

Probing GDP, employment and unemployment: a little forensic macroeconomics

Dante B. Canlas*

Abstract

The paper examines the behavior of the growth rates of real GDP, employment and unemployment in the recent past decade and a half based on the estimates of levels taken from the National Income and Product Accounts (NIA) and the Labor Force Surveys (LFS). Real GDP per worker exhibits extreme volatility and seems to deviate from its expected pro-cyclical nature. When linked to the monetary accounts, real per capita GDP suggests a surprisingly low elasticity of money demand with respect to real GDP. Moreover, the recently revised method for determining the employed and unemployed in the labor force tends to exclude a significant number of the working age population from the labor force. The findings suggest revisiting the estimation procedures with the end in view of improving the accuracy of the NIA and the LFS.

JEL classification: E01, E24

Keywords: national income accounts, employment, unemployment, labor force

1. Introduction

This paper is in the nature of an appeal to economists to be more concerned about the quality of the country's economic measurement system and to invest time and effort in improving them. I am personally interested in the national income and product account (NIPA) and the labor force survey (LFS). My current research on economic growth and business fluctuations relies heavily on these two accounts. I encountered some data limitations while working, for instance, on my paper entitled "Economic Growth in the Philippines: Theory and Evidence," published in the *Journal of Asian Economics* (October 2003). I had to make do with a less than desired number of time-series observations. The government statistical agencies in charge—the National Statistical Coordination Board (NSCB) for the NIPA and the National Statistics Office (NSO) for the LFS—had introduced revisions that shortened the linked series. Moreover, in the absence of technical notes on the

*The author is the Enrique Virata Professor of Statistical Economics at the University of the Philippines. This paper was prepared for the annual meeting of the Philippine Economic Society held at the Bangko Sentral ng Pilipinas on March 4, 2005. An early version of this paper was presented at the Friday seminar of the U.P. School of Economics. I thank Manny Esguerra, Winnie Monsod and seminar participants for the useful discussions and comments.

methodological changes, I am curious whether the revisions are consistent with recent advances in economic theory as well as with conceptual issues that generally motivate methodological revisions.

This paper starts with an inquiry into recently adjusted GDP figures. My study begins with a basic macroeconomic identity that links the growth of real GDP to growth of employment and labor productivity. Applying the real GDP and employment growth rates for 2001-2004 gives the growth rate of labor productivity as a residual. The figures that emerge from this simple quantification show highly volatile figures for labor productivity and an absence of pro-cyclical movements for employment. These observations are inconsistent with the behavior of labor productivity and employment in the course of a business cycle. The real GDP growth is then further examined for consistency using a relation linking it to the growth of money and the inflation rate.

The LFS, meanwhile, has also been subjected to revisions. Very recently, the NSO released in its website two parallel laborforce data sets—one based on a Philippine definition and the other on a so-called ILO definition. The unemployment rate based on the latter is about four percentage points lower than the one obtained from the Philippine definition. According to the NSO, the new unemployment figures resulted from applying an ILO definition on availability for work. I point out below that the NSO erred in its interpretation, that, in fact, it ignored the ILO's international recommendation on labor's availability for work.

2. The national income and product account (NIPA)

The NIPA forms the core of the macroeconomic data set of market-oriented economies. The gross domestic product (GDP), gross national product (GNP), and their various components represent the statistical counterparts of various theoretical concepts associated with the aggregate performance of the economy. The level and growth rate of GDP adjusted for inflation, for instance, are used to study economic growth and business fluctuations. And when demographic variables such as population growth rate are incorporated, the real per capita output or income is used to infer changes in living standards.

The Philippine NIPA has been undergoing refinements in the postwar era. The NSCB has undertaken conceptual changes that entailed the reclassification of measured activities. It has also made some source-data improvements that captured evolving structural changes in the economy. In addition, it has revisited the external-trade accounts and prepared a satellite account for the information technology sector, all aimed at getting the GDP and GNP right. In short, there is no doubt that much statistical progress has been made in measuring the level and growth rate of the national output.

Recently, the NSCB announced that it had performed some methodological changes on the NIPA for 2000-2003, but it had not applied the adjustments to the figures for 1999 and earlier. The exercise began in September 2003; it is expected to be completed by the end of 2004 (see Note under Table 3.1, 2004 *Philippine statistical yearbook*, NSCB, October 2004). At this juncture, I am not aware of any published document that describes the recent methodological changes the NSCB introduced. With no access to technical notes from the NSCB, I try to assess the quality of the revised figures by analyzing whether they are consistent with some basic identities and relations rooted in economic theory and empirical work.

2.1. Linking growth of real GDP, employment, and labor productivity

I start with a fundamental identity. Let Y denote real GDP and N the employment level. The following holds as an identity:

$$Y = N(Y/N). \quad (1)$$

Taking the logarithms of both sides above and differentiating with respect to time yields:

$$\text{growth rate of } Y = \text{growth rate of } N + \text{growth rate of } (Y/N). \quad (2)$$

Equation (2) states that the growth rate of GDP is identically the same as the sum of the growth rate of employment and of labor productivity, defined as average output per worker.

Table 1 shows the level and growth rate of real GDP for the period 1989-2004. The methodological changes adopted by the NSCB preclude comparison of GDP for 2000-2004 with the GDP for 1999 and earlier. From a growth of 1.76 percent in 2001, real GDP recovered in 2002 with a growth rate of 4.34 percent. This was sustained in 2003 with a growth rate of 4.7 percent. In 2004, real GDP surged to an average of 6.4 percent in the first three quarters.

Table 2 shows the level and growth rate of employment. Given the change in the sampling frame in 2000, employment for 1999 cannot be compared with that of 2000. Based on the revised figures, employment growth surged to 8.45 percent in 2001, followed by a decline of .25 percent in 2002. Employment recovered again in 2003 with a growth rate of 4.8 percent.

Table 3 presents the decomposition of real GDP growth based on equation (2) above. The figures suggest extreme volatility of labor productivity. After declining in 1991 up to 1993, labor productivity recovered in 1994 and 1995, only to recede again in 1996. The recovery was short-lived, falling again in 1998. For the period 2001-2004, labor productivity resembled a roller-coaster ride. It decreased in 2001, recovered in 2002, declined again in 2003, and seemed headed for a recovery in 2004.

Table 1. Level and growth rate of real GDP

<i>Year</i>	<i>Real GDP (in million)</i>	<i>Growth rate (in %)</i>
1989	699,448	
1990	720,690	3.04
1991	716,522	(0.58)
1992	718,941	0.34
1993	734,156	2.12
1994	766,368	4.39
1995	802,224	4.68
1996	849,121	5.85
1997	893,151	5.18
1998	888,000	(0.58)
1999	918,160	3.40
2000	972,960	
2001	990,042	1.76
2002	1,032,969	4.34
2003	1,081,497	4.70
2004		6.401

Average for Q1 to QIII

Source: 2004 *Philippine statistical yearbook*, National Statistical Coordination Board

Table 2. Average annual employment and growth rate

<i>Year</i>	<i>Average Employment (in thousands)</i>	<i>Growth rate (in %)</i>
1989	21,908	
1990	22,212	1.39
1991	22,915	3.16
1992	23,921	4.39
1993	24,433	2.14
1994	25,171	2.98
1995	25,572	2.10
1996	27,440	6.77
1997	27,879	1.60
1998	28,290	1.47
1999	28,995	2.49
2000 ¹		
2001	30,139	8.45
2002	30,064	(0.25)
2003	31,517	4.83
2004		3.70 ²

¹The sampling frame changed in 2000; it is not clear if the 2000-2004 series is linked to the series before 2000.

²Based on the average for the January, April, and July surveys

Source: 2004 Philippine statistical yearbook, National Statistical Coordination Board

Table 3 Decomposition of real GDP growth rate (in %)

<i>Year</i>	<i>Real GDP growth</i>	<i>Employment growth</i>	<i>Labor productivity growth</i>
1990	3.04	1.39	1.65
1991	(0.58)	3.16	(3.74)
1992	0.34	4.39	(4.05)
1993	2.12	2.14	(0.02)
1994	4.39	2.98	1.41
1995	4.68	2.10	2.58
1996	5.85	6.77	(0.92)
1997	5.18	1.60	3.58
1998	(0.58)	1.47	(0.92)
1999	3.40	2.49	0.91
2000			
2001	1.76	8.45	(6.69)
2002	4.34	(0-25)	4.59
2003	4.70	4.83	(0.07)
2004	6.40	3.70 ¹	2.70

¹Based on the average employment for the January, April, and July surveys

In most market-oriented economies, labor productivity tends to be pro-cyclical. That is, it rises during a recovery and falls during a recession. The pro-cyclical nature of labor productivity, however, is not detectable from the figures for 1990 to 2004 in the Philippines. In view of these puzzling movements in labor productivity, one is led to doubt the accuracy of either the GDP or employment, or both. These movements, however, do not tell us whether GDP and employment are over- or underestimated. Further investigation is needed.

2.2 Linking the GDP to the monetary accounts

In this section, I pursue further my evaluation of the quality of the revised GDP growth figures in 2001-2004 by linking GDP growth to money-supply growth and the inflation rate. I use a monetary-equilibrium framework. Denote the nominal money stock that is willingly held by M , the general price level by P , and the liquidity preference function by $L(R, Y)$ where R is the nominal interest rate and Y is the GDP. Assuming equality of money demand and supply while holding R fixed yields:

$$M = (P) \cdot L(Y). \quad (3)$$

Taking logs and differentiating and assuming a specific functional form for $L(Y)$ yield a relation of the form:

$$\text{growth rate of } M = \text{growth rate of } P + \varepsilon (\text{growth rate of } Y) \quad (4)$$

where ε is the elasticity of money demand with respect to GDP. Note that the growth rate of P is the inflation rate.

In 2004, as of the third quarter, real GDP growth averaged 6.4 percent while money supply growth was 6.1 percent. The inflation rate was 5.1 percent. Substituting these figures in equation (4) puts ε at about 0.15. This value of ε suggested by the current GDP growth and inflation is exceedingly low compared to the one under the historical monetary programming techniques of the Bangko Sentral, which has been using a value between 1 and 1.5. In 2003, for instance, money grew 8.5 percent; inflation was 3 percent and real GDP growth, 4.7 percent. The elasticity implied by these numbers is about 1.2.

Alternatively, a quantity theory of money equation, which takes the form $MV = PY$ can be used. Here M is nominal money stock, V is money velocity, P is the price level and Y is real GDP. Taking logs and differentiating yields, $g.r. V = g.r. P + g.r. Y - g.r. M$. Substituting the growth rates above yields a growth rate for V of 5.4 percent. Such a high growth rate for money velocity indicates a decline in the demand for money, thereby raising money velocity.

Two questions emerge: Did the demand for money shift downward significantly in 2004? Or are the methodological changes recently adopted by the NSCB producing too much GDP? Given that the agricultural sector is growing rapidly, which is very much a cash-in-advance economy, the elasticity of the demand for money with respect to GDP could not have declined profoundly even with all the recent monetary and payments innovations. What this suggests is the NSCB is capturing a lot more GDP with the adjustments it is doing.

3. The labor force survey (LFS)

The NSO reports in its website that under a so-called ILO definition, the unemployment rate is about four percentage points lower than the existing Philippine definition. This figure was reached following the addition of a question that reads as follows: "Was _____ available for work during the past week?" The question is answerable by "yes" or "no." Respondents who answered "no" were presumably taken out of the labor force, instead of being counted as unemployed. This tends to explain the sharp reduction in the number of unemployed and the unemployment rate under the so-called ILO definition.

This decision of the NSO is highly questionable. In the 2000 edition of the *Current International Recommendations on Labor Statistics* published by the

International Labor Office, the section on availability for work states: "In the application of the criterion of current availability for work...appropriate tests should be developed to suit national circumstances. Such tests may be based on notions such as present desire for work and previous work experience, willingness to take up work for wage or salary on locally prevailing terms, or readiness to undertake self-employment activity given the necessary resources and facilities."

Based on the labor force questionnaire of the NSO, no such tests were carried out. Only one question about availability for work was asked. It is thus wrong to call the new set of labor force measures the ILO definition. The ILO's international recommendations emanate from the International Conference of Labor Statisticians (ICLS), participated in by the NSO. The current international recommendations are supported by resolutions adopted in the 1993 and 1998 ICLS.

If a revision—one relevant to public policy needs—is to be done with the labor force data at this point, it is in finding out who among the economically active population are undergoing hardships in the labor market. Consistent with ILO recommendations, more probing questions are needed about the underemployed, hours of work, wages, and the informal sector. Definitely, however, it is a mistake to take people out of the labor force simply because they answered "no" to one question on availability for work.

4. Concluding remarks

My main objective in this paper has been to draw attention to GDP and employment figures that appear inconsistent with a fundamental identity and relation used in modern macroeconomic analysis. At the most rudimentary level, the preliminary findings indicate the need for the NSCB and the NSO, the government agencies in charge of preparing and releasing the GDP and labor force figures, respectively, to document in technical notes the revisions they have been doing in recent years, whether conceptual or methodological, to address the doubts that have been generated. In addition, to minimize inconsistency among the various economic accounts now being compiled by various statistical agencies of government, an institutional reform aimed at merging these agencies and making the merged entity independent is worth considering.

Moving forward, several important advances in economic theory have been made in recent decades, with implications for GDP measurement. For example, in recognition of the importance of human capital for growth, a reclassification from consumption to investment of, say, some education spending is warranted. In addition, new products of higher quality get to be introduced invariably in the course of economic development and, hence, may require the adoption of hedonic prices indexes. Moreover, the growing importance of non-market time, particularly for educated married women, opens up the importance of time-use studies. In

short, the revisions needed to get the GDP right call for the active participation and support of economists.

Meanwhile, it is a disservice to have two labor-force data sets, since this may impair public policymaking. If the unemployment rate is made lower than warranted, government policymakers may be deluded into thinking that current policies are working, with unwanted results for human welfare. Firms, in turn, may be fooled into thinking that the lower unemployment rate could trigger a rise in the demand for their products, and mistakenly expand their production. The fact is some of the unemployed were merely taken out of the labor force and remained with no earnings.

Lastly, if no serious efforts are undertaken to improve the quality of the NIPA and the LFS, the goal of building a knowledge-based society is impeded. This would result in a huge waste of time as university-based researchers end up explaining, not facts, but artifacts.