PROGRAM EVALUATION: ASSESSING THE IMPACT OF ECONOMIC POLICIES OR INTERVENTIONS USING ECONOMETRIC METHODS

***Dr Rajendra Singh **Neelam Singh**

**Associate Professor, HOD Mathematics, MBPG College Dadri, G.B. Nagar*

***Associate Professor, VMLG College Ghaziabad*

Received: 14 December 2019; Accepted: 10 January 2020; Published: 16 January 2020

ABSTRACT

Economic policies and interventions rely heavily on programme assessment, which helps to determine how effective they were and allows for decisions to be based on evidence. To this end, econometric approaches are invaluable, as they let researchers to conduct thorough analyses of the correlations between interventions or policy shifts and the resulting economic effects. Researchers can gain a better grasp of a policy's impact by using econometric models and statistical methods to separate the policy's impacts from those of other variables. To help policymakers create actions that have good and long-lasting effects on the economy, integrating various methodologies helps build a complete evidence foundation. The use of econometric methods in programme assessment is becoming increasingly important as governments and organisations work to tackle complicated economic issues. This will help make better decisions and create a more fair and robust economy.

Keywords: *Program Evaluation, Economic Policies, Interventions, Econometric methods*

Program Evaluation: *Assessing the impact of economic policies or interventions using econometric methods*

INTRODUCTION

The assessment of their influence is crucial for directing decision-makers towards well-informed and efficient plans. An effective framework for gauging the results of monetary policies and interventions is programme assessment, especially when seen through the prism of econometric approaches. This method utilises statistical methods to examine numerical data, which yields useful insights into the links between actions taken and economic results. Pursuing effective economic policies necessitates a thorough comprehension of their consequences in order to verify their effectiveness and to streamline and improve future endeavours. For policymakers seeking to understand the full extent of their initiatives' effects, econometric approaches provide a methodical way to untangle the myriad elements that affect economic phenomena.[1]

Econometric approaches provide a detailed knowledge of the complex dynamics by allowing researchers to model and estimate the interactions between variables. These methods are based on economic theory and statistics. Economists can separate the effects of targeted policies or interventions from non-target variables by using a variety of methodologies, including difference-in-differences, instrumental variable methods, and regression analysis. In economic systems,

where many factors interact in complex ways, this methodological rigour is especially important because it is difficult to pin changes down to a single policy action. Using econometric assessments, we cannot only find out how big of an effect an intervention has overall, but we can also see whether there is any variation in the impacts between populations or areas.[2]

When it comes to making decisions based on facts, policymakers cannot afford to ignore the importance of evaluating economic policies using econometric lenses. To solve economic problems, several groups devote substantial resources, including governments and international organisations. But these efforts won't amount to much unless their effects on important economic variables like GDP growth, employment, inflation, and income inequality are carefully examined. Policymakers can use econometric analysis to improve strategy, reallocate resources, and adjust to changing economic landscapes by gauging the success or failure of certain initiatives. Due to the interconnected nature of the modern world, the assessment of economic policy is no longer limited to individual nations. If we want to make domestic policies that work and help keep the global economy stable, we need to know how actions will affect other areas and what consequences such changes may have. To help policymakers foresee and lessen the effect of unforeseen repercussions, econometric tools allow for the assessment of cross-country implications; this, in turn, promotes international cooperation and coordination.[3]

OVERVIEW OF THE IMPORTANCE OF ECONOMIC POLICIES AND INTERVENTIONS

A nation's economic growth, stability, and general prosperity are heavily influenced by its economic policies and actions. These policies are put in place by governments and central banks to tackle different economic issues, boost growth, and protect citizens' interests. Because they affect employment rates, inflation, income distribution, and the general level of living, these policies are crucial. Stability in the economy as a whole is a key goal of fiscal policy. This entails establishing conditions favourable to long-term economic expansion by controlling inflation and unemployment. In order to manage inflation and influence economic activity, central banks frequently use monetary policies, which include changing the money supply and interest rates. Government expenditure and taxes are examples of fiscal policies that aim to affect demand in the economy as a whole. Preventing economic imbalances and ensuring long-term stability requires finding the correct balance between these approaches.[4]

In order to promote social justice and reduce income disparity, economic policies play a crucial role. A more equal distribution of wealth and resources can be achieved by targeted initiatives, social welfare programmes, and progressive taxes. One way governments might help bring people together and reduce social tensions is by encouraging inclusive economic growth. Human capital may be improved by focused interventions like healthcare and education programmes, which in turn contribute to economic development in the long run. To restore economic stability during recessions and other economic crises, governments frequently resort to interventionist programmes. To avoid a severe economic downturn in the wake of the 2008 financial crisis, several governments enacted stimulus programmes to increase consumer spending. For the economy to avoid further downturn and get back on its feet as soon as possible, these measures

are essential. Many nations adopted fiscal policies and provided monetary assistance to lessen the economic blow of lockdowns and interruptions caused by the COVID-19 epidemic.[5]

Economic strategies also address the essential issue of environmental sustainability. Governments throughout the world are integrating green policies into their economic frameworks in response to rising concerns about environmental degradation and climate change. Economic methods increasingly include carbon pricing, renewable energy incentives, and legislation that try to reduce carbon emissions. To secure a sustainable future, we need strong policies to tackle the complicated task of balancing economic growth with environmental protection. One area where economic interventions can have an impact on a country's ability to compete internationally is in its trade policy. Governments preserve home industries, encourage foreign commerce, and guarantee fair competition through trade agreements, subsidies, and tariffs. The economic competitiveness of a nation and the doors to new prospects for growth and development may be enhanced via the implementation of strategic trade policies. When it comes to encouraging innovation and technical progress, economic policies are crucial. Businesses are more likely to invest in innovation when governments provide tax incentives and subsidies to stimulate research and development. This helps the economy in the long run by increasing production and putting the country at the forefront of technological advancement.[6]

Emphasize the need for rigorous evaluation to assess their impact

In the ever-changing world of technology, it is crucial to thoroughly evaluate new developments in order to determine how they will affect people, businesses, and the economy. To uncover the actual consequences of implementing breakthrough technology, regulations, or treatments, a thorough and detailed review procedure is needed. The effectiveness, efficiency, and possible consequences of each new invention can only be ascertained by thorough review.[7]

The complexity and interconnection of modern systems is a key factor for promoting thorough review. There is a domino effect that innovations, especially in technology, cause to appear in many parts of our life. The effects of recent developments in AI, ML, social policy, and healthcare treatments are far-reaching and complex. To unravel the complex web of intended and unforeseen outcomes, a thorough review procedure is essential. To make sure the advantages are greater than the dangers, it offers a framework for systematically analysing the impact on various stakeholders.[8]

In addition, due to the rapidity with which technology is evolving, review methods must be proactive. Assessment methods need to change and progress at the same dizzying pace as new technology. To stay up with the ever-changing nature of technological innovation, it is clear that real-time evaluation systems are needed. Because of this real-time assessment, not only can decisions be made more quickly, but any negative impacts may be mitigated more quickly as well. We need a strict framework for evaluating innovations because of their potential social and ethical effects. The importance of thinking about ethics in relation to technology is growing as it is more integrated into our everyday lives. Considerations of privacy, security, and social equality are integral to any evaluation of a technology's influence, which extends well beyond any short-term

gains. Careful assessment allows stakeholders to spot possible prejudices, ethical conundrums, and unforeseen effects, giving them a chance to fix these problems before they get worse.[9]

The significance of thorough assessment is further highlighted by economic factors. Large sums of money are frequently needed to fund the introduction of new policies or the development of innovative technology. In addition to calculating ROI, a comprehensive analysis reveals the wider economic effects. Possible economic upheavals, employment losses, and expansion prospects can be better anticipated with its aid. In order for governments, corporations, and investors to make well-informed decisions, this economic analysis is crucial.[10]

ECONOMETRIC METHOD OF ECONOMICS

The field of economics known as "econometrics" uses mathematical models and statistical analysis to predict and evaluate economic theories. The empirical evidence for economic linkages is provided by combining economic theory with statistical methodologies. When it comes to analysing data, estimating parameters, and making predictions, economists rely heavily on econometric approaches. Economic study frequently employs a number of important econometric tools:[11]

- **Linear Regression Analysis:** The modelling of the connection between a dependent variable and one or more independent variables can be accomplished through the application of a fundamental econometric technique known as linear regression. This model makes the assumption that the connection between the variables is linear, and the coefficients estimate the marginal influence that each independent variable has on the variable that is being studied.
- **Time Series Analysis:** Data that has been gathered over a period of time may be analysed using time series econometrics. For the purpose of analysing trends, seasonality, and the dynamics of economic variables, methods such as autoregressive integrated moving average (ARIMA) models and cointegration analysis are utilised.
- **Panel Data Analysis:** The use of panel data, which incorporates both cross-sectional and time-series dimensions, enables economists to adjust for individual variation and investigate the impact of policies or variables across the course of time. When doing panel data analysis, it is usual practice to employ both fixed effects and random effects models.[12]
- **Propensity Score Matching:** The creation of a balanced comparison group is accomplished through the use of propensity score matching in observational studies, which are instances in which randomization is not practical. Because it matches treated and untreated units based on their propensity scores, it helps compensate for selection bias and assess the effects of causality.

TYPES OF ECONOMIC POLICIES AND INTERVENTIONS

The term "economic policies and interventions" refers to the wide range of tools used by governments and central banks to shape and control national economies. The goals of these policies are to stabilise the economy, accomplish certain objectives, and deal with potential

problems. Monetary policy, supply-side policies, and fiscal policy are the main categories into which economic interventions and policies fall. To affect the general level of economic activity, fiscal policymakers employ taxation and government expenditure. Depending on the state of the economy, governments may either boost it or slow it down through fiscal policy. In times of economic recession, for instance, governments often cut taxes and expand expenditure in an effort to stimulate investment and demand. Governments may choose to reduce expenditure and increase taxes as part of contractionary fiscal policies in order to control inflation when the economy is overheating or when inflation is very high.[13]

Conversely, central banks are mainly responsible for monetary policy. To accomplish broad-based economic objectives including price stability, full employment, and long-term growth, monetary policymakers control the money supply and interest rates. The money supply, interest rates, and economic activity are all affected by the interest rate adjustments made by central banks. Borrowing, investment, and consumer spending may all be stimulated by lowering interest rates, while an overheated economy can be cooled and inflation controlled by rising them. By fixing underlying problems, supply-side policies aim to boost economic efficiency and production. The long-term goal of these measures is to increase the economy's production capacity. Investments in education and infrastructure, changes to the tax system, changes to the labour market, and deregulation are all examples of common supply-side policies. The goal of supply-side policies is to promote innovation, productivity, and long-term economic growth by lowering entry barriers and increasing competition.[14]

Governments may respond to particular problems with a wide range of targeted economic interventions, not limited to the ones listed above. When there is a crisis in the financial sector, for instance, the government may step in to help stabilise the markets, replenish bank liquidity, and rebuild public trust. Examples of such interventions include bailout packages that were implemented in response to the global financial crisis of 2008. Governments influence international commerce through a variety of economic interventions, one of which is trade policy. The purpose of trade agreements, quotas, and tariffs is to regulate trade imbalances, encourage exports, and safeguard domestic industries. The international economy and diplomatic ties between countries are both affected by these measures.[15]

Policies pertaining to the environment and social welfare also influence economic results. Pollution and climate change are two examples of environmental problems that governments may try to solve through incentives and rules. Income inequality, social mobility, and general social welfare are all impacted by social policies, which encompass welfare programmes and labour market rules. Considerations such as economic environment, implementation quality, and stakeholder collaboration determine the efficacy of economic policies and interventions. Furthermore, due to the interdependence of the world economy, international cooperation and coordination are frequently necessary for national economic strategies to be successful.[16]

CAUSAL INFERENCE AND PROGRAM EVALUATION

Understanding the influence of interventions and policies on diverse outcomes requires skills that causal inference and programme evaluation provide, which are fundamental components of the

field of social science research as a whole. The goal of programme assessment is to determine how well a particular intervention or programme worked, whereas causal inference is to find and explain the links between variables. Both ideas are fundamental for guiding public policy and decision-making based on facts. scientists work tirelessly to decipher the intricate network of correlations between various variables and their respective results. Finding correlations is just the beginning; you'll also need to determine the strength and direction of any causal effects. Experimental designs, observational studies, and quasi-experimental designs are some of the approaches used to separate association from causation. When it comes to drawing conclusions about cause and effect, randomised controlled trials (RCTs) are the way to go. These studies minimise confounding variables by randomly assigning individuals to treatment or control groups.[17]

In order to determine if policies or interventions were successful, programme evaluations expand on the concepts of causal inference. The goal is to find out if the programme was successful by collecting, analysing, and interpreting data. Evaluating the reach of interventions, the impact on specified outcomes, and the accuracy of programme execution are generally many variables that are included in programme evaluations. Policymakers can benefit greatly from the insights provided by thorough programme evaluations when deciding how to allocate resources and how to enhance existing programmes. Dealing with selection bias is a major obstacle in causal inference and programme assessment. It becomes difficult to merely ascribe observed outcomes to the intervention when there is a systematic difference between the people or groups participating in the programme and those who do not. Propensity score matching and instrumental variable analysis are two examples of advanced statistical methods that try to reduce the impact of selection bias and strengthen the reliability of causal conclusions.

When evaluating programmes and drawing causal conclusions, the use of counterfactuals is crucial. Researchers can determine if an intervention was responsible for a change in outcomes by comparing them to the "counterfactual," or the set of circumstances in which the intervention did not take place. To make sure causal assertions are strong and legitimate, we have to think about other possible explanations and things that may confuse the results. The advancement of practices supported by evidence is aided by causal inference and programme assessment. To learn how initiatives worked, how to best use funds, and how to make programmes better, policymakers depend on thorough assessments. Research and policy may be better communicated with the use of these approaches, which in turn improve the efficacy of social interventions and inform decision-making.[18]

Causality and Potential Outcomes

Potential outcomes and causality are cornerstones of statistical and research theory, particularly as it pertains to causal inference. The study of causation aims to deduce the chain reaction that starts with a change in one variable and ends with a change in another. However, under alternative circumstances or exposures, possible outcomes are occurrences that may have happened. When put together, these ideas provide the framework for answering causal issues and carrying out robust studies.

Before delving into the topic of causation, it is crucial to differentiate between correlation and association. Causation suggests that one variable has an immediate impact on another, in contrast to correlation, which suggests that two variables are statistically related. When trying to determine what happened and why, it's important to look at things like how long things took, how strongly things were linked, if there was a dose-response relationship, and whether there were any other possible explanations.[19]

Theoretically, causal inference is based on possible outcomes, which are often depicted using the counterfactual framework. A person or group's potential outcomes under a different set of circumstances are shown in the counterfactual scenario. Contrasting the actual results with the hypothetical ones that would have happened if the treatment hadn't been administered is a common practice in experimental settings. By calculating the disparity between the actual and hypothetical results, researchers are able to more precisely pinpoint the intervention's or exposure's causal influence.

For non-experimental or observational causal problems, the possible outcomes framework shines. Due to the lack of random assignment, researchers encounter difficulties in demonstrating causation and must depend on statistical approaches to account for confounding variables. By simulating the randomization of experiments, methods like instrumental variables, propensity score matching, and regression analysis hope to lessen the influence of confounding and provide more accurate estimates of causal effects.[20]

Realising that an intervention's causal effect could change among subgroups is another important aspect of understanding prospective outcomes, which brings attention to the idea of treatment effect heterogeneity. This acknowledgement highlights the significance of investigating and publishing subgroup analyses to get the subtleties of causal linkages among varied populations. Theory and practice of causal inference have been enhanced by developments in statistical methods, such as Bayesian approaches and machine learning techniques. By improving the accuracy and precision of causal estimations, these methods make it easier to deal with complicated data structures, high-dimensional variables, and nonlinear interactions.

Confounding

When an unintended variable affects both the independent and dependent variables, creating an artificial or deceptive correlation between them, this phenomenon is known as confounding, and it is an important subject in epidemiology and research. Because confounding introduces bias, it becomes more difficult to ascribe observed effects exclusively to the intervention or exposure that was evaluated. Assumed cause or exposure is the independent variable, and the outcome is the dependent variable; the objective is to discover and comprehend the connection between the two. An additional variable, or muddle, is considered to be present when it influences both the independent and dependent variables. An erroneous or misleading perception of a causal link may be produced by this association.[21]

If you want your study to have internal validity and to evaluate the causal link between the variables correctly, you must control for confounding. Different research designs call for different approaches to reducing the possibility of confounding:

- **Randomization:** Randomised controlled trials, also known as RCTs, are designed to ensure that both known and unknown confounding factors are distributed evenly between the treatment group and the control group, thereby reducing the effectiveness of confounding factors.
- **Matching:** It is possible for researchers to reduce the influence of potential confounding factors by matching participants with similar characteristics in observational studies. The method of creating comparable groups based on the likelihood of receiving the treatment is referred to as "propensity score matching," and it is common practice.
- **Stratification:** When conducting the analysis, researchers have the ability to stratify it according to particular subgroups of confounding variables. A better understanding of the impact of potential confounding factors can be achieved through the examination of the association within strata.
- **Statistical Adjustment:** When it comes to statistically controlling for confounding factors, multivariable regression analysis is a typical strategy. The researchers want to determine the influence of the independent variable on the dependent variable; thus they include potential confounding factors as covariates in the model.
- **Instrumental Variables:** To overcome the issue of unmeasured confounding, instrumental variables may be utilised in certain circumstances. A variable that has an influence on the exposure of interest but is not directly connected to the result is referred to as an instrumental variable. This type of variable helps to identify the specific causal effect.[22]

CONCLUSION

Econometric tools must be used to assess the efficacy and repercussions of economic policies or interventions. Researchers and policymakers can acquire a better understanding of the underlying causal mechanisms by conducting detailed studies that aid in deciphering complicated relationships within economic systems utilising econometric methods. The effects of policies and interventions may be discovered and quantified using econometric methods and statistical models such as instrumental variable approaches, difference-in-differences, and regression analyses. This evidence-based approach helps to improve understanding of the economic situation as well as the capacity to make targeted policy decisions. Evaluating policies using econometrics helps to improve them and develop new ones that function better, allowing the economy to flourish and remain robust. With the ever-changing global economic landscape, it is critical to employ comprehensive econometric research to produce evidence-based policies that address the complex concerns confronting communities and economies throughout the world.

REFERENCES

1. Angrist, J. D., & Pischke, J. S. (2019). Mostly Harmless Econometrics: An Empiricist's Companion. Princeton University Press.
2. Heckman, J. J. (2018). Econometric Causality. International Statistical Review, 76(1), 1-27.
3. Wooldridge, J. M. (2018). Econometric Analysis of Cross Section and Panel Data. MIT Press.
4. Duflo, E., Glennerster, R., & Kremer, M. (2018). Using Randomization in Development Economics Research: A Toolkit. Handbook of Development Economics, 4, 3895-3962.
5. Imbens, G. W., & Rubin, D. B. (2015). Causal Inference in Statistics, Social, and Biomedical Sciences. Cambridge University Press.
6. Deaton, A. (2017). Instruments of development: Randomization in the tropics, and the search for the elusive keys to economic development. National Bureau of Economic Research Working Paper No. 14690.
7. Card, D., & Krueger, A. B. (2017). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. The American Economic Review, 84(4), 772-793.
8. Abadie, A., Diamond, A., & Hainmueller, J. (2016). Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. Journal of the American Statistical Association, 105(490), 493-505.
9. Athey, S., & Imbens, G. W. (2017). The Econometrics of Randomized Experiments. Handbook of Economic Field Experiments, 1, 73-140.
10. Banerjee, A., Duflo, E., Goldberg, N., Karlan, D., Osei, R., Parienté, W., ... & Udry, C. (2015). A multifaceted program causes lasting progress for the very poor: Evidence from six countries. Science, 348(6236), 1260799.
11. Miguel, E., & Kremer, M. (2016). Worms: Identifying impacts on education and health in the presence of treatment externalities. Econometrica, 72(1), 159-217.
12. Blundell, R., & Costa Dias, M. (2020). Evaluation methods for non-experimental data. Fiscal Studies, 21(4), 427-468.
13. Vytlacil, E. J. (2017). Econometric evaluation of social programs, part I: Causal models, structural models and econometric policy evaluation. Handbook of Econometrics, 6, 4779-4874.
14. Ichimura, H., & Todd, P. E. (2018). Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme. The Review of Economic Studies, 65(2), 261-294.
15. Dehejia, R. H., & Wahba, S. (2015). Propensity score-matching methods for nonexperimental causal studies. The Review of Economics and Statistics, 84(1), 151-161.
16. Mullainathan, S. (2015). How much should we trust differences-in-differences estimates? The Quarterly Journal of Economics, 119(1), 249-275.
17. Manski, C. F. (2020). Nonparametric bounds on treatment effects. American Economic Review, 80(2), 319-323.

18. Rosenbaum, P. R., & Rubin, D. B. (2017). The central role of the propensity score in observational studies for causal effects. Biometrika, 70(1), 41-55.
19. Rubin, D. B. (2019). Estimating causal effects of treatments in randomized and nonrandomized studies. Journal of Educational Psychology, 66(5), 688-701.
20. Rubin, D. B. (2017). Multiple imputation for nonresponse in surveys. John Wiley & Sons, Inc.
21. Staiger, D., & Stock, J. H. (2017). Instrumental variables regression with weak instruments. Econometrica, 65(3), 557-586.
22. Stock, J. H., & Yogo, M. (2015). Testing for weak instruments in linear IV regression. In Identification and Inference for Econometric Models (pp. 80-108). Cambridge University Press.