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The Political Economy of Platform Urbanism: Data Accumulation, Market Power, and Governance

Dr. Sindhuja M.¹

Abstract

Digital technologies have evolved from being simply convenient tools to constituting essential infrastructures of urban life mediating housing, mobility, labour, and civic engagement. This paper surveys and synthesizes the emerging literature on “platform urbanism,” defining its unique characteristics as compared to the previous “smart city” model, as well as pinpointing the common themes in the theorization of this topic. Based on research done within the fields of urban geography, media studies, and urban planning, the essay asserts that platform urbanism can only be analyzed taking into account four important characteristics: a unique core-periphery structure with concentrated technical and commercial control; conjunctural spatiality in which the platform both inhabits the spaces it mediates and is separate from them; a multivalent value politics that extends beyond the commodification of data; and an inherent governance deficit in which local municipalities often lack the capacity to regulate platform corporations. This paper demonstrates these processes via the example of short-term rental platforms and housing markets, followed by the analysis of new approaches to regulation, imitation, and resistance used by cities and citizens to challenge the power of platforms. In conclusion, platform urbanism is argued not to be a consistent and homogeneous process of transformation, but rather an uneven and contested process, and some implications are considered for future studies in this developing field.

Keywords: Platform Urbanism, Short-Term Rental Platforms, Housing Markets Platform Governance, Data Commodification

1. Introduction

Digital platforms—app-based, data-rich intermediaries linking riders to drivers, guests to hosts, consumers to retailers, and citizens to municipal services—have been so integrated into daily urban experience that the impacts of digital platforms on the city itself

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have been rendered invisible by virtue of their ubiquity. An individual summoning a ride, renting out her spare room, ordering some food delivery, and consulting the municipal dashboard is interacting with a series of infrastructures that did not exist two decades ago, but which have profoundly affected the way that individuals live, move, consume, and the way that urban administrations try to govern urban space. Urban scholars have increasingly asserted that these processes cannot be fully understood using the discourse of the “smart city,” focusing on sensors and efficiency (Kitchin, 2014) and have posited that there is instead an analytic framework needed: platform urbanism (Sadowski, 2020; Barns, 2020).

This paper provides a theoretical and comparative discussion of platform urbanism as the subject matter has been treated in recent urban studies literature. Three interrelated questions are discussed. Firstly, this paper shows how platform urbanism is different from the concept of the smart city that precedes it, and why this has been important for scholars to draw this distinction. Secondly, it discusses the theoretical mechanisms – architectural, spatial, economic and political – through which platforms are argued to transform urban life. Thirdly, it discusses how the empirical reality of platform-enabled housing markets illustrates the potentials and dangers of this transformation and how platform power can be regulated, replicated and contested.

In dealing with these issues, the paper makes use of such seminal works as those by Kitchin (2014), Shelton et al. (2015), Sadowski (2020), Graham (2020), Barns (2018, 2020), van Dijck et al. (2018), Wachsmuth & Weisler (2018), among many others. The paper continues as follows. Section 2 maps the conceptual shift from smart cities to platform urbanism and explains what is meant by this term in scholarly literature. Section 3 discusses spatiality and materiality of platforms, with an emphasis on the concept of “conjunctural geographies”. Section 4 applies the concept through the example of short-term rental platforms. Section 5 discusses the political economy of platform data and value.

Section 6 deals with the governance gap created by platforms for cities, and Section 7 talks about approaches to regulation, replication, and resistance. Section 8 discusses the issues that cross-cut scholarly literature, Section 9 discusses implications for planning and policy, and Section 10 offers conclusions.

2. From Smart Cities to Platform Urbanism

2.1 The Smart city and its limitations

During much of the last decade, debates about urban technologies have focused on the notion of “smart city”. According to Kitchin (2014), the smart city is a vision wherein cities become “instrumented” by means of technological infrastructure capable of generating big data, allowing real-time monitoring and analysis of urban phenomena and techno-

cratic governance of the cities which promises efficiency, sustainability, and transparency in urban processes. However, according to Kitchin (2014), the notion of the smart city faces some problems, such as the way urban data is considered to be politically and ideologically neutral while being quite the opposite because it represents particular choices and absences of institutions; technocratic governance replacing democratic deliberation; and the susceptibility to failures which occurs due to the dependency of urban systems on software infrastructure that becomes “code/space,” which means that malfunctioning of software results in malfunctioning of the physical space.

Shelton et al. (2015) extend the critique by claiming that the majority of smart city literature has been preoccupied with the examination of paradigmatic “cities of the future” like Songdo, Masdar, or Living PlanIT Valley, overlooking the everyday realities of the implementation of smart city policies within already existing cities such as Louisville or Philadelphia. Utilizing the idea of “actually existing neoliberalism” proposed by Brenner and Theodore, they argue for the need to pay more attention to the “actually existing smart city,” i.e., to the reality of technology adoption within cities rather than marketing discourses produced by technology providers (Shelton et al., 2015).

2.2 Defining Platform Urbanism

The emergence of platform urbanism was driven by the feeling that, irrespective of the critical refinements, the idea of smart cities was still too state-oriented, too focused on large-scale infrastructure projects and too sensor-centered, and was not well equipped to address the special dynamics of commercial digital platforms like Uber, Airbnb, Deliveroo, Google Maps, which mediate urban activities through direct interactions with consumers, rather than control centers of the municipality (Sadowski, 2020). According to Sadowski (2020), platform urbanism is “a different mixture of capital-technology-cities” that is much more consumer-oriented, focused on rapid scaling via venture capital and network effects, and, normally, more hostile to government regulations and traditional industries than the regular smart city projects (p. 448).

Platform urbanism has been theorised extensively by Barns (2018, 2020), who sees it as the study of “the many registers of urban life and experience that platforms operate upon,” moving beyond the formal workings of city governance into commerce, sociality, and mobility (Barns, 2020). For Barns, platforms must be considered not only as software, but also as urban infrastructures themselves – in the same way that roads, water, and power grids are infrastructures organising the movement of people and commodities across a city, but also privately-owned and therefore proprietary and non-transparent infrastructures (Barns, 2018). It is this characterisation of platforms as infrastructures that is significant in shifting their conception from something that is convenient for citizens to a structural element of modern urban life.

2.3 The Core-Periphery Architecture

One of the most frequent conceptual tools used in this literature is the argument that platforms are based on a stable “core,” which is controlled from the center, and a variable “periphery,” which is governed in a looser manner. APIs enable developers, companies, and users to develop applications on top of platforms based on their core, but access to platforms is inherently asymmetrical, as peripheries do not have much influence on the structure of the platforms, whereas platforms can change their access rules, algorithms, and exclude certain individuals or entities (Barns, 2020; van Dijck et al., 2018). According to van Dijck, Poell, and de Waal (2018), this architecture allows platforms to represent themselves as neutral mediators, connecting supply and demand without taking part in transactions, but actually affecting the nature of these transactions.

3. Spatiality and Materiality of Platform Urbanism

3.1 Conjunctural geographies

One of the most important theoretical perspectives on this topic has been developed by Graham in his theory of “conjunctural geographies” (Graham, 2020). Graham posits that platforms that operate in cities have the ability to gain significant control over urban interactions without having to face any consequences due to their existence in two opposite geographic spaces: on the one hand, platforms have to be embedded in particular geographic locations, where drivers have to drive along actual streets, and hosts have to take care of actual apartments and where delivery drivers have to move through actual neighborhoods, but, on the other hand, they can be disembedded, since the ownership, code, taxation, and decision-making processes are located elsewhere, in other countries (Graham, 2020). Thus, platforms benefit from both their embeddedness in certain geographic locations and their disembeddedness, as it makes them too big to control, too new to regulate, and too innovative to stifle. What is important, according to Graham (2020), such a conjunctural geography is not a strategically unassailable position of platforms. Their weakness lies in their code and networked infrastructure.

3.2 New urban materialities

While advocating this point of view, the scholars who study platform urbanism stress the emergence of specific material manifestations of these platforms in the city. In contrast to sensor networks and control centers usually found in smart city infrastructures, the platform urbanism materializes itself in such ways as short-term rentals used for tourism purposes, personal cars transformed into ride-sharing taxis, delivery bikes and mopeds driving along pedestrian zones, and, finally, in data centers where all the information produced by these processes is kept (Sadowski, 2020). This issue is crucial to understand that the platform urbanism is not only an informational layer overlaid upon the static physical city but also the one that transforms its material reality.

4. Platform Urbanism and Housing: The Case of Short-Term Rentals

The most tangible and thoroughly studied example of platform urbanism in terms of its economic and material impacts is the change brought to urban housing markets through short-term rental platforms, such as Airbnb. According to Wachsmuth and Weisler (2018), their research on short-term rentals in New York City offers a useful perspective on this change.

According to their analysis, Airbnb generates a new revenue stream in housing markets through the possibility of renting out residential property for short-term periods and at rates more suitable for tourists than long-term tenants, thus generating what they call anew rent gap – the gap between the current rental revenue from a piece of property and the higher revenue that may come out of its short-term rental (Wachsmuth & Weisler, 2018).

Unlike the traditional rent gap related to large-scale redevelopment, which calls for significant investment of new money and is generally caused by developers, Wachsmuth and Weisler (2018) highlight that the rent gap generated by Airbnb arises instantly and does not involve any drop in the property's existing income stream and can be used easily without much capital by many different actors, such as individual owners, tenants renting out rooms to others, and homeowners, as well as big investment firms. According to the authors, this mechanism creates a unique pattern of “gentrification through the sharing economy,” whereby popular international neighborhoods see a rise in their rents and value unrelated to redevelopment but to the reallocation of housing via the platform to hotel-like use.

The example also shows a number of things that have been outlined in theory earlier. First, it showcases the “conjunctural geography” of Graham (2020) by showing how Airbnb relies upon physical housing that is situated in concrete neighbourhoods; at the same time, the control, algorithms, and money-making mechanisms of the platform take place mostly beyond any one city's legal control, thus resulting in the accountability problem that Graham mentions as typical for platform urbanism. Second, the example highlights the special materiality produced by platform urbanism, i.e., the “Airbnb apartment” which is different materially both from a regular apartment and from a hotel room. Third, it shows how platforms make value not only through data extraction, but through economic reorganisation of urban property markets.

5. Datafication, Value, and the Political Economy of Platforms

5.1 Beyond commodification

A number of platform urbanism studies have explored the concept in the larger context of criticism of “platform capitalism”, wherein digital platforms emerge as a novel orga-

nizational form of capital accumulation that hinges on the harvesting and monetization of data created by users through their daily activities (Srnicek, 2016). According to this conceptualization, cities are considered an excellent source of data mining, owing to the high level of economic and social interaction that cities provide as platforms to mediate social interaction and generate economic value.

However, there have been some scholars who have warned about the danger of simplifying platform urbanism as a one-logic enterprise of data commoditization. Van Dijck et al. (2018) observe that the platforms do not function merely as an economic entity exploiting the economic value, but as a socio-technical system that remolds the “public values,” which are associated with the democratic system like privacy, accuracy, safety, and fairness, because platforms are carrying out the roles that were once done by public bodies, but now they are privately controlled and minimally regulated by democracy (van Dijck et al., 2018).

5.2. The Platform Society and Public Values

The notion of the “platform society” coined by Van Dijck et al. (2018) is especially valuable in understanding the political dimensions of platform urbanism since it draws attention to the contradiction between the connective, personalized, and frictionless character of services that are provided through these platforms, and their disruptive nature regarding the market, labour, and institutions involved. The fact that a platform such as Airbnb offers convenient services in terms of renting an apartment, or Uber – in terms of ordering a ride – is contingent upon circumventing the “cumbersome institutional or industrial overhead” that the platform offers,

which includes, among other things, regulation, taxes, and the systems of protection for the labour of individuals (van Dijck et al., 2018).

6. Power, Accountability and the Urban Governance Deficit

6.1 Structural unaccountability

Graham (2020) lays bare the governance implications of platform urbanism, noting that platforms in urban contexts are “fundamentally unaccountable” insofar as they tremendous power over urban space while having little democratic accountability to the spaces and communities in which they operate. Unaccountability is not a byproduct of the above described conjunctural geography, but rather an intrinsic feature of it in that platforms have the potential to take advantage of local markets while being insulated from regulatory pressure due to their global presence and cutting-edge technology.

6.2 Regulatory asymmetry and municipal capacity

This governance gap is aggravated by substantial asymmetries in terms of technical

expertise and legal capacity of municipalities compared to that of platform companies. Sadowski (2020) places this within a larger context of a general trend where platform urbanism appears to be much more antagonistic to local authorities and incumbents than traditional smart city programs, which on the contrary, are usually designed specifically for the sake of cooperation with, and sometimes even upon demand from, city authorities. While smart city sensor networks are usually purchased, customized, and controlled by municipal administration, platforms such as Uber or Airbnb arrive to the city on their own terms, establishing themselves on the market before any regulatory regime emerges around them (Sadowski, 2020; Shelton et al., 2015).

This is evident from the discussion of the housing case presented in section four. Due to the fact that the platforms own the code used to create, modify, and publish the listing, any city effort aimed at regulating the short-term rental, for instance, by making sure that the host shows the registration number, by restricting the number of nights during which the property may be rented out, and by demanding that there should be disaggregation of the tax data, must depend largely on the willingness of the platform to include compliance measures within its systems (Wachsmuth & Weisler, 2018). Failure of such cooperation results in very little independent verification ability of the cities.

7. Regulation, Replication, and Resistance

While there is clear evidence of a deficit in governance, there is caution in the academic literature against viewing the power of platforms as all-encompassing and inevitable. Graham (2020) finishes his discussion of conjunctural geographies with three overarching approaches to contest the power of platforms: regulation, replication, and resistance.

Regulation entails the application of legal and administrative instruments such as licensing schemes, information exchanges, taxation policies, and competition laws to compel platforms to operate within the bounds of locally accountable governance systems even in the absence of full enforcement capacity. Replication involves the creation of alternatives in the form of publicly or collaboratively governed platforms that can provide the same services in a non-extractive, nonproprietary fashion that the dominant commercial platforms do (e.g., ride sharing or short-term rentals). This is possible because of Graham's (2020) claim that platforms are fundamentally a product of code and organizational form and not a physically unique and irreplicable piece of infrastructure. Resistance involves a range of tactics—from labor organizing to user evasion to anti-displacement campaigns—by which people who have been incorporated into the platform urbanism are attempting to reassert their agency over the conditions of their inclusion.

These approaches are consistent with the larger debates within the platform society literature, wherein it is argued that despite their weakening influence, public institutions still have the power to influence the way platforms work within their jurisdictions, but

only when they are able to generate the necessary political will and technical capacity, and in some cases, cross-city coordination (van Dijck et al., 2018).

8. Discussion: An Uneven and Contested Transformation

In summary, this body of literature identifies several core propositions, while also raising some internal contradictions.

8.1. Points of Core Theoretical Convergence

A consensus exists in the literature that platforms have to be recognized as critical infrastructures not as just some services but as indispensable parts of the modern city life. As such, they organize the flows of people, products, capital, and data in much the same way as the traditional public utilities do, although within the completely different institutional arrangements (Barns, 2018, 2020; Sadowski, 2020).

In a similar way, there is consensus among researchers about the threat posed by urban platforms to democracy. Such a problem is analyzed from different perspectives, namely, conjunctural geography (Graham, 2020), technocracy replacing traditional politics (Kitchin, 2014), and the erosion of public values due to privately held connective infrastructure (van Dijck et al., 2018).

8.2. Conceptual Tensions and Debates

Another more controversial issue in the literature is the extent to which platform urbanism must be separated from smart urbanism in general. According to Sadowski (2020) and Barns (2020), these concepts can be seen as similar yet distinct phenomena, whereby platform urbanism is characterized by consumer-oriented, commercially motivated, and rapidly scaled nature. Some scholars, in turn, who follow Shelton, Zook, and Wiig (2015) in their stress on the unevenness of “actually existing” technological urbanism, find it more appropriate to consider platform urbanism as a particular type of digitally mediated city-making process.

Ultimately, as the governance-deficit perspective implies the existence of an almost inescapable logic of platform expansion and appropriation, some scholars, such as Graham (2020), are explicitly critical of such interpretation and argue that the same features of platforms, which make them successful, namely the ability to replicate through code, can be used against them and contested. Thus, the outcomes of platform urbanism, whether they are displacement and subordination or civic activism and regulatory innovation, do not depend on technology per se but rather on cities’, workers’ and citizens’ reactions to this technology.

9. Implications for Urban Planning and Policy

This literature review points out certain implications that should be taken into account

by planners and policymakers in order to manage the impacts of platform urbanism on their cities.

First, municipal authorities should understand platform data and platform compliance mechanisms as something that has to be negotiated actively rather than expecting voluntary cooperation from corporations; according to the example of short-term rentals, regulatory enforcement (registration systems, occupancy limits, tax reports) is possible only if there is built-in compliance with the platform code, and this is usually possible only with negotiating power or legislative intervention (Wachsmuth & Weisler, 2018).

Second, planners must pay attention to “conjunctural nature of platform operations” discussed by Graham (2020): since platforms are locally embedded yet not locally accountable, city-level regulation may prove to be inadequate, and some coordination between cities, or cities and nation-states, is needed.

Third, when cities are looking to adopt “smart city”-type digital innovations, they must make sure that they can differentiate between the type of infrastructure which they themselves are directly responsible for commissioning and owning, and the kind of ecosystem platforms which they merely connect with and/or subsidize, because the second set poses risks associated with lock-in, data opaqueness, and reduced future control as noted through this literature (Kitchin, 2014; Barns, 2020).

Fourth, in line with the recommendation by Graham (2020), municipalities and civic organizations may want to look at publicly owned and/or cooperatively run digital platforms for housing, mobility, or services to benefit from the coordination advantages offered by platforms but build in accountability directly within such digital infrastructure.

10. Conclusion

This paper has examined the new academic work on platform urbanism, positing that it is an inevitable conceptual development from earlier “smart city” discourse precisely due to the emphasis that it places on the specific architectural, spatial, political-economic and governance issues inherent in commercial digital platforms in urban environments. Following the critiques of technocratic smart urbanism put forward by Kitchin (2014), the need to study the “actually existing” and unevenly distributed nature of urban technologies outlined by Shelton, Zook and Wiig (2015), the conceptualization of platforms as consumer-focused, infrastructural, and antagonistic to regulatory control by Sadowski (2020) and Barns (2018, 2020), Graham’s (2020) conception of the “conjunctural geographies” of platforms and their resultant lack of accountability, van Dijck, Poell, and de Waal’s (2018) analysis of the platform society and its dangers to public value, and the empirical research conducted by Wachsmuth and Weisler (2018) into platform gentrification via short-term rentals, it has been established that platform urbanism is a complex and contradictory process.

In light of the fact that platforms accumulate a great deal of power within centrally organized cores, take advantage of ambiguity in space and jurisdiction to escape accountability, and produce new and uneven patterns of value distribution among urban inhabitants, it is also important to note that these characteristics simultaneously open possibilities for regulation, imitation, and resistance.

It should be noted that the key challenge for urban scholars, policy makers, and planners is not to wait until there will be a techno-utopian or techno-dystopian solution to platform urbanism, but to examine empirically how a particular platform interacts with particular regulation, economic, and social context.

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Criminal Breach of Trust across States in India: Is it worth Criminality?

Swastick Sen Chowdhury¹

Abstract

There are several reasons for crime rates to grow. In situations where there is extreme disparity in the distribution of wealth and income, as well as unequal access to educational possibilities, a segment of the population resorts to illicit activities in order to maintain themselves. Many macroeconomic factors, such as the per capita net state domestic product (which gauges the states' economic health), the unemployment rate, the percentage of the population living below the poverty line (which gauges the extent of poverty), and estimates of monthly per capita expenditure from the Lorenz ratio (which gauges the degree of inequality) could account for the rise and emergence of criminal breach of trust in different Indian states. Through an empirical analysis, this study aims to determine the factors that actually influence the prevalence of criminal breach of trust in different Indian states throughout a range of time periods. In summary, we can say that estimations of monthly per capita expenditure using the Lorenz ratio have a positive correlation with the prevalence of criminal breach of trust in Indian states, while populations below the poverty line have a major negative impact.

Keywords: Criminal Breach of Trust, Poverty, Unemployment, Inequality.

JEL Classification Codes: C01, K42.

1. Introduction

Many social scientists and economists believe that there is a direct correlation between the rate of crime, unemployment, and poverty. It is a common observation that a large number of people are forced to seek employment in the shady and illegal businesses due to a lack of employment opportunities and/or low-income levels. A criminal act that is punishable by law and that can be the subject of a police or magistrate complaint is referred to as an offense. Any dishonest use or disposition of property by one person upon whom another has entrusted his property is considered a criminal breach of trust because

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the act must have been committed in the discharge of such trust and the other party should have suffered breach of trust as a result of this dishonest use or disposition.

There is a large corpus of study on the connection between crime and economic repercussions. Ehrlich (1973) examined the connection between defense (collective law enforcement) and crime and discovered a clear connection between property crimes and wealth inequality.

Mauro (1995) found that corruption, bureaucracy, ineffective judiciary, and political instability impeded growth and investment.

Goel and Nelson (1998) investigated the relationship between public official corruption and government size using both supply-side and demand-side incentives. They have computed the relationship between the frequency of corruption and the total size of the federal government, and they have endeavoured to determine what aspects of government operations could deter the abuse of public office.

Machin and Meghir (2004) looked at the relationship between financial incentives and crime rates, focusing on the fluctuations in salaries at the bottom of the wage distribution. The authors found a correlation between an increase in crime rates and a (relative) fall in the incomes of low-wage workers, based on data collected on police departments in England and Wales between 1975 and 1996. Empirical research revealed a strong relationship between the crime rate and the low-wage labour sector.

Ferwerda (2009) investigated the hypothesis, which is that the enforcement of anti-money laundering policies discourages aspiring criminals from participating in unlawful activities, hence reducing the crime rate. The most important policy strategy for reducing crime was international cooperation; other variables included the institutional framework, the role of laws, and the role of the private sector in law enforcement. Using panel data from Chinese provinces between 1999 and 2008, Liu and Lin (2012) investigated the role of government auditing in decreasing corruption and discovered a negative association between the post-audit rectification effort and the province's level of corruption.

The research works that we have discussed primarily addressed the concerns surrounding the economic repercussions of corruption in general, and there is a great deal of room to investigate related issues in this field. There were none that we could find in the literature on economic crimes. By investigating the factors that contribute to criminal breach of trust in India, this study closes this gap in the literature.

2 Data and Methodology

This study uses information from India's National Crime Records Bureau (NCRB) to look at criminal breach of trust that Indian states have committed. Macroeconomic

variables like the unemployment rate, the proportion of the population living in poverty, and per capita net state domestic product are all included in the Reserve Bank of India's Handbook of Statistics on Indian States. Monthly estimates of per capita expenditure based on the Lorenz ratio are available from the Databook Planning Commission (2014).

Here, we have tried to empirically examine the impact of 'per capita net state domestic product at constant prices (in rupees)', 'population below poverty line (in per cent)' based on Mixed Reference Period consumption, 'rate of unemployment (per 1000)' based on Usual Status and 'Lorenz ratio estimates of monthly per capita expenditure' based on Mixed Reference Period on incidence of crime in case of 'criminal breach of trust'.

Our panel study's era is discontinuous, spanning 2004, 2009, and 2011, due to a lack of data. The 84 observations for these three points in time come from the use of annual data from 28 Indian states: Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal.

2.1 Criminal Breach of Trust

The variables that we have used in this section are described below:

cbt → incidence of criminal breach of trust

nsdp_pc → per capita net state domestic product at constant prices (in rupees)

pov → population below poverty line (in per cent)

unemp → rate of unemployment (per 1000)

lorenz → Lorenz ratio estimates of monthly per capita expenditure

First, descriptive statistics are acquired for every variable. Descriptive statistics provide a concise summary of the properties of the variables under investigation. They are used to offer quantitative descriptions that are manageable. Descriptive statistics are important because without them, it would be difficult to grasp what the data is showing.

Next, panel regression is carried out. Panel data give sufficient observations, resulting in higher degrees of freedom, lower collinearity, higher sample variability, and more accurate model parameter inference. These models do better at representing the intricacy of human behaviour than a single cross-section or time series data.

Panel data models are better at representing the heterogeneity seen in each individual unit. The panel data structure suggests that there is diversity among the cross-sectional units, which can be people, companies, governments, or nations. Ignoring these varied

impacts in empirical modelling leads to results that are skewed and unproductive.

Since cross-sectional models can only identify the behavioural pattern at a certain point in time, they are not appropriate for capturing behavioural dynamics. It is also impossible to compare changes in the behaviour of different economic agents using time series data because it confines information to a single unit and spans a period of time. However, because panel data sets provide time series on each cross-sectional unit in a group, evaluating changes in the behavioural pattern using the data becomes quite easy.

In order to denote both individuals and time observations, panel data often refers to groups with the subscript i and time as the subscript t . For example, a panel data observation y_{it} is observed for all individuals $i = 1, 2, \dots, N$ across all time periods $t = 1, 2, \dots, T$.

Let us consider a simple linear model:

$$y_{it} = \alpha + \beta x_{it} + \epsilon_{it}$$

The representation above is a homogenous model:

- The constant, α , is the same across groups and time.
- The coefficient, β , is constant across groups and time.
- Any differences across groups enter the model only through the error term, ϵ_{it} .

The one-way fixed effect panel data model includes unobservable time-specific or individual-specific effects. These effects capture omitted variables. It assumes that individual-specific effects are correlated with the observed characteristics, x_{it} . Pooled Ordinary Least Squares (OLS) estimates for data generated by this process will be inconsistent.

$$y_{it} = \beta_0 + \beta_1 x_{it} + u_{it}$$

$$u_{it} = \mu_i + \epsilon_{it}$$

$$y_{it} = \beta_0 + \mu_i + \beta_1 x_{it} + \epsilon_{it}$$

The one-way random effect panel data model includes unobservable time-specific or individual-specific effects, which act like individual-specific stochastic error terms. It assumes that these effects are uncorrelated with the observed characteristics, x_{it} . It does not result in biased OLS estimates of coefficients but does lead to inefficient parameters and incorrect standard inference tools.

$$y_{it} = \beta_0 + \beta_1 x_{it} + u_{it}$$

$$u_{it} = \mu_i + \epsilon_{it}$$

$$y_{it} = \beta_0 + \mu_i + \beta_1 x_{it} + \epsilon_{it}$$

$$+ \beta x_{it} + \epsilon_{it}$$

The distinguishing feature of the random effect model is that μ_i does not have a true value but rather follows a random distribution with parameters that we want to estimate. The random effect term, μ_i is uncorrelated with x_{it} and pooled OLS estimates of the model parameters will not be biased. It alters the covariance structure of the error component, suggesting that pooled OLS estimations of the model parameters will be inefficient and that standard inference instruments, like the t-statistic, will not produce reliable results. The random effect model should be estimated using Feasible Generalized Least Squares (FGLS). FGLS can be used to add the error structure — one that accounts for the error terms specific to each individual — to the model.

Finally, when the panel data models with fixed effect and random effect are run, we use the Hausman test to determine which of the two models performs better. The Hausman test is sometimes referred to as a model misspecification test. In panel data analysis, the Hausman test can help us choose between the fixed effect model and the random effect model. Based on the null hypothesis, the random effect model is the preferred model. The alternative hypothesis is the notion that the model is fixed effect. In essence, the tests look for a relationship between the model's regressors and unique errors. The idea that there is no association between the two is the null hypothesis.

3 Results and Discussion

Table 1: Descriptive Statistics

Variable	Mean	Standard Deviation
cbt	555.5952	745.2642
nsdp_pc	46028.48	36058.93
pov	25.71095	12.80943
unemp	80.52381	75.53767
lorenz	0.3111155	0.0584561

Source: The Author

The results of the Descriptive Statistics of the variables under investigation are summarized in Table 1. During the survey period, the average incidence of criminal breach of trust (cbt) in 28 Indian states was 555.5952. One indicator of variability is the standard deviation. It measures how widely apart the numbers in a data collection are from one another. In this case, the standard deviation is 745.2642.

During the sampling period, the average per capita net state domestic product at constant prices (nsdp_pc) for all 28 Indian states was Rs. 46028.48, with a standard deviation of Rs. 36058.93. The states' economic health is indicated by this variable.

During the sampling period, the average percentage of people living below the poverty line (pov) in 28 Indian states was 25.70995. Similarly, during the sampling period, the average percentage of people living above the poverty line across 28 Indian states was 74.28905 per cent. In this case, the standard deviation is 12.80943 per cent. This variable shows how impoverished the citizens of the states are. Over the sampling period, the average unemployment rate (unemp) in the states under consideration was 80.52381 per 1000. In this case, the standard deviation is 75.53767 per 1000. This variable shows the rate of unemployment among the labour force in various states. During the sampling period, the average Lorenz ratio estimates of monthly per capita expenditure (lorenz) in 28 Indian states were 0.311155. In this case, the standard deviation is 0.0584561. The degree of inequality between the Indian states is shown by this variable.

We now attempt to estimate the model mentioned earlier in the text after learning more about the characteristics of the variables of interest. Its main focus is criminal breach of trust, which is illustrated as follows:

$$cbt_{it} = \beta_0 + \mu_i + \beta_1 nsdp_pc_{it} + \beta_2 pov_{it} + \beta_3 unemp_{it} + \beta_4 lorenz_{it} + \epsilon_{it}$$

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$: parameters to be estimated

ϵ_{it} : random white-noise error term, which is stochastic in nature

μ_i : unobserved heterogeneous factor cbt_{it} : incidence of criminal breach of trust

$nsdp_pc_{it}$: per capita net state domestic product at constant prices (in rupees)

pov_{it} : population below poverty line (in per cent)

$unemp_{it}$: rate of unemployment (per 1000)

$lorenz_{it}$: Lorenz ratio estimates of monthly per capita expenditure

We can gain an understanding of the impact of these factors on the dependent variable (cbt_{it}) by estimating the model mentioned above. Stated differently, the influence of changes in the independent factors on the dependent variable can be investigated. First, we ran a fixed effect panel model for this. The following is the regression result derived from the fixed effect model:

Table 2: Regression Result of Fixed Effect Model for ‘cbt’

cbt	coefficient	t-statistic	p-value
nsdp_pc	-0.0007023	-0.65	0.521
pov	-7.722461	-1.71	0.093
unemp	0.3076728	0.44	0.664
lorenz	1914.703	1.83	0.073
constant	166.0034	0.48	0.632

Source: The Author

Here, the dependent variable is ‘cbt’ and the independent variables are ‘nsdp_pc’, ‘pov’, ‘unemp’ and ‘lorenz’. We want to estimate the impact of ‘per capita net state domestic product at constant prices’, ‘population below poverty line’, ‘rate of unemployment’ and ‘Lorenz ratio estimates of monthly per capita expenditure’ on ‘incidence of criminal breach of trust’ in Indian states. Our null hypotheses are:

$$\beta_0=0, \beta_1=0, \beta_2=0, \beta_3=0, \beta_4=0;$$

against the alternatives:

$$\beta_0 \neq 0, \beta_1 \neq 0, \beta_2 \neq 0, \beta_3 \neq 0, \beta_4 \neq 0$$

It is evident from the results (Table 2) that the probability value for “nsdp_pc” is higher than 0.01 at the 1 per cent level of significance, higher than 0.05 at the 5 per cent level of significance, and even higher than 0.1 at the 10 per cent level of significance. This suggests that the variable is statistically insignificant at all significance levels (1 per cent, 5 per cent, and 10 per cent), leading to the rejection of the alternative hypothesis and acceptance of the null hypothesis. This indicates that the incidence of criminal breach of trust in Indian states is not significantly correlated with per capita net state domestic product. In other words, the incidence of criminal breach of trust is unaffected by changes in the states’ economic conditions.

The probability value for “pov” is also more than 0.01 (at the 1 per cent level of significance), greater than 0.05 (at the 5 per cent level of significance), and less than 0.1 (at the 10 per cent level of significance). The variable is statistically significant at the 10 per cent level of significance, but statistically insignificant at the 1 per cent and 5 per cent levels. At the 10 per cent level, the alternative hypothesis is thus accepted and the null hypothesis is rejected. After learning about the important connection between “pov” and “cbt,” we turn our attention to the value of the associated coefficient. Here, we can observe that the two have a negative relationship. This suggests that the incidence of criminal breach of trust in Indian states decreases (increases) by 7.722461 units for every unit of the population living below the poverty line. This indicates that the haves of the states, not the have-nots, are primarily responsible for the occurrence of criminal breach of trust. To put it another way, this area of economic crime is a form of white-collar crime that targets the wealthy.

Furthermore, it is evident that the probability value for “unemp” is higher than 0.01 at the 1 per cent level of significance, higher than 0.05 at the 5 per cent level of significance, and even higher than 0.1 at the 10 per cent level of significance. This suggests that the variable is statistically insignificant at all significance levels (1 per cent, 5 per cent, and 10 per cent), leading to the rejection of the alternative hypothesis and acceptance of the null hypothesis. This indicates that the incidence of criminal breach of trust in Indian

states is not significantly correlated with the unemployment rate. In other words, the incidence of criminal breach of trust is unaffected by changes in the unemployment rates of Indian states.

Once more, the probability value for “lorenz” is less than 0.1 (for the 10 per cent level of significance), larger than 0.05 (for the 5 per cent level of significance), and greater than 0.01 (for the 1 per cent level of significance). The variable is statistically significant at the 10 per cent level of significance, but statistically insignificant at the 1 per cent and 5 per cent levels. At the 10 per cent level, the alternative hypothesis is thus accepted and the null hypothesis is rejected. After learning about the important connection between “lorenz” and “cbt,” we turn our attention to the value of the associated coefficient. Here, we can observe that the two have a positive relationship. This suggests that the incidence of criminal breach of trust increases (decreases) by 1914.703 units in Indian states for every unit of Lorenz ratio estimations of monthly per capita expenditure. To put it another way, this means that the frequency of criminal breaches of trust increases or decreases in tandem with the level of disparity among Indian states.

Finally, because the probability value is discovered to be greater than 0.1, the constant term is statistically unimportant at all significance levels (1 per cent, 5 per cent, and 10 per cent).

The random effect panel model was then conducted. The following is the regression result derived from the random effect model:

Table 3: Regression Result of Random Effect Model for ‘cbt’

cbt	coefficient	z-statistic	p-value
nsdp_pc	-0.0005551	-0.51	0.609
pov	-4.230248	-0.98	0.328
unemp	-0.3047495	-0.46	0.645
lorenz	2797.205	2.89	0.004
constant	-155.807	-0.45	0.650

Source: The Author

The probability value for “nsdp_pc” is larger than 0.01 (for the 1 per cent level of significance), greater than 0.05 (for the 5 per cent level of significance), and even greater than 0.1 (for the 10 per cent level of significance), according to the data obtained (Table 3). This suggests that the variable is statistically insignificant at all significance levels (1 per cent, 5 per cent, and 10 per cent), leading to the rejection of the alternative hypothesis and acceptance of the null hypothesis. This indicates that the incidence of criminal breach

of trust in Indian states is not significantly correlated with per capita net state domestic product.

Likewise, it is evident that the probability value for “pov” is higher than 0.01 at the 1 per cent level of significance, higher than 0.05 at the 5 per cent level of significance, and even higher than 0.1 at the 10 per cent level of significance. This suggests that the variable is statistically insignificant at all significance levels (1 per cent, 5 per cent, and 10 per cent), leading to the rejection of the alternative hypothesis and acceptance of the null hypothesis. This indicates that the number of people living below the poverty line and the frequency of criminal breaches of trust in Indian states do not significantly correlate.

Furthermore, it is evident that the probability value for “unemp” is higher than 0.01 at the 1 per cent level of significance, higher than 0.05 at the 5 per cent level of significance, and even higher than 0.1 at the 10 per cent level of significance. This suggests that the variable is statistically insignificant at all significance levels (1 per cent, 5 per cent, and 10 per cent), leading to the rejection of the alternative hypothesis and acceptance of the null hypothesis. This indicates that the incidence of criminal breach of trust in Indian states is not significantly correlated with the unemployment rate.

Once more, at the 10 per cent level of significance, the probability value for “lorenz” is less than 0.1; at the 5 per cent level of significance, it is less than 0.05; and at the 1 per cent level of significance, it is under 0.01. This indicates that at all significance levels (1 per cent, 5 per cent, and 10 per cent), the variable is statistically significant. Therefore, the alternative hypothesis is accepted at all levels and the null hypothesis is rejected. After learning about the important connection between “lorenz” and “cbt,” we turn our attention to the value of the associated coefficient. Here, we can observe that the two have a positive relationship. This suggests that the incidence of criminal breach of trust increases (decreases) by 2797.205 units in Indian states for every unit of Lorenz ratio estimations of monthly per capita expenditure. Finally, because the probability value is discovered to be greater than 0.1, the constant term is statistically unimportant at all significance levels (1 per cent, 5 per cent, and 10 per cent).

Following the execution of the fixed effect and random effect models, we used the Hausman test to determine which model was best. The favoured model is random effect, according to the null hypothesis. The model is fixed effect, according to the alternative hypothesis. According to the results, the probability value is equal to 0.0355, which is less than 0.05 at the 5 per cent level of significance, less than 0.1 at the 10 per cent level of significance, and larger than 0.01 at the 1 per cent level of significance. This indicates that it is found to be statistically significant at the 5 per cent and 10 per cent levels of significance but statistically insignificant at the 1 per cent level. At the 5 per cent and 10

per cent thresholds, the alternative hypothesis is thus accepted and the null hypothesis is rejected. Therefore, we can say that the fixed effect panel model is the appropriate model that might be considered appropriate in this situation. Therefore, the above-mentioned results (Table 2) have been taken into consideration for empirical analysis.

4. Conclusion

The incidence of criminal breach of trust in Indian states is not significantly correlated with per capita net state domestic product, according to empirical observations. The incidence of criminal breach of trust therefore decreases (increases) by 7.722461 units for every unit of the population below the poverty line. Furthermore, the incidence of criminal breach of trust and the unemployment rate do not significantly correlate. Lastly, in the Indian states under consideration, the incidence of criminal breach of trust increases (decreases) by 1914.703 units for every unit of Lorenz ratio estimations of monthly per capita expenditure.

In summary, we can say that the number of people living below the poverty line has a considerable negative impact on the incidence of criminal breach of trust in Indian states, while estimates of monthly per capita expenditure based on the Lorenz ratio have a favourable impact.

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Problems and Prospects of Gig Economy in India

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Abstract:

Gig economy can be defined as a work engagement where on one side, there is a service seeker i.e. a consumer with a demand for a specific task, and on the other side, there is a service provider i.e. a gig worker who can perform that specific task. The gig economy is changing how people work and earn a living. By connecting workers to short-term tasks and projects through digital platforms and apps it can provide opportunities to earn Income, gain work experience and network. However, gig work can also be unpredictable and characterized by unstable income and a lack of, or limited, labour and social protections. While it can serve as a pathway to jobs, entrepreneurship and freelancing, achieving self-reliance in the gig economy depends on reliable internet connectivity, access to up skilling and careful financial management, especially for women and youth in rural areas, people with disabilities, migrants and refugees. An inclination towards flexible work is being driven by factors such as freedom, technology upgradation, skill focus, additional income and human capital. Gig economy allows task ownership, convenience and flexibility

Keywords: Gig economy, labour market, platform economy, Niti Ayog, job security

Concept

Gig economy can be defined as a work engagement where on one side, there is a service seeker i.e. a consumer with a demand for a specific task, and on the other side, there is a service provider i.e. a gig worker who can perform that specific task. In this economy, tech-enabled Platforms connect the consumer to the gig worker to hire services on a short-term basis, Gig workers include self-employed, freelancers, independent contributors and part-time workers. This project-based gig economy allows the service adopter to cut overhead costs, and the gig worker to get paid for a specific task performed instead of receiving a fixed salary. Thus, a shift from a full time 9-to-5 job to an on-demand, freelance and task-based economy can be termed as gig economy.

The gig economy is changing how people work and earn a living. By connecting workers to short-term tasks and projects through digital platforms and apps it can provide op-

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portunities to earn income, gain work experience and network. Digital apps predictable and characterized by unstable income and a lack of, or limited, labour and social protections. While it can serve as a pathway to jobs, entrepreneurship and freelancing, achieving self-reliance in the gig economy depends on reliable internet connectivity, access to up skilling and careful financial management, especially for women and youth in rural areas, people with disabilities, migrants and refugees.

Artificial Intelligence (AI) is rapidly reshaping the job market - creating new work opportunities while replacing some with automation, requiring workers to continuously upskill and adapt. This resource aims to raise awareness of and provide insight into the realities of gig and platform work. It covers:

- types of gig work and what it looks like;
- trade-offs between flexibility and job security;
- skills demand and income levels;
- how online platforms manage payments and contracts;
- gig work as a potential stepping stone to the labour market,
- impact of AI on gig work;
- common challenges and online safety.

What is the difference between gig work and traditional jobs?

In the gig economy, workers are typically self-employed or independent contractors, rather than being employed by a company.

Unlike traditional jobs, they must find their own clients and projects through online platforms and apps.

Rather than receiving a regular paycheck, gig workers are paid after completing a series of tasks or an entire project. For example:

- food delivery couriers working for Door Dash, Glovo, or Totters earn money per delivery, meaning their income varies daily, depending on how many deliveries they complete;
- a virtual assistant on Upwork or Fiverr is hired for a specific set of tasks, rather than entering into a long-term employment commitment, and is paid when these tasks are completed;
- online tutors earn per lesson, or according to a set number of teaching hours, rather than receiving a fixed salary from a school.

Types of Gig Workers

- **Platform-Based Workers:** Whose work is based on online software apps or digital platforms.
- **Non-platform Gig Workers:** They are generally casual wage workers and own account workers in the conventional sectors, working part-time or full-time.

The Scale of Gig Work in India

- The gig workforce is expected to expand to 2.35 crore (23.5 million) workers In 2020-21. 77 lakh (7.7 million) workers were engaged in the gig economy. by 2029-30.
- The concentration of workers in medium-skilled occupations is gradually declining, while that of low-skilled and high-skilled occupations is increasing.

Growth Drivers of the Gig Economy

- **Technological Advancements:** Rapid rise of online marketplaces and digital platforms made it easier for individuals to showcase their skills and connect with potential customers.
- **Expansion of Gig Platforms:** E.g., Uber, Ola, and Swiggy opportunities for flexible, app-based work.
- **Job Market Fluctuations:** especially during events like the COVID-19 pandemic, there is a demand for flexible, contactless work arrangements.
- **Emergence of Startup Culture:** It has driven the preference hiring contractual or project-based professionals to reduce fixed costs and enhance efficiency.
- **Government Initiatives:** E.g., Digital India and Startup India have supported digital entrepreneurship and platform-based employment.

Significance of the Gig Economy

Be organizations organisations

Reduced Cost: Companies reduce operational costs by outsourcing short-term tasks, avoiding long-term commitments like pensions, health insurance, and other employee benefits

Greater Agility by organizations to quickly increase or decrease team size and composition in response to market unpredictabilities.

Benefits to the workers

- **Flexibility:** Gig workers can choose when, where and how much to work allowing for better work-life balance.
- **Non-discriminatory access:** due to the lack of entry barriers Diverse income streams are provided by providing flexibility to work on multiple projects simultaneously.

Socio-economic benefits

- **Expanding Labour Participation** for women & students who may only be available for part-time work.
- **Development Of Rural Areas** by allowing artisans to sell their products and farmers to directly sell their products to a broader market, eliminating intermediaries and increasing their earnings

Challenges of Gig Workers

- **Income Instability and Poor Job Security:** Gig workers are not covered under major labour laws such as the Minimum Wages Act of 1948, which guarantees minimum wage protection to formal employees.
- **Lack of Social Security Net:** Gig workers are excluded from benefits such as health insurance, pensions, and paid leave, leading to increased informalization of labour. The individualized and scattered nature of unionisation makes it difficult, reducing workers' ability to negotiate fair wages and conditions.
- **Regulatory Challenges:** The absence of a nationwide protection regulation for gig economy workers leaves them vulnerable to exploitation and insecurity.
- **Regional Disparity:** Limited internet connectivity in certain areas restricts Access to gig opportunities, deepening the urban-rural digital divide.
- **Algorithmic Control:** Workers are subject to opaque platform algorithms that can penalise or deactivate them without transparency.
- **Government Initiatives for Gig Economy**
 - **Code on Social Security (2020):** It clearly defines a gig worker and also envisages various benefits for gig workers through the formulation of schemes like life and disability cover, accident insurance
 - **E-SHRAM Portal (Launched in 2021):** It is a national portal for unorganised workers, including gig workers. It offers Access to government welfare schemes and social security benefits.

- **National Social Security Board:** Constituted to oversee and coordinate the implementation of social security for organised or unorganised sector workers including gig workers. It recommends welfare schemes for gig workers
- State-Level Initiatives:
- **Rajasthan Platform-Based Gig Workers (Registration and Welfare) 2023:** Requires employers and aggregators to deposit Act, a monthly welfare cess for the benefit of gig workers in the state .
- Karnataka Gig Workers Bill, 2024; Proposes to establish the Gig Workers' Welfare Board.
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Way Forward

- **Regulatory & Legal Measures:** Mandating basic labour protection like minimum wages, maximum working hours, paid leaves, etc.
- **Fiscal incentives**, such as tax holidays or grants are provided to businesses that employ socio-economically disadvantaged groups.
- **Providing Social Security:** Mandatory coverage under the Pradhan Mantri Jan Arogya Yojana and Pradhan Mantri Jeevan Jyoti Bima Yojana may be considered.
- **Empowering gig workers:** by introducing peer-to-peer mentoring and Establishing hybrid sharing platforms (offline and online) to enable workers to connect.
- Guarantee protection from algorithmic abuse, including arbitrary deactivation & wage deductions.
- **Skill Training & Career Pathways:** Invest in training programs that help gig workers transition into higher-skilled or permanent employment opportunities. With India's gig workforce projected to reach 23.5 million by 2030, NITI Aayog stresses the urgent need for inclusive social protection and regulatory reforms. A balanced approach combining legal recognition, welfare coverage, and platform accountability is essential to ensure dignity, security, and equity for gig workers.

Trends in Gig economy

The digital gig economy generated a gross volume of approximately \$204 bn from worldwide customers in 2018. Transportation-based services contributed to over 50% of this value. The size of the gig economy is projected to grow by a 17% CAGR and generate a gross volume of -\$455 bn by 2023. India has emerged as the 5th largest country for flexi-staffing after US. China, Brazil and Japan. Haryana, Madhya Pradesh, Andhra

Pradesh, Gujarat and Telangana have most opportunities in terms of growth for the flexi-workers. Digital platforms have emerged as enablers for employment creation with the power to easily discover job seekers and job providers in the absence of middlemen. The McKinsey Global Institute mentions that digital platforms for labour could increase US GDP by 2.3% as well as its full-time equivalent employment by 2.7% by 2025. Due to the rapid developments in technology, the transaction cost for outsourcing non-core activities is reducing and facilitating an increase in the number of tasks which can be performed by each worker. Thus, firms are shrinking in size and we are witnessing a rise in start-ups which are outsourcing many activities to expert service providers on a contractual basis. While the gig economy is popular amongst the blue-collar workers in India Uber/Ola drivers, there is now huge potential for the white-collar workers as well, due to increasing demand in industries project-specific consultants, logo/content design, web design etc. (For example-Tapchief in India). (The gig economy is expanding from less skilled services) (For example domestic chores at BookMyChotu in India, TaskRabbit in US) to more skilled jobs (For example-Guru in India, Upwork in US).

Why do people decide to get into gig work?

People enter gig work for various reasons, often influenced by their personal circumstances, economic conditions, industry shifts and the lack of formal job opportunities

:Common reasons for entering gig work include

Flexibility and lifestyle fit:

- some people choose gig work because they can set their own hours and work from any location. rather than having a fixed schedule or workplace;
- digital nomads, students, parents and caregivers often turn to gig work to earn income while studying, caring for children, or meeting other commitments:

To earn extra money or supplement existing pay:

- many people do gig work alongside a full- or part-time job to cover extra expenses, or save for future projects, like a major purchase:
- some use gig work to fill income gaps, especially if their main job does not pay enough to meet their needs;

As a temporary solution for individuals who are between jobs, changing career, or adapting to changes in their personal lives - for example:

- **job-seekers** and professionals between jobs take gig work to keep earning money and stay active while applying for new positions:

- **recent graduates** use gig work to gain experience, build a portfolio and develop key skills that will help them secure stable employment;
- **workers changing career**, moving into a new industry or role, or starting their own business rely on gig work for financial support while upskilling or exploring different career paths or business opportunities;
- **individuals returning to work** after maternity leave, or an accident or illness, use gig work as a stepping stone to re-enter the job market;

As a main source of income for those facing difficulties in finding work in the traditional jobs market - for example:

- **people with few/no qualifications** - gig jobs can be a practical option for those struggling to find a traditional job owing to a limited employment history or unrecognized certifications;
- **migrants and refugees** - they often face additional challenges, such as language barriers and difficulties in obtaining work permits. Many turn to gig work to earn a living, develop their skills and adapt to a new job market,
- **people with disabilities** - the gig economy serves as an entry point into the labour market for people with disabilities who require flexible or remote work options.

Digital platforms in the gig economy

Apps and digital labour platforms serve as the main connection between workers and clients in the gig economy.

Some of the best-known platforms, such as Upwork, Fiverr, Uber, Didi, Lyft, SafeBoda, GrabFood, Rappi and Amazon Web Services, use digital applications (apps) to facilitate services.

These platforms allow clients to order cab rides, food delivery, or beauty services, while businesses can use them to hire freelancers for tasks like podcast production, document translation, or web development.

:Labour platforms generally fall into two broad categories

- **Online (web-based) platforms** - these facilitate work that can be performed remotely, such as freelance work, content creation, programming, or digital marketing;
- **Location-based platforms** - these connect workers with in-person jobs, such as providing ride-sharing services, food delivery, home services and personal care.

Additionally, hybrid platforms offer a mix of online and location-based services, giving people different ways to earn money through a single app. These platforms help peo-

ple find gigs or platform work in areas like ride-hailing, delivery, home services and online freelancing, depending on the demand for these in their region.

For example:

- Rappi (Colombia, Mexico, Brazil and Argentina) - considered a “super app”, offering food and grocery delivery, personal shopping, banking services, and home tasks like cleaning and running errands;
- SafeBoda (Uganda, Kenya and Nigeria) - started as a motorcycle ride service, now includes food delivery, parcel delivery and digital payment services;
- Careem (Middle East, South Asia and North Africa) - started as a ride-hailing app and now includes food and grocery delivery, bike rentals, financial services, and courier and package delivery.

What do gig and labour platforms have in common?

Gig platforms are online spaces in which people who need work done or services performed can connect with workers available and able to do so.

While each platform is different, most share some common features, in that they:

- * connect workers with clients-platforms connect people who need a service (such as a cab ride delivery, or freelance work) with workers offering that service,.
- * process payments-clients pay through the platform, which deducts a fee before paying the worker:
- * set rules - platforms decide who can join, how jobs are assigned, and what workers must do to stay active;
- * operate in an evolving legal landscape- labour and social protection regulations covering gig and platform workers are still developing and vary by country.

Each type of platform presents its own opportunities and challenges, influencing how workers interact with clients, manage earnings and navigate job security.

Online gig work (cloud work or web-based)

Some gig work is performed entirely online, allowing workers to operate from anywhere with a reliable internet connection.

This kind of work attracts people from diverse backgrounds and skill levels and comprises everything from basic tasks to highly specialized services.

Examples of online gig work include:

- entry-level tasks-data entry, online surveys and transcription;
- creative gigs - freelance writing, video editing and graphic illustration;
- specialized work-algorithm programming, cyber-security consulting and digital marketing.

In-person gig work (location-based work)

Unlike online gigs, some work must be performed in person, even if it is arranged through an app or platform. These jobs require workers to travel, on demand, to a specific location to provide goods or services. Besides common gigs like ride-hailing and food delivery, some location-based platforms offer specialized services that require specific skills or expertise across different professions and industries - for example:

- beauty and wellness services-hairstyling, massage therapy and personal training;
- event and entertainment services - photography, DJing and catering;
- education and tutoring services - music and art lessons, language tutoring and academic support;
- pet and animal care - pet grooming, dog walking and vet house calls,
- home services - furniture assembly, repairs and house/office moving services.

How is artificial intelligence influencing gig work?

Artificial intelligence (AI) is changing how gig work is done.

Some jobs are now automated, either fully or partially, which is reducing demand for certain roles.

These include:

- data tagging and image labelling;
- customer service, where it is handled by chatbots and AI-driven assistants.

More complex jobs require workers to learn how to use AI tools to stay competitive:

- graphic design has integrated AI tools like Adobe Sensei to speed up work;
- software development and coding uses AI-driven code assistance like GitHub Copilot;
- translation and writing are supported by Chat GPT or specialized software to assist with content creation and translation.

AI algorithms are used by gig apps and platforms to match workers to tasks, set work schedules, assign jobs and determine pay, thus limiting worker control.

While AI makes work faster and creates new opportunities to earn income, it also raises concerns about job security, fair wages and worker autonomy.

Gig workers would need to adapt and learn how to use AI tools, as many jobs now combine human skills with AI capabilities.

The gig economy as a stepping stone to jobs and income

The gig economy has the potential to provide economic opportunities for traditionally underserved groups. With the right safeguards and support in place, the gig economy has the potential to enable economic inclusion and self-reliance, helping individuals:

- gain new skills and experience in different industries and roles;
- build networks and connect with new clients;
- pursue entrepreneurship or self-employment; and
- access digital commerce and freelancing opportunities.

This is especially relevant for low-skilled workers, women and young people in rural and remote areas people with disabilities and refugees. Job opportunities in the formal economy can be limited for these groups, owing to among other things-lack of formal education or recognition of qualifications, mobility challenges and work-permit restrictions.

The challenges associated with gig work

Gig and platform work is not always simple and straightforward. The most common challenges to be aware of are outlined below.

Fixed costs

Gig and platform workers must cover their fixed costs to maintain their ability to work. These costs vary depending on the job:

Payment and banking fees:

Taxation and official registration:

B. Fixed costs for location-based gig work

Work equipment, depending on the type of work:

Transport and upkeep costs:

Workspace

Taxation and official registrationTo keep in mind:**Unpredictability of work volume and income****Online risk Online**

Gig and platform workers face digital threats that can affect their security, identity and well-being. To stay safe, workers need to be familiar with strong cyber-security practices, be able to verify job opportunities and stay informed about online risks.

Limited or no access to safety nets

Most gig and platform workers do not receive social protection benefits, such as health insurance, paid leave, or workers' compensation, unless they arrange and pay for it themselves. financial

This means that if they get sick, injured, or face an emergency, they may lose income, with no support.

Without the job security and protections that formal employment provides, gig workers need to plan for financial instability in case of illness, injury, pregnancy, retirement, work-related accidents and invalidity, or unexpected job loss.

Stress and long working hours

Gig work often involves irregular hours, financial pressure and high demands, making it stressful. Workers need to constantly balance platform fees, client expectations and unpredictable workloads, while also maintaining their income.

The future of Gig Economy

Gig workers are adopted and rewarded based on their skill to deliver which motivates them to deliver with creative thinking and be self-reliant. The future of gig work holds great potential because it tends to be more meaningful and rewarding in more than just the monetary aspect. Additionally, the biggest advantage of gig work lies in its integration with technology because, the future of India's start-ups and its gig economy lies in digital innovations. The government too has been endeavoring to democratize digital platforms across sectors.

A major part of the economy, gig aspired people are now exploring various needs of the economy and turning to professions in beauty, fitness, plumbing, electrical repairs, etc. This business model allows for the service providers to communicate with the end-users directly through the app according to their terms and conditions. This opens up a world of opportunities for the freelance workforce.

To conclude, the gig economy has certainly led to the transformation of India's work culture, with enhanced flexibility and autonomy, overriding the traditional relationship shared between an employer and employee. In a developing country like India, the potential advantages of the gig economy are going to be numerous. Particularly for women, it portends to be an important step towards professional and financial freedom.

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Do Emotional Biases Influence Individual Investment Decision-Making? Evidence from Kolkata

Rajendra Nath Datta¹

Abstract

One of the main assumptions of traditional finance theory is the Efficient Market Hypothesis (EMH), which assumes that investors make financial decisions rationally and that their investment decisions are not influenced by biases. However, this assumption has been challenged by many scholars and practitioners in the field of behavioural finance. The present paper seeks to examine the reliability and validity of the measurement model representing emotional biases that influence individuals' investment decisions. Furthermore, it aims to study the underlying co-variance structure of these emotional biases that shape investment decisions. The study is based on primary data collected through the distribution of structure questionnaire among 125 respondents in Kolkata. Despite the limited sample size, the study provides meaningful insights into the presence of emotional biases among investors, indicating that investment decisions are influenced by various biases and, therefore, are not always rational. The findings further revealed that emotional biases are interrelated, indicating strong association among the underlying constructs.

Keywords: Emotional biases, Investment decision-making, Investors, Confirmatory Factor Analysis (CFA)

Introduction

Financial decisions are significant because they involve one's hard-earned money and savings. Investors make every attempt to make fruitful financial decisions based on their judgement and intuition; however, they sometimes make spontaneous or emotional choices, which may lead to unfavorable outcomes. At times, investors may not even acknowledge that their financial decisions were irrational.

Behavioural biases may be defined as the beliefs, judgements, or preferences that significantly affect the financial decisions of the investors. One of the key reasons for such irrationality is the presence of these behavioural biases. According to behavioural

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finance, investors' decisions are normal rather than rational. As noted by Noble laureate Professor Daniel Kahneman, human behavior deviates systematically from that predicted by standard economic theory under conditions of uncertainty. The concept of behavioural finance suggests that individuals' emotions, moods, attitudes, and experiences influence their risk-taking capacity and often prevent them from making rational decisions. Moreover, these factors affect various states of the decision-making processes (Khara & Kapoor, 2023).

The present study focuses on key emotional biases which are rooted in impulsive tendencies and drive investors to make decisions based on emotions rather than deliberate judgement. The purpose of studying behavioural finance is to understand the actual behavior of the investors while making investment decisions. Investors are considered key participants in the capital market, as financial investments contribute to the creation of a nation's capital stock. (Sarkar & Sahu, 2018). Therefore, understanding investor sentiment at the time of decision -making becomes an engrossing area of study.

Paule-Vianez et al. (2020) and Jain et al. (2022) through their bibliometric and content analysis, concluded that research in behavioural finance has witnessed impressive growth over the last 2 decades. Although the concept of behavioural finance is not new, awareness regarding the impact of behavioural biases has significantly increased over the last decade (Khara & Kapoor, 2023). As per the SEBI Investor report (2015), investor sentiments are deeply linked with both internal and external factors.

In this backdrop, the present paper attempts to examine the underlying co-variance structure of the emotional biases that influence the individuals' investment decisions.

Literature Review

Kumar & Chaurasia (2024) attempted to investigate the relationship between emotional biases and investment decisions by employing a meta-analysis approach. The authors, based on 31 empirical studies, observed a significant positive correlation between emotional biases (loss aversion bias, overconfidence bias, and regret aversion bias) and investment decisions. They suggested that effectively addressing emotional can help investors make more informed and rational decisions. Some of the strategies proposed to mitigate these biases include portfolio diversification, setting clear financial goals, and seeking advice from financial advisors to reduce the influence of biases on investment decisions.

Badola et al., (2023) conducted a survey of 631 individual investors in India and found that a statistically significant relationship between behavioural biases and investment re-

lated decisions. The authors suggested that understanding the vulnerability of the investors is crucial for informed and rational investment choices.

Badola & Joshi (2022) stated that emotion can be understood as an impulsive response rather than a deliberate thought process. These biases are rooted in human intuition, making them too rigid to be separated from the thought process. Hence, even if investor wish to regulate or resist these biases, it is largely difficult to do so as they originate from instinctive reactions.

Upadhyay & Shah (2019) have observed in their study conducted in Ahmedabad that more than 50% of the respondents rely on their intuition and gut feelings when making investment decisions. Furthermore, the author concluded that females are more prone to emotional biases than male. Additionally, they found that investors are significantly affected by emotional biases; therefore, investment decisions are often not entirely rational.

Kumar (2016) concluded that individual investors in the Indian stock market are predominantly value-expressive than utilitarian in nature. The investment decisions of these investors are affected by various behavioural biases as well as certain demographic factors. He further suggested that investors require a balance combination of utilitarian and value expressive benefits in their investment decisions.

Objectives of the Study

The objectives of the study are as follows:

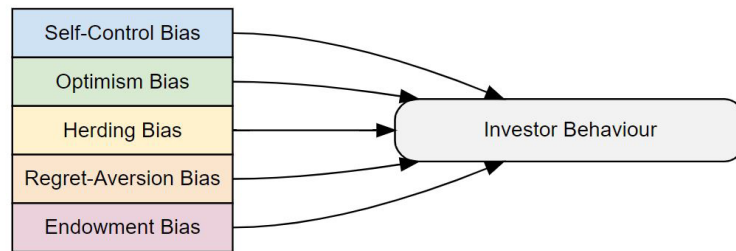
1. To examine the reliability and validity of the measurement model representing the emotional biases influencing individuals' investment decisions.
2. To investigate the underlying co-variance structure of the emotional biases influencing individuals' investment decisions.

Research Methodology

Nature of the Study: The present study is exploratory and empirical in nature.

Sources of Data: The primary data was collected through distribution of structure questionnaires among the sample investors in Kolkata. The statements for the questionnaire are designed by considering the prominent biases, experts' opinions and by undergoing extensive literature review.

Research Model: Our model have taken into consideration five emotional biases (Self-Control Bias, Optimism Bias, Herding Bias, Regret Aversion Bias, and Endowment Bias). The research model is depicted in Figure 1.



Source(s): Figure created by author

Figure 1: Conceptual model for analysis

Hypothesis of the study

The following hypothesis is formulated to achieve the above-mentioned objective of the present study:

H_{01} : The selected emotional biases do not exhibit a significant covariance structure.

Survey Questionnaire:

The present study is based on primary data collected through a field survey. The structured questionnaire is divided into two sections: the first gathers the demographic profile of the respondents, while the second focuses on emotional biases to capture their opinions regarding investment decision-making. The emotional bias section consists of Likert-scale items to measure the five emotional biases. The questionnaire consists of 25 items measured on a 5-point Likert scale covering 5 emotional biases, where 1 represents “strongly disagree” and 5 for “strongly agree”.

Five emotional biases were considered to assess the influence of emotional biases on the investment decision making process of the respondents. The biases were selected based on the existing literature and expert’s opinions.

The list of the biases considered in the questionnaire is summarised in Exhibit 1.

Exhibit 1: Emotional Biases Considered

1. **Self-Control Bias:** This bias refers to the tendency of the investors to act impulsively, thereby focusing on short-term goals over long term stability. Such a bias may induce investors to take greater risks for short term gains rather than long-term benefits (Banerjee et al., 2017). It leads investors to spend more today at the

cost of saving for tomorrow. This bias was measured using six Likert-scale statements (SC1 – SC6).

2. **Optimism Bias:** This bias induces investors to overestimate the expected returns from risky investments. It also influences the overall sentiment of the financial market (Banerjee et al., 2017). Because of their optimistic nature, investors tend to believe that they are above average in their investment abilities. (Pompian, 2011). This construct was assessed through five statements (OB1 – OB5).
3. **Herding Bias:** Roy (2011) and Sarkar (2011) describe herding bias as the tendency of individuals to mimic the behaviour or actions of a larger group. In this case, investors depend on what others are doing rather than applying their own judgement or analysis. This bias was measured using five items (HB1 – HB5).
4. **Regret Aversion Bias:** This bias prevents investor from taking necessary action because they fear that the outcome of a decision may be less than optimal. (Pompian, 2011). It was measured through six statements (RA1 – RA6).
5. **Endowment Bias:** Pompian (2011) stated that investors who are subject to endowment bias tend to value an asset more highly when they already own it than when they do not. Eventually, investors may display a tendency to hold on to securities that they have already purchased. This bias was captured using three statements (EB1 – EB3).

Sampling Design and Data Collection: The data were collected from 125 respondents in Kolkata. Purposive and/or judgemental sampling methods were used to approach the respondents. The data were collected during the period from April 2025 to August 2025. Initially, a pilot study was conducted with 30 respondents to evaluate the internal consistency and reliability of the data set.

Tools & Techniques used: The different tools employed in the present study include descriptive statistics, Cronbach's alpha, and confirmatory factor analysis.

Results and Analysis

Demographic profile of respondents

The demographic profile of the respondents is presented below in Table-1. In terms of gender, the majority of the respondents are male (56%). The largest proportion of the respondents belongs to the age group '21-30 years' which accounts for 52% of the total sample. Together, the age groups '21-30 years' and '31-40 years' comprise 92.8% of the respondents, suggesting that the most of the participants are young people (below 41 years of age).

In terms of education, the highest percentage of the respondents are graduates (47.20%), indicating that the majority of the respondents are educated. A total of 27.2% of the respondents have completed Higher Secondary Education but still invest in the stock market, suggesting that although they have not completed higher education, they have a keen interest in investing in stocks.

Occupationally, 32% of the respondents are self-employed professionals, followed by 28% working in the service sector and 24% engaged in business. Only 12% of the respondents are students. Collectively 92.8% of the respondents have an annual income of Rs. 10 lakh or less. With respect to investment experience, 41.6% of the respondents have less than one year of experience, while 40% have between one and five years of experience, reflecting a balanced mix of novice and moderately experienced investors.

Table 1: Demographic profile of respondents

<i>Demographic Profile</i>	<i>Category / group</i>	<i>Frequency</i>	<i>Percentage</i>
Gender	Male	70	56.0
	Female	55	44.0
(Age (in Years	21-30	65	52.0
	31-40	51	40.8
	41-50	07	05.6
	51-60	02	01.6
Education	Up to Class XII	34	27.2
	Diploma / Vocn. Training	09	07.2
	Graduate	59	47.2
	Post Graduate	12	9.6
	Ph.D	05	04
	Professional Qualification	04	3.2
	Others	02	1.6
Occupation	Student	20	16
	Business	30	24
	Service	35	28
	Self Employed Profes- sional	40	32

Annual Income	Less than Rs. 5 Lakhs	68	54.4
	Rs. 5 lakhs - 10 Lakhs	48	38.4
	Rs. 10 lakhs - 15 lakhs	07	5.6
	Rs. 15 - 20 lakhs	02	1.6
Experience	Less than a year	52	41.6
	Years 5 - 1	50	40
	years 10 - 6	20	16
	Years and above 10	03	2.4

Source(s): Table created by authors

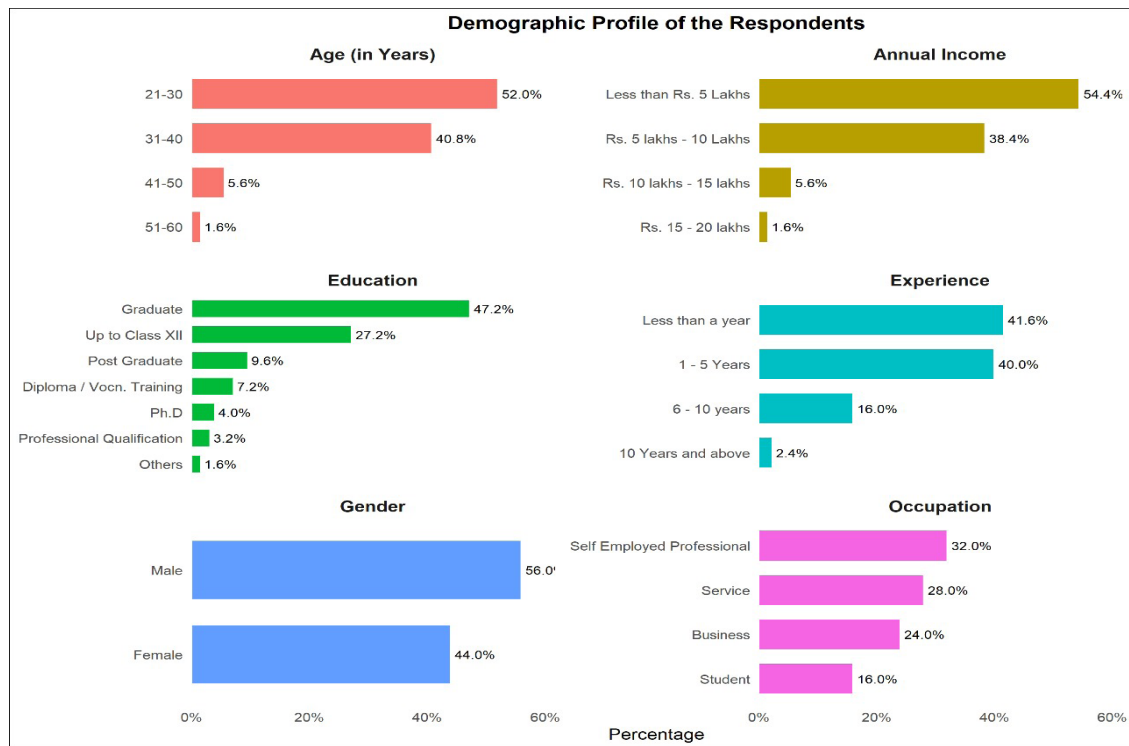


Figure 2: Demographic Profile of the Respondents

Reliability Test & Descriptive Statistics

The detailed item-wise descriptive statistics analysis for all the 25 Likert-scale state-

ments is provided in Appendix-A.

The mean values of all the individual items of the aforementioned five biases ranged from 2.85 to 3.40, suggesting a moderate level of agreement among the respondents regarding the influence of emotional biases on investment decisions.

The reliability of the biases was assessed using Cronbach's alpha coefficient, which measures the internal consistency of the items. Table 2 shows that, for all biases, the Cronbach's alpha values were greater than 0.70, thereby confirming satisfactory internal consistency (Hair et al., 2010; Kharra & Kapoor 2023).

The mean scores of the biases ranged from 3.00 (Self-Control bias) to 3.11 (Regret Aversion bias), indicating that respondents had a neutral level of agreement with the Likert scale statements measuring the different emotional biases. The standard deviation values suggest a moderate degree of variation around the mean, with no extreme deviations.

Table 2: Descriptive analysis & Cronbach's α of the biases

Variable name	Cronbach's α	Mean	Std. Deviation
Self-control bias	0.872	3.00	0.924
Optimism bias	0.839	3.05	0.927
Herding bias	0.835	3.03	0.900
Regret aversion bias	0.883	3.11	0.977
Endowment bias	0.799	3.06	1.012

Source(s): Table created by authors

The Presence of Emotional Biases in the Decision-Making Process

The mean values of the emotional biases indicate that investors experience and exhibit emotional biases during the investment decision-making process, thereby exhibiting potentially influencing the rationality of their investment choices. The results in Table-2 reveal that investors also exhibit varying degree of susceptibility to emotional biases while making decisions.

Confirmatory Factor Analysis and Model Fit

Confirmatory factor analysis (CFA) is employed for all the aforementioned biases to examine the factor structure and the relationships between the latent constructs and observed indicators within an already specified theoretical model derived from the existing literature. The proposed model assumes that five emotional biases- Self-Control bias, Optimism bias, Herding bias, Regret-aversion bias, and Endowment bias influence the investment decision-making process of the individuals.

The chi-square statistics in Table-3 indicates a significant chi-square value; however, the chi-square- to- degrees- of- freedom ratio suggests an acceptable model fit, considering the sample size. The value of $CMin/DF = 500.709/265 \approx 1.89$ which suggests a good fit, as it is less than 3.

The different model fit indices shown in Table-4 provide insights into the extent of the measurement model's fit. The fit of model is evaluated through various indices, and the results are presented in Table 4. The CFA exhibits an acceptable model fit. The comparative Fit Index (CFI=0.924), Tucker-Lewis Index (TLI=0.914), and Bentler-Bonett Non-Normed Fit Index (NNFI=0.914) indicate a good fit. The accuracy of the model is supported by Bentler-Bonett Normed Fit Index (NFI=0.853), Bollen's Incremental Fit Index (IFI=0.925), Relative Noncentrality Index (RNI=0.924) and Parsimony Normed Fit Index (PNFI=0.868). However, Root mean square error of approximation (RMSEA=0.085) suggests an acceptable, although relatively moderate, level of moderate fit. The Goodness of fit index (GFI=0.986) suggests an excellent fit, while the McDonald Fit Index (MFI=0.731) suggests a moderate fit. Furthermore, Hoelter's critical N values were 110.99 ($\alpha = .05$) and 117.325 ($\alpha = .01$) suggest that the sample size may be marginally small for the specified model, although the other fit indices indicate an acceptable overall model fit.

Table 3: Factor Model

Model	X^2	df	p
Factor model	500.709	265	001. >

Note. The standard error method is robust.sem.

Table 4: Model fit indices

Indices	Recommended value	Measurement model (For all emotional biases)	Interpretation	Source
CMin/DF (χ^2 / df)	< 2 (good), < 3 (acceptable)	1.89	Good fit	Wheaton et al., 1977; Carmines & McIver, 1981
Comparative Fit Index (CFI)	≥ 0.90 (acceptable), ≥ 0.95 (good)	0.924	Acceptable fit	Bentler, 1990; Hu & Bentler, 1999
Tucker-Lewis Index (TLI / NNFI)	≥ 0.90 (acceptable), ≥ 0.95 (good)	0.914	Acceptable fit	Tucker & Lewis, 1973; Hu & Bentler, 1999
Normed Fit Index (NFI)	≥ 0.90	0.853	Slightly below threshold; marginal fit	Bentler & Bonett, 1980
Parsimony Normed Fit Index (PNFI)	≥ 0.50	0.868	Good fit	Byrne, 2013
Relative Noncentrality Index (RNI)	≥ 0.90	0.924	Acceptable fit	Bentler, 1990
RMSEA	< 0.05 (close fit), 0.05–0.08 (reasonable), 0.08–0.10 (mediocre), > 0.10 (poor)	0.085	Mediocre fit	Browne & Cudeck, 1993; MacCallum et al., 1996
RMSEA 90% CI	—	[0.073, 0.096]	Upper bound indicates borderline fit	Browne & Cudeck, 1993

RMSEA p-value	$p > 0.05 \rightarrow$ close fit	1.514×10^{-6} ($p < 0.001$)	Model does not achieve close fit	Browne & Cudeck, 1993
Standardized Root Mean Square Residual (SRMR)	≤ 0.08 (good), ≤ 0.05 (excellent)	0.065	Acceptable fit	Hu & Bentler, 1999
Hoelter's Critical N	≥ 200	111 ($\alpha = .05$), 117 ($\alpha = .01$)	Slightly low; sample may be marginally small	Hoelter, 1983
Goodness of Fit Index (GFI)	≥ 0.80	0.986	Excellent fit	Hu and Bentler, 1999
McDonald Fit Index (MFI)	≥ 0.90 (good), ≥ 0.80 (acceptable)	0.731	Below acceptable; marginal fit	McDonald & Marsh, 1990

Source: JASP Software

Composite reliability and validity of the model

The composite reliability of all the five emotional biases was calculated for each latent variable, and the results are presented in Table 5. The values of CR and AVE for all five biases are greater than 0.70 and 0.50, respectively, thereby fulfilling the recommended thresholds for composite reliability and convergent validity (Hair *et al.*, 2010).

Table 5: Reliability and Convergent Validity Indices

Latent Variable	Composite reliability (CR)	Average Variance Explained (AVE)
Self-Control Bias	0.899	0.598
Optimism Bias	0.875	0.585
Herding Bias	0.870	0.575
Regret-aversion bias	0.905	0.615
Endowment Bias	0.843	0.644

Source: JASP Software

Table 6 reveals the factor loadings of the observed variables on their respective latent factors. The p-value in all cases is less than 0.01, indicating that all the factor loadings are statistically significant and the observed variables are significantly related to their respective latent factors. Most of the factor loading are above 0.70, indicating a strong item-factor relationship. The factor loadings are consistent across the factors, indicating that all the items contribute significantly to their respective constructs.

The significant and relatively standardized factor loading across all the biases- Self-Control bias, Optimism bias, Herding bias, Regret-aversion bias, and Endowment bias- indicate that the respective latent constructs are adequately represented by their observed variables. This supports the proposed theoretical structure, indicating that the underlying dimensions of the five emotional biases are reflected in the observed indicators and may influence investors' investment decision-making behaviour.

Table 6: Factor loadings

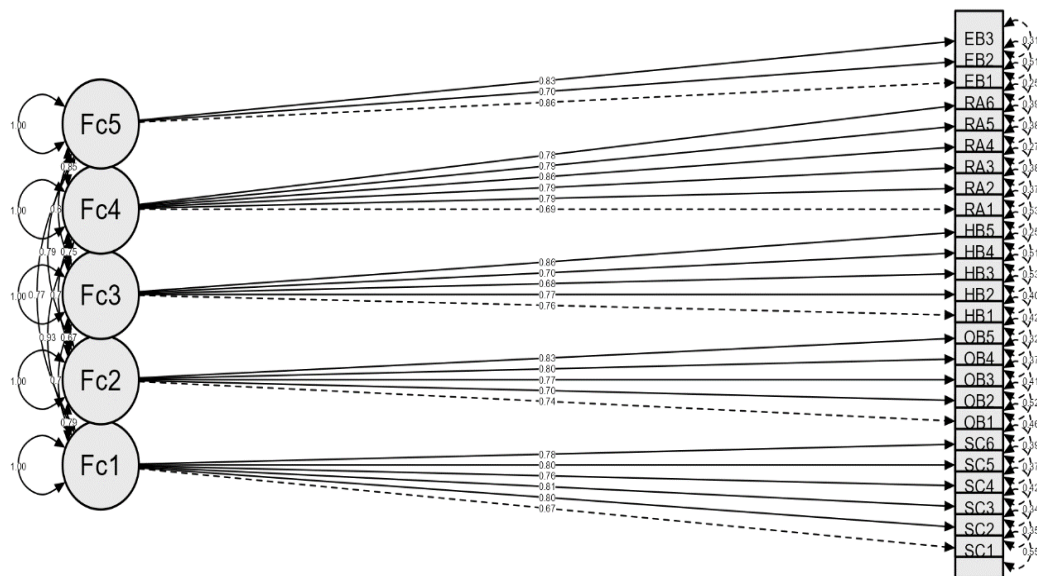
Factor	Indicator	Std. estimate	Std. Error	z-value	p	95% Confidence Interval	
						Lower	Upper
Factor 1	SC1	0.674	0.049	13.72	< .001	0.577	0.770
	SC2	0.803	0.032	25.49	< .001	0.742	0.865
	SC3	0.815	0.030	27.10	< .001	0.756	0.874
	SC4	0.763	0.037	20.70	< .001	0.691	0.835
	SC5	0.797	0.033	24.14	< .001	0.732	0.861
	SC6	0.779	0.034	22.74	< .001	0.712	0.846
Factor 2	OB1	0.736	0.044	16.61	< .001	0.649	0.823
	OB2	0.695	0.043	16.27	< .001	0.611	0.779
	OB3	0.765	0.043	17.74	< .001	0.680	0.850
	OB4	0.796	0.036	21.93	< .001	0.725	0.868
	OB5	0.825	0.033	25.37	< .001	0.761	0.889
Factor 3	HB1	0.759	0.041	18.67	< .001	0.680	0.839
	HB2	0.774	0.041	18.93	< .001	0.694	0.854
	HB3	0.682	0.054	12.53	< .001	0.575	0.789
	HB4	0.698	0.048	14.48	< .001	0.603	0.792
	HB5	0.864	0.029	29.53	< .001	0.807	0.922
Factor 4	RA1	0.686	0.046	15.04	< .001	0.597	0.775
	RA2	0.791	0.033	24.31	< .001	0.727	0.854
	RA3	0.790	0.034	23.51	< .001	0.724	0.856
	RA4	0.856	0.025	34.15	< .001	0.807	0.905
	RA5	0.788	0.035	22.60	< .001	0.720	0.857
	RA6	0.784	0.034	23.26	< .001	0.718	0.850
Factor 5	EB1	0.863	0.037	23.54	< .001	0.791	0.935
	EB2	0.702	0.044	16.00	< .001	0.616	0.788
	EB3	0.832	0.034	24.66	< .001	0.766	0.898

Source: JASP Software

The Std. Estimate column in Table-7 shows the standardized correlations between the pairs of latent factors. The p-values are less than 0.01 in all cases, indicating that all the correlations are statistically significant. The high and statistically correlation among the five emotional biases indicate a strong association among the underlying constructs. The results are consistent with the proposed theoretical model.

Table-7: Factor Covariances

							95% Confidence Interval	
			Std. esti- mate	Std. Error	z-value	p	Lower	Upper
Factor 1	↔	Factor 2	0.794	0.041	19.32	< .001	0.713	0.874
Factor 1	↔	Factor 3	0.731	0.059	12.46	< .001	0.616	0.846
Factor 1	↔	Factor 4	0.927	0.022	42.60	< .001	0.884	0.969
Factor 1	↔	Factor 5	0.766	0.049	15.78	< .001	0.671	0.861
Factor 2	↔	Factor 3	0.667	0.062	10.83	< .001	0.546	0.788
Factor 2	↔	Factor 4	0.778	0.042	18.66	< .001	0.696	0.860
Factor 2	↔	Factor 5	0.787	0.041	19.03	< .001	0.706	0.868
Factor 3	↔	Factor 4	0.749	0.049	15.30	< .001	0.653	0.846
Factor 3	↔	Factor 5	0.662	0.060	11.05	< .001	0.544	0.779
Factor 4	↔	Factor 5	0.847	0.037	22.84	< .001	0.774	0.920



Source -JASP Software Source- JASP Software Figure 3: Constructs validity of the factors using CFA

A first-order confirmatory factor analysis was conducted to assess the measurement model. The model comprises five latent factors (Fc1, Fc2, Fc3, Fc4, Fc5), representing the 5 emotional biases, along with their respective observed variables. The diagram (Fig-3) shows the standardized factor loadings, measurement errors, and correlations among the latent variables. The circles represent the latent variables, while the rectangles represent the observed variables.

As discussed previously, the standardized factor loadings range between 0.67 and 0.84, indicating that the observed variables have substantial relationships with their respective latent factors. The error variances are shown by the curved arrows pointing towards the observed variables on the extreme right-hand side of the figure. These error terms represent the proportion of the variance that is not explained by the respective latent factors.

The correlations among latent factors are shown by the curved two-headed arrows on the extreme left-hand side of the picture. The correlations among all the factors were significant, as outlined in Table-7.

In the diagram the first observed variable for each latent factor is shown with a dotted line (SC1, OB1, HB1, RA1, and EB1) as the first indicator is used as a reference for scaling the latent construct. The natural scale is absent for latent variable so they required one indicator to anchor their measurement.

Overall, the indices presented earlier provide adequate evidence of the model's fit. Thus, the present model provides support for the proposed theoretical structure comprising the five emotional biases examined in the study. The significant correlation among these biases indicate that the constructs are interrelated rather than operating in isolation. Hence, emotional biases are deeply rooted in human psychology, leading to deviations from the rational behaviour.

The residual correlation matrix, as presented in Appendix-B, shows the residual correlations among the observed variables. Values closer to zero generally indicate smaller unexplained associations between pairs of observed variables, whereas larger residual correlations may indicate areas where the model could potentially be improved. In the present analysis, most of the residual values are small and close to zero, suggesting that the model adequately accounts for the relationship among the observed variables. Overall, the matrix provides additional support for the adequacy of the measurement model.

Discussion and Conclusion

In the study, confirmatory factor analysis was employed to examine the latent structure of five emotional biases: Self-Control bias, Optimism bias, Herding bias, Regret-aversion bias, and Endowment bias. The findings indicate that the five emotional biases are present among the respondents and are strongly interrelated, reflecting consistent behavioural

tendencies. Furthermore, the results show significant associations among the emotional biases, supporting the coherence of the underlying factor structure. The significant presence of emotional biases persists among the respondents suggests that investors in Kolkata may be susceptible to such biases in their investment decision-making. The results of the study fall within the accepted ranges of the relevant model-fit indices, and the significant correlations among the latent variables indicate meaningful relationships among the emotional biases. The findings are consistent with previous studies, suggesting that emotional biases are inter-related and may jointly influence investors' financial judgment and behavioural tendencies (Kumar & Chaurasia, 2024; Badola et al., 2023).

The results of the study lead to the rejection of the null hypothesis (H_{01}), indicating that the emotional biases are significantly correlated within the behavioural framework examined.

To conclude, investors' decisions may be neither completely rational nor completely irrational but rather reflect bounded rationality. Investors' judgement in financial context may be affected by the presence of emotional biases, which may lead to suboptimal decisions. In today's complex business environment, it is essential to recognise and appropriately address behavioural biases properly to support better investment decision-making. By recognizing these biases and developing appropriate strategies to mitigate their impact, investors may be better positioned to make more informed financial decisions. Overall, the study contributes to a better understanding of the nuances of emotional biases in investment decision-making, highlighting their theoretical and practical relevance and providing insights into investment behaviour.

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Appendix-A: Item-wise Descriptive Statistics of the Emotional Bias Items

Factor	Item Code	Statement	SD	D	N	A	SA	Mean
Self-Control Bias (SC)	SC1	I sometimes make impulsive investment decisions.	18 (14.4%)	35 (28.0%)	30 (24.0%)	32 (25.6%)	10 (08.0%)	2.85
	SC2	I find it hard to stick to my planned investment strategy.	11 (8.8%)	27 (21.6%)	40 (32.0%)	38 (30.4%)	09 (07.2%)	3.06
	SC3	My spending habits affect how much I am able to invest.	16 (12.8%)	27 (21.6%)	29 (23.2%)	36 (28.8%)	17 (13.6%)	3.09
	SC4	I struggle to delay immediate financial rewards for future gains.	16 (12.8%)	22 (17.6%)	40 (32.0%)	37 (29.6%)	10 (08.0%)	3.02
	SC5	I invest small amounts frequently instead of saving to invest strategically.	15 (12.0%)	32 (25.6%)	28 (22.4%)	35 (28.0%)	15 (12.0%)	3.02
	SC6	I often fail to maintain consistent investment habits over time.	16 (12.8%)	32 (25.6%)	34 (27.2%)	30 (24.0%)	13 (10.4%)	2.94

Optimism Bias (OB)	OB1	I believe my investment decisions are better than most others	%(13.6) 17	20 (16.0)	30 (24.0)	38 (30.4%)	20 (16.0%)	3.19
	OB2	I rely more on my own analysis than expert advice	10 (08.0%)	38 (30.4%)	30 (24.0)	36 (28.8%)	11 (08.8%)	3.00
	OB3	I believe I can anticipate market movements before they happen	(08.8%) 11	24 (19.2%)	39 (31.2%)	36 (28.8%)	15 (12.05)	3.16
	OB4	I am usually very confident in my financial judgments	(16.0%) 20	21 (16.8%)	36 (28.8%)	32 (25.6%)	16 (12.8%)	3.02
	OB5	I expect most of my investment choices to produce positive results	(12.8%) 16	31 (24.8%)	38 (30.4%)	32 (25.6%)	(06.4%) 8	2.88
Herding Bias (HB)	HB1	I often invest based on what many others are doing	(17.6%) 22	27 (21.6%)	34 (27.2%)	29 (23.2%)	13 (10.4%)	2.87
	HB2	I feel more confident investing when I know others are doing the same	(09.6%) 12	34 (27.2%)	40 (32.0%)	28 (22.4%)	11 (08.8%)	2.94
	HB3	I follow market trends instead of doing my own analysis	11 (08.8%)	29 (23.2%)	41 (32.8%)	33 (26.4%)	11 (08.8%)	3.03
	HB4	I believe following the majority is a safer investment strategy	(07.2%) 09	21 (16.8%)	32 (25.6%)	37 (29.6%)	26 (20.8%)	3.4
	HB5	Discussions with others sometimes influence me to reconsider my investment decisions	13 (10.4%)	37 (29.6%)	33 (26.4%)	33 (26.4%)	09 (07.2%)	2.9

Regret-aversion bias (RA)	RA1	I avoid making investment decisions because I am afraid of being wrong	16 (12.8%)	26 (20.8%)	33 (26.4%)	31 (24.8%)	19 (15.2%)	3.09
	RA2	I often think about past investment decisions that I regret	(09.6%) 12	31 (24.8%)	34 (27.2%)	37 (29.6%)	11 (08.8%)	3.03
	RA3	I hesitate to sell losing investments because I do not want to accept the loss	(14.4%) 18	22 (17.6%)	29 (23.2%)	38 (30.4%)	18 (14.4%)	3.13
	RA4	I feel anxious when I have to choose between different investment options	(12.8%) 16	18 (14.4%)	32 (25.6%)	39 (31.2%)	20 (16.0%)	3.23
	RA5	I take extra time to evaluate investment decisions to avoid regretting them later	(12.8%) 16	24 (19.2%)	37 (29.6%)	24 (19.2%)	24 (19.2%)	3.13
	RA6	I avoid unfamiliar investment options to prevent possible regret later	(13.6%) 17	22 (17.6%)	36 (28.8%)	41 (32.8%)	09 (07.2%)	3.02
Endowment Bias (EB)	EB1	I hold on to my investments even when better options exist	(10.4%) 13	26 (20.8%)	33 (26.4%)	37 (29.6%)	16 (12.8%)	3.14
	EB2	I value the assets I own more than similar assets I do not own	(14.4%) 18	24 (19.2%)	38 (30.4%)	33 (26.4%)	12 (09.6%)	2.98
	EB3	I hesitate to sell an investment because I feel attached to it	(13.6%) 17	21 (16.8%)	37 (29.6%)	36 (28.8%)	14 (11.2%)	3.07

Note- SD= Strongly Disagree, D= Disagree, N= Neutral, A= Agree, SA= Strongly Agree

.Values in parentheses represent percentages of respondents within each category

Appendix-B: Residual Correlation Matrix

	SC1	SC2	SC3	SC4	SC5	SC6	OB1	OB2	OB3	OB4	OB5	HB1	HB2	HB3	HB4	HB5	RA1	RA2	RA3	RA4	RA5	RA6	EB1	EB2	EB3
SC1	0																								
SC2	.02	0																							
SC3	.07	.09	0																						
SC4	.05	.05	.08	0																					
SC5	.07	.01	.02	.02	0																				
SC6	.05	.01	.02	.01	.08	0																			
OB1	.09	.07	.01	.07	.03	.13	0																		
OB2	.06	.02	.12	.06	.1	.05	.01	0																	
OB3	.09	.04	.08	.05	.05	.13	.01	.08	0																
OB4	.13	.01	.06	.05	.03	.02	.09	.02	.15	0															
OB5	.09	.03	.02	.06	.05	.05	.12	.05	.06	.06	0														
HB1	.06	.02	.11	.11	.06	.16	.01	.03	.1	.05	.05	0													
HB2	.04	.01	.02	.03	.03	.04	.14	.02	.01	.1	.08	.05	0												
HB3	.03	.06	.12	.07	.05	.07	.06	.02	.01	.05	.01	.04	.11	0											
HB4	.07	.02	.09	.01	.03	.02	.03	.04	.04	.04	.04	.09	.04	.12	0										
HB5	.08	.06	.07	.03	.05	.01	.01	.03	.03	.09	.02	.06	.07	.01	.01	0									
RA1	.12	.13	0	.05	.1	.05	.09	.02	.01	.19	.01	.04	.08	.1	.15	.15	0								
RA2	0	.04	.03	.04	.06	.09	.07	.03	.02	.05	.03	.07	.01	.05	.01	.05	.05	0							
RA3	.04	.06	.05	.03	.08	.07	.07	.06	.04	.03	.04	.03	.04	.12	.05	.09	.09	.05	0						
RA4	.01	.08	.07	.01	.12	.02	.02	.01	.05	.03	.03	.12	.05	.01	.11	.01	.05	.08	.06	0					
RA5	.07	.04	.02	.08	.07	.05	.02	.04	.1	.09	.06	.09	0	.02	.03	.03	.06	.06	.04	0	0				
RA6	.09	.04	.05	.05	.06	.07	.1	.05	.01	.07	.1	.11	.01	.07	.06	.01	.05	.0	.04	.01	.07	0			
EB1	.03	.04	.03	.02	.08	.04	.01	.18	.02	.02	.07	.07	.06	.01	.04	.03	.06	.06	.15	.06	.05	.03	0		
EB2	.16	.01	.04	.01	.07	.06	.06	.05	.06	.01	.11	.16	.04	.01	.03	.05	.05	.18	.07	.11	.0	.04	.03	0	
EB3	.01	.03	.04	.03	.09	.02	.17	.12	.04	.06	.07	.07	.12	0	.11	.03	.15	.1	.09	.05	.09	0	.13	.1	0

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Socio-Demographic Determinants of Employment Participation in India: Evidence from PLFS

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Abstract

The paper examines how important socio-demographic variables influence the employment participation in India based on unit level data of Periodic Labour Force Survey (PLFS). By examining the labour force, the study compares the effect of sex, age, marital status, and years of formal education on the likelihood of being employed. A binary logistic regression is estimated based on a large nationally representative sample of 1,106,446 people where employment status is based on the number employed versus not employed and actively seeking employment. The findings show strong gender differences in the level of participation in employment: women and transgender people are much less likely to be employed than men even when other factors, such as age, marital status, and education, are taken into consideration. The marital status is revealed as a powerful predictor of employment, with currently married, widowed, divorced or separated persons having significantly better employment opportunities compared to those who have never been married. Employment is positively related to age as labour market attachment increases with age. Conversely, years of formal education also exhibit negative relationship with employment participation, which indicates that they delay their entry in the labour market or do not match their educational level with the employment opportunities. Model diagnostics have shown high predictive accuracy. On the whole, these results indicate the existence of structural and demographic differences in labour market participation, and the necessity to take into consideration gender and marital status when developing labour market strategies.

Keywords: Employment participation, Labour force, Socio-demographic determinants, Gender inequality, Logistic regression, PLFS

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Introduction:

The role of employment participation in development economics is an important issue that continues to be a source of income and livelihood in addition to serving as an important modality by which individuals attain economic security, social inclusion, and autonomy. In the developing economies like India, the employment outcomes are highly institutionalized in social structures based on the gender norms, household setups, and life cycles. Although the trend of economic development and increasing educational attainment have led to a decrease in sharp demographic disparities in employment participation patterns over the past decades, it is still essential to raise critical questions concerning who participates in the labour market, and under what conditions over the past decades. Much literature has been conducted to study the relationship between labour participation and employment and the countries of gender, education, and marriage. These works illuminate the enduring gender division in the labour markets, the importance of household in women choosing to work, and inequality in returns to the human capital that are enjoyed by the various sections of the population. Meanwhile, life-cycle variables, including age and marital status transitions have been established to have complex and usually non-linear effects in regard to their attachment to the labour market. Although such literature has produced significant insights, as well as the existing evidence has a tendency to concentrate either on labour force participation in general or on certain particular areas of employment like formal and informal work that generally view employment as a predictable outcome. This literature has two significant gaps. To start with, less focus has been given to the employment participation conditional upon labour force attachment, i.e. a distinction between employment and non-employment among willing and available individuals. This difference is important in situations such as in India where the participation of labour force is already influenced by a high level of social norm especially among the women, and where unemployment may indicate alternative limitations to non-participation in the labour market. Second, the available research usually addresses socio-demographic determinants separately or on a relatively small subset sample, which restricts a detailed explanation of the interactions between multiple traits in determining employment outcomes in the labour force. Besides, the correlation between education and participation in employment is still not theoretically clear in the context of developing countries. Though human capital theory implies that the more we have education, the more are the chances of getting employment, empirical data indicates that higher education level does not necessarily lead to immediate or better employment, especially in informal labour markets, envisaged by a lack of formal job creation and skills mismatches. This brings to greater concern the purpose of education in the mediation of access to employment and how far labour markets can accommodate the increasingly educated workforce. The other aspect that has not been studied significantly is demographic diversity other than the male-fe-

male dichotomy. Even though recent surveys have started appreciating transgender individuals, there is paucity of systematic empirical data on the employment outcomes of transgender individuals. Consequently, labour market studies tend to ignore a significant population, which can be subjected to different and compounded employment inhibition. It is against this background that there is an evident necessity of an empirical evaluation, which specifically evaluates employment among the participants of the labour force, considers several socio-demographic dimensions at once, and uses big-data nationally representative data. This way, it is possible to understand more clearly how gender, marital status, age and education structure the role of employment in the labour market, as opposed to the simple act of establishing entry or exit to the labour market. The paper fills these gaps and offers the empirical evidence of the socio-demographic determinants of employment participation in India, as of 2007. In this manner, it seeks to enlighten on current discussions concerning labour market inequality, the efficiency of human capital accumulation as well as the continued existence of structural constraints to employment, hence providing information that can be useful in academic and policy formulation.

Literature Review:

Empirical evidence has extensively studied the effect of individual socio-demographic variables in the labour market (marital status, gender, age and years of formal education) on labour market participation and labour market performance in different types of work. The initial theoretical and empirical literature states that the marital status has an influence on labour supply choices by influencing household income, domestic specialization, and gendered socialisation social norms, leading various employment results to married and unmarried individuals (Lundberg and Pollak, 1985, “Bargaining and Distribution in Marriage, *Journal of Labor Economics*). There are empirical findings that demonstrate how married women are less likely to work on regular paid jobs and are more likely to choose between self-employment or unpaid family duties because of the requirements to be flexible and regarding the need to fulfill domestic recurrence (Blau and Kahn, 2017, *The Gender Wage Gap: Extent, Trends, and Explanations, Journal of Economic Literature*). The division of labour in informal work, family work and household businesses has always been reported, where women are heavily overrepresented in the informal sector, and men hold the majority of regular wage and salary-earning jobs despite education and experience control (Kabeer, 2012, “Women Economic Empowerment and Inclusive Growth, *International Development Research Centre*; Chen et al., 2019, *Informality, Gender and Labour Markets*). The age is also an important factor that determines employment status as young workers cannot be formally employed because of the lack of experience, old workers, especially women, have higher chances of staying on informal employment or self-employment because of the loss of skills and being discriminated against (Neumark, Burn and Button, 2019, “Is It Harder for Older Workers to Find Jobs? *Journal of Labor*

Economics. Education proves to be a decisive factor of quality of employment, and with the increased levels of formal education, the likelihood of regular salaried employment and the decrease in dependence on casual wage labour and unpaid family labour increases significantly (Psacharopoulos and Patrinos, 2018, *Returns to Investment in Education, Education Economics*). Nonetheless, some of them observe that even education does not offset the disadvantages related to gender and marital status completely, especially in the developing economies where even well-educated women might be constrained to informal or family-related jobs because of the social and institutional barriers that persist (Deshpande and Deshpande, 2021, “Gender Gaps in Labour Market Outcomes,” *Economic and Political Weekly*). There is equally some evidence of other developing areas (suggestion) and South Asia indicates married women of lower educational levels have a much higher probability of involvement in household enterprises or unpaid family work, only men of similar nature are more likely to be involved in casual wage labour or public works programmes (Fields, 2019, “Employment Vulnerability and Informality,” *World Development*). Multinomial and panel data analyses continuously show that this is because the interaction of gender, marital status, age, and education form occupational sorting and choice of employment category, with segmentation between the formal and informal labour markets exalted (Sarkar, Sahoo and Klasen, 2019, *Employment Transitions in Developing Countries, Journal of Development Studies*). Further evidence is a role of labour market institutions and macroeconomic structures in mediating such relationships, in which formal sector employment has been highly selective and biased towards prime-age men who have continuous work histories, and women - especially those who are married - are systematically excluded despite equal educational attainment (Banerjee and Duflo, 2019, *Employment and Structural Transformation, Journal of Economic Perspectives*). The studies on the self-employment in the house holds suggests that self-employment is not an entrepreneurial but a residual employment usually by women who have intermittent labour market attachment as a result of marriage and child bearing (Maloney, 2004, “Informality Revisited,” *World Development*). Longitudinal data indicate also the high persistence of unpaid family work and low promptness to regular wage work which suggests that it is possible to have the presence of structural barriers as opposed to temporary labour market sorting (Bargain & Kwenda, 2014, *The Informal Sector Wage Gap, Journal of Development Studies*). The age-specific studies also indicate that the employment vulnerability is highest in middle-aged workers that have less educational attainment which is more prone to the cycling of casual wage labour and own-account self-employment, especially at the time of the economic downturn (Loayza & Rigolini, 2011, “Informality Trends and Cycles,” *World Bank Policy Research Working Paper*). Research that uses decomposition methods shows that the variations in the type of employment by gender and marital status can be accounted by the human capital endowment in only part with the rest being unexplained factors can be attributed to labour market dis-

crimination and normative limitations (Ñopo, 2008, “Matching as a Tool to Decompose Wage Gaps,” Review of Economics and Statistics). Recent facts also show that the public works and casual employment programmes consume men in disproportion, and female participation is still limited by time poverty and childcare duties, which confirms gender inequalities in the quality of work (Ravi & Engler, 2015, “Workfare as an Effective Way to Fight Poverty,” World Development). In general, this literature highlights the idea that the results of employment status and work categories are influenced by long-term structural, institutional, and socio-demographic factors, and future studies that combine the concept of life-cycle effects, household bargaining, and labour market segmentation into a single analytical paradigm are highly necessary.

Data and Research Methodology:

The unit-level data applied in this study from PLFS. It is only limited to the members of the labour force i.e. the employed and the unemployed actively seeking employment. People who were not in the labour force (those who were in educational institutions, only working on household chores, pensions or remittances, or who said they were disabled or otherwise not working) did not form part of the sample. The final sample of analysis after imposing such restrictions is. The dependent variable in the analysis is, formed by the PLFS status code. The people who are classified as employed or working, whether self-employed workers, regular salaried or wage workers, casual wage workers, unpaid working family workers and other forms of economic activity are coded as 1, whereas unemployed workers in the labour force and seeking employment are coded 0. Those respondents who are not in the labour force are out of the analysis. The major explanatory variables are. Sex is a categorical variable, which is coded into male, female, and transgender with male being the reference group. Age is quantified in years of completed years and this is incorporated as a continuous variable to embody the effect of the life-cycle on its participation in employment. Marital status is a categorical variable that will be divided into never married, currently married, widow and divorced or separated with never married as the reference category. Formal education Years of formal schooling are summed to give the total years of formal schooling and are used as a continuous measure of human capital. Since the dependent variable is binary, a logistic regression model is used in estimating the likelihood of employment based on the set demographic and socioeconomic factors. This model is estimated with the use of maximum likelihood and the findings are presented in the form of odds ratios to provide ease in understanding it. Likelihood ratio tests, pseudo R^2 measures, classification accuracy statistics and a link test of model specification are used to test model performance and validity. The estimates are all done in Stata.

Results and Discussion:

Table 1: Logistic Regression Results for Employment Participation

Dependent variable: Employment status (1 = Employed/Working, 0 = Unemployed but in labour force)

Odds ratios reported

Variable	Odds Ratio	Std. Error	z	p-value	95% CI	Interpretation
Sex (Ref: Male)						
Female	0.6089	0.0061	-49.38	< .001	[0.5971, 0.6210]	Females have about 39% lower odds of being employed compared to males, holding other factors constant.
Transgender	0.4219	0.1449	-2.51	.012	[0.2152, 0.8271]	Transgender individuals face substantially lower employment odds ($\approx 58\%$ lower) relative to males.
Marital Status (Ref: Never married)						
Currently married	4.3629	0.0535	120.18	< .001	[4.2593, 4.4690]	Currently married individuals are over four times more likely to be employed than never-married individuals.
Widowed	3.2228	0.1805	20.90	< .001	[2.8878, 3.5966]	Widowed individuals have significantly higher employment odds , likely reflecting economic necessity.
Divorced/Separated	1.7681	0.0980	10.28	< .001	[1.5861, 1.9709]	Divorced/separated individuals are about 77% more likely to be employed than the never married.

Age (years)	1.1042	0.0009	122.32	< .001	[1.1025, 1.1060]	Each additional year of age increases the odds of employment by approximately 10.4% .
Years of formal education	0.8314	0.0010	-146.93	< .001	[0.8294, 0.8335]	Additional schooling is associated with lower employment odds , indicating delayed or selective labour market entry.
Constant	2.8885	0.0651	47.08	< .001	[2.7639, 3.0191]	Baseline odds for the reference individual; not substantively interpreted.

Table 2: Diagnostic Measure

Diagnostic Measure	Value
Classification Accuracy	
Overall correctly classified	93.76%
Sensitivity (True positive rate)	99.62%
Specificity (True negative rate)	6.90%
Positive predictive value	94.08%
Negative predictive value	54.85%
Link Test	
_hat (predicted value)	1.2349***
_hatsq (squared predicted value)	-0.0476***

Model statistics

Number of observations = 1,106,446

LR $\chi^2(7) = 162,032.67, p < .001$ Pseudo $R^2 = 0.3109$

Log likelihood = -179,542.93

Table 1 gives the estimates of a logistic regression model which was tested to determine the determinants of participation in employment. The model has good overall fit, as shown by a very significant likelihood ratio test (LR $\chi^2(7) = 162,032.67, p < .001$) and a fairly large Pseudo $R^2 = 0.3109$, indicating a significant amount of explanatory power to a binary choice model using large sample survey data. The difference in employment

due to sex is also high: females have much lower chances of being employed than males whereas transgender people have an even worse disadvantage, which indicates universal structural obstacles in labour market access. The marital status exerts a more crucial influence on the employment results as currently married people are more likely to be employed over four times than not married people, widowed and divorced or separated people also demonstrate a much higher likelihood of employment, which has been attributed to life-cycle effects and economic need based on household obligations and matrimonial transitions. Employment bears a positive correlation to age in terms of the fact that the older the person the more likely they are to be attached to labour force. Conversely, years of formal education has a negative relationship with employment participation, which implies late entry into the labour market, further education enrolment or a lack of correspondence between educational attainment and suitable employment opportunities in the labour market observed. All in all, the findings demonstrate that demographic and socioeconomic factors have a statistically significant and economically significant impact on employment participation, and gender and marital status become especially influential predictors. The results of the classification show that it has a high predictive employment status with the overall accuracy at 93.76. The model is highly sensitive (99.62%), which implies that it is able to identify almost all working persons. This is especially crucial in the studies of the labour market where the main focus is the description of the participation in employment and not non-participation. The positive predictive value of 94.08% also confirms the fact that when the model predicts employment the model is right in almost all the instances. the results of the link test indicate that the predicted value ($\hat{y}$) is significant and therefore, there is meaning in the explanatory information contained in the model. Even though the squared predicted term is also statistically significant ($\hat{y}^2$) which is a sign of misspecification, it is likely to happen in a very large sample where even trivial violations of the functional form assumptions are observed. In that regard, the suggestiveness of the link test is that it can be further refined (e.g. nonlinearities or other controls), yet does not contradict the estimated coefficients, which are statistically significant and substantively informative.

Conclusion:

The paper will add to the existing body of literature in the area of labour market performance in developing economies by looking at the level of employment participation among those individuals who are already members of labour force in India. The analysis gives a more meaningful view of the employment destiny as compared to those studies which only consider the broad measures of participation. This method is especially pertinent in the situations when the social norms and household roles are the major influences on the labour market behaviour, particularly among women. The evidence illuminates unchanging and methodical disparities in the level of participation in employment among

socio-demographic entities. Gender differences are still intense, which means that transgender and women have a considerable hiring obstacle that cannot be attributed only to age, marital status, or learning degrees. The high correlation between marital status and employment participation highlights the role played by household set up and economic need in influencing labour market performance. Simultaneously, the positive role of age indicates life-cycle tendencies of labour market attachment, whereas the negative association between years of formal education and employment participation indicates conflict in school-to-work transition and the small potential of the labour market to create appropriate jobs to absorb more and more educated employees. These results are policy implications. They also propose that increasing educational levels would not translate into greater employment unless job creation is matched with a rise in labour demand and institutional reforms that would enable job matching and inclusion. Policies to enhance the performance of labour markets should thus respond to the structural factors in labour markets, such as gender norms, inequalities in access to labour markets, and formal and informal divided sectors. Still, customized measures that assist women in getting into jobs, enhance the education-to-employment linkage, and include greater numbers of people in the job-making would be more effective than the homogenized policy strategies. Future research also has a number of avenues of research, identified in the analysis. To begin with, the framework should be expanded to investigate the category of employment and types of work to have a better understanding of the labour market segmentation and the vulnerability. Second, longitudinal/ panel data may be useful to determine the employment transitions and life cycle persistence. Third, it would be preferable to introduce household-level variables including fertility, caregiving, and intra-household decision-making to gain a better insight into the mechanisms that drive gendered employment patterns. Lastly, the direction of future work might be to consider regional, sectoral, and institutional heterogeneity, nonlinearities and interactions of major socio-demographic factors in order to narrow the gap on the comprehension of the dynamics of employment in India. Comprehensively, this paper sheds light on the socio-demographic factors of employment participation in the labour force, thus, informing the continuity of structural impediments in the labour markets and offers a baseline on forthcoming empirical and policy-oriented research perspectives to encourage the experience of inclusive and sustainable employment growth.

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Global Oil Shock and Macroeconomic Order: Perspectives from Oil-Importing Countries

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Abstract

The issue of oil supply disruption in global market has renewed its momentum of late, especially in the wake of geopolitical crisis raging in Middle East and West Asia, following the outbreak of US-Israel ambush on Iran. The breakdown of oil supply chain due to lockdown of international transit for the movement of crude oil has set ripples in the economies across the globe, especially the ones that high on oil import in the need of supporting domestic production, like India. The current paper thus seeks to contemplate into the possible ramification of geopolitical turbulence for global supply chain of essentially goods, particularly those of crucial need in production, by setting the oil-crisis, currently extant, on macroeconomic perspective. To that end, the paper develops a macro-theoretic model drawing Keynes-Kaldor tradition of inter-sector dynamics of output and price to elicit the macroeconomic vulnerability of domestic economy to external real shock, like disruption of oil supply in global market, contingent upon the extent to which the domestic production in oil-intensive and the domestic supply of oil is import-driven. The model extends further to elucidate probable policy responses, in form of structural adjustment, to external supply shock as way to reduce the macroeconomic vulnerability of import-dependent countries to geopolitical imbalance affecting the internal flow goods.

Keywords: Geopolitical Imbalance, Global Supply Chain, Macroeconomic Crisis, Oil-Importing Countries, Structural Adjustment, US-Israel War

Introduction

The global economic landscape in the twenty-first century has become increasingly susceptible to geopolitical uncertainties and external shocks that transcend national boundaries. In an era marked by deep economic integration and interconnected supply chains, geopolitical disturbances have emerged as critical determinants of global economic stability. Armed conflicts, territorial disputes, trade wars, economic sanctions, and diplomatic tensions among major economies have significantly altered patterns of international trade, investment, and commodity markets. Among the various channels through

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which geopolitical instability affects economic performance, the energy sector—particularly the crude oil market—occupies a central position due to its strategic importance in sustaining industrial production, transportation, and overall economic activity. Despite, ongoing efforts toward energy transition and the adoption of renewable energy sources crude oil continues to be one of the most vital commodities in the global economy despite. Consequently, disruptions in oil supply or expectations of future supply constraints often trigger substantial fluctuations in global oil prices. Recent geopolitical developments, including conflicts in major oil-producing regions, sanctions imposed on energy-exporting countries, and disruptions in critical maritime trade routes, have highlighted the sensitivity of oil markets to geopolitical events. Such episodes have reinforced the notion that geopolitical risks are not merely political phenomena but significant economic forces capable of generating widespread repercussions across national and international economies. Beyond their immediate economic consequences skyrocketing prices inflated import bill and fiscal strain oil shocks generate broader macroeconomic spillovers that affect multiple dimensions of economic performance. Exchange rate volatility, current account imbalances, declining industrial competitiveness, reduced consumer confidence, and fluctuations in capital flows are among the key transmission channels through which oil price shocks influence economic outcomes. In an increasingly interconnected world, these effects may be amplified through global financial markets and international trade networks, making import-dependent economies particularly vulnerable to external disturbances originating beyond their borders.

Given the growing frequency and intensity of geopolitical tensions in recent years, understanding the relationship between geopolitical turmoil, oil price dynamics, and macroeconomic performance has become an important area of economic inquiry. Examining this nexus is essential not only for identifying the mechanisms through which external shocks are transmitted but also for informing policy strategies aimed at enhancing economic resilience. Against this backdrop, the present study investigates the interconnected relationship between geopolitical instability, oil price shocks, and their macroeconomic spillover effects on import-dependent economies. By exploring these linkages, the study seeks to contribute to the broader discourse on economic vulnerability, energy security, and sustainable macroeconomic management in an increasingly uncertain global environment.

Literature Review

Since the advent of globalization, the world economic scenario has been intimately linked with the interplay of geopolitical dynamics, supply chain disruptions, energy market volatility, and macroeconomic performance. The frequent bout of geopolitical disorder—marked by the Russia–Ukraine conflict, escalating U.S.–China strategic rivalry and of late conflicts in the Middle East,—has led global trade to fiasco, as much as it has

unveiled structural vulnerabilities within global production and trade networks. Consequently, the issue of how geopolitical shocks propagate through supply chains and energy markets to influence inflation, growth, trade, and financial stability has surfaced in the contemporary literature.

The theoretical foundation of this economic implication of geopolitical dynamics can be traced in Caldara and Iacoviello (2022), demonstrating the adverse effects geopolitical tensions on investment, consumption, and international trade. The study attempts to construct Geopolitical Risk (GPR) Index to measure the macroeconomic consequences of geopolitical events. Subsequently, empirical literature highlights the vulnerability of global supply chains to geopolitical crisis. Using novel shipping congestion data, Bai et al. (2024) establish a causal relationship between global supply chain disruptions and macroeconomic performance. The findings indicate that supply chain shocks have been significantly instrumental in spawning prolonged stagflation exposing the hidden fault lines of import-intensive economies, in particular. Similarly, Finck and Tillmann (2023) find that disruptions arising from events such as the Suez Canal blockage and the Shanghai port congestion led to a decline in economic activity and a sharp increase in consumer prices across European economies. These findings underscore the macroeconomic significance of supply chain resilience in an increasingly interconnected global economy. Asadollah et al. (2024) using global data from 1999 to 2022 shows supply chain disruptions explain nearly one-third of headline inflation, leaving aside oil price and monetary policy shocks. The study highlights the channels through which geopolitical disturbances affect inflation and further, that inflation story in the post-pandemic era is more aligned with supply-side geopolitical risks than typical demand-side factors.

It worth mentioning that energy markets provide a route through which geopolitical disturbance can translate into macroeconomic crisis. Historically, oil price shocks have been associated with major geopolitical events, ranging from the Arab oil embargo to the Gulf Wars. Contemporary studies continue to confirm the centrality of this relationship. Zhao et al. (2024) demonstrate significant spillover effects from geopolitical risks to crude oil, natural gas, and coal markets. Their findings reveal that heightened geopolitical tensions increase energy price volatility and systemic risk across global energy markets. Likewise, recent research by Kilian, Plante, and Richter (2024) shows that geopolitical risks associated with potential disruptions in oil supply have meaningful effects on oil prices and macroeconomic conditions, particularly through expectations and precautionary behavior in energy markets.

Besides, there are evidences of a two-way relationship between oil markets and geopolitical risk. Such findings indicate that energy markets not only respond to geopolitical events but may also reinforce broader geopolitical tensions, creating a feedback loop between energy insecurity and economic uncertainty. The Russia–Ukraine conflict provides

a particularly important empirical context for understanding these linkages. The conflict disrupted global energy markets, elevated transportation costs, and intensified inflationary pressures across advanced and developing economies. The International Monetary Fund (IMF) and World Bank have repeatedly highlighted how geopolitical conflicts affecting energy-exporting regions generate adverse macroeconomic spillovers through rising oil prices, deteriorating trade balances, and declining purchasing power. Import-dependent economies have been especially vulnerable due to their reliance on imported crude oil and intermediate goods. Recent assessments suggest that prolonged disruptions in major energy transit routes could substantially reduce global growth while accelerating inflationary pressures, thereby complicating monetary policy responses.

Emerging literature has also emphasized the role of political uncertainty in magnifying the effects of oil shocks on supply chains. Williams (2025) finds that oil price shocks generate significantly greater supply chain pressures during periods of elevated political uncertainty compared with periods of relative geopolitical stability. This evidence suggests that geopolitical uncertainty functions as a transmission amplifier, intensifying the economic consequences of energy market disturbances. The interaction between political instability, energy price volatility, and supply chain disruptions consequently creates a multidimensional source of macroeconomic vulnerability.

Overall, the existing band of literature resonates with complex and mutually reinforcing relationship between geopolitical risk, supply chain disruptions, oil market volatility, and macroeconomic outcomes.

The Baseline Model

The model developed in this paper resonates with Keynes-Kaldor tradition of macro-theoretic analysis of inter-sectoral linkage underplaying the determination of aggregate output and price level. Accordingly, the model showcases a small open economy with two production sectors – oil and non-oil – linked through input-output relationship, where the oil sector provides the fuel input to the production in non-oil sector at a fixed coefficient, denoted by β , as given technologically. Both the sectors are exposed to foreign trade through export and import, with the oil sector importing crude oil and exporting refined fuel facing competing in the global market from other oil exporter. The aggregate demand for oil sector output is thus generated from fuel consumption by end-users and firms in the non-oil sector, on the domestic front and import made other countries on external front, as determined by the arbitrage gap between the domestic oil price and international price. The output of domestic oil-sector is however constrained by the availability of crude-oil through import route, the volume which for simplicity, is held to fixed as denoted by Oc^* , given – (a) the global supply of crude oil is coordinated (and dominated) by the cartel of only a few countries exporting the same backed by their

vast reserve and (b) the domestic oil-producing firms are price-takers in the global market for crude oil. Further, import intensity of oil sector output, as measured by amount of imported crude required per unit output of refined oil, is assumed technologically given at ac . The domestic oil price (denoted by P_o), assumed to be flexible in nature, can freely adjust to clear the domestic oil market thereof. On the other side, output of non-oil sector is shaped by the demand sourced to final consumption use and investment use on domestic front and net export on external front, with the price being cost-determined and thus sensitive to domestic oil price. Denoting price of non-oil sector output by P_{no} , it stands out hence that P_{no} is an increasing function of P_o . The exchange rate determining comparing domestic prices with international counterpart is crucial to the export competitiveness of the each sector (especially, for the arbitrage gap determining oil export) and is assumed to be flexible in nature and is therefore free to adjust, in order to clear the external sector. However, the model does not incorporate financial sector of the economy and thereof assumes the interest rate to be exogenously given, having ruled out the cross-border of financial capital.

Thus, the overall layout of the model can be presented in terms of the following structural equations.

$$Y_{no} = C_{no} \left[\left(\frac{P_{no}Y_{no} + P_oY_o}{P_{no}} \right) (1 - \alpha) \right] + \bar{I} + NX_{no} \left(\frac{eP^*}{P_{no}}, y, y^* \right), 0 < C'_{no}(\cdot) < 1 \dots \dots \dots (1)$$

$$Y_{no} \equiv \frac{O_c^*}{a_c} = C_o \left[\left(\frac{P_{no}Y_{no} + P_oY_o}{P_o} \right) \alpha \right] + \beta Y_{no} + NX_o \left(P^* - \frac{P}{e}, \rho \right), 0 < C'_o(\cdot) < 1 \dots \dots \dots (2)$$

$$P_{no} = P_{no}(P_o), P'_{no}(\cdot) > 0 \dots \dots \dots (3) \quad NX_{no} \left(\frac{eP^*}{P_{no}}, y, y^* \right) + NX_o \left(P^* - \frac{P}{e}, \rho \right) = 0 \dots \dots \dots (4)$$

Where, $y \equiv P_{no}Y_{no} + P_oY_o$

Let us now explain the equations as mentioned above. The equation (1) demonstrates the condition of equilibrium in non-oil sector which clears through adjustment in Y_{no} equaling planned supply on the left-hand side with the planned demand on the right-hand side. The next export component of the demand for non-oil output varies directly with real exchange rate $\left(\frac{eP^*}{P_{no}} \right)$ and aggregate income of importing countries put together (y^*), while inversely with the domestic aggregate income (y). On the other end, the equation (2) signifies to equilibrium in oil sector as maintained by free adjustment in P_o . The right-hand side of equation (2) indicates the import-constrained output to be match under equilibrium with the aggregate demand demonstrated by the right-hand side comprising of final consumption, intermediate consumption by non-oil sector and net export sensitive to arbitrage gap $\left(P^* - \frac{P}{e} \right)$ and any other non-price factor, denoted by ρ , manifesting

international quality standard or international political sanction against oil export. The equation (3) resonates with the cascading effect of domestic oil price on the price of non-oil goods, given the latter being cost determined, while equation (4) signifies to the external equilibrium mediated through adjustment in foreign exchange rate (e). Accordingly, the model presented here has four endogenous variables, namely, Y_{no} , P_0 , P_{no} and e to be determined from equation (1) – (4). However, for purpose of clarity and precision one may focus on Y_{no} and P_0 as key endogenous variables and let other two to shape in correspondingly. Thus, one may substitute equation (3) and (4) into equation (1) and (2) and reduce the model to following equations, solving for equilibrium values of Y_{no} and P_0 and in turn from these determine the equilibrium values of P_0 and e .

$$Y_{no} = C_{no} \left[\left(\frac{P_{no}(P_0)Y_{no} + P_0Y_o}{P_{no}(P_0)} \right) (1 - \alpha) \right] + \bar{I} - NX_o \left(P^* - \frac{P_0}{e(P^*, P_0, y, y^*)}, \rho \right) \dots (1)'$$

$$\frac{O_c^*}{a_c} = C_o \left[\left(\frac{P_{no}(P_0)Y_{no} + P_0Y_o}{P_0} \right) \alpha \right] + \beta Y_{no} + NX_o \left(P^* - \frac{P_0}{e(P^*, P_0, y, y^*)}, \rho \right) \dots (2)'$$

Where, $e(P^*, P_0, y, y^*)$ derives from equation (4) using implicit function theorem

Plotting the reduced form equations in (Y_{no}, P_0) plane, we get two loci– one showing equilibrium in non-oil sector (denoted by NN in fig. 1) and the other showing equilibrium in oil sector (denoted by OO in fig 1.) and at the intersection of which come up the equilibrium values of Y_{no} and P_0 , consistent with market clearing exchange rate , as

$$Y_{no}^* = f \left(\frac{O_c^*}{a_c} P^*, y^*, \alpha, \beta, \rho \right) \dots (5) \quad P_0^* = g \left(\frac{O_c^*}{a_c} P^*, y^*, \alpha, \beta, \rho \right) \dots (6)$$

Substituting (5) and (6) in (4), we get the equilibrium e as $e^* = h \left(\frac{O_c^*}{a_c} P^*, y^*, \alpha, \beta, \rho \right) \dots (7)$

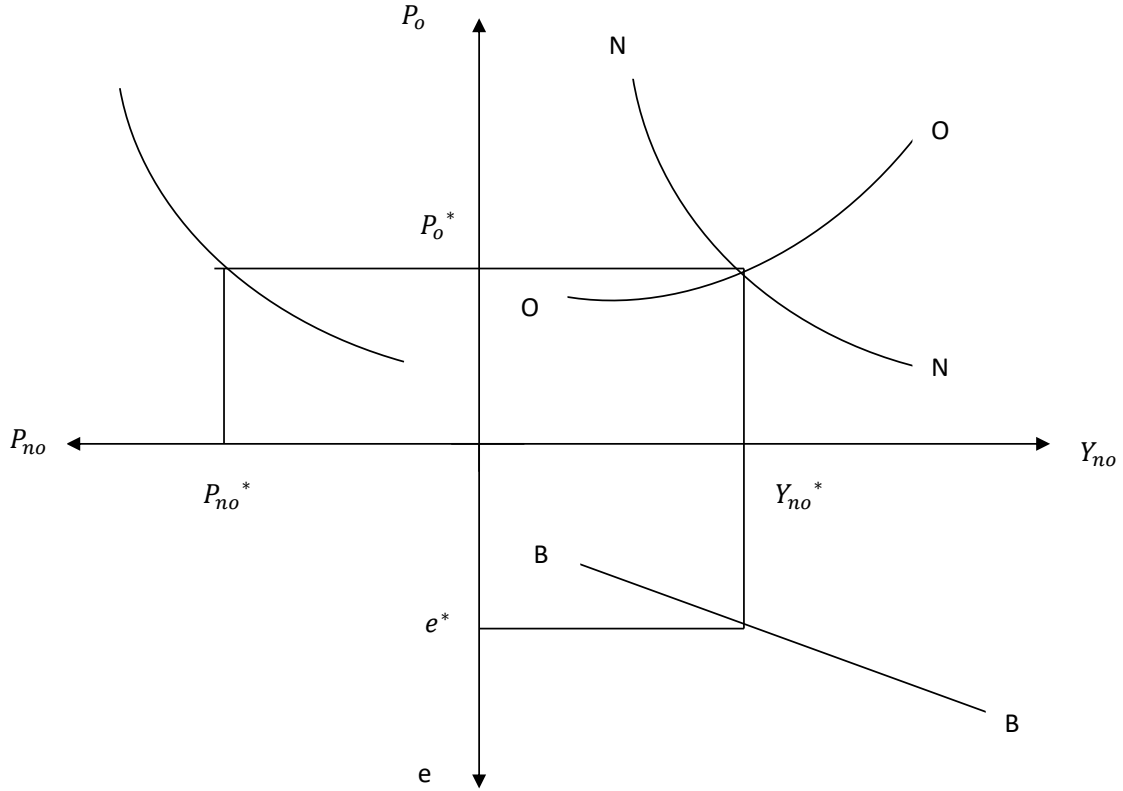


Fig.1

Here, fig.1 illustrates the determination of the endogenous variables of the model at equilibrium, as, Y_{no}^* , P_o^* , P_{no}^* and e^* . The right panel on top depicts the simultaneous operation of oil and non-oil sector at equilibrium with equilibrium exchange rate at e^* , as evinced by the intersection point of NN and OO curves traced out by such (Y_{no}, P_o) combinations that keep oil and non-oil at equilibrium respectively. Moving forward let us explain the rationale underlying the gradients of OO and NN curves. The OO curve as already is imprint of oil-sector being equilibrium at every point lying on the curve, so much so that a ceteris paribus increase in non-oil output raises the demand for oil as in input in the fixed proportion, β and in effect creates exceed demand for oil with its supply remaining intact, which in turn get cleared through increase in P_o , explaining why OO is positively sloped. On the other side the negative slope of NN curve can be primarily reasoned to how ceteris paribus increase in P_o makes real aggregate income, $\left(\frac{P_{no}Y_{no}+Y_oP_o}{P_{no}}\right)$

contract, with P_{no} rising proportionately more than rise in P_o and further the elasticity of P_{no} to P_o [denoted by ε_{no}] being greater than the share of oil-output in nominal GDP [denoted by θ_o] (as what the case may be for highly oil-intensive mode of production in non-oil sector) and consequently, a fall in the final consumption demand for non-oil output. This however stands athwart to the a possibility of increase in net-export of non-oil sector led by exchange rate shooting up, as result of fall in oil export due to arbitrage gap squeezed down by increase in P_o , given P^* . Nonetheless, the rigour of contraction in real income due to considerably high inflationary outcome of rise in P_o and resultantly, the fall in domestic consumption demand can be expected to outweigh the escalation of export demand for non-oil output and thereof, justifies the net fall in demand in non-oil sector, leading to decline in Y_{no} . The left panel on top in continuation shows the determination of non-oil price, as it stands being cost-determined. Finally, the bottom panel manifests the determination of equilibrium exchange rate keeping with equilibrium Y_{no} , P_o and P_{no} ; wherein it assumed that a real depreciation improves the trade balance vide Marshall – Lerner condition, which obviously worsens with the rise in nominal aggregate income as factor stimulating import of non-oil goods, warranting BB curve being positively sloped.

Mathematically expressed, the slopes of NN, OO and BB curve (for derivation see the Appendix at the end) are as given below.

$$\left(\frac{dP_o}{dY_{no}}\right)_{NN} = \frac{\varphi_1}{\varphi_2} \dots \dots \dots (8)$$

$$\left(\frac{dP_o}{dY_{no}}\right)_{OO} = (-) \frac{\varphi_3}{\varphi_4} \dots \dots \dots (9)$$

$$\left(\frac{de}{dY_{no}}\right)_{BB} = (-) \frac{\varphi_5}{\varphi_6} \dots \dots \dots (10)$$

Where,

$$\varphi_1 \equiv \left[1 - C'_{no}(1 - \alpha) + \left(\frac{\partial NX_o}{\partial q}\right) \left(\frac{\partial e^*}{\partial y}\right) P_{no} \right] > 0, q \equiv \left(P^* - \frac{P}{e}\right), \left(\frac{\partial NX_o}{\partial q}\right) > 0$$

$$\varphi_2 \equiv \left[C'_{no}(\theta_o - \varepsilon_{no}) \left[\frac{(1 - \alpha)}{P_{no}} \right] - \left(\frac{\partial NX_o}{\partial q}\right) \left[-\frac{1}{e_o^*} + \left(\frac{\partial e^*}{\partial P_o}\right) \left(\frac{P_o}{e_o^{*2}}\right) + \left(\frac{\partial e^*}{\partial y}\right) \left[\varepsilon_{no} + \frac{\theta_o}{1 - \theta_o} \right] \left(\frac{P_{no}}{P_o}\right) Y_{no} \right] \right] < 0$$

$$\varphi_3 \equiv \left[C'_o \left(\frac{P_{no}}{P_o}\right) \alpha + \beta - \left(\frac{\partial NX_o}{\partial q}\right) \left(\frac{\partial e^*}{\partial y}\right) P_{no} \right] > 0$$

$$\begin{aligned}\varphi_4 &\equiv \left[C'_o \left[\alpha(\varepsilon_{no} - 1) \left(\frac{P_{no}}{P_o} \right) Y_{no} \right] \right. \\ &\quad \left. + \left(\frac{\partial NX_o}{\partial q} \right) \left[-\frac{1}{e_o^*} + \left(\frac{\partial e^*}{\partial P_o} \right) \left(\frac{P_o}{e_o^{*2}} \right) + \left(\frac{\partial e^*}{\partial y} \right) \left[\varepsilon_{no} + \frac{\theta_o}{1 - \theta_o} \right] \left(\frac{P_{no}}{P_o} \right) Y_{no} \right] \right] < 0 \\ \varphi_5 &\equiv \left[\left(\frac{\partial NX_{no}}{\partial p} \right) \left(\frac{P^*}{P_{no}} \right) + \left(\frac{\partial NX_o}{\partial q} \right) \left(\frac{P_o}{e_o^{*2}} \right) \right] > 0, p \equiv \frac{eP^*}{P_{no}} \\ \varphi_6 &\equiv \left[\begin{aligned} &p(\varepsilon_{no}) \left(\frac{\partial NX_{no}}{\partial p} \right) P_o \\ &+ \left[\frac{1}{e_o^*} \left(\frac{\partial NX_o}{\partial q} \right) - \left(\frac{\partial NX_{no}}{\partial y} \right) \left[P_{no} + \left(\frac{P_{no}}{P_o} \right) Y_{no} \left(\varepsilon_{no} + \frac{\theta_o}{1 - \theta_o} \right) \right] \right] \end{aligned} \right] \left(\frac{\varphi_3}{\varphi_4} \right) < 0\end{aligned}$$

The signs of φ_1 , φ_2 , φ_3 and φ_4 as stated above are to be traced in the equilibrating role of the Y_{no} for non-oil sector in response to change P_o impacting demand for non-oil output and that of P_o for oil sector in response to change in Y_{no} impacting demand for oil. In particular, φ_1 represents the fall in excess demand (supply) per unit rise (fall) for non-oil output, created out of fall (rise) in P_o as represented by $(-\varphi_2)$. Similarly, φ_3 represents the excess demand (supply) created for oil created by expansion (contraction) of non-oil output and φ_4 represents the fall in such excess demand (supply) per unit increase (decrease) in P_o . Finally, φ_5 represents improvement in overall trade balance per unit increase in exchange rate counterbalancing the worsening of the same owing to unit increase in Y_{no} as represented by φ_6 . Now, it is worth noting that gradients of NN, OO and BB as described are as per required for the stability of the entire model (of macroeconomic equilibrium, alternatively said), with OO curve being steeper than NN curve, purporting to the domestic oil price being more prompt to adjust than what non-oil output happens to be. Thus the following proposition stand.

Proposition 1: The dependence on import for oil and fuel supply, crucial to domestic production, can intensify the susceptibility of macroeconomic order of a country to foreign trade to backlash of geopolitical turmoil hindering the international transit for movement of goods.

Geopolitical Turmoil, Oil Shock and Stagflation

Outbreak of geo-political turmoil embroiling oil exporting countries will cause disrupt the global oil supply and related logistics due to blockade in international transit, leading to a contraction of oil flow into oil-importing countries. In this paper, we have these developments aligned with geopolitical strife, by making O_c^* as increasing function of γ , denoting a geopolitical order or stability. In effect disruption of geopolitical stability due to outbreak of war involving oil-exporting countries may denoted by $d\gamma < 0$ and consequently the chocking off of oil supply imported may be denoted by $dO_c^* = O_c^{*'} d\gamma < 0$. Thus, the macroeconomic impact of oil shock led by

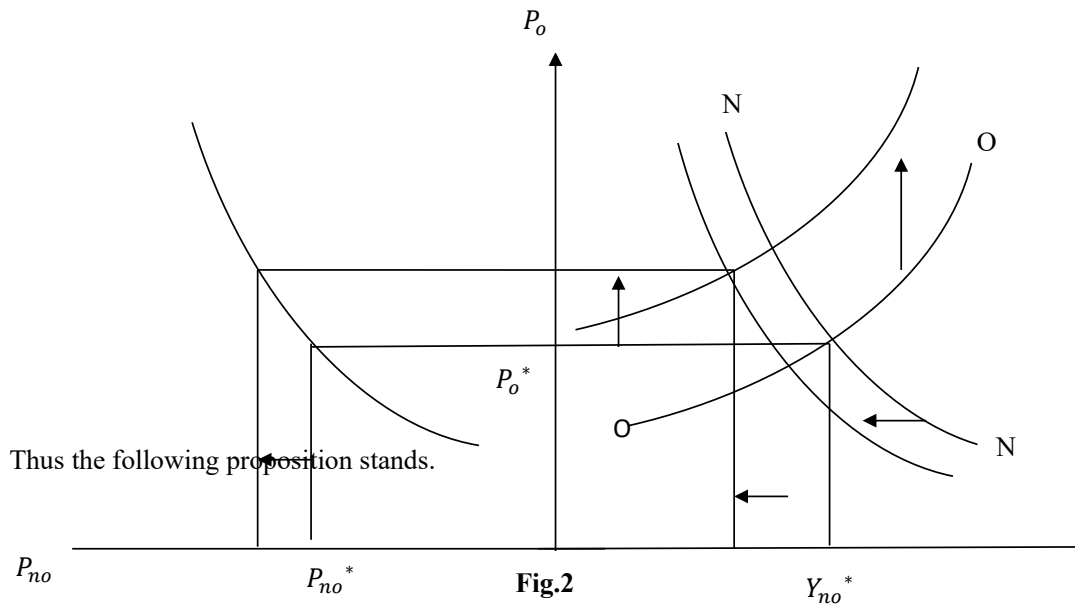
geopolitical disorder can be traced out using comparative static analysis of the effect of fall in γ on the equilibrium levels of Y_{no} , P_o and P_{no} . Hence the result is as follows.

$$dY_{no} = \left[\frac{C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha) \phi_4 + \frac{\phi_2}{a_c}}{|D|} \right] O_c^{*'} d\gamma < 0 \dots \dots \dots (11)$$

$$dP_o = \left[\frac{\left(\frac{\phi_1}{a_c} \right) - \phi_3 C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha)}{|D|} \right] O_c^{*'} d\gamma \dots \dots \dots (12)$$

$$dP_{no} = P'_{no} \left[\frac{\left(\frac{\phi_1}{a_c} \right) - \phi_3 C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha)}{|D|} \right] O_c^{*'} d\gamma \dots \dots \dots (13), |D| = \begin{vmatrix} \phi_1 & -\phi_2 \\ \phi_3 & \phi_4 \end{vmatrix} < 0$$

The above results evince negative multiplier effect of global oil-supply shock, coming up on the back of geopolitical inclemency, on non-oil sector output revealing a cumulative contraction of the same, however the effect on the domestic oil-price and consequently, non-oil price remains ambiguous. The reason behind such ambiguous case, being that a contraction of non-oil sector leads to proportional decline in demand for oil causing downward push in domestic oil, to be weighed inflationary impact of fall in domestic oil supply. Yet, it sounds logical to contend that the negative demand effect of contraction of non-oil output is likely to outweigh the initial price effect of fall in domestic oil supply, so that the domestic oil price ultimately ends up rising, further pushing up the non-oil price. The nuanced interplay of two opposite forces applying on domestic oil price leading to potential stagflation has been shown in fig.2.



a country vulnerable to geo-political crisis and global oil supply disruption manifesting in cumulative contraction of aggregate output and spiraling prices in its aftermath.

Energy Innovation and Economic Resilience to Geo-political Crisis

In the backdrop of the forgone analysis it is perhaps worth interesting to explore of energy innovation as step to combat the macroeconomic setback from geo-political disturbance hampering the international movement of critical goods influencing supply chain. To that end the paper envisages the introduction bio-fuel to shift the domestic energy base crude oil imported from outside (viz. Malaysia and Singapore are most emergent amongst a few countries currently exploring palm-oil based fuel as an alternative to conventional fuel derived from crude to pare import-dependence for domestic production). Here in the model, the potential role of energy innovation through shift in fuel base can be calibrated with the simple comparative exercise reflecting the effect of change the crude-oil content of fuel produced by oil domestic oil sector, as denoted by a_c . In particular the implication of energy innovation for economic insulation from geo-political war can traced to the impact of ceteris paribus fall in a_c on, Y_{no} and P_o as illustrated below.

$$dY_{no} = (-) \left[\frac{C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha) \phi_4 + (1 - C'_{no} \alpha) \phi_2}{|D|} \right] \left(\frac{Q_c^*}{a_c^2} \right) da_c > 0, da_c < 0 \dots \dots (14)$$

$$dP_o = \left[\frac{(1 - C'_0 \alpha) \phi_1 - C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha) \phi_3}{|D|} \right] \left(\frac{Q_c^*}{a_c^2} \right) da_c \dots \dots \dots (15)$$

As evident from the results aforementioned, transition in fuel base from crude to plant resource (as palm oil) and shift to bio-fuel can provide an upward lift to non-oil sector output by insulating the domestic oil supply against external disturbance choking off import. In other word, diversification of fuel base though bio-fuel engineering can help economy build a strong buffer for staying buoyant amidst global headwinds affecting the crucial supply and thus provides immunity against microeconomic backlash of oil-shock. However, the effect of energy innovation in term of stemming inflation is contingent upon the scale of diversification towards bio-fuel away from crude oil. In particular, expansion of fuel supply following the introduction of bio-fuel needs to strong enough relative to the increase in oil and non-oil demand deriving from the increase in aggregate income owing to expansion of aggregate output. This is essentially what the fig.3 illustrates.

tries with strong trade ties with West Asia beyond the conventional line, much in direction of leveraging innovation in the need of attaining self-reliance through indigenous capacity building. To this end the current paper may be seen as modest attempt to set some relevant perspectives for overhauling the existing regime and structures of economic policy in making way to resilient and sustainable future albeit frolics and frenzy led by vicissitudes of time.

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Appendix:

Slope of NN, OO and BB curve:

Total differentiation of equation (1)' and (2)' [respectively revealing equilibrium conditions in the non-oil and oil sector] holding all variables fixed except Y_{no} and P_o , respectively determine the slope of NN and OO curve as illustrated by equation (8) and (9). On the end, the derivation of the slope of BB curve comes in two steps – the first step being substitution of the equilibrium value of P_o , as given in equation (6) into the external sector equilibrium condition, given equation (4) and then differentiating the same totally holding everything fixed, except e and P_o in the second step.

Comparative static results:

- Impact of fall in O_c^* (due to on equilibrium levels of Y_o and P_o is traced out by totally differentiating equation (1)' and (2)' holding everything else fixed, except, Y_o , P_o and O_c^* and using Cramer's rule as what follows.

$$dY_{no} = \frac{\begin{vmatrix} C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha) O_c^{*'} d\gamma & -\varphi_2 \\ \frac{O_c^{*'} d\gamma}{a_c} & \varphi_4 \end{vmatrix}}{\begin{vmatrix} \varphi_1 & -\varphi_2 \\ \varphi_3 & \varphi_4 \end{vmatrix}}$$

$$dP_o = \frac{\begin{vmatrix} \varphi_1 & C'_{no} \left(\frac{P_o}{P_{no}} \right) (1 - \alpha) O_c^{*'} d\gamma \\ \varphi_3 & \frac{O_c^{*'} d\gamma}{a_c} \end{vmatrix}}{\begin{vmatrix} \varphi_1 & -\varphi_2 \\ \varphi_3 & \varphi_4 \end{vmatrix}}$$

- Similarly follows the other comparative results aligned with the impact of fall in a_c (as result diversification of fuel base and energy innovation) on equilibrium Y_o and P_o

BOOK REVIEW

Book Title: Contemporary Issues in Social Sciences

Editors: Dr. Subrata Kumar Ray, Subhajyoti Majumder,
Dr. Sudip Jana, Sharmistha Mukherjee

Genre: Edited Volume in Social Sciences

The volume *Contemporary Issues in Social Sciences* presents a comprehensive and timely exploration of some of the most pressing challenges confronting contemporary society. Bringing together contributions from scholars across multiple disciplines, the book addresses a wide range of topics, including the social status of Dalits in India, gender and identity politics, restructuring higher education for equitable growth, academic stress and student suicides, multidisciplinary and information science, environmental sustainability and economic development, pollution intensity, artificial intelligence in social science research, sustainable development in West Bengal, Indian Dharma and global legal prudence, behavioural finance, and the role of banks in economic development. The diversity of themes reflects the evolving nature of social science research and its increasing engagement with complex societal issues. One of the book's greatest strengths lies in its multidisciplinary approach. Rather than treating social, economic, political, environmental, and technological issues as isolated phenomena, the contributors demonstrate how these domains intersect and influence one another. This integrated perspective enables readers to appreciate the interconnectedness of contemporary social challenges and highlights the importance of collaborative research across disciplines.

The chapters addressing social justice provide particularly valuable insights. The discussions on the social status of Dalits in India critically examine persistent inequalities despite constitutional safeguards and affirmative action policies. Similarly, the chapter on gender and identity politics explores the changing dynamics of gender relations, social inclusion, representation, and identity formation in an increasingly globalized society. These contributions effectively combine theoretical perspectives with empirical evidence, making them relevant to both researchers and policymakers.

The chapters on higher education address the urgent need to restructure educational institutions to promote equitable growth, accessibility, and quality. The authors examine policy reforms, institutional governance, digital transformation, and inclusive educational practices, and also highlight the growing concerns surrounding academic stress and student suicides. These chapters offer a balanced discussion of structural challenges within educational systems and propose practical interventions for improving student well-being and institutional effectiveness.

Environmental sustainability emerges as another major theme throughout the volume. The discussions on sustainable development, pollution intensity, and economic growth underscore the delicate balance between environmental conservation and developmental aspirations. The chapter focusing on sustainable development in West Bengal provides valuable regional insights that enrich broader national and global debates. These contributions emphasize the necessity of integrating environmental concerns into public policy and development planning.

The inclusion of a chapter on artificial intelligence in social science research significantly enhances the contemporary relevance of the volume. The authors ex methodologies are transforming data collection, analysis, and policy evaluation while also discussing ethical considerations, algorithmic bias, and the future of human-centered research. This section effectively bridges traditional social science methodologies with emerging technological innovations.

Equally noteworthy are the chapters on Indian Dharma and global legal prudence, behavioural finance, and the role of banks in economic development. These topics broaden the scope of the book by integrating philosophical, legal, psychological, and financial dimensions into contemporary social science discourse. The discussion on behavioural finance provides important insights into decision-making processes beyond conventional economic models, while the examination of banking institutions highlights their crucial role in fostering inclusive economic growth and financial stability.

The editorial organization deserves appreciation for maintaining coherence despite the diversity of subjects. Each chapter is logically structured, supported by relevant literature, and concludes with meaningful observations that encourage further inquiry. The language remains accessible without compromising academic rigor, making the volume suitable for postgraduate students, researchers, faculty members, and policy practitioners. Nevertheless, the volume has certain limitations. Given the breadth of topics covered, some chapters could have benefited from deeper comparative analyses and greater engagement with international literature. A stronger thematic synthesis in the concluding section would have further strengthened the integration of the various contributions. Additionally, greater methodological consistency across chapters would enhance the overall coherence of the edited volume.

The edited volume titled '*Contemporary Issues in Social Sciences*' represents a significant contribution to interdisciplinary scholarship. It successfully captures the complexity of contemporary social transformations while offering valuable theoretical insights, empirical evidence, and policy recommendations. The volume demonstrates that addressing today's societal challenges requires multidisciplinary perspectives and collaborative research approaches. Overall, this book serves as an important academic resource for

scholars, educators, students, policymakers, and professionals interested in understanding the multifaceted issues shaping modern societies. Its breadth of coverage, analytical depth, and contemporary relevance make it a worthwhile addition to university libraries and research collections. The volume not only contributes to ongoing academic debates but also encourages critical reflection on the future direction of social science research in an increasingly interconnected world.

Reviewer – **Dr. Sanghamitra Brahma,**
Associate Professor in Management,
Amity Business School, Amity University Kolkata

BOOK REVIEW

Book Title: *The Interconnected Economy: Eastern Himalayan Perspectives*

Editors: Yojna Kharga, Dr. Subrata Kumar Ray, Manojit Dasgupta,
Dr. Gouranga Das

The edited book volume titled '*The Interconnected Economy: Eastern Himalayan Perspectives*' is a unique contribution to the growing scholarship on the socio-economic transformation of the Eastern Himalayan region. Bringing together research from economics, sociology, geography, environmental studies, public policy, and development studies, the volume offers a comprehensive understanding of the interconnected nature of economic development, ecological sustainability, indigenous knowledge systems, and community wellbeing in one of India's most ecologically fragile and culturally diverse regions. The collection aligns with contemporary debates on sustainable mountain development, emphasizing that economic progress in the Himalayas must be understood through the interconnected lenses of environment, society, culture, and governance. The contributors successfully demonstrate how livelihoods, migration, financial inclusion, environmental ethics, gender relations, and tourism are deeply interconnected. The volume highlights that development in the Eastern Himalayas cannot be separated from the unique ecological characteristics and indigenous cultural traditions of the region.

The chapter examining **migration and tea plantation labour** provide valuable insights into the historical and contemporary dynamics of labour mobility in the tea-growing districts of North Bengal. The discussion effectively illustrates how seasonal and permanent migration has shaped both plantation economies and household livelihoods. The contributors of the chapters devoted to **mountain horticulture** and **sustainable agriculture** convincingly argue that horticultural diversification offers a viable pathway for improving rural incomes while preserving fragile mountain ecosystems. Through discussions of organic farming, high-value crops, climate adaptation, and value-chain development, the volume highlights the importance of environmentally responsible agricultural practices. The chapter on **sustainable development in Sikkim** demonstrates how environmental conservation, organic agriculture, eco-friendly governance, and community participation have together created a distinctive development model. The chapter acknowledges ongoing challenges while illustrating important lessons for sustainable regional planning. The analysis reinforces the growing recognition of mountain regions as laboratories for sustainable development policies. Financial development receives thoughtful attention through chapters on financial access in Kalimpong and financial inclusion through micro-

finance that examine the role of banking institutions, digital financial services, self-help groups, and microfinance institutions in expanding economic opportunities among marginalized populations. The discussion moves beyond conventional financial indicators by emphasizing financial literacy, institutional accessibility, and community participation. The empirical findings demonstrate that inclusive financial systems contribute not only to poverty reduction but also to entrepreneurship and social empowerment. The discussions on sustainable community development advocate participatory planning models that place local communities at the centre of development initiatives. Rather than imposing externally designed policies, the authors argue for integrating indigenous knowledge with modern development planning.

The chapters exploring **indigenous environmental ethics and collective wellbeing in the Eastern Himalayas** are among the most intellectually engaging sections of the book. They demonstrate how traditional ecological knowledge has contributed to biodiversity conservation, sustainable resource use, and climate resilience across the Eastern Himalayas. By documenting local belief systems, customary institutions, and community conservation practices, the contributors challenge the assumption that modern scientific knowledge alone can address environmental crises. Understanding of development beyond conventional economic indicators encompass social cohesion, cultural identity, ecological sustainability, and community resilience. This multidimensional perspective reflects recent developments in development economics and human wellbeing research, offering a more holistic framework for assessing regional progress. The volume also presents an insightful discussion on **rural and eco-tourism** as an emerging strategy for livelihood diversification. Rather than promoting mass tourism, the contributors advocate responsible tourism practices that preserve local culture, generate employment, and minimize ecological degradation. The case studies demonstrate that community-based tourism can simultaneously support conservation and rural economic development when appropriately regulated. The discussion of **Bihbare Haat and socio-economic development** provides a compelling micro-level case study of traditional rural markets as institutions of local economic integration, and how periodic markets function not only as centres of commercial exchange but also as spaces of social interaction, cultural continuity, and regional connectivity.

Methodologically, the book benefits from a balanced combination of qualitative interviews, household surveys, field observations, case studies, policy analysis, and interdisciplinary theoretical perspectives. The use of diverse research methods enables the contributors to present nuanced interpretations while maintaining empirical credibility. The inclusion of localized case studies from Sikkim, Kalimpong, Darjeeling, and other Eastern Himalayan areas enhances both the authenticity and policy relevance of the research.

In conclusion, this edited volume successfully demonstrates that sustainable development in mountain regions requires integrated approaches that recognize the interdependence of economy, ecology, culture, institutions, and community participation. It makes a significant scholarly contribution by moving beyond conventional economic analyses toward a holistic understanding of development in the Eastern Himalayas. Its orientation, empirical richness, methodological diversity, and policy relevance make it an important reference for future research on mountain economies and sustainable regional development. The book deserves a wide readership among academics, researchers, government agencies, and development organizations working on sustainable development in ecologically sensitive regions. It stands as a meaningful addition to the expanding literature on the complex relationships between economic growth, environmental stewardship, and human wellbeing in the Eastern Himalayas.

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BOOK REVIEW

RURAL DEVELOPMENT IN INDIA: PROSPECTS AND CHALLENGES

Dr. Subrata Kumar Ray, Subhajyoti Majumder & Nabanita De

(Kunal Books, New Delhi, Price Rs- 1095.00)

The book on “Rural Development in India: Prospects and Challenges” is a collection of research papers based on scholarly articles written by authors belonging from different branches of social sciences. The focal theme was based on rural development and its various prospects and challenges highlighting the Indian context. The authors have thrown light on the state of negligence and impoverishment of the Indian villages as a result of past legacies and faulty planning structure. In this perspective, different approaches including System approach, Structural approach, Non-classical decision making approach etc. have been analyzed.

Micro-finance has emerged as a powerful tool for poverty alleviation and financial inclusion in many Indian villages. The transformative role of micro-finance has somewhat intensely affected the socio-economic landscape of the rural areas. While analyzing the Indian rural scenario the case of West Bengal did make a promising appearance. Over the last five decades, rural West Bengal has experienced a significant transformation in women’s social consciousness and participation in the development process.

The rural India has undergone significant, multi-faceted changes with the face of reforms since independence. The five-year plans have transformed the nation from a stagnant exploitative colonial economy to a diversified and self-reliant one. The reforms of 1991 have integrated the Indian agriculture into the global trade market opening up opportunities for agricultural export. However, rural India is still facing several challenges towards progress.

With the rest of the world, India is also progressing towards a digital economy, the rays of which have touched the Indian villages too. Digital India has offered scope for rural connectivity and rural entrepreneurship at micro and meso levels.

This book encompasses rich and vivid concepts of rural development in Indian context. The book will provide an insightful journey of the Indian villages with its different facets of development.

Dr. Anandita Dawn

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BOOK REVIEW**INDIA'S DEVELOPMENT: SECTORAL ISSUES AND DIMENSIONS****Dr. Subrata Kumar Ray, Dr. Sudip Jana & Sharmistha Mukherjee***(Kunal Books, New Delhi, Price- Rs- 1195.00)*

The book on “India’s Development: Sectoral Issues and Dimensions” is a collection of research papers based on scholarly articles written by authors belonging from different branches of social sciences. India is one of the fastest-growing large economies globally, with its GDP continuing to expand at a robust pace. Significant capital injections into public infrastructure—including railways, highways and smart cities—are supported by a resilient manufacturing and construction base. The implementation of the Goods and Services Tax (GST) and the expansion of the digital public infrastructure (like Unified Payments Interface - UPI) have revolutionized commerce and financial inclusion. India’s successful emergence in the world economy has often been attributed to this liberalized trade and industrial policy regime. Essentially, the existing literature on India’s development experience analyses its economic performance in an attempt to link it with the broad theoretical contours of outward versus inward-looking industrialization and development. India’s development experience has attracted significant attention in the field of economic development. While literacy has been a critical means of choosing livelihoods and empowering people as well as a crucial indicator of socio-economic development, in Indian society literacy is historically low with substantial gender gap observed.

India stands at a pivotal juncture in its developmental journey as it envisions of becoming ‘Vikshit Bharat’. India’s current macro-economic trends including GDP, inequality, unemployment and infrastructural gaps have been pointing towards a more inclusive economy with institutional reforms. Significant capital injections into public infrastructure—including railways, highways, and smart cities—are supported by a resilient manufacturing and construction base. The country has steadily climbed the United Nations Human Development Index (HDI) due to sustained improvements in national income and mean years of schooling.

This book encompasses rich and vivid concepts of development in Indian context. The book will provide an insightful journey of the India’s era of development with its different facets of economic growth and inclusion.

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