	-0.068 (0.135)	-0.072 (0.134)
R^2	0.123	0.186

Note: White (HC1) standard errors in parentheses; n=88.
* indicates significantly different from zero at the 5% level.

Table 2: Tests for divergence in growth rates by region

	Number of spells	Intercept (α)	Slope (β)	R^2	Slope (β) (setting α =0)
East Asia	25	1.828 (0.763)	0.628 (0.153)	0.286	0.821 (0.169)
Eastern Europe and Central Asia	26	-2.558 (2.853)	0.010 (0.024)	0.000	0.082 (0.417)
Latin America & Caribbean	43	-0.264 (1.137)	0.694 (0.264)	0.088	0.675 (0.248)
Middle East & North Africa	4	-1.196 (0.885)	1.465 (0.570)	0.650	1.384 (0.473)
South Asia	22	-0.730 (1.619)	0.742 (0.563)	0.093	0.525 (0.258)
Sub-Saharan Africa	21	-2.679 (1.258)	0.645 (0.357)	0.085	0.874 (0.512)
Total	142	-0.437 (0.811)	0.519 (0.221)	0.079	0.499 (0.198)
(Excluding EECA)	116	-0.636 (0.634)	0.836 (0.146)	0.228	0.775 (0.122)

Note: White (HC1) standard errors in parentheses.

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