IMPLEMENTATION OF A NEW ARCHITECTURE FOR THE U.S. NATIONAL ACCOUNTS

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by

Dale W. Jorgenson and J. Steven Landefeld[*]

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The development of national accounts is one of the greatest innovations in economics. These accounts are the mainstay of macroeconomic analysis and economic policy and have been cited as one of the reasons for post-WWII stability in the U.S. and other developed economies. The national income and product accounts (NIPAs) in the United States and the national accounts of other countries were created in the aftermath of a major financial collapse and the Great Depression. However, they have focused on measuring growth and fluctuations in gross domestic product (GDP) or national income with limited linkages to financial flows and balance sheets.

Despite the post-war explosion of theoretical, empirical, and policy work on the sources of economic growth, the national accounts have failed to develop integrated production accounts with inputs as well as outputs in current and constant prices. In addition, there has been little progress on linking national accounts to expanded measures of production. These would cover household production and the use of natural resources and the environment. Similarly, expanded measures of investment would cover R&D, intangibles, human capital, and other near-market goods and services.

This paper presents a comprehensive and consistent macroeconomic framework, which we describe as a "New Architecture for the National Accounts". This provides a consistent theoretical foundation for the long-overdue integration of growth accounting with national

accounts. It presents statistically-based means of balancing and reconciling the data derived from the decentralized U.S. statistical systems to provide consistent estimates of economic activity. The framework expands and updates the national accounts to cover key sources of growth such as research and development, human capital and other intangibles, and natural resources. Finally, it expands the scope of the national accounts to better capture the interactions between the economy and the environment, household production, health care, and other near-market activities through a series of supplemental accounts.

Within the decentralized U.S. statistical system, the Bureau of Economic Analysis generates the core system of national income and product accounts (NIPAs). The Bureau of Labor Statistics produces the productivity statistics, and the Federal Reserve Board produces the flow of funds and balance sheets statistics. While these accounts are regarded as among the best in the world, their lack of complete integration, consistency, and completeness in measuring important sources of growth and interaction with near-market activities limits their usefulness in a number of contexts.

The key elements of the new architecture are outlined in a "Blueprint for Expanded and Integrated U.S. Accounts," by Dale W. Jorgenson and J. Steven Landefeld (2006, pp. 13-112).[1] They present a prototype system that integrates the NIPAs with productivity statistics generated by BLS and balance sheets produced by FRB. The system features GDP, as does the NIPAs; however, GDP and gross domestic income (GDI) are generated along with productivity estimates in an internally consistent way. The balance sheet covers the U.S. economy as a whole and fills an important gap in the existing flow of funds accounts.

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[1] See Jorgenson and Landefeld (2006, pp. 13-112)

I. Importance of Integrated Accounts. A few recent examples illustrate the usefulness of a better integrated framework. Such a system would be extremely helpful in identifying and highlighting speculative asset price "bubbles", such as the rapid rise in housing and equity prices since the mid-1990s. An integrated presentation with new measures of net saving and changes in wealth would show that household net worth rose from 514 percent of disposable income in 1995 to 571 percent in 2007. However, most of the increase in wealth came from the revaluation of assets and very little from net saving. Over this time period, holding gains accounted for 88 percent of the $30 trillion increase in net worth, as the personal saving rate plunged from 6.5 percent during1990–1995 to nearly zero today.

The integrated system would also better show how far equity values had gotten out of line with growth fundamentals, as represented by profits, real GDP growth, and profits' share of GDP. Until the mid-1990s, trend growth in equity prices, profits, and GDP were roughly in line. During the dot-com boom and the later housing and stock market boom, equity prices were roughly 60 percent higher than would have been consistent with growth in GDP and profits.

The new architecture would also challenge conventional views of U.S. economic growth. The existing data suggest that growth in productivity is a key source of economic growth. By contrast, the prototype version of integrated accounts shows that over 1948-2006 investment is the most important source of growth, accounting for 49 percent of growth in post-WWII. Growth of labor input ranks next, accounting for 31 percent of growth, while growth in productivity is third, accounting for only 20 percent of growth.   The integrated accounts also show that in 2000–2006 productivity contributes more significantly to growth (26 percent) than growth of labor input (22 percent) (Jorgenson, 2009, pp. 1-42).

The third example of the usefulness of the integrated accounts relates to the international dimensions of the current financial-housing crisis. A consistent set of integrated accounts would have enabled policy makers abroad to better judge their exposure to U.S. derivative instruments, including mortgage-backed securities, the implications of a downturn in the financial sector, and the effects of counter-cyclical infrastructure spending on growth and productivity. More broadly, integrated production accounts would aid the understanding of significant differences in economic growth among nations.

II. The blueprint for integrated accounts. The new architecture builds on the existing system of national income and product accounts (NIPAs) to provide a comprehensive, consistent, and fully integrated set of macroeconomic accounts. The new architecture provides a fully articulated set of economic flows and stocks in a system of seven accounts: (1) Production, (2) Domestic Receipts and Expenditures, (3) Foreign Transactions Current Account, (4) Domestic Capital Account, (5) Foreign Transaction Capital Account, (6) Domestic Balance Sheet, and (7) U.S. International Investment Position.

III. Production accounts. The production accounts integrate the NIPAs generated by BEA and the productivity statistics constructed by BLS. Adding productivity statistics to the national accounts remedies a critical omission in the NIPAs and the United Nations System of National Accounts (1993 SNA). The new architecture would provide production accounts at both aggregate and industry levels.

The first step in moving from the existing set of national accounts, as represented by the international SNA guidelines or the NIPAs, is the development of estimates of real capital and labor services. The 1993 SNA and BLS (1993) provide measures of the price and quantity of labor services. These can be combined with the price and quantity of capital services introduced

by BLS (1983) to generate price and quantity indexes, as well as multifactor productivity. Measures of capital services were approved for incorporation into the revised 1993 SNA by the United Nations Statistical Commission at its February-March 2007 meeting. Paul Schreyer, head of national accounts at the OECD, has prepared a new OECD manual on *Measuring Capital* (2008) that provides detailed information on the construction of measures of capital services.

The new architecture would provide measures of capital services for all productive assets in the U.S. economy. The primary challenge for development of these measures is the absence of market rental data for most types of capital. Although rental markets exist for many assets, such as commercial and industrial real estate and industrial and transportation equipment, relatively little effort has been made to collect rental prices, except for renter-occupied housing. Lacking comprehensive market data on rental prices, the BLS imputes the prices for the assets, employing the user cost formula introduced by Jorgenson (1963).

The user cost of an asset is an estimate of the rental price that an owner would charge a user of that capital. This includes depreciation on the value of the asset, the return that the owner could make on alternative investments, plus any capital losses on the value of the asset. The user cost imputation requires estimates of depreciation and the rate of return, as well as changes in asset prices based on market transactions. Measures of asset prices and depreciation, as well as investment and capital stocks, are presented in BEA's (2003) reproducible wealth accounts. BLS has generated estimates of the rate of return by combining property income from the NIPAs with capital stocks derived from BEA's estimates of investment. BLS employs the imputed rental prices as weights for accumulated stocks of assets in generating price and quantity measures of capital services.

Current BLS estimates of capital input cover non-farm business. The next step is to add estimates of capital input for agriculture and for government and nonprofit sectors. Government investment in highways, airports, utilities, and other infrastructure are key inputs to economic growth, and a measure of their real capital services is essential to a complete understanding of economic growth. In the absence of market transactions the price and quantity of these capital services would be imputed, using the user cost of capital.

The final step in combining the NIPAs with the productivity statistics is integrating BEA and BLS estimates of industry output through the use of common source data, estimating methods, and balancing techniques. The consistency and accuracy of the industry-level and aggregate estimates can also be improved by weighting the use various input data used in producing the industry estimates by their relative accuracy. This can be carried out within the constraints of a balanced input-output framework to produce consistently reconciled GDP by industry estimates, as demonstrated by Ann M. Lawson, et al. (2006, pp. 215-262) and Brian C. Moyer, Marshall B. Reinsdorf, and Robert E. Yuskavage (2006, 263-308).

Dennis J. Fixler and J. Steven Landefeld (2006, pp. 91-132) show that there are significant differences in the estimates of industry transactions from BLS, BEA, and the Census Bureau across industries, geography, and time. These can produce conflicting estimates of the sources of economic growth that have important implications for monetary and fiscal policy, as well as for regulatory and tax policy. The differences are the partly the result of differences in sample frames and firm classifications. Full reconciliation would require legislation to allow the agencies to exchange micro-data, but many of the differences can be resolved by using common source data and estimating methods.

IV. Domestic receipts and expenditures and foreign transactions accounts. The next step in implementing the new architecture is incorporating real capital and labor inputs into the income and expenditure accounts. When combined with the existing expenditure and income accounts, this extension produces integrated nominal and real income and expenditure accounts. The product side in the expenditures and income account includes consumption and investment goods output in constant prices from the production account. The income side includes labor and capital inputs in constant prices from the production account. The foreign transactions account is little affected.

V. Capital Accounts. The next step in constructing the new set of macroeconomic accounts is the integration and expansion of BEA's reproducible assets and U.S. international investment position (IIP) and the Federal Reserve Board's balance sheet and flow of funds accounts. The final objective is to construct a comprehensive balance sheet for the U.S. economy, now absent from the NIPAs and the flow of funds accounts. Albert M. Teplin, et al., (2006, pp. 471-540) have reconciled income and expenditure estimates from the NIPAs and the flow of funds within the 1993 SNA framework. However, there are important obstacles that remain in constructing a national balance sheet.

The existing balance sheet accounts are among the most comprehensive in the world, but exclude land and the value of natural resources. They also exclude other assets important for understanding economic growth and productivity, such as human capital, R&D, and other intangible assets. All of these extensions of the balance sheet accounts must be integrated with the production, income and expenditure, accumulation, and other accounts to show the accumulation and flow of capital services from these assets.

In addition to the values for productive assets, an extended set of accounts should include more detailed pension accounts, presenting financial assets and liabilities and their linkages to saving, business expenditures, and income. The prototype accounts developed by Jorgenson and Landefeld (2006, pp. 13-112) are designed to incorporate improvements and extensions in the national accounts as they become available. These would include BEA's national income and product, reproducible wealth, and international investment position accounts, the FRB flow of funds and balance sheet accounts, and the BLS productivity accounts.

Finally, there is a need to resolve inconsistencies between the BEA and FRB data. This reconciliation will build on the work of Teplin, et al. (2006, pp. 471-540) and will include the use of common source data and methods, statistical balancing, and the exchange of micro data. Detailed international data by type of financial instrument, ownership, and geography will be needed to quantify the interconnected liabilities associated with the current international financial crisis. Longer term, a full reconciliation will require changes in regulations and laws regarding the exchange of data and the development of improved and more detailed source data.

VI. Further extensions of the accounts. There is a long-standing interest in extending national accounts to include non-market goods and services that stand at the intersection of the economy and social welfare. This includes accounts for household production, health, and the environment. As described by Katharine G. Abraham and Christopher J. Mackie (2006, pp. 161-192) and William D. Nordhaus (2006, pp. 143-160), the structure of the national accounts, including valuation, weighting, double-entry accounting, would add significantly to the value of non-market indicators.

The new architecture is designed to accommodate satellite accounts. These supplemental accounts do not undercut the usefulness of the core national income and product accounts.

Designed on a consistent basis with the core accounts, the supplemental accounts can use the rich information contained in the main accounts to analyze the effect of changes in the environment and other non-market goods and services on incomes, industries, products, regions, and international transactions.

The significant gains in the usefulness of the national accounts offered by the new architecture would be obtained primarily through better integration and extension of existing data. By building directly on the existing accounts, the new accounts can benefit directly from the data and knowledge accumulated over decades. In addition, the new architecture will preserve the multiple-entry accounting relationships that support the decomposition of macroeconomic phenomena across products, industries, incomes, regions, countries, and assets.

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