Editor's Note: The theory and practice of econometrics is concerned with the problem of measurement in economics. As a form of sophisticated abstraction, econometric theories and models are directed towards developing, reviewing and synthesizing theories and models to analyze and learn from economic data. Over the last half-century, much has been realized through a systematic use of economic data in conjunction with economic and statistical models, sampling theories and inferential approaches. In a sense, therefore, both economics and statistics are concerned with generating information that may be used to improve decision-making and economic choice.

For its initial issue for the year, the Development Research News focuses on Econometric Models. Our guest writer is Dr. Manuel F. Montes, a Visiting Research Fellow at the Philippine Institute for Development Studies and an Associate Professor of the School of Economics, University of the Philippines. For several years now, Dr. Montes has been involved in research projects on macroeconomic modeling and forecasting. His most recent work for the Institute is a multi-phase project entitled “Econometric Model of the Philippine Economy.” Previous to this, he was also a co-author of a PIDS Monograph: A Review of the 1983-84 Balance-of-Payment Crisis published by the Institute in 1985.

If the goal is to select the best decision from a set of economic choices, it is usually not enough to know that economic variables are related. In addition, we must also know the direction of the relation and in many cases, the magnitudes involved.

— The Theory and Practice of Econometrics by George T. Judge, et al.

The quantification of ideas from the field of economics has two main purposes: (1) the testing of theoretical constructs and (2) the generation of models that can be used for prediction and policy analysis in actual economies. These two objectives, with more emphasis on the latter, underlie econometric model building efforts.

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Steps in Economic Model Building

One can speak about three important steps in model building in economics. The first step is the specification of the model which involves the setting down of the research in view of “how the economy works”. In this process, the structure of the economy is usually expressed in terms of identities, equilibrium conditions and behavioral equations which embody the relationships between important economic variables. Identities reflect accounting relationships that always hold because of the manner in which the variables are defined. Equilibrium conditions (or disequilibrium conditions) reflect ideas regarding the conditions under which one might observe economic data. For example, a computed sale at a given price might be observed because at that price, demand is equal to supply — a situation of equilibrium. Behavioral equations embody theories regarding the behavior of actors in the economic system. The overwhelming source of these behavioral relations in mainstream economics is the theory that behavior is the result of individual optimizing decisions. Thus, a demand function is the result of the optimization of the use of household income. Behavioral equations, and sometimes equilibrium conditions, reflect the relationships between economic variables through “parameters”.

Equilibrium Conditions or the Behavioral Relationships

The assignment of real numbers to these parameters, called the estimation of the model, constitutes the second step in the process. One can talk about three main methods of model estimation. First, one can assign reasonable values from experience or from the results of other studies that use comparable data. For example, if one had a cross-section study of the consumption function that provided an estimate of the marginal propensity to consume, one might use the same value in a time-series model. The weakness of this method is that the parameter estimates do not correspond to the actual data used in the model. One might however consider this method if one had limited data or if one believed that the structure of the economy has changed so that the past data only reflect a superseded structure.

Second, one can use the method of “calibration”. This method involves the assignment of a set of mutually consistent parameters to a model that will allow it to replicate an actual data set. This method is heavily used in computable general equilibrium models. The method relies heavily on the existence of enough restrictions that might be improved from theoretical considerations. Since a set of actual values might be consistent with more than one set of parameter values, the parameters derived from the calibration approach contain a significant amount of the researcher’s personal judgement. There still do not exist commonly accepted methods for quantifying the effect on parameter estimates of personal judgement in this method.

The third method of estimation is the statistical approach. In this approach, assumptions are made regarding the statistical processes that generated the observed data, in addition to the purely behavioral considerations derivable from economic theory. An example of these assumptions are the assumptions on the error term of the classical regression model which require: (1) that the error term be a random variable when expected value is equal to zero; (2) that the error term should have a constant variance for all observations; (3) that it be independently generated for each observation; and (4) that it be independent of all explanatory variables. Given these statistical assumptions, statistical theory tells us the “best” method for estimating the parameter. Of course, there are implicit tradeoffs in determining the “best” method. For example, an estimator might be biased but can have a smaller variance. Moreover, limits on computational resources often do not permit the application of the “best” method. In the case of the classical regression model, theory tells us that ordinary least squares method is the most appropriate method of estimation. This method can be easily applied by using commonly available computer facilities.

Recent work in rational expectations has pointed out that econometric models of the Klein or Keynesian type may also be criticized as embodying more the researcher’s view instead of the true equilibrium structure of the economy. In particular, “identifying restrictions”, which are implicit in the choice of which
variables do not appear, as explanatory variables have been criticized as inappropriate, since in the real world all variables are hardly jointly determined. Under this view, rational decisionmakers can undo the output effects of money supply increases so that having only money supply without any offsetting variables as explanatory variables would be erroneous. Research in vector auto-regression methods and similar methods are attempts to address these objections. These new methods, while they may embody equilibrium concepts more fully, are however still subject to a researcher's bias to the extent that functions for perception or expectation of unobserved variables are typically required by these models. The specification of these functions is not unique. For example, perfect foresight would be one specification but a continuum of types of imperfect foresight would also be alternative specifications.

Large econometric model building continues to rely heavily on the classical methods of estimation. However, the increasing use of newer methods which often require more computational resources is foreseen in the future. The third step in economic model building is that of validation which consists of determining how well the model fits the available data. Unlike the other two estimation methods, econometric model building has a well-defined set of methods for this purpose. Econometric models are “solved” for each time period for which actual data are available. A solution is a set of mutually consistent values for the endogenous variables. Thus, it might happen that while a particular equation is solved within a full model, the estimates for the variable might not be too accurate. This would happen if the equation is overly sensitive to estimation errors of other variables so that a compounding of errors occurs. In this situation, a specification of the model might be appropriate.

The validation exercises for an econometric model typically consist of the following: (1) a “statistic” simulation in which the model is solved independently in each period; (2) a “dynamic” simulation in which the solution values of the model are permitted to affect the solution of subsequent periods according to the specification of lagged responses of the model; (3) a multiplier analysis in which the model is solved for perturbed values of the exogenous variables to determine if the overall response is consistent with theory, in sign and in magnitude; and (4) “ex-post” forecasting in which the model is simulated beyond the estimation period. Errors that are identified in these exercises necessitate the specification and re-estimation of the model.

The ultimate validation of an econometric model is its actual use for policy simulation and forecasting. The actual use of the model requires frequent re-estimation and re-specification so that it might provide reasonable results and capture issues of current importance.

Recent Econometric Models in the Philippines

We can now give a brief review of recent econometric model building research in the Philippines. By “recent”, we refer to work not included in the comprehensive review by Velasco (1980). In a doctoral dissertation presented to the University of Pennsylvania in 1983, V. Montes (1985) estimated a 435-equation annual macroeconomic model of the Philippines. The model contained 145 behavioral equations and 290 identities and transformation. A significant focus of this model was the balance of payments-foreign debt servicing issue. Montes analyzed the sustainability of foreign borrowing using this model. The huge model is highly disaggregated with a demand and supply structure for each major product of the economy.

A semestral model was constructed by R. Danao and M. Montes (1985) at the Philippine Institute for Development Studies. The model has 35 behavioral equations and 18 identities. The model determines rational output from the demand side, and has a balance of payments block that has special equations for foreign interest payments. The monetary sector starts off from the determination of the monetary base from the balance of payments and domestic credits. A government sector which determines tax revenues and the government deficit (which in turn affects domestic monetary credit) and a price sector are also included in the model. Validation procedure has been applied to this model. The model has also been used extensively in forecasting exercises. Subsequent work on this model has involved further disaggregation of the monetary and trade sector, and the construction of the supply side of the economy to improve its utility.

In a doctoral dissertation presented to the University of the Philippines, J. Yap (1985) constructed a semestral macro model with emphasis on the monetary sector. A separate demand equation for important financial assets and a small demand-side model of the economy permits the testing of the real effects of monetary policy. The author finds that monetary variables have a weak but significant effect on the real output of the economy.

In his most recent work, R. Mariano (1985) presented a one-equation monthly inflation model with high predictive power. Inflation is explained by variables such as oil prices, the exchange rate, and total liquidity. The model is extensively validated.

Recent modelling efforts may be distinguished from previous ones in that these models have been directly applied to forecasting and policy analysis. This has permitted continuous evaluation of the model specification. These recent models have been hampered by the large economic shifts occasioned by the 1983 balance of payments crisis.

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and Financial Sectors: A Monetary Model

UPDATE:

NEW PUBLICATION

IMPACT OF BOI INCENTIVES
ON RATE OF RETURN, FACTOR
PRICES AND RELATIVE FACTOR
USE: A COMPARATIVE
ANALYSIS OF INCENTIVES
UNDER THE OMNIBUS IN-
VESTMENTS CODE OF 1981
(P.D. 1789) AND THE INVEST-
MENTS INCENTIVE POLICY
ACT (B.P. 391)

by Rosario Manasan
Research Fellow
Philippine Institute for Development
Studies
Staff Paper Series No. 86–01

The study looks into the various
legislative incentives passed by
the government since the start of the post-
war era, and how such incentives affect
the rate of return of industries, factor
prices and relative factor use. It also
makes a comparison of these incen-
tives over time. There is reference to
several significant legislations, the earliest
being R.A. 35, otherwise known as the
New and Necessary Industries Act of
1945. This started an era of exemptions
for “new and necessary industries” from
all internal taxes, excluding tariffs, for
a four-year period beginning the formal
date of establishment. A series of other
regulations followed to broaden the tax
exemption provisions, as in R.A. 901
(1953) and R.A. 3127, the Basic
Industries Law (1961). In 1967, the Invest-
ment Incentives Act (R.A. 5186)
provided for a wide range of fiscal and
other benefits to firms investing in
pioneer industries, the term “pioneer”
applying to industries “that introduce
new products or processes in the market.”
R.A. 5186 applied a capital cheapening
effect due to the provisions of accele-
rated depreciation, tax credits, tax
exemptions and expansion reinvestment
allowances, among others.

Amendments to this legislation came
in the wake of martial law in 1972 with
This was aimed at liberalizing the condi-
tions for taxable income deductions
and the availability of tax credits. In
1981, P.D. 1789, also known as the
Omnibus Investments Code was passed.
It reinforced the provisions of R.A.
5186 because it also worked to achieve a
capital cheapening effect. In 1983, B.P.
391 or the passage of the Investments
Incentives Policy Act aimed to simplify
the administration of fiscal incentives,
at the same time favoring incentives that
have a neutral effect on relative factor
prices and were resource-efficient.

In summary, the author concludes that
the host of incentives offered by the two
most recent regulations on the rate of
return is substantial. The relative impact
of either legislation on most exporting
firms’ profitability is about the same
except on pioneer expansion exporting
enterprises which seem to be more favor-
ed under the former incentive laws.

MEASURING THE INCIDENCE
OF HEALTH EXPENDITURES
(PHASE I): USE OF PUBLIC
HEALTH FACILITIES IN BICOL

by Panfila Ching

The study presents an empirical
analysis of the factors determining the
use of public health facilities in Bicol.
A thorough discussion of these factors
leads to a specification of an econo-
metric model which provides basis for
the findings of the study. The most
important of these findings appear
to be that neither income nor cost
acts as a significant barrier to access
or use of public health care. Hence,
poverty and costs (i.e. time and money
flows in the Philippines, and how
these flows blend with the spatial, urban
and demographic dimensions of Philip-
pine development. The study also deals
with inter-regional trade and how regional
trade deficits are financed. It notes that
the patterns observed are consistent with
urbanization and regional population
growth trends. For example, the National
Capital Region (NCR) and its periphery
(Central Luzon and Southern Tagalog),
including the frontier regions (Mindanao
and Cagayan Valley), grew rapidly while
the more traditional agricultural regions
like Ilocos, Bicol and the Visayas lagged
behind. Likewise, urbanization has been
slow except in the NCR, its periphery and
the cities in the frontier areas.

The main finding of the study is that
general trends in industrial location,
tariff protection and inter-regional flow
of funds reinforce the observed trends
in regional population growth and urban-
ization. In particular, regional resource
flows are examined from three (3) per-
spectives: a) industrial location patterns,
explained either in terms of physical
characteristics of production processes,
or in terms of the matching of functions
and places; b) the regional effects of
tariffs; and c) the flow of funds through
commercial banks. Regressions have sub-
stantiated the observation that per capita
net flow of funds into a region increases
more than proportionately with the level
of urbanization and per capita income.
had very little to do with public health services use. Apparently, there is another variable, or other variables which deter public health services use. The study cites distance as one of them. Health knowledge as well as beliefs are also found to exert an influence on the use of public health facilities. However, it has also been noted in some cases that families respond to the relative money prices of traditional and public facilities, in particular, the hilot/herbolario and the rural health unit/city health office (RHU/CHO). Given such a competitive environment, health planners would have to figure out strategies to effectively establish the use of public facilities by residents.

EXPENDITURES FOR INFRA-STRUCTURE AND SOCIAL SERVICES IN TWO REGIONS OF THE PHILIPPINES, VOLUMES I – III

by Ledivina V. Carino and Associates
College of Public Administration,
University of the Philippines

The study adds to the literature on regional participation in development, particularly in the provision of certain public goods and services. Taking Regions III and VII as sample areas, the study describes and analyzes public expenditure patterns for infrastructure and social services for the period 1979–1983. It also looks at the state of financial reporting in the regions. Based on this analysis, proposals are made to improve the system of monitoring regional expenditures.

Although focusing on Regions III and VII, the study nonetheless makes inter-regional comparisons on a nationwide basis. Major data sources used were financial documents, government reports, earlier academic publications, as well as interviews with officials at regional and central levels.

Four hypotheses served as focal issues to be examined. These are:

1. Sectoral activities are not equally supported in terms of number of projects and funding. Infrastructure, particularly transport-related, tended to receive higher funding than the whole social services sector.

2. Foreign funding went primarily for major roads and national irrigation systems while domestic funding supported various types of social services and some infrastructure.

3. New construction projects receive greater emphasis than repair and maintenance.

4. Expenditures for infrastructure and social services are very unevenly distributed between and within regions.

The study notes that regions III and VII have not been favored regions in terms of funding, in either infrastructure or social services. Both regions received less than would be expected, given equal distribution, or population size and land area. The allocation process for the regions appears to take into account many factors, including political and economic conditions obtaining outside the regions. In terms of redistribution of power, local government units in general did not generate enough resources to support public works and social services in their areas even when these units have pledged funding for various local projects.

Finally, the study recommends enhancing access to, and use by management of, information generated by the units for assessing programs. In addition, attention to salient socio-economic features and more equitable distribution of benefits among regions is a good start. As a consequence, the regional development councils could be reactivated to serve as agents of inter-sectoral coordination in the regions.

POLICY ISSUES IN THE COORDINATION AND CONTROL OF PUBLIC ENTERPRISES

by Gabriel U. Iglesias
Dean, College of Public Administration
University of the Philippines

The project aims to evaluate the existing structure and process for coordination and control of Philippine public enterprises. At the same time, several measures are proposed to ensure public accountability and responsiveness of these enterprises to national development goals and priorities. The findings of the project are contained in a three-volume manuscript. The first volume details the Philippine model structure for coordination and control of public enterprises, and includes an assessment of their comparative effectiveness, as experienced by the National Power Corporation (NPC), the Philippine National Oil Company (PNOC), Metropolitan Waterworks and Sewerage System (MWSS), and the Southern Philippine Development Authority (SPDA). Alternative systems to reform ineffective mechanisms are proposed to improve coordination and control of public enterprises. The case studies, as contained in Volume II, are in-depth reports on the nature, process and dynamics of coordination and control in the public enterprises just mentioned, with each case representing a sector in the Philippine public enterprise classification. Each case focused on six (6) policy areas, namely: a) plans and programs; b) investment and loans; c) budgeting; d) financial and performance audit; and e) personnel and human resource development. The third volume, on the other hand, provides background information on the roles, powers and functions of several state-controlling and coordinating bodies such as the Commission on Audit (COA), the Civil Service Commission (CSC), the Office of Budget and Management (UBM), and the Investment Coordination Committee (ICC). Likewise, the study also tries to determine the extent of government exposure in public enterprises as of 1984.

EXPPLICIT BUDGETARY CONTRIBUTIONS OF NATIONAL GOVERNMENT TO GOVERNMENT CORPORATIONS

by Juanita D. Amatong, Gil S. Beltran and Emy Boncodin

The study makes an in-depth analysis of the rapid growth of the government
corporate sector and the similarly rapid growth of national government contributions to this sector. Although the sectoral allocation has been based on the priorities outlined in development plans, the study nonetheless observes that the allocation system has various shortcomings, specifically: a) the substantial discrepancies between amounts appropriated, programmed and disbursed; b) the basis of contributions to government corporations were not allocated on the criteria of financial viability nor on the corporate's need for investment funds. On the average, government corporations posted rates of return on investment below the opportunity cost of capital and the average commercial lending rate. This, however, did not seem to stop the flow of funds to public enterprises who despite having reported negative rates of return, still received almost half of total contributions to the sector. Also, capital contributions were mostly used to finance operating expenditures while investments are financed by profits and borrowings; c) contributions tend to expand rather than reduce the need for borrowing. Moreover, borrowing increases the need for contributions from the national government. The expanded level of contributions given by the national government to the sector works to increase the liability of the national government that is, the amount of debt that it assumes; d) national government contributions to government corporations allow these entities to price their output below production costs, and it is estimated that 8–20% of total output price represents the effective subsidy given to the consumer because of this practice. Given such specific findings, the study recommends steps to reform current procedures concerning national government support. Foremost among these is the need to streamline the resource allocation system to minimize discrepancies between appropriations, programs and disbursements. Second, the allocation system should ensure that contributions are made on the basis of financial performance/viability of government firms. This also means that national government guarantees on loan obligations of government firms should be limited to corporations with repayment capabilities to reduce the possibility of the national government in assuming unpaid loan obligations. Lastly, it will be helpful to restudy the policy on government corporations and the subsidies given to these firms to determine its consistency with policies that aim to strengthen the role of the private sector and to bolster productivity.

**ON-GOING PROJECTS**

**THE AGRICULTURAL PRODUCER: RESPONSE TO PRICE AND ENVIRONMENT**

by Ma. Cynthia S. Bantilan
College of Development Economics and Management
University of the Philippines at Los Banos

Agriculture is recognized as a focal point of government policy in the Philippines. Thus, the government actively intervenes in the sector's activities through price supports, subsidies, credit market intervention, infrastructure investments, research and extension. This study aims to further the understanding of the economic behavior of farmers as producers in the Philippine setting. It directs attention to the manner in which farmers respond to interventions in either prices or policy environments, the latter being a variable of technological, infrastructural or policy shifts. In particular, an analytic model is specified to include product supply and factor demand functions as determined by factor and product prices and environmental variables.

Using IRRI data from Laguna and Central Luzon from 1965 to 1984, the estimates derived from the model will serve as inputs to two economy-wide models for the Philippines, namely, the specification of farmer's behavior to be incorporated into a general equilibrium economic model developed by R.E. Enerson (1983), and the computational general equilibrium model by C. F. Habito (1984).

**SEMINARS**

**SEMINAR ON THE "ANNUAL ECONOMETRIC MODEL OF THE PHILIPPINES"**

A seminar on the "Annual Econometric Model of the Philippines" was held on January 10, 1986 at the NEDA Operations Room in Makati. The presentation highlighted the findings of a joint study by Dr. Roberto Mariano, Ms. Winifreda Constantino and Dr. Mario B. Lamberte on an econometric model for the Philippine economy. The model is deemed to be of use to government planners and academicians. Dr. Mariano is a visiting consultant of the Institute while Ms. Constantino is a Research Associate. Dr. Lamberte is one of the Research Fellows at the Institute.

**SEMINAR ON "PATTERNS OF ASIAN DEVELOPMENT IN COMPARISON WITH PHILIPPINE DEVELOPMENT"**

The Institute is fortunate for having Dr. Schinichi Ichimura as a paper presenter in its second seminar this year. The seminar brought out the highlights and summary of Dr. Ichimura's paper on the "Patterns of Asian Development in Comparison with Philippine Development." The event was held on January 30, 1986 at the Operations Room of the NEDA Makati Building. Dr. Ichimura is currently Professor of Economics at the Center for Southeast Asian Studies at Kyoto University in Japan.

**SEMINAR ON "REGIONAL GROWTH AND INTERREGIONAL RESOURCE FLOWS"**

For the month of February, a seminar on "Regional Growth and Interregional Resource Flows" was held. The paper presented was basically a follow-up research on a previous PIDS-sponsored study published sometime in 1983, on the spatial dimensions of Philippine development by E.M. Pernia et al. Dr. Felipe Medalla was guest speaker for the seminar which was attended by representatives of the NEDA Regional Development Staff, the U.P. School of Economics, U.P. School of Urban Planning and staff members of the Philippine Institute for Development Studies.
PIDS PUBLICATIONS AVAILABLE

PIDS WORKING PAPERS


PIDS STAFF PAPERS


5. S.P. #8205 An Analysis of the Behavior of the Commercial Banks. Mario B. Lamberte.


8. S.P. #8303 Monetary Aggregates and Economic Activity. Mario B. Lamberte.


13. S.P. #8403 Estimating the Shadow Exchange Rate, the Shadow Wage Rate and the Social Rate of Discount for the Philippines. Erlinda M. Medalla.


15. S.P. #8405 Derived Protection for Nontraded Primary Product. Erlinda M. Medalla.


17. S.P. #8407 The Development Bank of the Philippines and the Financial Crisis: A Descriptive Analysis. Mario B. Lamberte.


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Entered as Second-Class Mail at the MIA Post Office on October 13, 1983. Private firms and individuals are charged for delivery and mailing services at an annual rate of P35.00 (local) or US$5.00 (foreign).