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<b>Economisation of Consumption: A Study in Indian States</b>	<b>3</b>
<b>Dr. Debottam Chakraborty and Dr. Niladri De</b>	
<b>Growth, Break and Fluctuation in Productivity in Total Foodgrains in Three Backward Districts of West Bengal in the Period 1960-61 to 2014-15</b>	<b>22</b>
<b>Prof. Debasish Mondal and Dr. Swarup De</b>	
<b>Paper 3 Understanding The Dimensions of Vulnerability to Poverty of Pune's Slum Dwellers</b>	<b>37</b>
<b>Dr. Shilpa Deo &amp; Dr. Suddhasil Siddhanta</b>	
<b>Women's Work in India</b>	<b>56</b>
<b>Arpita Bhowmick</b>	
<b>Development With Disparity</b>	<b>74</b>
<b>Biswajit Chatterjee</b>	
<b>Book Review</b>	<b>83</b>
<b>Dante A. Urbina</b>	

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**BOOK REVIEW**

**STUDIES ON ECONOMETRIC APPLICATIONS**

**by Debesh Bhowmik, Synergy Books, New Delhi, 2019, Pp 301 pages.**

Ordinary least squares, heteroscedasticity, autocorrelation, logit model, unit roots, autoregressive processes, impulse-response functions, vector error correction model, fixed effects, random effects, dynamic panel data analysis, Bayesian estimation... Definitively, econometrics is a very complex but, at the same time, very interesting aspect of economic research. In fact, at present most of academic research in economics is dominated by econometrics. Basically, this is because, as Samuelson says, "Econometrics may be defined as the quantitative analysis of actual economic phenomena based on concurrent development of theory and observation, related by appropriate methods of inference".

In this context, Dr. Debesh Bhowmik's book *Studies on Econometric Applications*, which is a compilation of papers, constitutes an excellent example of how econometrics can be rigorously used to analyze different topics in economics. Indeed, it applies several econometric methods from cross-sectional analysis, time series and panel data. Thus, it is evident that Dr. Bhowmik masters an extensive set of econometric techniques, so that his work can be a very useful reference for students and researchers (or, even better, it can inspire students to become researchers).

In his previous book, *Applications of Econometrics in Economics* (2017), Bhowmik developed several applications of time series econometrics but did not include panel data methods. By contrast, in this book we can find, as added value, several applications of panel data econometrics, especially in terms of panel vector error-correction models. For example, in the paper "Factors of Human Development Index in ASEAN: Panel cointegration analysis" Bhowmik applies a panel VECM to study the relationship between Human Development Index and other variables like GDP, education expenditure, health expenditure and unemployment rate in ASEAN countries during the period 1990-2016. Similarly, in the paper "Sectoral employment rate in India: Panel cointegration and vector error correction analysis" the same method is applied to investigate sectoral employment rates in males and females in India during the period 1991-2016. Interestingly, it is found that male employment rate of all sectors is positively related with GDP shares of sectors and growth rates of sectors and that female employment rate of all sectors is negatively related with GDP shares of sectors and growth rates of sectors. This result shows a clear pattern which must be studied more thoroughly by those interested in equality of opportunities between men and women.

Of course, as an Indian scholar, Dr. Bhowmik is focused on economic problems of India, which is the third largest economy in the world in terms of GDP based on PPP (purchasing power parity). In this way, in the paper “Econometric test on growth-unemployment nexus in India” he relates these variables during 1991-2016 in India and finds that there is a negative relationship between unemployment and economic growth, which is significant at 10% level. In turn, in the paper “Impact of social sector expenditure on economic growth in India” he uses a double-log regression model for the Indian economy during the period 1990-2017 and finds that one per cent increase in social expenditure generate 0.6374% increase in GDP, 0.48627% increase in GDP per capita, 0.1166% increase in HDI, 0.1679% increase in growth rate and 0.060139% decrease in unemployment rate, so that it is clear that social expenditure is a very important instrument to promote economic development in India.

But there are not only studies focused on India or Asian economies. For instance, in the paper “Linkages among global CO<sub>2</sub> emission and world GDP” Bhowmik performs a study at the world level. This paper is relevant because it presents econometric evidence against climate change deniers who argue that there is no association between climate change and human activity. Indeed, using data from 1960 to 2015 and applying Granger causality test, Bhowmik finds that world GDP growth rate Granger causes world CO<sub>2</sub> emission per capita. On the other hand, in the paper “Impact of Foreign Direct Investment on trade integration in African bloc-ECOWAS” he studies the impact of FDI on trade integration in the Economic Community of Western African States (ECOWAS) during the period 1995-2016 and, considering intra bloc exports and imports, finds that FDI accelerates trade integration in this group of countries.

Moreover, we have that econometrics has been traditionally seen as the key tool for testing economic theories. In this vein, Bhowmik uses econometric methods to test different economic ideas. Thus, in the paper “Econometric test for orthodox quantity theory of money” he analyses the validity of the well-known equation  $MV=PT$  in India during the period 1960-2015 and finds that there is a positive but not proportional relationship between price level and money supply. In addition, in the papers “Robertsonian saving function in India” and “Econometric test on Keynesian saving function in India” he also tests economic theories.

So, it is clear that Dr. Bhowmik’s book constitutes a valuable contribution to economic research since it shows the application of several sophisticated and highly technical econometric tools and models but in a simple a direct language. In turn, it is remarkable the scope of subjects which are discussed, including human development, GDP, economic integration, investment, labor markets, social expenditure and climate change. All of this reminds me Keynes’ description of the ideal economist: “The master-economist must possess a rare combination of gifts. He must be mathematician, historian, statesman, philosopher -in some degree. He must understand symbols and speak in words. He must contemplate the particular

in terms of the general and touch abstract and concrete in the same flight of thought. He must study the present in the light of the past for the purposes of the future. No part of man's nature or his institutions must lie entirely outside his regard. He must be purposeful and disinterested in a simultaneous mood; as aloof and incorruptible as an artist, yet sometimes as near to earth as a politician."

**Prof. Dante A. Urbina**  
**University of Lima**  
**durbina@ulima.edu.pe**