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Staff Advisor's Note

It gives me immense pleasure to introduce the third volume of the Ramjas Economic Review that continues the tradition of publishing peer-reviewed scholarly articles. Exposure to and encouragement of research work by students in an undergraduate programme is an important part of education. The Ramjas Economic Review along with the Annual Winter Conference of the Department of Economics and the Ramjas Economics Society research project initiative provides platforms that encourage students to pursue research work of their interest.

The past year has been extraordinary and difficult because of the pandemic. Despite all hurdles, students have written and contributed research articles, and the editorial board has kept up its work through the difficult times to bring out the journal while continuing to maintain high standards. The editorial board has been working relentlessly the past many months sending out the call for papers and encouraging students from all over the country to submit articles and editing them at every stage. Shortlisted articles have been reviewed by two reviewers and articles accepted after the suggested revisions have been incorporated. I take this opportunity to congratulate the editorial board for their superb work and to thank the faculty for reviewing the shortlisted papers.
I hope the young readers find the articles interesting, informative and challenging. At the same time, I strongly urge you all to continue with your research work in the future.

Dr. Mihir Pandey
Staff Advisor
Ramjas Economic Review

Editor-in-Chief 's Note

It is always a daunting yet exciting challenge to take on the reins of anything that has achieved phenomenal success in the past. The task of succeeding becomes serious when one considers the long history which precedes it. Following the much-celebrated acclaim garnered by the previous volumes of the journal in its current form, I, on behalf of the Editorial Board, take great honour to present before you the third volume of Ramjas Economic Review (ISSN: 2582-6093), the annual academic journal of the Department of Economics, Ramjas College, University of Delhi. The present volume was conceptualised, drafted and curated by the Editorial Board in the midst of the havoc wreaked by COVID-19. Some of us were personally affected by the vicissitudes of the pandemic. It took long meetings over the Internet and countless discussions on matters both important and trivial with members, faculty and others to finally bring out the result of what has been an exceptionally rewarding experience.

The academic skill of writing manuscripts allows undergraduates (and other students, alike) to gain conceptual clarity and rigour via the application of classroom theory to the outside world. It produces knowledge in whatever limited way it can and pushes the frontiers of the discipline. It allows students to develop critical interests in their respective chosen fields. However, enough emphasis is not laid on the promotion of this skill in the Indian university space. Our discipline faces this problem quite acutely. Bound in textbook curriculum, a typical undergraduate student in economics at an Indian public university has to go out of their way to write and publish quality papers and essays worthy of being discussed by their peers. Ramjas Economic Review is the present manifestation of a culture long upheld by the Department of Economics at Ramjas College that seeks to ignite the curiosity and inquisitiveness of young, eager undergraduates to probe the world as they experience it. It provides a rich space for aspiring economists to share their work with a wider audience following a thorough, painstaking review process. This allows students to refine their academic research and critical thinking skills which equips them to further take on intellectually stimulating endeavours.

The present volume of the journal is a testament to the diversified interests of the authors who sent their work for consideration. From mainstream issues in the discipline revolving around interest rates, trade and globalisation to heterodox topics in political economy and gender, we received submissions from institutions spread all across the country. The process of selection of entries from the brilliant pool of entries for further reviewing is always a tough job. We have tried to eliminate all possible biases in the selection phase. Following this, the chosen entries were sent for a double-blind peer review process followed by a plagiarism test to uphold academic integrity. We had to reject some manuscripts in the middle of the entire process since they had been previously published elsewhere. I would like to congratulate all the authors whose work is featured in this edition. I extend my heartiest gratitude to all those who considered our journal worthy enough

to send their work to and cooperated with us on matters of revisions and the publishing decision regarding their entries.

This journal would not have seen the light of the day without the efforts of the people with whom I have thoroughly enjoyed working. In the process, I have learnt a great deal. I would like to highlight my appreciation and thankfulness for all the reviewers who took the time out to provide detailed and timely feedback on the entries. I would like to thank the entire faculty of the economics department for the support and encouragement extended towards us in pursuit of our goals. Their contribution in the making of this journal is invaluable. I would like to thank Mr. Alok Dash, our Teacher In-Charge, for his assistance in various stages of the process. I would like to extend my gratitude towards our Staff Advisor Dr. Mihir Pandey for ensuring the smooth functioning of the editorial board. His advice was sought in several matters during the course of the academic year. A special mention goes to Dr. Apoorva Gupta for her guidance and remarks on several aspects of the journal. Without her efforts and cooperation, there would have been extensive challenges in the review process. I am also grateful to the Student Council of The Ramjas Economics Society for their cooperation.

I would like to end my note by recognising the role played by the editorial board members themselves in the making of this journal. This year was immensely tumultuous for many people we know. In addition to the various hardships brought by the pandemic, the members had to honour their academic commitments. In spite of all this, they displayed exceptional professionalism and meticulousness in their work. Their hunger for knowledge and learning was evident in the numerous discussions on various matters ranging from economic theories to popular culture. Various team-building exercises that were held throughout the year are moments that I will always cherish. Ritik Goel, Deputy-Editor in Chief, played an instrumental role in leading several initiatives. His humour and cheerfulness lifted our spirits when times seeked bleak. The perseverance and dedication of Arshita Garg was highly useful on several occasions throughout this period. She was responsible for a number of activities that sought to make our editorial board more inclusive and fun. I am highly grateful to Sanjana Saxena for their designing and multitasking skills which have often been employed. Their insights on matters consulted were highly significant. Vedant Deshpande deserves a special mention here. Being the most interesting conversationalist ever, his supplies of reading material and critical insights are something we are heavily indebted to. Namit Mahajan, G. Soundharya, Krisha Kapur and Ashi Agarwal showed serious commitment to the work allotted to them. Despite being first-year students, they displayed remarkable professionalism and engagement in several activities. To say that I got a brilliant team would be an understatement; I could not have asked for a better one. It is safe to say that the future of Ramjas Economic Review rests on reliable shoulders.

Rijul Alvan Das
Editor-in-Chief
Ramjas Economic Review

THE ADVENT AND EVOLUTION OF SOCIAL DEMOCRACY

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Abstract

This paper attempts to explore the philosophy of social democracy and trace the path from its inception to its current state, investigating the reasons behind its post-war dominance in Europe and the subsequent fallout in the following decades. It carries out a systematic appraisal of social democracy, covering its historical development and its performance in the electoral arena. The paper also categories a set of nation-states into social democratic and neoliberal, and then conducts a cross-sectional analysis based on several development indicators.

JEL Classification: B00, P51, P16
Keywords: Social Democracy, Neoliberalism, Welfare Economics, Political Economy

1. INTRODUCTION

Late modern history has been shaped by a sustained the tussle between capitalism and socialism. This tussle seemed to end with the fall of the USSR, even as the socialist movement refused to fall out of relevance. Francis Fukuyama called it the "end of history"- the conclusion of humankind's ideological development with the establishment of liberal democracy as the final world order (Fukuyama 1992). In the midst of this, there was another political movement playing out in Europe, and fairly successfully at that. Social democracy often gets the rough end of the dichotomy between capitalism and socialism in that it gets left out of the political economy debate. However, the fact remains that it is ideologically distinctive, and needs to be acknowledged and appreciated. It is difficult to think of another ideology that has evolved, for better or worse, to the extent that social democracy has. Even though it emerged from the socialist movement and played an influential role in shaping the global economy post World War II, one would be hard-pressed to find it visible in the mainstream discourse. In 'Understanding Social Democracy', Sheri Berman observes that the primary reason for this invisibility is "a simple confusion of terms". As social democracy has evolved so much over time, its fundamental positions have also become obscured with it.

It's very common to see terms such as 'welfare state' and 'welfare capitalism' being used to describe social democracy. There is some truth to these descriptions, but they're far from being comprehensive. It thus becomes imperative to cultivate perspective on such an important socio-economic force and map the historical change that took place on its authority, while also making an informed judgement over the future trajectory of the movement.

2. LITERATURE REVIEW

The subject of social democracy has attracted a lot of academic interest, particularly in the second half of the 20th century. The most prominent contemporary work on the political economy of social democracy comes from Sheri Berman's 'The Primacy of Politics'. This paper extracts a lot of essential inputs from Berman's work, specifically concerning the historical development of the movement. Tony Judt published two illuminating works in the first decade of the 21st century. 'Postwar: A history of Europe since 1945' traces the direction and the subsequent dominance of social democracy in the political economy of Europe. It also outlines the creation of the Keynesian Welfare State as a response to the aftermath of the war years. In 'Ill Fares the Land', Judt critiques the vulgar individualism that has seeped into the lifestyle of western high societies and articulates several suggestions for the future of social democracy.

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The aforementioned works form the most important contemporary literature on social democracy, but Eduard Bernstein's 'Evolutionary Socialism: A Criticism and Affirmation' remains the theoretical foundation from which subsequent authors have derived their central lines of argument. Bernstein's work will be further discussed in the later sections of this paper. In academia, there have been several scholars who have endorsed social democratic solutions to public policy dilemmas. Paul Krugman, Joseph Stiglitz, Eric Maskin, George Akerlof and Kenneth Arrow in the US, and Gunnar Myrdal and Jan Tinbergen in Europe- all of whom have been recipients of the Nobel Memorial Prize for Economic Sciences- have advocated for a prominent role of the state in influencing the lives of the citizens. Thomas Piketty's most important work till date, 'Capital in the Twentieth Century', focuses on income inequality in Europe and the United States and has very strong social-democratic undertones. The central proposition of his research, r>g, is a crucial insight into the forces that drive inequality, but it remains a very hotly debated topic among many economists (Wolfers 2014).

3. THE IDEOLOGICAL INCEPTION

The roots of the social-democratic movement can be traced back to late nineteenth-century Europe. Discord had started to brew among the socialists of various groups across the continent due to the orthodoxy and dogmatism, perceived or otherwise, of Marxism (Berman 2006). This then led to the social democrats rejecting their initial commitment to Marxism and created the necessary space required for revisionism to grow out of it in the form of social democracy- achieving the objective of socialism by the means of democratic institutions instead of a violent revolution. The juggernaut of unfettered capitalism had, on one hand, furthered the exploitation of labour, and on the other, disrupted the conventional social life of the workers. This provided an impetus to the working-class struggle against state machinery, and in the process, led to the mobilization of workers into formal organizations (Wallerstein 1983). Yet, social democracy did not have a proper theoretical framework until Eduard Bernstein composed his seminal work 'Evolutionary Socialism: A Criticism and Affirmation' in 1909. He directly challenged the cornerstone of orthodox Marxism, historical materialism- a theory developed by Marx

which places the changing economic mode of production as the driving force behind history. Additionally, the course of political action chosen by him was that of reforming the system from within as opposed to destroying it and building a new one altogether, which is in direct contrast to Marx's proposition. Marx's insights into capitalism further disillusioned him, and he began seeing at least some legitimacy in capitalism's affinity for efficient and fast-paced growth (Meyer and Hinchman 2007, 111). In the aftermath of the Second World War, a consensus was reached among the European nation-states that the ravages of the war could only be overcome through communitarian state policies to ensure economic and social stability. The mistake of letting capitalism go unchecked was to be avoided, which they did not after the first World War (Berman 2005). However, over the course of the second half of the 20th century, social democracy warmed up further to capitalism. Today, the guiding principle for social democracies is the safeguarding of social justice within the ambit of the free market.

4. ELECTORAL PERFORMANCE

This section will deal with only the major social democratic parties, following the scope of the paper. When dealing with matters related to social democratic parties, or social democracy in general, it is important to take caution and note that most of them were not founded as such, but rather drifted away from their initial orthodox Marxist position.

The SPD (Sozialdemokratische Partei Deutschlands), arguably the most influential social democratic party in the world, was founded in Germany in 1875. It was initially known as SAP (Sozialistische Arbeiterpartei) and played a vital role in the socialist revolution (Reschke, Krell, and Dahm 2013, 32). By 1912, it had become the biggest party in Germany with 110 seats in the Bundestag (Wolfers 2014). This was, indeed, before it had given up its revolutionary aspirations. As the chairman of SPD, Friedrich Ebert became the first democratically elected head of state of Germany in 1919 (Reschke, Krell, and Dahm 2013, 51). Post-war, in what was known as West Germany, the first general elections were held in 1949 where the SPD formed the primary opposition party with a vote share of 29.2 percentage to the elected CDU (Christlich Demokratische Union)

(Sasson 1998). The decisive step towards the future of SPD and the modern social democratic movement came in 1959 when the party adopted the Godesberg Programme, which was characterized by its acceptance of the market economy to some extent. This acted as a catalyst for the stagnant popularity of the party, and it finally came to power in 1966 in coalition with CDU. In the Bundestag election of 1972, SPD became the biggest party in Germany with a vote share of 45.8 per cent (Reschke, Krell, and Dahm 2013, 90-103). It came back to power in 1998 again after 16 years in opposition, however, in the 21st century its popularity has been on a downward trend with the party securing only 20.5 per cent of the votes in the 2017 elections; their worst performance to date (Clark 2019). Recently, the party has been struggling to win back its core voter base and mobilise support.

The Social Democratic Party of Austria (SPO) was founded under the name of the Social Democratic Workers' Party (SDAP) in 1889. As was the case with many left-wing governments of the time, the SPO endured harsh persecution under the occupation of Nazi Germany (Pelinka 2013, 33-34). In the post-war period since 1945, it has been the most successful party in the country, winning 18 out of the 23 general elections. However, in the latest elections of 2019, the party secured just 21.2 per cent of the total votes- their lowest ever yet (Álvarez-Rivera 2019). Austria, not unlike many parts of the world and Europe itself, has seen a shift towards the right as far as political results and the public discourse are concerned. And while SPO remains the second-biggest party in the country, it's important to note their failure to come to power in a coalition, something they've managed to do for the better part of the post-war period.

The Danish Social Democratic Party (Socialdemokratiet) also colloquially known as The Social Democrats (Socialdemokraterne) was established in 1871. Their performance in the national elections has been underwhelming; however, they have managed to consistently take office in the local elections (Christensen 2013, 88 and 93). Even though it has not been a dominant force at the national level, its demotion to the second-largest

party in the country and a trend of losing votes in successive elections has been the primary concern for the party in the 21st century.

Much like most other prominent social democratic parties, the SAP (Sveriges socialdemokratiska arbetareparti) in Sweden was founded in the last quarter of the 19th century. The party has been a prominent symbol of social democracy and a successful model of welfare state across the world. Be that as it may, the SAP could not escape the deflation in vote share in the 21st century; a phenomenon experienced by social democratic parties across the European Union (Tsarouhas 2013, 347-355). The party has been in power since 2014 in a minority coalition and remains the biggest party in the country (Álvarez-Rivera 2018).

The Social Democratic Party of Finland (Suomen Sosialidemokraattinen Puolue), initially known as the Labour Party of Finland (Suomen Työväenpuolue), was established in 1899 (Hastings 2013, 107-112). It was the best-performing party in the 20th century and often ended up in the opposition even after securing the highest number of votes. It also assumed a dominant role in multiple coalition governments. However, in the last decade or so, its electoral performance has undergone severe deterioration as it suffered its worst defeat ever in 2015 with a vote share of only 16.5 percentage. The party has come back to power in the recent elections of 2019, but their dwindling vote share remains a cause of worry (Álvarez-Rivera 2019).

It is quite evident that there has been a marked decline in the electoral performance of several social democratic parties across Europe in the 21st century. It's not clear yet if this was due to their failure to come up as a viable alternative to austerity induced politics which took prominence in the 1970s, or their gradual shift towards further reforms.[1] This is by no means an exhaustive account of the electoral record of social democracy. There have been significant contributions to the social democratic movement outside the European Union, most notably in New Zealand (Gustaffson 1974, 331-345), Canada (Wiseman and Isity 2007, 567-589), Australia (Macintyre 1986, 3-14) and even in a sub-national

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[1] Austerity is a set of policy measures aimed at reducing the fiscal deficit of the government. This typically results in heavy cuts in public expenditure. Paul Krugman, in his column *The Austerity Agenda* for The New York Times, talks about this at length in the context of the British Government under the then Prime Minister David Cameron.

government like the state of Kerala in southern India (Sandbrook et al. 2007, 65-92). This, however, should provide sufficient context for the performance of social democratic parties in the electoral arena.

5. COMPARATIVE ASSESSMENT

Before proceeding with a cross-section analysis of social democracies, it's important to lay down general policy-making practices that characterize them. Modern social democracies boast of some of the freest economies in the world, a fact which can be corroborated by the annual index of economic freedom published by the Heritage Foundation.[2] This can often blur the not-so-fine line between social democratic and neoliberal economies, and therefore calls for the addition of some important caveats to the discussion. It can be argued that social democracy, as opposed to neoliberalism or libertarianism, prioritizes social justice over economic efficiency to an extent. The social democratic states, therefore, need to ensure some principal socioeconomic rights to their citizens. These broadly include (a) universal access to

essential public goods — healthcare and education; (b) dignity in the workplace — right to form unions, safe working conditions, fair wages and pay equality; (c) social security — unemployment and retirement benefits (Meyer and Hinchman 2007, 23-24). Further, the objective of redistribution is to be generally met through high–income taxes. The social democratic state, then, derives its legitimacy from these rights alone and all policymaking is practised to guarantee these fundamental rights. Neoliberalism, on the other hand, stands in direct contrast with the aforementioned rights. It espouses the abolition of minimum wage, employment protection, formation of unions and high taxes. Lastly, social democracies follow a Keynesian framework of sorts. The state plays an active role in steering the market to minimize the unequal outcomes of capitalism and correct the inefficiencies that it invariably produces.

We can now classify countries as social democratic and neoliberal based on these guidelines and carry out a comparative review. Since this is a contemporary assessment, the period under consideration will be 2000-2019.

Table 1: *GDP Per Hour Worked in USD (constant prices 2010 and PPPs) and indices*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	97.505	90.52	97.965	93.35	96.21	93.62	93.38	89.825
Latest	104	107.4	101.4	102.4	100.5	103.8	101.2	116.4
Highest	105	107.4	102.7	102.4	100.5	103.8	101.2	116.4
Average growth rate p.a.	0.99	2.45	0.79	1.34	0.85	1.47	0.94	3.55

Source: OECD

Table 2: *Trade Union Density (in percentage)*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	69.47	88.8	50.18	74	26.4	11.47	20.6	7.98
Latest	60.3	91.8	49.2	65.6	23.4	10.1	17.3	4.3
Highest	75.1	92.5	52.4	86.6	29.7	12.9	22.4	14
Average growth rate p.a.	-1.14	-0.88	-0.34	-1.59	-1.3	-1.33	-1.48	-6.14

Source: OECD

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[2] For more information about the Index of Economic Freedom, refer to : https://www.heritage.org/index/about?version=1116

Table 3: *Unemployment Rate (in percentage)*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	8.24	4.2	3.7	7.04	5.67	5.88	5.02	9.02
Latest	6.69	3.54	3.7	6.77	3.77	3.67	3.58	4.4
Lowest	6.37	2.29	2.56	5.6	3.77	3.67	4.1	4.4
Average growth rate p.a.	-1.57	-1.31	1.59	1.46	-1.29	0.94	-1.39	-1.79

Source: OECD

Table 4: *Labour Compensation per hour worked (Total Annual growth rate (percentage))*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Latest	1.61	5.09	3.94	4.22	3.66	3.13	4.12	5.8
Highest	4.36	8.02	6.51	8.12	6.45	6.53	7.98	25.69
Average growth p.a.	2.54	6.23	4.46	3.54	3.26	3.11	3.74	8.68

Source: OECD

Table 5: *Average Wages in USD(constant prices 2016 and PPPs)*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	45 698	68 006	54 027	46 695	47 226	65 836	44 031	30 297

Source: OECD

Table 6: *Life Expectancy at birth*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	80	82	81	81	80	78	80	74
Latest	82	83	83	83	81	79	82	78
Highest	82	83	83	83	81	79	82	78
Average growth rate p.a.	0	0	0	0	0	0	0	1

Source: World Bank

Table 7: *Tertiary Education Attainment (per cent of 25–64year-olds)*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	39	35.06	39	35.46	37	41.9	37	35.05
Latest	45.93	45.04	44.13	43.97	47.19	48.34	39.07	41.37
Highest	45.93	45.04	44.13	43.97	47.19	48.34	39.29	42.37
Average growth rate p.a.	2.03	3.06	2.17	2.09	3.3	1.49	1.93	1.97

Source: OECD

Table 8: *Total researchers per thousand labour force*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	14	10.14	11.21	12.67	8.57	8.47	9	6.5
Latest	13.72	10.28	12.24	13.82	9.08	8.87	9.65	7.04
Highest	14.93	10.28	12.24	13.82	9.08	8.87	9.97	7.04
Average growth rate p.a.	-1.37	1.44	2.76	6.44	2.2	2.07	-	1

Source: OECD

Table 9: *Total GHG emission(excluding LULUCF) in thousand kilograms per capita*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	12.95	14.5	11.26	6.56	9.86	22.76	18.26	14.5
Latest	10.21	14.43	9.75	5.16	6.94	20.29	16.63	15.1
Highest	16.36	17.19	12.46	7.79	12.16	25.02	19.8	16.56
Average growth rate p.a.	-1.2	-0.06	-1.23	-2.1	-3.01	-1.34	-0.77	1.7

Source: OECD

Table 10: *GINI Coefficient (0-1)*

	Social Democratic				Neoliberal			
	Finland	Iceland	Norway	Sweden	UK	US	New Zealand	Estonia
Mean	0.275	0.279	0.273	0.276	0.342	0.408	0.408	0.329
Latest	0.274	0.268	0.27	0.288	0.348	0.414	0.419	0.304
Highest	0.283	0.318	0.316	0.296	0.360	0.415	0.470	0.372
Average growth rate p.a.	0.05	-0.03	0.06	0.42	-0.23	0.18	0.4	-1.34

Source: World Bamk; Stats NZL for New Zealand

We first look at the productivity levels across both groups in Table 1. This is measured by the GDP per hour worked. There isn't much to split between the two groups. Iceland and Estonia seem to be the clear outliers across both the groups, but productivity remains more or less similar otherwise. The latest figures for productivity are also the highest in the given period, which is not surprising given the natural progression of technological advancement.

Table 2 represents the trade union density in the countries. This convincingly illustrates perhaps the most important distinction between social democracy and neoliberalism- that of the workers' movement. Although both groups have seen a drop in the density, social democracies still maintain a reasonably high magnitude.

Table 3 looks at the unemployment rates. Neoliberal countries seem to do a tad better, on average, at tackling unemployment. Their latest figures are also closer to the lowest in the given period.

OECD defines labour compensation per hours worked as the ratio of compensation to employees in the national currency to the total number of hours worked. As evident from Table 4, both groups perform roughly likewise. Additionally, the recent figures suggest Iceland and Estonia do considerably better than the rest.

Table 5 shows the data for mean wages. The mean wages take into account the aggregate wages, average number of workers in the economy, average usual weekly hours per full-time employee and average usually weekly hours for all employees. Estonia's numbers are, more than anything else, a reflection of its much younger economy. In time, it will likely revert to its actual mean, which is certainly higher than its current figure. The rate of productivity growth in Table 1 points towards this conclusion.

Tables 6 and 7 display the life expectancy at birth and the tertiary education attainment by 25-64 year-olds. At the start of the century, Estonia, and the US had a life expectancy at birth of 70 and 77 respectively. Estonia added 8 years, while the US added 2 during this period. Even after accounting for population density and lower base, Estonia's progress is pretty

remarkable. The United Kingdom and the United States do relatively better than social democracies in tertiary education attainment, but New Zealand does significantly worse.

Table 8 presents the status of research and development in both groups. Total researchers per thousand labour force is a measure of how robust the system of research and development is in creating new knowledge. Clearly, social democracies perform much better than neoliberal economies on this front. This vindicates the social-democratic preference of heavy public investment in academia.

The current global climate crisis requires the immediate attention of the entire world, but more so of the developed economies. Table 9 looks at the outcomes on the environment. The greenhouse gas emissions (excluding Land Use, Land Use Change and Forestry) have been controlled more convincingly by social democracies. Estonia is the only country across both groups with a positive average growth rate of GHG emissions per annum, which, as mentioned earlier, is a reflection of its relatively young and growing economy.

Table 10 presents the data on income inequality. The GINI coefficient, which is the most popular measure of income inequality, explains the proportion in which income is distributed across the population. Social democracies comfortably outmatch their neoliberal counterparts in this regard, and unsurprisingly so, given the ideological priorities concerning the subject of inequality and re-distribution of income.

Importantly, the above data also negates the conservative apprehensions towards unions. There's no conclusive evidence to suggest that strong unions come in the way of efficient entrepreneurial action. In fact, the social democracies have achieved high productivity, competitive wages and labour compensation in the presence of very powerful unions. Iceland, for instance, has the highest average wages and labour compensation per hour worked, and the second-highest GDP per hour worked across both groups, with a trade union density of almost 92%. It also has the lowest unemployment rate and GINI coefficient.

6. THE WAY FORWARD

It would be an interesting thought exercise to ponder upon the possible outcomes had much of the world, but Europe specifically, not gone the Keynesian way in the post-war period. In many ways, it was a reflection of the social anxiety and the economic woes, marred by ethnic antagonisms, that Europe attempted to tread towards a more collective conscience in building not only its institutions but also enhancing its culture. In the subsequent decades, this collective conscience was distributed by a spate of vulgar individualism, mildly in some parts and violently in others, owing to the emergence of Thatcherism and Reaganism. The flag bearers of the Chicago school of economics, and Milton Friedman in particular, acted as fervent catalysts of this transition. Subsequently, social democratic parties gave in to the Washington Consensus and adopted some neoliberal policies into their party programmes,

for which they garnered criticism from their core base. This criticism continues to persist even today. The current global pandemic has again disturbed the consensus, though, and not just across Europe. It has laid bare several vulnerabilities of our institutions and exhibited that collective action is something worth preserving. Will this usher in a new era of social democracy, just like the post-war period, as nation-states attempt to recover from the debris of the pandemic? Perhaps. To take an instance from pop culture, in Kim Stanley Robinson's Mars Trilogy, Mars goes under a human occupation and the society thus created mirrors that of much of the world today; an unequal and skewed one. The story concludes with the Martians taking hold of the government and developing a constitution to transform the society into what one would call social-democratic today. Equally, perhaps it won't. But one could certainly anticipate (and even wish for) such a prospect to come to fruition.

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THE IMPACT OF GLOBALISATION ON FEMALE LABOUR FORCE PARTICIPATION IN OECD COUNTRIES: AN EMPIRICAL ANALYSIS

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Abstract

This paper empirically investigates the relationship between female labour force participation and globalisation in OECD countries. It emphasizes the multifaceted aspect of globalisation and its segregation into three major components namely– economic, social and political. The dataset used for this study has been compiled from larger datasets provided by the KOF Economic Institute and World Bank. A panel dataset of 37 OECD countries over 25 years (1993-2017) is being used. The paper presents economic arguments for the behaviour of variables chosen for the study along with the need to study these variables separately to understand female labour force participation trends.

JEL Classification: C51, F66

Keywords: Globalization, Female Labour Force participation, OECD

1. INTRODUCTION

The increase in women's participation in the labour force and the acceleration in globalisation in the past few decades has compelled us to study and establish a relationship between the two. This study tries to discern if this increase in women's labour force participation can be attributed to rising international interconnectedness.

It is imperative to study the female population in isolation since a significant amount of gender discrimination and inequalities exist in all parts of the world. One of the most important components of understanding the trends in female labour economics is to understand the political and social climate along with the economic climate. However, more often than not, only economic variables are factored in a study undertaken to analyse Female Labour Force Participation (FLFP). To incorporate all aspects of globalisation, we have chosen three KOF Globalisation Indexes as a way to quantify globalisation. These indexes are relatively newer and therefore do not have a lot of literature indicating directional changes. This paper explores the relation of these indexes vis-à-vis the FLFP. Along with these indexes, we have selected Gross Domestic Product

(GDP) and Total Fertility Rate (TFR) as independent variables to get a more comprehensive picture of the preferences and factors that affect employment choices.

We have selected a panel dataset consisting of 37 OECD countries over 25 years from 1993 to 2017. The premise behind the choice of this dataset is the existence of healthy trade agreements and relations among the countries. Furthermore, we found a lot of literature discussing the impact of globalisation in developing countries but not so much on high-income countries. Economic theory suggests that preferences are diverse across economic levels. Therefore, it seems reasonable to understand the pattern of the female labour market in high-income countries too.

The theoretical framework for this investigation is discussed in the following section. The literature on the subject is discussed in Section 3. The econometric model and estimation methods utilised in this study are described in Section 4. Section 5 gives a full explanation of the dataset for econometric estimation that was generated from multiple data sources. Section 6 includes estimates, findings and interpretations based on various estimating

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approaches. Section 7 concludes by connecting some of the findings of our paper with the theoretical difficulties raised in Section 2.

2. THEORETICAL FRAMEWORK

This study emphasises the multifaceted aspects of globalisation and the impact it has on female labour force participation. Globalisation has mostly been interpreted in terms of Economic Globalisation, which is the integration of global financial, product and labour markets. However, this definition seems very limited which pushes us to explore other viable components of globalisation along with the impact of trade and foreign direct investment. The analysis of this study follows a multidimensional view towards understanding the impact of globalisation on labour, particularly the female labour force.

The definition that has been taken into account describes globalisation as the process of creating networks of connections among actors at intra-continental or multi-continental distances, mediated through a variety of flows including people, information and ideas, capital and goods. Globalisation is a process that erodes national boundaries, integrates national economies, cultures, technologies and governance, and produces complex relations of mutual interdependence (Gygli et al. 2019). Our study will include three components of globalisation which are *economic, social and political globalisation.*

Human capital development has been reaping the benefits of globalisation. It has been claimed that globalisation has positively impacted the development of human capital in OECD countries. However, how such benefits have impacted the labour force is yet to be explored.

We believe that the rise in women's labour force participation coincides with trade liberalisation in many countries. By empirical analysis, we seek to find how much has the opening up of the economy affected female labour force participation. Intuitively speaking, we can divide our arguments into two parts, One part is the conservative approach and the other being a rather optimistic one. The former has its reservation as to the magnitude in which globalisation has impacted women and predicts a negative relationship between economic globalisation and FLFP. Conversely, the latter suggests that increased economic globalisation is a harbinger of GDP growth, consequently increasing the general level of income which would lead to an increase in wage. As a result, the opportunity cost of leisure for women becomes very high and can lead to a trade-off, thus increasing their participation in the labour force.

Social and political variables underpin the structure of an economy. Therefore, it is reasonable to study all these components separately to derive the results of the impact of these three pillars (economic, social and political) individually to gain insight into the interplay of various globalisation factors. We believe that international interactions of whatever nature (economic or social) would lead to the diffusion of ideas and norms. The more they engage in this activity, the more are they likely to absorb the ideas of various societies. This intuition is based on the same logic as the voting rights revolution. The idea of cultural freedom has proven to be contagious in the past. Although the impact of these variables is rather ambivalent, the precedence suggests that *social globalisation* is likely to have a positive impact on women's labour force participation.

To study the relationship between fertility and FLFP, we take into account the time allocation model (Becker 1965) which recognises that women not only arbitrate between leisure and labour but between leisure, labour (supplied in the market to buy goods and services) and home production of goods and services. Taking care of young children falls into the last category. Traditionally, mothers have been considered to have low labour force attachment, suggesting a fall in the FLFP rate around childbirth.

We have used GDP per capita as a proxy to analyse the growth of the country. Literature suggests an increase in income levels can lead to major decision changes for substituting between work and leisure for women as it is believed that low-income countries have higher female labour force participation due to their greater involvement in subsistence activities.

After doing a basic correlation analysis, we found a weak positive correlation of FLFP with economic globalisation. We found a weak negative correlation between FLFP and political globalisation and a positive correlation with social globalisation.

Due to the paucity of data, we were not able to control for variables such as health and education that would act as a proxy for welfare. However, this does not in any way undermine our study since we are primarily focusing on how social, political and economic globalisation influence labour force participation by women.

3. LITERATURE REVIEW

Globalisation has had wide-ranging economic, social, and political implications on the world. Following the onset of the industrial age and the expansion of international trade, it became rather intriguing to analyse the repercussions via empirical evaluation. It has been found that globalisation has promoted competition and standards among countries which has, in turn, resulted in higher product quality. However, there has been little discussion about the impact of globalisation on human capital in terms of labour force participation.

Economic theories and empirical studies largely support the beneficial effects of economic integration on economic growth (Sachs et al 1995). When looking at different stages of development, a rise in trade has a direct and significant impact on economic growth (Dowrik and Golley 2004). The theory of comparative advantage suggests that an economy can produce certain goods at a lower opportunity cost than its trading counterparts, hence pushing for gains of trade. However, demographics of this have not been discussed thoroughly in relation to what all globalisation has changed. Bussmann argues *"Social tensions, reflected in street protests and poll results, force politicians to slow down economic reforms. A challenge for policymakers is to avoid a ''backlash of globalisation' (Rodrik 1997) by striking a balance between economic integration and social disintegration, while also assisting people who must absorb the distributive costs of economic interdependence. Globalisation will leave some people winners and others losers."* (Bussmann 2009)

Although it has been claimed in many studies that trade liberalisation has improved the macroeconomic health of the country in addition to raising income standards, the distribution of this income might not have been equitable. There are several ways in which political, social and economic globalisation can impact women. For starters, more international exposure to sectors with a high female concentration or new opportunities created for them as a result of globalisation-induced changes in labour requirements would affect female demand relative to male demand (Knowles, Lorgelly and Owen 2002; Sauré and Zoabi 2014). Intuitively speaking, globalisation is a carrier of superior technology not only by exports, imports or FDI but also by exchange of ideas, removal of cultural barriers and impact on political economy. As more capital-intensive technology is introduced into industrial processes as a result of globalisation, new career prospects for women emerge as physical strength becomes less important (Juhn et al. 2014). However, this can be counterproductive. Female participation in the labour force would fall if the associated technologies are complementary to males, as females in developing nations lag in education (Gaddis and Pieters 2016).

So far, the discourse has revolved around the changes in the demand for female employment pertaining to globalisation. Focusing on supply-side impacts shows, however, that liberalisation of trade and investment may modify male income and thus, household income. Consequently, this triggers changes in the female labour supply (Gaddis and Pieters 2016). As a result of globalisation, more women have greater opportunities for income-generating jobs. Increased work choices provide more methods to escape unequal relationships and a greater variety of opportunities for the application of their skills and labour. Households are one of the first places where the benefits of enhanced employment opportunities for women are reflected. Women's position and relative power improve as households grow increasingly reliant on female income (Gray, Kittilson and Sandholtz 2006). There is additional evidence that economic changes connected with globalisation may also provide the seeds for cultural changes that enhance women's status. In an impressive study of public attitudes toward gender roles in seventy nations, Inglehart and Norris (2003) argue that economic growth is only a part of the

story; substantial changes in social norms, beliefs, and values are also necessary to bolster women's roles in society and politics. They find that industrial and post-industrial nations are more likely to support gender equality than agrarian nations. More supportive attitudes toward women's equality then provide fertile soil for the formulation of concrete policies that help women to gain equal rights and opportunities. All these factors cumulatively lead to enhanced political and social roles.

The relationship between women's labour force participation and TFR is a topic that has received a lot of attention in the literature of demography and economics. This is one of the variables this study controls for. According to Bowen and Finegan (1969), an increase in TFR can have opposite effects on FLFP, one being a positive influence and the other being negative. In the context of our dataset, the relationship between TFR and FLFP has given rise to an alternative 'societal response' hypothesis stating a positive relationship between FLFP and TFR. Due to the institutional changes in OECD countries since the 1980s, women have been able to combine work and childcare more efficiently. Studies have found that societal level responses such as changing perspectives towards working mothers, rise in availability of childcare and implementation of paid parental leaves have resulted in a change in the relationship between FLFP and TFR from negative to positive in the 1980s (Ahn and Mira 2002; Brewster and Rindfuss 2000).

4. ECONOMETRIC MODEL AND ESTIMATION METHODS

The analysis examines the impact of globalisation on female labour force participation in 37 OECD countries.

The econometric model used in this study has been expressed in equation (1). Here, 'i' refers to the number of cross-sectional subjects in the panel dataset and 't' refers to the time dimension of the panel dataset.

FLFP $= \beta_0 + \beta_1 \textbf{KOFEcGI}_{it} + \beta_2 \textbf{KOFSoGI}_{it} + \beta_3 \textbf{KOFPoGI}_{it} + \beta_4 \textbf{GDP}_{it} + \beta_5 \textbf{TFR}_{it}$ (1)

i= 1,2,......37
t=1,2,.......25

Here, β_1, β_2, β_3, β_4, β_5 represent the regression coefficients of the model given in equation (1). The explanatory variables chosen along with data sources are mentioned in Table 2. We have assumed that all the variables are strictly exogenous for the simplification of model estimation.

The estimation methods which have been used in this study are Pooled OLS estimation, Fixed Effects estimation and Random Effects. Intuitively speaking, given the data set of OECD countries, we believe using pooled OLS will not provide for the suspected heterogeneity among the countries. We are dealing with a short panel (N>T) and we strongly believe that individual or cross-sectional units in our sample are not random drawings. Therefore, we believe that the Fixed Effects method would be the right estimation technique. Moreover, "even if it is assumed that the underlying model is pooled or random, the fixed effects estimators are always consistent" (Gujarati and Gunasekar 2017).

The econometric model given in equation (1) has been estimated by all three estimation methods. The decision regarding the most appropriate estimation method(s) has been made based on the F-test, Hausman test, and Breusch–Pagan Lagrange Multiplier test.

F–Test (Pooled OLS v/s Fixed Effects)
H_0: Both Pooled OLS and Fixed Effects methods give consistent estimators.
H_1: Fixed Effects method gives consistent estimators.

Hausman Test (Fixed Effects v/s Random Effects)
H_0: Both Fixed Effects and Random Effects methods give consistent estimators.
H_1: Fixed Effects method gives consistent estimators

Breusch– Pagan Lagrange Multiplier test (Pooled OLS v/s Random Effects)
H_0: Both Pooled OLS and Random Effects methods give consistent estimators.
H_1: Random Effects method gives consistent estimators.

Table 1: *Estimation Method Tests*

	F-Test	Breusch-Pagan Lagrange Multiplier test	Hausman Test	Appropriate Estimation Method
statistic	22.625	6577.5	69.032	
P-value		< 2.2e-16	1.629e-13	
	Null Rejected	Null Rejected	Null Rejected	Fixed Effects

Source: Authors' calculation

5. THE DATA

This study uses a panel dataset that has been compiled from larger datasets provided by the World Bank and KOF Swiss Economic Institute. The compiled dataset includes data on 37 OECD members (Australia, Austria, Belgium, Canada, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea Republic, Lithuania, Latvia, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States). The data is from the years 1993 to 2017.

The description of the data on the dependent and independent variables is given in the following table.

Table 2: *Data Description*

Variable	Classification	Abbreviation	Source
Female labour force participation rate (% of female population ages 15+)	Dependent	FLFP	World Bank
Economic Globalisation (KOF index)	Independent	KOFEcGI	KOF Swiss Economic Institute.
Social Globalisation KOF index)	Independent	KOFSoGI	KOF Swiss Economic Institute.
Political Globalisation (KOF index)	Independent	KOFPoGI	KOF Swiss Economic Institute.
GDP at Constant 2010 prices (US Dollar)	Independent	GDP	World Bank
Total Fertility Rate (Absolute Number)	Independent	TFR	World Bank

Our first explanatory variable is KOF *Economic Globalisation*, which has two components: KOF Trade and KOF Financial Globalisation, second is KOF *Social Globalisation* that consists of three main components: KOF Interpersonal Globalisation, KOF Informational Globalisation, KOF Cultural Globalisation and third is KOF *Political Globalisation*. These indexes are further divided into *de jure* and *de facto* components (see Appendix 3).

We have taken the composite index value for this study. The fourth explanatory variable is GDP per capita (constant 2010 US Dollar) and the fifth is the *total fertility rate.*

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental economic organisation, founded to stimulate economic progress and world trade. It is only reasonable to test the effects of different attributes of globalisation on most 'globalised' countries of the world. Given healthy trade relations among OECD countries, it comparatively controls for heterogeneity.

According to the World Bank, 34 out of the 37 OECD members are classified as 'OECD High-Income' Countries. 26 countries belong to Europe, 3 countries to America, 3 to Asia and 2 to Oceania.

Table 3: *Descriptive Statistics of the compiled dataset*

Variable	Mean	Standard Deviation	Median	Minimum	Maximum
Female labour force participation rate (% of female population ages 15+)	51.30	8.09954	52.16	23.05	73.74
Economic Globalisation (KOF index)	71.32	12.44486	73.10	30.60	93.60
Social Globalisation (KOF index)	77.34	10.35913	79.80	40.80	92.30
Political Globalisation (KOF index)	84.73	12.27894	89.18	34.57	98.59
GDP at Constant 2010 prices (US Dollar)	33784	-	33573	4713	111968
Total Fertility Rate (Absolute Numbers)	1.691	0.4097596	1.614	1.052	3.182

Source: Authors' calculation

6. ESTIMATION RESULTS AND INTERPRETATION

In this section, the results based on the Pooled OLS, Fixed Effects and Random Effects (Swamy-Arora) estimation methods are presented. Based on the results of our tests namely: the F-test, Hausman test, and the Breusch-Pagan Lagrange Multiplier test, correct estimation method(s) are determined. Later, this section discusses the results based on the chosen appropriate method(s).

The descriptive statistics of the compiled dataset and the results of the F-test, Hausman test, and the Breusch- Pagan Lagrange Multiplier test are presented in Table 1. The results from equation 1 by different estimation methods are given in Table 4 to Table 6.

Table 4: *Pooled OLS*

Independent Variables	Estimates
Intercept	28.272 (10.9459)
KOFEcGI	-0.24153 (-10.2945)
KOFPoGI	-0.25191 (-14.3940)
KOFSoGI	0.77531 (22.4277)
GDP	-0.000014595 (-1.1251)
TFR	1.2484 (2.4613)
R^2 adjusted	0.48015

Source: Authors' calculation

( ) – t values

Table 5: *Fixed effects (within) model*

Independent Variables	Estimates	Standard Error
KOFEcGI	-0.099572*** (-5.4718)	0.018197
KOFPoGI	-0.039922* (-2.1081)	0.018937
KOFSoGI	0.15873*** (7.2636)	0.021852
GDP	0.00033171*** (17.9705)	0.000018458
TFR	-0.12888 (-0.2680)	0.48096
R^2 adjusted	0.47322	

Source: Authors' calculation
( ) – t values

Table 6: *Random Effects OLS*

Independent Variables	Estimates
Intercept	38.40096877 (22.0091)
KOFEcGI	-0.09908234 (-5.3881)
KOFPoGI	-0.05312783 (-2.8153)
KOFSoGI	0.18587230 (8.4404)
GDP	-0.000014595 (0.00029589)
TFR	0.06166779 (0.1278)
R^2 adjusted	0.4695

Source: Authors' calculation

As found in Section 3 and on the basis of statistical tests, it can be inferred that the Fixed Effects estimation method is the most appropriate method for this study. Therefore, this supports our intuition regarding the choice of the estimation method. Hence, the estimation results given in Table 5 are all that are required for statistical inference and interpretation.

It can be seen that there exists an inverse relationship between economic globalisation and female labour force participation. The coefficient value suggests that a one-unit increase in KOFEcGI will lead to an average decrease in FLFP by 0.09 units. This result is supported by various studies that suggested a decline in FLFP as a result of an increase in trade amongst nations. Trade and financial globalisation being a component of economic globalisation substantiate the negative sign of the coefficient, thereby suggesting either the trade opportunities have been 'crowding out' women or there is less participation due to an increase in household income as a result of the substitution of work with leisure.

The coefficient of political globalisation suggests a negative relationship between political globalisation and FLFP with an average decrease of 0.03 units of female labour force participation with every one unit increase in political globalisation. It is a rather volatile variable, dependent on treaties, communication and bilateral agreements. Global politics, realistically speaking, does not factor in women empowerment or development of all sections of society. Hence, a negative sign seems plausible.

The coefficient of social globalisation suggests a positive relationship with the dependent variable. With every one unit increase in social globalisation, there is, on average, a 0.15 unit increase in FLFP. The sign of this coefficient is *a priori.* We have mentioned earlier in the paper that the socialisation effect leads to enhanced roles of women in all spheres including the labour force.

GDP coefficients suggest a positive relationship between GDP per capita and FLFP. However, the coefficient value is very low with a one-unit increase in GDP per capita leading to an average increase of 0.0003 units. The explanations in terms of the effect of GDP are rather ambivalent and we believe it depends mostly on the data set chosen, the status of

the countries, and work-leisure preferences of women.

The total fertility rate is the only estimate that came out to be insignificant. One unit increase in the total fertility rate will lead to a decline in FLFP by an average of 0.12 units. We have still included this variable as childbearing is considered the primary duty of women according to various societal norms and a major determinant of employment decisions. According to the literature on OECD countries which suggest there might be a positive relationship due to institutional changes, the sign is not a priori. However, since it is statistically insignificant, we will not go further into determining if institutional changes have led to a positive influence if at all it exists.

The model is free from the problem of perfect multicollinearity as indicated by finding the Variance Inflation Factors (VIFs). All of them were less than 4.[1] However, we faced a problem of heteroscedasticity which was solved by using White's robust standard errors (see Appendix 1). However, after correcting for heteroscedasticity, KOFPoGI is rendered insignificant to this model. Given its ambivalent nature, the result seems plausible. The model also faces the problem of autocorrelation, which can be corrected by the use of Instrumental Variables. However, that is beyond the purview of this paper.

7. CONCLUSION

We started this study to provide empirical proof that social, economic and political factors impact women's labour force participation rate. Concluding the results mentioned in the previous section, economic globalisation seems to have a significantly negative impact on FLFP. Social globalisation has a positive impact and statistically significant impact on FLFP. However, political globalisation, when corrected for heteroscedasticity, has a positive but statistically insignificant impact.

This study throws light on the fact that high-income countries have different results when compared to developing countries with regards to women's labour force participation. Many factors such as work-leisure preferences, household income, working conditions, etc. will play a role in determining it. We find it imperative to shed some light on the fact that social globalisation is one of the important determinants affecting women's labour force participation rate. The Social Globalisation Index comprises international tourism, transfers, international voice traffic, migration, patent applications, international students and high technology exports. This factor impacts the cultural environment of a country and thus, positively impacts FLFP.

One aspect that remains unexplored in this paper is the impact of the fertility rate. Given our chosen dataset: OECD countries, the literature on the relation of FLFP with TFR is ambivalent and is subject to institutional policies and age structure. Unlike high population countries, we cannot readily conclude a negative relationship between the two. However, here in our paper, we do find such a relationship. TFR in the past has had a dual impact in some cases. Hence, a detailed analysis is required on the subject which, as mentioned earlier, is beyond the scope of this paper.

Although independent variables support significant effects, the coefficient values are much lower than we expected. This model can further be developed by using Instrumental Variables. The model also assumes exogeneity for practical purposes. Endogeneity and simultaneity have to be judged to get efficient estimators. Due to the paucity of data available (in a continuous interval) we could not control for a few variables. The estimators will have more precise values once controlled for.

APPENDIX

A.1 Robust Standard Errors: Correction for Heteroscedasticity

Independent Variable	Estimate	Robust Standard Error
KOFEcGI	-0.099572 (-1.9233)	0.051770
KOFPoGI	-0.039922 (-0.9587)	0.041643
KOFSoGI	0.15873* (2.3122)	0.068646
GDP	0.00033171*** (5.5692)	0.000059561
TFR	-0.12888 (-0.0785)	1.6420

( ) – t statistic

A.2. Scatter plot of Female Labour Force Participation and the different explanatory variables as given in Equation 4
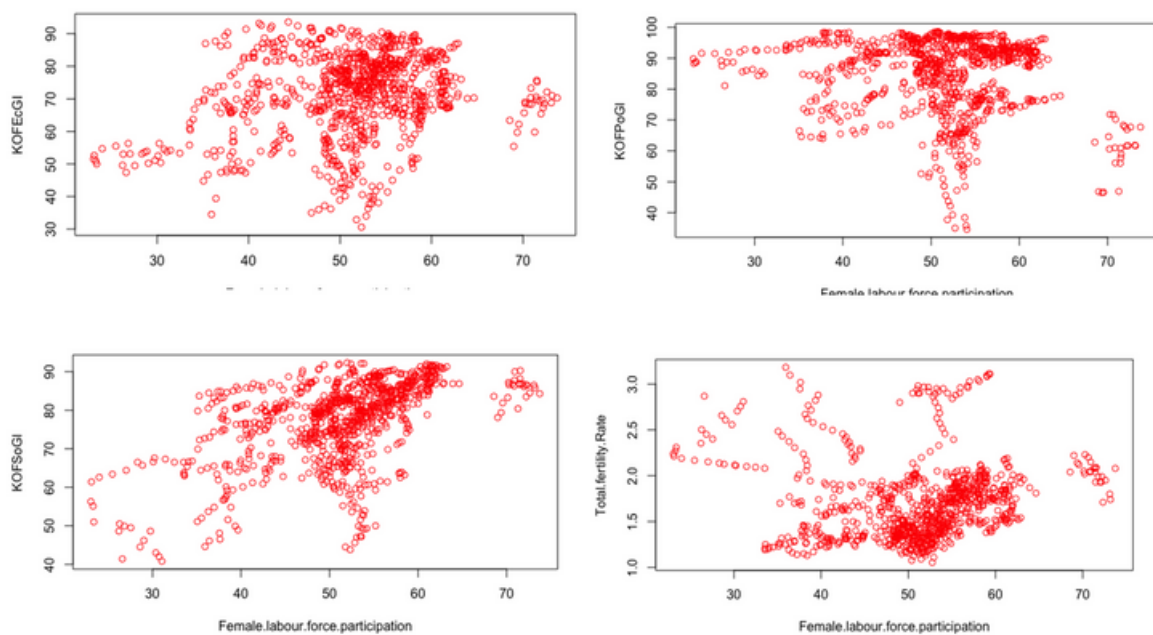
Significance codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '

A.3. Structure of the KOF Globalisation Index

Globalisation Index, de facto	Weights	Globalisation Index, de jure	Weights
Economic Globalisation, de facto	*33.3*	*Economic Globalisation, de jure*	*33.3*
Trade Globalisation, de facto	*50.0*	*Trade Globalisation, de jure*	*50.0*
Trade in goods	40.9	Trade regulations	32.5
Trade in services	45.0	Trade taxes	34.5
Trade partner diversification	14.1	Tariffs	33.0
Financial Globalisation, de facto	*50.0*	*Financial Globalisation, de jure*	*50.0*
Foreign direct investment	27.5	Investment restrictions	21.7
Portfolio investment	13.3	Capital account openness 1	39.1
International debt	27.2	Capital account openness 2	39.2
International reserves	2.4		
International income payments	29.6		
Social Globalisation, de facto	*33.3*	*Social Globalisation, de jure*	*33.3*
Interpersonal Globalisation, de facto	*33.3*	*Interpersonal Globalisation, de jure*	*33.3*
International voice traffic	22.9	Telephone subscriptions	38.2
Transfers	27.6	Freedom to visit	31.2
International tourism	28.1	International airports	30.6
Migration	21.4		
Informational Globalisation, de facto	*33.3*	*Informational Globalisation, de jure*	*33.3*
Patent applications	35.1	Television	25.2
International students	31.2	Internet user	31.9
High technology exports	33.7	Press freedom	13.2
		Internet bandwidth	29.7
Cultural Globalisation, de facto	*33.3*	*Cultural Globalisation, de jure*	*33.3*
Trade in cultural goods	22.6	Gender parity	31.1
Trademark applications	13.3	Expenditure on education	30.9
Trade in personal services	25.6	Civil freedom	38.0
McDonald's restaurant	23.2		
IKEA stores	15.3		
Political Globalisation, de facto	*33.3*	*Political Globalisation, de jure*	*33.3*
Embassies	35.7	International organisations	37.0
UN peace keeping missions	27.3	International treaties	33.0
International NGOs	37.0	Number of partners in investment treaties	30.0

Notes: Weights in percent. Weights for the individual variables are time variant. Depicted are the weights for the year 2015.
Overall indices for each aggregation level are calculated by the average of the respective de facto and de jure indices.

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THE UNDOING OF BEHAVIOURAL INTERVENTIONS: AN ANALYSIS INTO CONSUMER BEHAVIOUR

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Abstract

Over the past ten years, Nudge Theory has become an increasingly popular tool for marketing, especially online, which has led to it highly losing its efficacy. However, till now, there has been no extensive research of note done on the effect of overuse of the same on consumer choices and responses. Our paper aims to collect data from a random sample consisting of people from various age groups and use Inferential Statistics and Grounded Theory to identify their responses to Nudge Marketing concerning their levels of shopping online, while also analysing the effect of usage of such techniques on consumers' perception of the companies. Our research concludes that there exists a negative relationship between people's exposure to nudge and its success (measured by looking at the number of people who end up buying products). It highlights that majority of the customers are aware of the fact that such techniques are examples of sales pressure and that there exists a positive relationship between the level of shopping (and thus exposure to nudge) and negative perception of the company.

JEL Classification: M3, Z1

Keywords: Nudge, Behavioural Economics, Behaviour, Consumer Behaviour, Undoing, Wise to Nudge

1. INTRODUCTION

Behavioural Economics, sometimes referred to as Neuroeconomics, is based on the idea that a variety of agents (corporations, governments, organizations, etc.) end up providing "nudges" towards users' and targets' decision-making process to stimulate the rational-thinking part of their brain, which goes into auto-pilot sometimes due to the plurality and frequency of choice in the modern world. Behavioural Economics asserts that people are not always rational despite the assumptions that they are and always make optimal choices, and stresses a great deal on influencing and ushering the choices of consumers that are typically outside the utopian domain of the 'rational' economic thinker and decision-maker. The study of the effect of psychological, cognitive, emotional, cultural, and social factors on an individual's or an institution's economic decision-making tendencies is termed Behavioural Economics. It also studies the difference between the decisions taken and the implications of the Classical Economic Theory.

A nudge is a concept under the umbrella of Behavioural Economics that proposes positive reinforcement and indirect suggestions as methods to influence the behaviour and decision-making tendencies of individuals or groups. Nudge theory accepts that people have certain attitudes, knowledge, capabilities etc., and exploits the respective study to devise specific techniques for various groups accordingly. However, over time, people across the globe have developed immunity to common nudge techniques. Keeping these initial thoughts in mind, this study aims to embark upon the exploration of the levels of effectiveness and the rates of success achieved by the prevalence of nudges that are exercised by e-commerce platforms and other commercial services online. This exploration further stems from an observation that over time, as such behavioural interventions in marketing become increasingly prevalent, consumers are growing wary of their legitimacy and hence becoming immune to the desired effect that the interventions had set out to achieve.

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The paper also focuses on the study of such inefficient nudges, immunity and resistive tendencies, and details the long-term undoing effects of these over the historic existence of behaviour. The research would be a window into analysing how the consumer response to perceived scarcity and other commonly used tactics changes over time, and the frequency of consumers' tendencies, thus contributing immensely to the present understanding of how nudge works not only in marketing but also in public policy and government schemes. The expected findings would ideally make firms wary of spending on such programmes and the efficacy of the same and would ideally give birth to newer techniques of marketing or potential revisions in the pre-existing frameworks.

2. THEORETICAL CONTEXT

Having addressed and come to terms with 'counter' individualized responses to behavioural interventions, an establishment of the linkages between such behaviour and other commonly established neuroeconomic phenomenon is needed. This entails a few empirically evidenced behavioural effects that consumers may have aligned with, rather than responding to nudges in the manner envisioned by marketers or exerting agents. Hence, these effects go at great lengths to justify or explain the anomalous behaviour of the consumers in question. As established by behavioural economists and psychologists such as Amos Tversky and Daniel Kahneman, heuristics are rules of thumb: they are subject to learning effects – and are not alike to biases, which are more generally regarded as errors or patterns of errors in decision-making. It has also been observed and established that repeated exposure to any tactic over time educates people about its likely veracity in that context. Researchers at UK's Trinity McQueen write that the power of such tactics may diminish in certain contexts, owing to repeated exposure and the phenomenon of 'growing wise to a nudge'. More broadly, marketers should expect – and accept - what Rory Sutherland calls 'context-sensitive contradictions in human behaviour' to conclude that deploying a given tactic is unlikely to result in a simple, linear behavioural impact (Sutherland 2018).

The first and most common effect contributing to this understanding is that of loss aversion.

Loss aversion is a significant idea related to the prospect hypothesis and is epitomized in the articulation "losses loom larger than gains" (Kahneman and Tversky 1979). It is believed that the torment of losing is mentally about twice as powerful as the joy of gaining. Individuals are all the more ready to face challenges or take risks or behave dishonestly (Schindler and Pfattheicher 2017) to keep away from misfortune than to make a profit or gain.

Secondly, the idea of regret aversion also comes into the picture, as has been observed especially in consumers who shop online (Gerrard 2019). When people fear that their decision will turn out to be wrong in hindsight, they exhibit regret aversion. Regret-averse people may fear the consequences of both errors of omission (e.g. not buying the right investment property) and commission (e.g. buying the wrong investment property) (Seiler et al. 2008). The effect of anticipated regret is particularly well-studied in the domain of health, such as people's decisions about medical treatments. A meta-analysis in this area suggests that anticipated regret is a better predictor of intentions and behaviour than other kinds of anticipated negative emotions and evaluations of risk.

Lastly, the impact of myopic loss aversion may also come into play. Myopic loss aversion happens when decision-makers take a perspective on their speculations that is unequivocally centred around the present moment, driving them to respond too adversely to late losses, which might be to the detriment of long-term benefits (Thaler et al. 1997). This effect is impacted by restricted 'framing', which is the consequence of, for instance, speculators thinking about specific investments (for example, in an individual stock or an exchange) without considering the portfolio as a whole or a sequence of trades over time. (Kahneman and Lovallo 1993).

3. LITERATURE REVIEW

The evolution of economists' work around the grounds of neuroeconomics, and more typically, behavioural economics has led to a change in our perception towards economic decision-making. The same has also led to an acquaintance with the fact that such a science does not only affect an individual's decision-making capacity but also affects the

economic policy-making (Heukelom and Lenfant n.d. 2021) behind any and every product or service.

Chronologically speaking, as a discipline, Economics emerged way before Psychology did. Neuroeconomics overviews the correlation between various mechanisms in the human brain and that in modern-day corporate institutions. It has primarily challenged the school of thought which propagates that decision making is just a matter of integrated and coherent utility maximization. (Loewenstein et al. 2007). The economists' definition of the term 'preferences' is fundamentally different from the psychologists'. Behavioural Economics and Neuroeconomics serve as a bridge connecting the fields of Economics and Psychology. While Behavioural Economics looks at the reasoning behind a decision taken by an individual, neuroeconomics leaps forward by studying the correlation between economic decision-making and chemical phenomena that take place in the human brain.

For a large part of the 20th century, economic theories suggested that decision-making was dominated by rational choice and revealed preferences theory. They then determine the extent to which decision-making is affected by the maximization of the utility function. However, they ignored the chemical functioning of an individual's brain while making a choice or a decision.

Behavioural Economics takes into account insights from a rational consumer's economic decision-making as well as from psychology. It most essentially explains why an individual ends up making an irrational choice. It also tends to study the reasons behind why a particular choice was made, and why the other option(s) were not opted for. As a matter of fact, suggested by research, the human brain reacts more to losses than to gains. Emotions affect decision-making which sometimes leads to making decisions that might not align with one's original preference or even their best interests.

Nudge theory is a branch under the field of Behavioural Economics which was mainly popularized by the works of American academics Richard H Thaler and Cass R Sunstein. Their work was mostly built on the grounds of the 'heuristics' work of Israeli-American psychologists Daniel Kahneman and Amos Tversky. Thaler and Sunstein have claimed that essentially 'heuristics' equate to 'nudges' (BusinessBalls 2017). A 'nudge' is an external technique used by choice architects to influence the consumers into buying or trying what the former is marketing. Nudge theory studies the realm of nudges which are successful and effective-enough to mould or dictate one's choices for corporate benefits or large-scale welfare of the society, while also designing nudges that align with how the consumers think and make decisions rather than how the leaders or sellers might think or believe the former decides or thinks. This in turn is to ensure minimal resistance and direct confrontation or potential conflicts of interests.

Thaler and Sunstein coined the term 'libertarian paternalism' as the Nudge theory's underpinning philosophy. The authority or unit responsible to create nudges should observe maximal ethics, care, and intelligence while working on designing a potential nudge. A choice architect, as termed by Thaler and Sunstein, is the person responsible to design and use a nudge to achieve the desired behaviour change which most usually is both positive and helpful to the consumers. However, the choice and definition of a 'positive and helpful outcome' is essentially subjective and the final say rests with the consumers themselves. As a matter of fact, people are more open to getting 'nudged' or are amenable if they have had a positive image of the company or authority in question (nudge issuer).

The initial motivation behind the creation of nudges was to encourage positively impactful and helpful decisions. However, ever since the concept of nudge has been caught in the corporate world, it has served as a mechanism to drive higher sales alongside increasing productivity, improving efficiency, and enhancing decision-making in the respective companies. Corporate nudging is fundamental in 'creating a win-win situation for the company, employees and customers' (McKinsey 2019).

To address the research gap purposed by the above scenarios, it can be discerned that there is a fairly low amount of work on this particular project. The only major research that can be looked at is the United Kingdom-based firm Trinity McQueen's research published in 2019, which talks about the overuse of

nudge theory and consumers' reaction to it. They used hypothetical hotel booking website examples to conclude and their research showed that "two-thirds of the British public (65 per cent) interpreted examples of scarcity and social proof claims used by hotel booking websites as sales pressure. Half said they were likely to distrust the company as a result of seeing them (49 per cent). Just one in six (16 per cent) said they believed the claims.

4. METHODS

4.1 Aims and Objectives

1. To identify and quantify a relation between frequency of shopping and response to nudge marketing.
2. To understand the negative or the positive effect on consumers' perception of companies that utilise marketing techniques based on the nudge.
3. To identify whether consumers look at such marketing approaches of companies as genuine.

4.2 Research Type and General Approach

To achieve our objectives, a mixed research format was followed which focused on both a quantitative and a qualitative approach. To establish relations between factors such as age groups, shopping levels etc., and responses to nudge marketing along with identifying consumers' perceptions, the Likert scale was utilised. However, the survey takers had the option of justifying their choices through fields next to each question integral to the survey.

The quantitative approach assisted in establishing a concrete correlation between the findings and factors, while the qualitative approach assisted in giving the respondents room to justify their choices or opt for ones not mentioned since consumption choices are inherently subjective.

4.3 Population and Sample

A *Random Sample* was used, in which the surveyees were approached through various social media platforms such as WhatsApp, Facebook, Twitter, and LinkedIn. The platforms were chosen because of the presence of all concerned age groups and types of

consumers on these platforms- as is shown in the responses, where the response is equitably distributed in the initial three groups, though it diminishes in the 50+ group. However, with more than 160 people surveyed, the survey can be said to be fairly generalizable.

4.4 Method of Collection and Processing of Data

The data was collected through the online survey method, owing to resource constraints and with the objective of properly maximising the reach and diversity of the sample. Inferential Statistical techniques were used to come to conclusions for quantitative data, while Grounded Theory was used to make conclusions from qualitative data.

4.5 Survey

The survey was based on case studies which were followed by questions about people's responses to being nudged.

The case studies were linked to scarcity, social proof, and decor effect- three often used nudge marketing techniques. Using three different techniques also allows us to ascertain which technique is easier to identify as a marketing strategy and whether it is believable even if it can be identified as a strategy.

After the case studies, questions related to how the customer feels about the marketing being in their interests, and their perceptions of the company, were posed. These questions were asked to identify whether it is possible to strike a balance and see if there can be a point where nudging can be at its most effective.

This research had expected to conclude that the nudge theory has indeed been overused and thus consumers are growing wary of it while analysing the differences across various age groups and nudges used by different types of firms. It had also aimed to analyse the distrust in people due to nudge tactics used by different firms and attempted to gauge the changing perceptions of the people by utilising the opinions survey format - both of which have been undertaken in-depth.

5. RESULTS

From a total of 166 respondents, different categories (detailed below) were created for the purpose of response analysis to the opinion survey that these respondents had undertaken. The first and foremost level of analysis undertaken was to categorise respondents based on their cognisance of online nudge-based marketing techniques with respect to the frequency of their tendencies to shop online. As was expected, the level of cognisance of such techniques as sales pressures or nudges was greater amongst those who shopped online frequently as opposed to those who were occasional shoppers. However, an interesting observation here is that the difference between the level of cognisance of occasional shoppers and frequent ones is not all too much and varies only by a few percentage points.

As we write about these tactics that employ nudges and behavioural interventions online, we have acknowledged that their power can decrease due to repetitive exposure and the 'growing wise to the nudge' phenomenon. As Todd and Gigerenzer put it, however, "It is the interaction between a heuristic and its social, institutional, or physical environment that explains behaviour… in a coadaptation loop between mind and world."

More generally, marketers should expect – and embrace – what Rory Sutherland calls 'context-sensitive contradictions in human behaviour' to conclude that deploying a given strategy is unlikely to result in a clear, linear behavioural effect. (Sutherland 2018). This brings us to another dimension of the observed behaviour which can be attributed to and christened as, the Information Effect or the Information Paradox. We observed that in the population of the sample which is cognisant of the nudge, both -- the percentage of those who have considered buying the product despite the nudge, and the percentage of those who believe that these claims or nudges are used for mounting sales pressure on consumers -- are increasing with the increase in the frequency of the consumers' online shopping tendencies. Despite having the knowledge that they are being nudged and not liking it, a large section of the surveyees were still active buyers online. On one hand, this strengthens our hypotheses that consumers are getting increasingly cognisant of the behavioural

interventions that are being deployed by the firms and brands to drive up sales and influence consumer behaviour online. However, this also quite contrastingly gave way to the contradictory behaviour of consumers. They were aware of being nudged but were not doing anything in their power to restrict or curtail their nudge-induced behaviour. This again can be attributed to multiple non-linear behavioural phenomena, which have been touched upon in the due course of this paper.

Hence, it can be safely summarised that not only are people more aware of the fact that they are being nudged, but their perception of the companies that use nudge marketing techniques is also changing. Analysis of the surveyees' responses to the survey shows a direct relation between shopping frequency and people 'not liking' or 'immediately stopping the use of said product or service' if they can discern the employment of behavioural tactics by the platform or product. The second critical observation is that of a similar relation between the frequency of shopping online and the approximate ratio of those who have bought products due to nudges and are aware of this behaviour.

Table 1: *Broad analysis of respondents to opinions survey on online nudge-based marketing techniques and their impact on consumer behaviour*

Total number of respondents	166
Number of respondents who shop online	160
Number of respondents who shop offline	6

Source: Survey response

From those who shop offline, 50 per cent maintained that they have been exposed to messages of scarcity or scarcity claims or other nudges by brands and sellers.

Table 2: *Distribution of shoppers across categories*

Frequency of shopping online (categories)	Number of shoppers identifying with this category	Number of those who have faced nudges or claims online	Percentage of exposure to scarcity claims
On festivals or occasionally	18	16	88%
Once every 2-3 months	70	66	94%
Once a month	32	31	96%
2-3 times per month	40	36	90%
Total	160	149	92%

Source: Survey response

Data sources and descriptions can be found in Table 2. Descriptive statistics of the variables can be found in Appendix A.2.

Figure 1: *Broad Analysis of Respondents to Opinions Survey on Online Nudge Based Marketing Techniques*
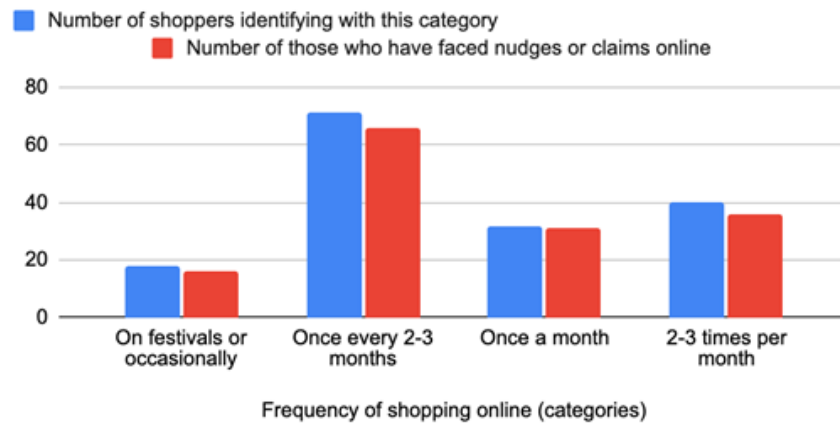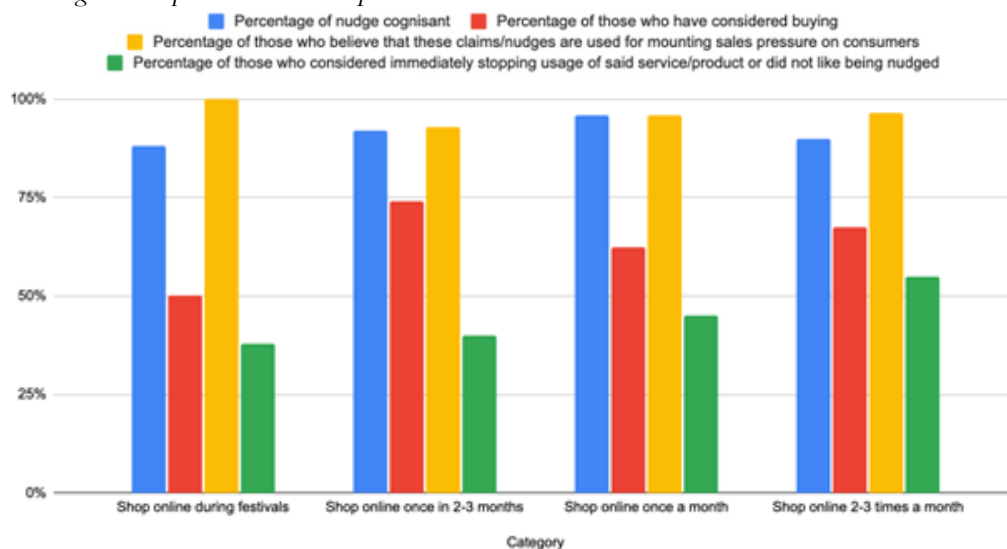

Source: Authors' calculations

Table 3: *Categorical Analysis of Respondents to Opinions Survey on Online Nudge-Based Marketing Techniques and Their Impact on Consumer Behaviour*

S. No	Category	Total No. of Shoppers	No. of Nudge Cognisant	Per cent of Nudge Cognisant	The ratio of those who have bought products due to nudges and are aware of this	Percentage of those who have considered buying	Percentage of who believe that nudges used for mounting sales pressure on consumers	Percentage of who considered stopping usage of said product or did not like being nudged
1	Shop online during festivals	18	16	88%	1 in 6	50%	100%	38%
2	Shop online once in 2-3 months	70	66	94%	1 in 7	74%	93%	40%
3	Shop online once a month	32	31	96%	1 in 8	62.50%	96%	45%
4	Shop online 2-3 times a month	40	36	90%	1 in 8	67.50%	96.60%	55%

Source: Survey response

Figure 2: *Categorical Analysis of Respondents to Opinions Survey on Online Nudge-Based Marketing Techniques and Their Impact on Consumer Behaviour*

Source: Authors' calculations

Of all those who shop online, 93 per cent maintained that they have been exposed to messages of scarcity or scarcity claims or other nudges by brands and sellers. On an average across shopping frequencies, 92 per cent of consumers shopping online claimed to have come across claims of scarcity or other nudges and were cognizant of their nature.

6. DISCUSSION

Over the years, marketing techniques based on nudge theory have become prevalent, especially in e-commerce. However, due to the overuse of these techniques and a larger number of people shopping online being exposed to them, the efficacy of the same has reduced of late. Not only are people more aware of the fact that they are being nudged, their perception of the companies that use nudge marketing techniques is also changing.

A random sample of 166 people filled the questionnaire circulated online. The findings were as follows:

In General
50 per cent of the people sampled said that they had seen nudge marketing techniques in offline stores. And, 92 per cent said that they had seen nudge marketing techniques on online platforms.

Out of these:
1. *88 per cent* of the people surveyed who shopped online only during festivals noticed nudges.
2. *94 per cent* of the people surveyed who shopped online once every 2-3 months noticed nudges.
3. *96 per cent* of people surveyed who shopped online once a month noticed nudges.
4. *90 per cent* of people surveyed who shopped online 2-3 times a month noticed nudges.

From the group of people *who shop online during festivals*, 88 per cent of people surveyed have observed nudges while shopping. 1 out of 6 people said that nudge techniques have forced them to buy products. 50 per cent of people surveyed said that these techniques have made them consider buying. 100 per cent of people surveyed agreed that such techniques are examples of sales pressure exerted by selling companies. 38 per cent of people surveyed said that they do not like it or have considered not buying the goods at all.

From the group of people who shop online once every 2-3 months, 94 per cent of people surveyed have observed nudges while shopping. 1 out of 7 people said that nudge techniques have forced them to buy products. 74 per cent of people surveyed said that these techniques have made them consider buying. 93 per cent of people surveyed agreed that such techniques are examples of sales pressure exerted by selling companies. 40 per cent of people surveyed said that they do not like it or have considered not buying the goods at all.

From the group of people *who shop online once a month,* 96 per cent of people surveyed have observed nudges while shopping. 1 out of 8 people said that nudge techniques have forced them to buy products. 62.5 per cent of people surveyed said that these techniques have made them consider buying. 96 per cent of people surveyed agreed that such techniques are examples of sales pressure exerted by selling companies. 45 per cent of people surveyed said that they do not like it or have considered not buying the goods at all.

From the group of people *who shop online 2-3 times a month,* 90 per cent of people surveyed have observed nudges while shopping. 1 out of 8 people said that nudge techniques have forced them to buy products. 67.5 per cent of people surveyed said that these techniques have made them consider buying. 96.6 per cent of people surveyed agreed that such techniques are examples of sales pressure exerted by selling companies. 55 per cent of people surveyed said that they do not like it or have considered not buying the goods at all.

7. CONCLUSION

This data and the implications derived from it give us some intriguing results:

1. The majority of the customers have observed that they are being nudged.
2. As people are more exposed to nudge techniques, it becomes less effective- while one out of every six people who shop less end up buying goods because of the nudge, the number drops to one out of eight in the case of active shoppers.
3. However, the data concerning people who consider buying is not consistent with the above point and will be expanded on.

4. The majority of the customers agree that messages such as display of scarcity are not genuine and are examples of sales pressure.

5. There exists a positive relationship between exposure to nudge and negative perception of the company.

Thus, as people are more exposed to nudge marketing techniques, they are less likely to support such companies.

8. SCOPE FOR FURTHER RESEARCH

There is no clear relation that exists between levels of shopping activity and moderate response to being nudged. While people are less likely to buy goods when they are exposed to nudge, the data also throws up inconsistencies with respect to people who do not actively buy but consider buying.

This can happen due to the following factors:

a.   People who shop very rarely or once a month have shown to be relatively less prone to being nudged moderately. This can be because of the reason that these people are not active online shoppers- they are more likely to go on the internet to buy things they need. Thus, as a result, nudge marketing is unable to force them to buy more or less than what they require.

b.   People who are very active shoppers or shop during festivals are relatively more prone to being nudged moderately. For active shoppers, this can be because online shopping becomes more of a want and less of a need, and thus, the desire to act on those wants leads to moderate nudges working more.

Secondly, for festive shoppers- it can be because festivals are often characterized as periods when buyers are competing against each other to buy goods since goods sell out relatively faster. At that time, they may be more prone to being nudged.

Information Paradox

Despite having the knowledge that they are being nudged and not liking it, a large section of the surveyees were still active buyers online. The reason for this can be traced back to why people shop online in the first place. Three major determinants are *price, convenience, and product availability* (Chaffey 2017). In the trade-off that the consumer faces between being made to feel manipulated and having cheap products available easily, it is likely that the latter triumphs, although further research can be done to determine the extent of this happening and whether or not this supposition is true in the first place.

9. SIGNIFICANCE AND PROSPECTIVE FUTURE ACTIONS

The findings of this paper should force marketing agencies and large corporations to reconsider how they promote their products and treat the consumer, especially in the virtual domain. It further sheds light on the changes in the behaviour of consumers over time. Future policy explorations and market researches can specifically delve into the factoring in of behavioural effects - loss aversion, regret aversion, and myopic loss aversion, which can go to great lengths to explain the behaviour of consumers in the marketplace and further utilise them to tailor their marketing tactics. This research has provided a small window into analysing how the consumer response changes towards perceived scarcity and other commonly used tactics, thus contributing to the present understanding of how nudge works not only in marketing but also in public policy and government schemes. However, this approach, far from being exhaustive, is only preliminary and more often than not, highlights the non-linearity of human behaviour as underlined by Todd, Peter M. and Gigerenzer (2017). Since nudge has been one of the most overused techniques in marketing over the past ten years, the expected findings would ideally make firms wary of spending on such programmes and the efficacy of the same and would ideally give birth to newer techniques of marketing or maybe revisions in the pre-existing frameworks. There is a fairly low amount of research work on this particular project, and the only major research that can be looked at is the United Kingdom-based firm Trinity McQueen's research published in 2019, which talks about the overuse of the nudge theory and the consumers' reaction to it (Güntner, Konstantin and Sperling-Magro 2019). They used hypothetical hotel booking website examples to conclude and their research showed that "two-thirds of the British public (65 per cent) interpreted examples of scarcity and social proof claims used by hotel booking websites as sales pressure. The example of this study and Trinity McQueen's research can further pave the way for a great deal of specialised exploration into consumer-oriented branding, marketing, and behavioural intervention.

APPENDIX

A.1. Questionnaire

<u>Section 1</u>
Name, Email ID and Age

<u>Section 2</u>
    1. How much do you shop online?
- Not at all
- On Festivals/Once a Year
- Once Every 2-3 Months
- Once Every Month
- 2-3 Times a Month

    2. How much do you shop offline?
- Not at all
- On Festivals/Once a Year
- Once Every 2-3 Months
- Once Every Month
- 2-3 Times a Month

    3. Have you come across messages that hint that a particular product is scarce?
For example, 'Just two left in stock' being shown under a book on Amazon.
- Yes
- No

<u>Section 3: Case Studies</u>
Kindly go through the next few images and select the most appropriate options.
Please try and keep your choices independent of any past experiences, making judgements solely on the basis of the provided information –

    1. At a Movie

Case 1
Imagine you're at a movie theatre. During the intermission, you feel hungry- the person watching the movie with you is hungry too. Please note that the small popcorn is for one person only.
Which popcorn size do you opt for?
- Small
- Medium
- Large

(Optional) Please tell us why you made that choice and reject the other option(s)

2. New Phone

Case 2

You have been waiting to buy a new phone- and are looking at this when the highlighted notification appears. You liked this phone much more than others but were gonna check other options again. You have sufficient funds.

How do you respond?

- I order this phone right now, I like it too much to let it go.
- I will accept the risk and evaluate other options, then buy- this one may go if it does.
- I will not buy

(Optional) Please tell us why you made that choice

3. Trip to London

Case 3

Three months from now, you will be visiting London. You do not have any friends who may guide you where to stay and thus are relying solely on reviews or people on the internet. You have shortlisted the following two hotels- which one do you choose?

How do you respond?
- Park Plaza (the first one)
- Leonardo Royal (the second one)

(Optional) Please tell us why you made that choice and reject the other hotel

Section 4

1. In the cases above, do you think all the statements were true or in your best interests?
- Yes
- No
- Sometimes

2. Do you think examples of scarcity and social proof claims used by online and offline stores can be deemed for the purpose of sales pressure?
- Yes
- No
- Sometimes

3. What is the impact of such methods on your perception of the company?
- I immediately stop using their services or products
- I do not like it
- I don't care/haven't noticed it
- I admire the company for its witty marketing
- Other:

Any other comments you may like to make

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SOCIAL NORMS, COMMUNITY AND FEMALE LABOUR FORCE PARTICIPATION

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Abstract

At the present date, policy initiatives to absorb greater numbers of females into the labour force focus on improving working conditions to assuage conventional concerns of harassment, maternal leaves, etc., and by improving educational outcomes. However, according to the National Family Health Survey, employment of women falls sharply with an increase in wealth, conveying the continued mentality that women are at best secondary earners and their employment is a matter of mere economic necessity. The link between education and employment is also not as expected.

This paper seeks to analyse the behavioural roots of female labour force participation, in the context of culture, community, and immediate social circle, so as to better supplement existing policy initiatives with behavioural understanding. Through qualitative and quantitative inferences, the author aims to understand the degree of influence these factors have on individual career decisions as well as the abstract quality of 'active ambition'. The paper also tries to analyse the link between active ambition and the optimum utilisation of intra-household bargaining power to reach optimal outcomes for the individual, combining behavioural insights and a normal game theoretic form. Finally, the author proposes policy recommendations incorporating the behavioural insights gleaned in the above two sections, keeping in mind social underpinnings of goal-identification and goal-achieving capabilities of individuals, especially from the immediate family in early childhood to avoid detrimental temporal lags.

JEL Classification: D91, J16, Z13, A12
Keywords: Social Norms, Community, Ambition, Female Labour Force Participation, Gender

1. INTRODUCTION

A long-term trend of declining female labour force participation (for instance, from 30.3% in the year 1990 to 20.5% in the year 2019) in India has baffled policymakers and scholars alike. In this paper, we consider the intrinsic satisfaction from work as one of the motivating factors for women to work. The demographic group considered for the study are women from the middle-upper income class background with a certain level of educational attainment. The barriers considered are the insidious barriers to realisation of this motivation. In literature, the myth of the 'gender ambition gap' goes as follows: in terms of career choices, with age and motherhood, women lower their career goals.

This line of thought believes that there is a distinct difference in the degree of ambition owing to a subconscious acceptance of the notion that the role of home-maker and child-bearer falls solely on women. This is contradictory with literature in sociology and psychology that shows girls to have higher aspirations than boys in working-class environments. It is this contradiction that leads us to look more closely at the interim developmental period.

1.1 Background and Motivation

The broad hypothesis goes as follows: the trajectory of the community's history in the context of women empowerment impacts the active ambition of the individuals of the present generation owing to the active guidance available to them, leading to an 'active ambition gap'.

Coupled with implicit expectations (wherein boys are taught at an early age that not attaining higher vocational achievements is not an option whereas this expectation is not always placed on girls), this evolves

into a 'gender active ambition gap' which leads to a temporal lag in the realisation of active ambition.

In this paper, the behavioural roots of an individual's ambition are considered. Here, visible ambition is defined keeping in mind the following criteria: the individual has a broad, overarching goal (say, to be a part of the corporate world or to earn a PhD) that is considered for the long term. This is considered to be an aspiration. Aspiration is defined as an individual's ability to identify and set goals for the future while being inspired in the present to work towards those goals (Quaglia and Cobb 1996). While this is the primary meaning of ambitions, other factors have to be considered as well. These include (i) *direction* (the steps that need to be taken) and (ii) *drive* (taking the needed steps). These additional factors are considered keeping in mind the aspiration-attainment gap where high aspirations are not always proportionate to attainment outcomes for some demographic groups (Gutman et al 2008). Therefore, in this paper, active ambition is represented as an average of a) clarity of future goals, b) satisfaction with the steps taken so far (assuming greater clarity with the interactions with diverse peer groups and differing degrees of efforts) and c) the extent of conviction of continuation of work despite the tremendous social backlash, including that from immediate family circles.

1.2 Scope of Research

This research endeavour has a narrowed scope from simply 'females' to consider females from two communities namely Marwaris and Bengalis[1] in the age group of 18-24 years.

This hypothesis is explored in the case of the Marwari and Bengali community owing to their differing histories. Hardgrove (2004) sums up an aspect of the differing histories of the two communities as follows:
"Marwari intellectuals' debates over widow remarriage, women's seclusion, female education,

and dowry did not arise until the second quarter of the twentieth century, about eighty to one hundred years after Bengalis wrestled with very similar issues. Indeed, many Marwaris themselves regard Marwari women—or even their own community as a whole—as simply 'backwards and conservative' compared to their proximate and pioneering Bengali neighbours."

The Marwari community, as compared to the Bengali community, was late in carving out its national and political identity and grappled with issues on various fronts prior to explicitly coming to terms with the issue of women empowerment. Initially, educational attainments for females were introduced in the domestic front with courses on home science, etiquette, etc. being offered to females to educate them for the future role (at that time) of being a wife and a homemaker. Later, educational attainments in the 'respected professions' (primarily, teaching) became more common. In many pockets of the society, however, further educational attainment for women was not allowed as a woman being more educated than her husband was frowned upon. Along similar lines, work post-marriage (if at all) would be with the husband's and in-laws' permission (discontinued in case permission was not granted). Post childbirth continued work obligation was even further out of the question. Along the same time, the Bengali community prided itself on its educational achievements, with women earning advanced degrees (postgraduate and doctoral) and continuing to higher posts on the job front[2]. Today, other than in select pockets (which are far lesser in number), the Marwari community (especially those within the upper middle-higher income class) extends support to higher educational and vocational attainments for its daughters.

The difference in active ambition, hence considered, is studied with regard to the following:
1. The nature of the support (active guidance or active support).
2. The nature of conversations and narratives the individual grew up with.
3. The presence of role models within the family.

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[1] Neither the hypothesis nor the results are intended as an insult to the two chosen communities, Marwari and Bengali, or affiliated individuals (of any gender) from those communities. The growth trajectory of the women empowerment movement in the context of these communities is recorded in public/ digital memory and the differences arise in a historical context. The results in the present day are a reflection of the impact of this history in implicit ways. Moreover, neither the hypothesis nor the research supports the general myth that women lack aspirations as compared to men and subscribe to traditional norms of gender roles.

[2] Data, however, on specific occupations to illustrate the point was not found.

The hypothesis, however, differs from the 'gender ambition gap' widely discussed in the literature as it considers the difference in the formative years as opposed to the later years. Given the historical background, in this paper, a detailed analysis of Marwari and Bengali women in this context has been made. Therefore, our primary hypothesis is that *Marwari females within the age group of 18-24 have less active ambition than those from the Bengali community.*

2. LITERATURE REVIEW

While delving deep into the topic of trends in female labour force participation, certain paradoxes have been observed in literature and empirics. The two primary paradoxes are the relation between (i) trends in female education and female labour force participation and (ii) the relation between trends in household income figures and female labour force participation.

The Global Gender Gap Index by the World Economic Forum measures the extent of gender-based gaps among 4 key dimensions. Two of them are especially important to be noted in this case:

1. Educational Attainment
2. Economic Participation and Opportunity

One of the key policy steps taken towards absorbing a greater number of females in the workforce at all levels has been to increase access to better education and skill enhancement. This, alongside measures to improve workplace conditions for women and build awareness around the need for educational and hence career-oriented outcomes for women (among other reasons, as a means of financial independence), is believed to be a crucial component in providing opportunities for the girl-child.

Figure 1: *Percentage of Gender Gap Closed to Date (2020)*

Source: Global Gender Gap Report, 2020

Table 1: *India's Rankings (2020)*

SUBINDEX	COUNTRY	RANK	SCORE
EDUCATIONAL ATTAINMENT	INDIA	112	0.962
ECONOMIC PARTICIPATION AND OPPORTUNITY	INDIA	149	0.354

Source: Global Gender Gap Report, 2020

As per the Global Gender Gap Report (2020), while the educational attainment gender gap around the world has been closed by 96% to date, only 58% of the economic participation and opportunity gap has been closed. In India specifically, which will be the focus of this research, the difference in score and rank for both sub-indices (0.608) along with the long-term puzzling trend of steeply declining female labour force participation, for both rural and urban sphere, is troubling and the reasons behind it remain unresolved.

Economic growth or increase in family income is not the panacea in this case. It is often a matter of discussion in the literature (Sinha 1965; Boserup 1970; Durand 1975) and most recently statistically illustrated by the World Bank that there is a U-shaped relation between real GDP and female labour force participation.

Examining the issue further through a sociocultural lens, the constraints to female labour force participation most often discussed are external such as:

1. The stigma attached to women earning (Klasen et al. 2015).
2. In higher social classes, the prestige attached to non-working female members and the 'income effect hypothesis' wherein females are considered secondary wage-earners.
3. Workplace conditions and instances of workplace harassment, sexual or otherwise.
4. The demands of the work-life balance are placed, conventionally, mostly on women (Mehrotra and Parnida 2017).

However, these explanations and literature conventionally place disproportionate weightage on wages and earnings as a reason for an individual choosing to work, like in the popular 'labour leisure trade-off wherein the returns to labour are monetary (wages) and leisure is what provides mental satisfaction and/or pleasure. According to the definition of the two layers of ambition provided by Turner (1964), this falls under the category of material ambition (extrinsic satisfaction).

An individual's choices which determine whether the potential is realised or not are influenced, to a great extent, by the aspirations of the young people. It is also influenced by the aspirations of their parents and the opportunities available to them (Bandura et al. 2001)

Schoon et. al (2007) note that girls consistently have higher aspirations than boys from similar working-class backgrounds. Parents also tend to have higher aspirations for their daughters because of the construed undesirable alternative outcomes for women in light of the social narratives around gender roles. Family background variables such as parental education, parental income, and social class among others have been shown to influence parents' aspirations for their children (Kao and Tienda 1998; Schoon et.al 2002: Schoon et. al. 2007). However, despite this, males also consistently enjoy a higher occupational status, career advancement, and financial rewards (Schoon et al. 2007).

The gap that exists between aspirations and achievements owes, in part, to the choices made by individuals. The choices made by individuals determine whether their potential is explored and nurtured or remains untapped. Consequently, this shapes the future trajectory of their lives (Bandura et al 2001). With individuals existing in a sociocultural paradigm, among others, the impact of community and related factors on an individual's choices, both conscious and unconscious, offer an interesting study.

3. DATA AND METHODOLOGY

Primary data for this study was collected using Google Forms. It was supplemented by open-ended interviews with the respondents. This methodology has been elaborated upon by Piore (2006). To conduct empirical and statistical tests, dummy variable regression analysis has been employed.

3.1 Google Form Survey

The Google Form survey had 93 respondents within the age group of 18-24 years. 46 respondents belonged to the Bengali community whereas the remaining 47 were from the Marwari community. The respondents were spread across Kolkata and Delhi. The data collected thenceforth was pertaining to (i) age, (ii) rating of approval/acceptance within the community of working females, and (iii) the number of working females in the present generation.

3.2 Open-Ended Interview

The open-ended interview was conducted with the above respondents' pool as a follow-up to better understand the attitudes and perspectives. It broadly followed the structure of the questionnaire with follow-up questions at the interviewer's discretion. The questionnaire can be found in the Appendix (A.1.) at the end of the paper.

4. RESULTS AND ANALYSIS

4.1 Relationship between community and the present attitude within the family in the realm of influence towards higher educational and vocational attainments.

To understand the relationship between the community and the present attitude within the family in the realm of influence towards higher educational and vocational attainments, the author proposes the following regression model:

Model 1: Present Attitude towards Working Women = $b_1 + b_2$ Community + u_1

In the above model, Community is a dummy variable taking value '1' for the Bengali Community and '0' for the Marwari Community.

The regression results are as follows:

Table 1: *Regression results for Model 1*

	Coefficient	Standard Error	t-stat
Intercept	7.085	0.121	58.104
Community	1.067	0.173	6.154[*]

*: Significant at 95% level
R-squared: 0.293
F-statistic: 37.877
Standard Error of Regression: 0.835

Source: Author's Calculations

The regression results suggest that the differences in present attitude towards working women as perceived by the respondents were approximately 29 per cent explained by the independent dummy variable, community, taking value '1' for the Bengali community. The attitude was found to be higher (i.e., more favourable) in the Bengali community than in the Marwari community, with a coefficient of 1.067. As such, while some incremental difference was perceived to exist, the results do not quite suggest the same.

4.2 Relationship between community and the number of working women in the previous generations in the extended family within the realm of influence.

Under the open-ended interview structure, the following observations were significant to note from the interview of 56 respondents (28 from each community):
a) While all 56 respondents had immediate goals in mind (as to pursuing higher education or getting a job), there was a stark difference as to when this clarity had been reached.

Model 2: Number of working women in the previous generation = $b_1 + b_2$ Community + u_1

Community is a dummy variable taking values '1' for Bengali and '0' for the Marwari community.

The regression results are as follows:

Table 2 : *Regression results for Model 2*

	Coefficient	Standard Error	t-stat
Intercept	3.702	0.221	16.741
Community	1.580	0.314	5.026[*]

*: Significant at 95% level
R-squared: 0.2173
F-statistic: 25.265
Standard Error of Regression: 1.516

Source: Author's Calculations

The dependent variable in the above model is able to explain 21.7 per cent of the variation in the number of working women in the previous generation by the independent variable, dummy variable, that takes 1 for the Bengali community. Results are found to be statistically significant.

4.3 Relation between number of working women in the current generation and the previous generations and the community

To understand the relationship between the number of working women in the current generation and the previous generations and the community, the author proposes the following model:

Model 3: Number of working women in the current generation = $b_1 + b_2$ Community + b_3 Number of working women in the previous generation + u_1

Community is once again as a dummy variable taking value '1' for Bengali and '0' for the Marwari community.

The regression results are as follows:

Table 3: *Regression results for Model 3*

	Coefficient	Standard Error	t-stat
Intercept	2.212	0.345	6.395
Community	1.306	0.275	4.748[*]
Number of working women in the previous generation	0.523	.081	6.443[*]

*: Significant at 95% level
R-squared: 0.567
F-statistic: 59.154
Standard Error of Regression: 1.174

Source: Author's Calculations

The results suggest that the variation in the dependent variable (number of working women in the previous generation) can be explained to a great extent (~56 per cent) by the independent variables, community, and number of working women in the previous generation. These results are found to be statistically significant.

4.4 Open-Ended Interview

To understand the relationship between the community and the number of working women in the previous generations in the extended family within the realm of influence, the author proposes the following model:

Under the open-ended interview structure, the following observations were significant to note from the interview of 56 respondents (28 from each community):

a) While all 56 respondents had immediate goals in mind (as to pursuing higher education or getting a job), there was a stark difference as to when this clarity had been reached.[3]

b) Girls with working members in the immediate family or in the extended family with repeated interactions (to be considered close) had this clarity for a long period of time,whereas those without had the realisation much later. They were able to quote incidents, references to conversations, or anecdotes about a family member's work that had struck with them in their early days and made them explore in that direction, giving rise to greater confidence and clarity in their goals.

c) For those respondents who had clarity earlier, the following general trends were observed:

(i) They ranked their family first for the influence in giving them this clarity.
(ii) They felt that they had taken active steps in realising their goals.
(iii) They were satisfied with the progress they had made.
(iv) They were confident that their goals would be realised.

On the other hand, those who had had this clarity later:

(i) They ranked their peer group and friends circle for pushing them into action and helping them gain clarity (all felt that clarity came from college friends while it was a mix of college and school competition and friends that pushed them into action).
(ii) They felt dissatisfied with the progress they had made and with missed opportunities.
(iii) They felt that they needed more time to gain further clarity in order to know what steps to take.
(iv) They lacked the confidence that the gap could be covered up.
(v) Everyone felt that they would have been more proactive if they had been pushed.

vi) They felt that they had the support but not the parental influence or guidance.

d) Bengali girls had exposure to 3 working female members at the very least and a legacy of past accomplishments in the family. This had the following consequences:
(i) They had active guidance and their immediate family was heavily invested in guiding them and pushing them to find their interests and to be ambitious.
(ii) They felt that they had something to prove and also had the confidence that it could be done since someone known to them had previously accomplished it.

e) Those without exposure to working members in the family, and more significantly without working females in the family (as in the case of 15 of the 28 Marwari respondents), felt that they had the support of their family in whatever decision they took but not their active guidance.

f) Those with working women in their families had work-centred and ambition-centred conversations which provided new information or guidance even at home while those without it felt that work-centred talk was limited to their current academic occupations and questions about their decisions pertaining to their future, with a lesser extent of active guidance.

g) 38 out of 56 respondents felt that they interacted more with their mothers than their fathers.

h) Out of 28 Marwari respondents, 16 had grown up without an explicit narrative about their working or married future (neither). Discussions were focused mainly on academics with the primary focus being more immediate.

i) Comparing the 2 communities, more of the Marwari respondents could recall
incidents of casual references to a settled life in the near future such as
- Parental discussions on marriage post-college education.
- Refrain from opting for careers requiring frequent travel because she would have to settle down eventually.

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[3] There was a difference in the confidence attached to these goals, some feeling they were too trivial or generic to be classified as 'goals' and were merely obvious stepping stones.

- To adjust and learn how to compromise because of differences in the outlook of parents and future–in–laws about the job and other aspects post–marriage This was even for respondents within 18-21 years of age, and similar references were recalled as having been heard before.

At the end of the interviews, respondents were required to answer some questions (see Appendix A.2.). The average of the responses to the questions was taken as a proxy variable for 'active ambition'. The participants were also asked whether they considered their family to be the primary influence or source of active guidance when it came to the formation of aspirations (with a great degree of clarity) and the formulation of steps taken to achieve those aspirations.

4.5 Ambition and Family Influence

We will now study the relationship between active ambition as obtained in section 4.4 and family influence. For this purpose, the author proposes the following model:

Model 4: Ambition = $b_1 + b_2$ Family Influence + u

Here, family influence is a dummy variable taking value '1' for active and '0' otherwise. [1]

The regression results are as follows:

Table 4: *Regression results for Model 4*

	Coefficient	Standard Error	t-stat
Intercept	7.5	0.18	39.79
Community	1.06	0.25	4.14*

*: Significant at 95% level
R–squared: 0.2411
F–statistic: 17.16
Standard Error of Regression: 0.96

Source: Author's Calculations

The results suggest that 24 per cent of the variation in the dependent variable, active ambition, could be explained by the independent variable, perceived family influence. These results were found to be statistically significant.

4.6 Active Ambition and Community

Besides family influence, it is also imperative to study the relationship of active ambition with the community.

For that, the author proposes the following model:

Model 5: Ambition = $b_1 + b_2$ Community + u_1

Once again, community is a dummy variable taking value '1' for the Bengali community and '0' for the Marwari community. The regression results are as follows:

Table 5: *Regression results for Model 5*

	Coefficient	Standard Error	t-stat
Intercept	7.809	0.106	16.741
Community	0.809	0.314	5.026*

*: Significant at 95% level
R–squared: 0.3486
F–statistic: 28.9
Standard Error of Regression: 0.56

Source: Author's Calculations

The results suggest that 34 per cent of the variation in the dependent variable (Active ambition) could be explained by the chosen independent variable, community. These results were found to be statistically significant.

4.7 Link between Active Ambition and Utilisation of Intra–Household Bargaining Power

In 'Interactive Decision Theory' i.e., game theory, rationality is assumed such that every player chooses to maximise their own payoffs. Thereby, the resultant strategy chosen is the equilibrium strategy. This outlook follows in the literature of intra household bargaining power and household decisions on issues such as budget allocation and whether or not women should work. In this regard, it is important to note the important role played by perceptions. Additionally, the final action chosen by each member depends on two other factors namely (a) perceived payoffs and (b) available action set.

The existence of adequate bargaining power for the woman in the household is not adequate. The utilisation of this bargaining power for optimal outcomes in the educational or vocational sphere is needed. Even in cases of familial support (translated into adequate bargaining power in the household pertaining to decisions to close the aspiration–attainment gap), other factors at play lead to the underutilisation of this bargaining power.

It was found, according to the survey presented in section 4.4, that the females who even felt that they had the support of the family but not the active guidance owing to lack of working experience compared to the other working members or compared to other households with work experience. Thus, they lacked clarity from an early age. This translated to a lack of awareness of a) their exact goals and b) the steps needed to achieve those goals.

While they felt their parents would be supportive of whatever decision they would choose to make (within financial constraints, regardless of gender), they were not quite sure of what decisions needed to be taken. The time lost in achieving that clarity made them believe that many opportunities had been lost and that, with the extent of competition in the workplace, they would be at a disadvantage compared to their peers (males and females both) who had consistently shown greater initiative in working towards reaching their goals.

4.8 Interaction Between Parental Aspirations and the Girl's Aspirations

The community's trajectory in female empowerment and the record of working members in the family shape the narrative around the 'family legacy' centered on higher attainments. The awareness that trickles down to the child is crucial in the formation of aspirations at an early age (Gutman et al. 2008). This was also observed in the open-ended interviews conducted. The extent of awareness decides the finite action set available to the child:

$$A = \{a_1, a_2, \ldots, a_i, \ldots, a_n\}$$

According to the theory of intertemporal choice, these different action sets cumulatively lead to outcomes that are realised at different stages over time. These outcomes include intangible outcomes such as confidence, exploration, clarity and initiative (among others). In either case, if we were to consider the interaction between parental aspirations and the girl's aspirations to be in a normal form coordination game, with expected payoffs replacing final payoffs, then it would be formulated as shown:

Table 6: *Normal form game between the parent and the girl*

	Passive Child		Active Child	
Passive Parent	(1,1)	(i)	(1,3)	(iii)
Active Parent	(0,1)	(ii)	(3,3)	(iv)

Parents' expected payoffs here are linked to the expected outcomes for a child's growth and their own fulfilment of the role of a supportive parent in their child's endeavours. The child's expected payoffs are linked to their limited action sets and the extent of clarity available to them. We can observe the following from the above game:

a) In state (i), if the parent is passive (even providing support to decisions undertaken) in the sense of lacking any narrative surrounding the future for the child or active discussions related to the same, and the child is passive owing to limited action sets available, limited available information at an early age and limited exposure to competition (the peer circle cannot be assumed constant and to have an extensive impact from an early age for all individuals due to a high degree of heterogeneity in those conditions), then the outcomes are low at (1,1). In this case, an equilibrium is reached because the only way to break the disequilibrium is to shift to state (ii) wherein the child achieves greater payoffs. Again, however, limited action sets and clarity lead to the state of inertia for the child, creating a huge time-lag of shift up until the peer group is influential enough to cause the shift. In such cases, a higher equilibrium could be reached but only after a temporal lag.

b) In state (ii), the active child even without the active guidance of the parents is able to attain higher payoffs. In these cases, the bargaining power of the child can, in some cases, translate to parents becoming more active in discussions and narratives owing to higher payoff obtained in state (iv) as they feel they are better-off fulfilling their role of support as well as have consistent efforts of the child in front of them.

c) Again in the case of state (iii), the active child receives a very little payoff than in the case of the passive child. However, if parental narratives and upbringing assert a great degree of influence on the aspirations of a child (as they have found in the literature), then in many cases, this can again lead to the outcome mentioned in state (iv) with active child and active parent.

Hence, it can be seen that for the above game, the equilibrium outcome is state (iv) with both the parent and the child coordinating to be active in the attainment of aspirations. While state (i) does not appear to be an equilibrium, it remains so unless the inertia on part of the child is overcome due to the influence of peer groups and other circles. At that point, moving from (i) to (ii) leads to the higher outcome of (iv). Until that point, state (i) can be counted as 'bad equilibrium' for the game, leading to stagnation at an early age.

Again, the formation of the drive at an early age is also important keeping in mind the social narratives surrounding females working, which is more insidiously heard. Further, in order to overcome the workplace bias towards men, especially in leadership positions, more initiatives are required by women. This temporal delay at an early age can lead to competitive disadvantages at later stages. Moreover, the 'default aspirations' as set by society for men and women continues to be different: A girl is told that not working is also an option (whatever educational attainment she may have) whereas a boy is told that working is a necessity, leading to a difference in drive owing to the baseline default aspiration and effort required.

5. CONCLUSION

Active aspirations of a child are formed in the formative years itself. For selected groups, an attainment-aspiration gap may arise due to a lack of knowledge or other overwhelming explicit and implicit narratives about assigned roles for their groups. These can be as insidious as simply guiding conversations towards a particular end for one group and the other end for another.

The role that the immediate family plays is crucial in the development of aspirations. Rather than the gender ambition gap in later years as focused upon in the literature, the root of this ambition gap can be traced back to an ambition gap that is not simply gender-related. This formative gender gap traces its roots back to a community's history of women empowerment, rather than the current regressive or progressive stance towards working women.

This impact of history is something that has not been explicitly considered in policy initiatives despite the large-scale impact it has on choices from an early age. Going by the inter temporal choice theory, these choices not only shape characteristics and future confidence of children but can also lead to a temporal lag in realising potential and clarity. This temporal lag is especially harmful in light of the following:

a) The bias towards men in the workplace that requires an extra edge from the woman's end to seek opportunities.
b) The currently competitive workplace scenario for men and women alike.

Keeping in mind the above, the 'active ambition' of an individual relative to the socioeconomic circumstances surrounding employment and the nature of work (including both field of work and post allocated to the individual) determines the extent of active participation of females in the workforce, where the default alternative is still outside of the workforce. Especially within the middle-income and higher-income class groups where wages below a certain socially acceptable standard disincentivise work in the absence of greater active ambition to overcome the social norms surrounding the alternative for women, which is a stable, married life.

With a high degree of correlation found between community history in terms of the number of working women in previous generations and the active ambition of females of the current generation, it is crucial that active steps be taken to put not just men and women on an equal footing for the opportunity, homogeneously, but to do so keeping in mind heterogeneous community history with regards to women empowerment.

6. POLICY RECOMMENDATIONS

6.1 Current Policy Initiatives

Some of the policy initiatives taken by the Government to increase female labour force participation are as follows:

a) Maternity Benefit (Amendment) Act, 2017
b) Issuance of an advisory to the States under the Factories Act, 1948 for permitting women workers in night shifts with adequate safety measures.
c) Collaboration with country-wide Women Industrial Training institutes, National Vocational

Training Institutes, and Regional Vocational Training Institutes for providing vocational training to women.

d) Protective provisions for creating safe working conditions for women.

e) The Equal Remuneration Act, 1976, ensures equal remuneration to men and women workers for same or similar work without any gender-based discrimination.

6.2 Author's Recommendations

The issue needs to be tackled at a much earlier stage since the above policy initiatives target:

a) The role of women as secondary (or primary breadwinners) and hence the focus on wages.

b) Security concerns related to women working.

c) The concerns of women at later stages (the maternity leave), where again, the paid maternity leave has disincentivised greater hiring of women by companies.

In the literature, the role of ambition in female participation in the workforce has been widely discussed, more so in instances where the work is found to be in dissonance with widely held perceptions of female characteristics (as in the case of women in politics which goes against the view of females avoiding conflict and the term power, with negatively viewed connotations attached to it perceptually). Hence, it has to be considered that the issue of female labour force participation is also a question of implicit perception and awareness barriers.

The issue of 'active ambition' needs to be targeted on a broader scale, especially for the women of middle and higher social and income strata where resource considerations are not the primary constraining factor. Having female role models and being exposed to varied working narratives needs to be a provision. This is also supported by data where the number of working women in the current generation was also found to be linked to the number of working women in the previous generation. This can be explained not only by variations in perceptions and support to working women but also by the exposure to female working role models and their narratives, as was found during the open-ended interviews. Moreover, nearly 68% of respondents felt that they interacted more with their mother than with their father, adding support to the need for female role models in the workforce and for the counselling of parents so as to provide active guidance to the girl child. Snippets of conversation or narratives were found to play a guiding role in forming a child's perceptions and giving direction to their curiosity in their formative years.

Keeping in mind the above, the following policy recommendations are made:

a) Counselling sessions with parents at an early age as different career options (all-inclusive, not those segregated for being suitable for women) require different steps. Hence, counselling is needed to reach those steps and enable them to provide active guidance to their children.

b) Active discussions about future goals in schools from an early age, through fairs or competitions.

c) A broader awareness program about accomplished women in all fields, both technical and otherwise, to be undertaken in collaboration with schools.

d) The same is to be undertaken on community levels with role models selected being from various communities, so as to engender a greater sense of relatability.

e) Awareness about the broader impact of reforms so far, such as the number of females opting for work in technical backgrounds (which are typically occupationally segregated as male-dominated).

f) Collaboration with the media to not only focus on the narratives of rigorous demands of work-life balance for women but also the narrative of women working as simply pursuing their dreams so as to overcome narratives of the career-family choice explicitly and exclusively for women.

g) Encourage women to join schools, vocational training programs; undertake confidence-building programs (this is for women belonging to lower social strata).

A broader policy recommendation is to carry out these awareness programs in a targeted format, targeting different communities with their different histories and social norms. This can be done keeping in mind the demographic structure within a state and the percentage-wise composition of communities living within it. The above would call for Centre-State collaboration.

7. ACKNOWLEDGEMENT

APPENDIX

A.1. Open–Ended Questionnaire

1. Do you have a goal in mind pertaining to higher vocational attainments?

2. If yes, when did you first realise this was a goal and was the primary shaping factor?

3. How many working members do you have in your immediate family or extended family within the realm of recurrent interaction? How many of these are female in the present and previous generations?

4. What are the steps that you have taken towards achieving this goal and when did you begin?

5. Retrospectively, are you satisfied with the steps taken? Do you feel that you could have taken the further initiative? If yes, what factor(s) do you think would have propelled you to take further action?

6. In your peer group, do you believe that others who have been more proactive are ahead of you? Do you feel this gap can be covered without significant outcome differences? What steps will you be taking towards covering this gap, if any?

7. What are the most common topics of conversation with your family and your peer group?

8. In realising this goal and in shaping your perspective so as to take steps towards the attainment, rank the following in terms of their influence:

a) Immediate family

b) Extended family (on the basis of interactions or news pertaining to their achievements)

c) Friends/peer groups (specify school or college)

d) Other (specify)

9. What is the narrative surrounding your future that you have grown up hearing if any?

10. What is the degree and nature of support provided by your family? What is the difference between this influence and the one provided by your peer group?

A.2. Questions for Active Ambition

a) Rate awareness about the steps needed to achieve your goals (on a scale of 1 to 10).

b) Rate your satisfaction with the steps you have taken to do so (on a scale of 1 to 10).

c) Are you certain you would continue with your career despite social backlash for doing the same at any point in time? (10 taken in case of yes, 0 in case of no)

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EXPLORING AND MODELLING THE CONCEPT OF BOUNDED RATIONALITY IN "THE GAME OF CHICKEN"

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Abstract

Conventionally, game theoretic models assume the economic man in all strategic decision-making situations. However, this assumption of a perfectly rational human is not always true and human rationality is actually very much bounded. That is, humans might not always act for their own benefit, given the circumstances. This paper aims to incorporate this "gap in human rationality" in the game of chicken played an infinite number of times by one player, while the opponent player every time is different. The paper finds out that with increasing numbers of games the patience level of a player falls which compels him/her to make a decision that might not be favourable if they were to choose rationally and how soon they steer away from the best possible strategy depends on their idiosyncratic patience factor.

1. INTRODUCTION

Game theory models the homo economicus or the economic man in all of its strategic decision-making situations. This assumption of a perfectly rational human means that the player will always act in a manner that maximises his/her payoff at the end of the game (Rittenberg and Tregarthen 2012). The player is able to analyse the entire situation at hand and choose the strategy that fetches the best outcome.

Maurice Allais (1953) and Daniel Ellsberg (1961) discovered the Allais paradox and the Ellsberg paradox respectively, both of which paved way for the development of Behavioural Game Theory. The paradoxes suggest that the decisions that the players make in a game are not consistent with the predictions made by the expected utility theory. Behavioural game theory adds to the analysis of emotions, mistakes, limited foresight, and learning. It is more concerned with what the player actually does rather than what they are expected to do (Colin F Camerer 2011).

Rather than modelling the homo economicus, whose main aim is to selfishly maximise a player's own utility, behavioural game theory uses experiments as a

tool to determine a player's actual behaviour in a game (that might differ from that of the homo economicus) (Bonau Sarah 2017).

The results derived from such experiments differ from those suggested by theory as what the theoretic model often fails to incorporate is the "Bounded Rationality" of the players. The term was introduced by Herbert Simon (Simon 1957b: 198; see also Klaes and Sent 2005) to replace the assumption of perfect rationality possessed by homo economicus with such a concept of rationality that is more suited to agents with a limited reasoning ability (as often seen in real-life situations) (Wheeler 2018).

Results of experiments suggest that players often engage in altruistic cooperation or altruistic punishment (Batson et al), and show some degree of unequal aversion instead of acting purely as a homo economicus (Vailati 2016) (Lucas et al 2013). Therefore, by trying to understand the inner workings of an individual's information processing and decision-making abilities, the behavioural game theory attempts to derive results that are much similar to the real-world scenario (Bonau Sarah 2017).

In this paper, the author attempts to incorporate impatience and bounded rationality to analyse a modified version of the hawk-dove game to give a

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plausible explanation for highway accidents (other than negligent driving). The main focus of this paper shall not be the modified model but the dynamic nature of human impatience explained through the model in an attempt to give a plausible explanation for a player losing his/her rationality as the game drags on for N periods.

2. LITERATURE REVIEW

The hawk–dove game is a game-theoretic situation in which two animals (fighting over prey) can either be aggressive or passive. The ideal situation for any player is when the opponent is passive and they get to be aggressive, as opposed to the situation in which the opponent is aggressive and they have to be passive to avoid confrontation (which is the worst case). A modern adaptation of this game is the game of chicken which remains exactly the same in its modelling, outcomes, and Nash equilibria but the story presented is a bit different. In this modern adaptation, two players are driving, and approach each other with great speed. Both the players have the option to either swerve (passive) or drive straight (aggressive). Both prefer to be aggressive rather than passive but both cannot be aggressive simultaneously to prevent crashing into each other. However, both the players try to avoid yielding for the sole reason that they succumb to their pride and do not wish to look like a "chicken", that is, submit to their opponent's aggression. When one of the players' yields, the crash is avoided and the game concludes.

In this paper, the author wishes to model a situation similar to the game of chicken with identical preferences and Nash equilibria but with a slight modification, instead of both players being in motion and moving towards each other, one of the players (player 1) is stationary on one side of the road. This player is about to make a U-turn and thus some of player 1's car's body is covering the road, but there is enough space for player 2 (the approaching driver) to pass. (Both players are currently in the same lane and facing the same direction).

To make the model simpler, the author has assumed this road to be two-laned, with each lane designated to a particular direction and that player 2 cannot overtake player 1 by crossing the lane boundary once player 1's car is perpendicular to the line of the road (as happens when a driver is making a U-turn). The

latter assumption is a realistic one keeping in mind the possibility of oncoming traffic for the other lane. It is also assumed that the road is infinitely long. This shall play out as a sequential game with player 2 moving after player 1, and due to the assumption of an infinitely long road, focusing on player 2 for now, player 2 will have to play the same game N number of times, each time with a new player 1 (with preferences of the new player1 being the same as that of the previous one).

The above shall form the basis of the model about to be discussed. However, the author wishes to further analyse the dynamic nature of rationality in player 2 (as they are playing the same game again and again) and see what effect this dynamic nature has on the end result of this game, that is, after the Nth game.

After analysing the player's choices in a sequential game, it was concluded that in a high-stakes situation, rather than being based on rationality, decisions were based on previous outcomes (Post et al 2008). Players facing poor outcomes in succession tend to become less risk-averse. Therefore, players having exceptionally bad outcomes tend to have a higher probability gamble and continue playing rather than the average players.

Whether lucky or not, it was found that players were willing to turn down the opportunity of over a hundred per cent of the expected value of their case to continue playing. This illustrates a shift from risk-averse to a risk-seeking attitude.

This newly developed affinity towards risk in contestants who have previously been unlucky can be explained by the break-even effect. The break-even effect roughly states that a player is likely to gamble more and take risky decisions in order to win back the utility/ money/ payoff lost.

On the contrary, lucky contestants, who have had a winning streak, also tend to show an affinity towards risk and that can be attributed to the house-money effect, which suggests that players in a winning streak have a higher probability of making risky decisions because their perception that the money/utility/payoffs they are gambling with are not their own. The main result that can be derived from this analysis is that incentives drive rational choice when players make a series of decisions.

Furthermore, rational choice is also influenced by the beliefs about other people in a decision-making game. These beliefs about other players may lead to differences being observed between experimental results and utility-maximising decisions. Costa-Gomez (2008) conducted an experiment where participants were questioned, prior to the game, about their beliefs of the opponent's actions. Only 35% of the participants complied with the Nash Equilibrium. Further, only 15% of the participants stated beliefs that their opponents would choose the traditional game theory equilibrium. This meant that the participants perceived their opponents to be less rational than they actually were. This result suggests that participants refrain from choosing the utility-maximizing action and expect the same from their opponents.

3. MODEL

Consider the following situation: two drivers are situated on the road, both moving in the same direction. The driver ahead (player 1) has now stopped on the side of the road and is initiating a U-turn (i.e., stationary at present), his/her car being almost perpendicular to the line of the road (such that if the driver chooses to make the U-turn, his/her vehicle will become perpendicular to the line of the road at one point in time during which the following driver will not be able to cross driver 1). The second driver (player 2) is still in motion and is approaching the 1st driver. (See figures A.1, A.2, A.3, and A.4 in Appendix A for visual representation).

Both the drivers have 2 strategies, either to "move and pass the other driver" or "not move to let the other driver pass by".

Just as in the hawk dove scenario, both drivers are selfish and prefer to move than not move. Further, if both choose to move, there will either be an accident as in the game of chicken (here as driver 1 will become perpendicular to the road and driver 2 will collide with the side of driver 1's car) or both will be forced to halt thus restarting the game (when driver 2 comes very close to driver 1 as driver 1 starts taking the U-turn, both stop as an accident is foreseeable).

Accordingly, we have the following preferences of each player over the possible outcomes, where strategies are –

M = move
NM = not move

The order of preference and the associated utility levels of the payoffs is given by–

$$U_1(M,NM) > U_1(NM,NM) > U_1(NM,M) > U_1(M,M)$$
(3)　　　　　　(2)　　　　　　(1)　　　　　　(0)

For player (driver) 1 and,

$$U_2(NM,M) > U_2(NM,NM) > U_2(M,NM) > U_2(M,M)$$
(3)　　　　　　(2)　　　　　　(1)　　　　　　(0)

For player (driver) 2.

The payoff matrix thus formed is as follows:

Table 1: *Payoff Matrix*

Player 1	Player 2 NM	Player 2 M
NM	(2,2)	(1,3)
M	(3,1)	(0,0)

Source: Author's elaboration

Therefore, as is the case with the hawk–dove game, we have two *pure-strategy* Nash equilibria. There is no dominant strategy in this game, but note that there are some differences between the chicken game and the aforementioned modified game as the author will elaborate shortly.

It should be realised that since the 2 players are in their respective cars, there is no way for the two to coordinate and play (NM, NM). Since the cars are equipped with horns and blinkers, each player can only signal to the other player about their excessive willingness to move and pass, and not about their willingness to stop.

The intensity of such indication determines the probability with which a player will choose to move or the threat that a player is giving in the case of a sequential game which we will mainly focus on.

4. ANALYSIS OF THE SEQUENTIAL GAME

This game when played sequentially becomes a lot more simplified as compared to a conventional

sequential game in terms of the variety of threats available with player 2 (second mover).

Since player 2 is approaching player 1 with a certain speed, they are able to signal player 1 about their urgency via the means of horn/blinkers. By signalling to player 1 about his urgency, player 2 is essentially making a threat, the credibility of which is known to them but player 1 has to determine it. (Note that in the context of the model, signalling means making one's urgency known to the other player.)

Had we analysed the situation just like in a conventional sequential game, the subgame perfect Nash equilibrium would have been [M, (NM/M, M/NM)]. It means that player 2 would've lost the game unless player 1 had a change of heart and decided not to move.

However, the threats here, as mentioned before, do not actually have the conventional variety due to physical restrictions. Since both the players are in their respective cars, player 2 cannot give a threat in which he repeats player 1's actions or does the opposite. Due to the physical constraints, player 2 can only give one threat, that is, they will choose to move irrespective of what player 1 chooses. If player 2 does not give any threat, then the situation is nothing but a simultaneous game, the reason being that neither of the drivers engages in conflict up until the point where they both have to decide simultaneously to avoid an accident, and such a game plays out just like "the chicken game". Another possibility with no signalling is when player 2 decides to halt and let player 1 pass them by. This is an unusual case and only possible if player 2 has an altruistic nature.

The scenario we wish to develop is similar to the practical situation drivers face on a highway.

Assuming the road to be of an infinite length, player 2 (the driver in motion) is moving along this road and encounters N drivers at equally distributed intervals of time (these intervals get smaller as N rises). With each new driver who enters the game as the first mover (player 1), player 2 must play a sequential game. Since player 2 can signal about their intentions of not stopping and player 1 is able to analyse them, we shall associate probabilities to each strategy.

We will model the case wherein N becomes very large, in which player 2 plays the same game a large number of times, every time with a new player (whom we assume is playing the game for the first time and both have similar preferences over the outcomes) and come to a plausible explanation as to how these accidents occur apart from the reasons associated with negligent driving by analysing the dynamic nature of the second mover's (player 2) impatience. We shall analyse the dynamic nature of player 2's beliefs/disbeliefs and their rationality as N grows larger.

Following is the payoff matrix with probabilities assigned to each strategy (like in a mixed strategy game)-

Table 2: *Payoff matrix with mixed strategies*

Player2 / Player1	NM (p)	M (1-p)
NM (q)	2,2	1,3
M (1-q)	3,1	0,0

Source: Author's elaboration

Let 'p' be the probability with which player 2 chooses not to move (i.e., come to a halt) and 'q' be the probability with which player 1 will choose to not move.

The above table represents a mixed strategy simultaneous game. But the author has presented the above table to make the analysis easier and to keep track. The expected utility of player 2 is our main focus since they are the driver in motion and we wish to see the changes in player 2's rationality and impatience. Being in motion, in order to prevent an accident, player 2 must choose a strategy that makes them yield in front of his opponent, which he prefers the least. We speak of expected utility as the game has not yet been played N number of times, but we wish to trace the sum of expected utilities derived from each game.

For a single game, the utility which player 2 can expect is dependent upon the probability distribution of player 1's decision.

If player 2 chooses M with probability (1-p), then they should expect a payoff of '3' (as given in the table) with probability q and '0' with probability (1-q). The same can be derived for when player 2 chooses to move with probability p.

Hence, we reach a utility function given by:

$$U2_{i=1} = [p*\{2q + 1*(1-q)\} + (1-p) *\{3q + 0*(1-q)\}]$$

$$= [p + 3q - 2pq]$$

For two games back-to-back, the utility function will also include a discount factor as player 2 would rather have encountered such obstacles all at once than to encounter them after a fixed interval. The reason for suggesting this assumption of "one big jam being better than many small jams" is related to inertia. The driver in motion will prefer to stay in motion unless forced to stop as a cost of effort is associated with bringing a car in motion to stop, and subsequently bringing it back into motion. Similarly, for the driver at rest, the cost of effort is associated with getting a stationary car into motion. Naturally, the driver would like to pay this implicit cost only once rather than multiple times. Although this factor plays some role in the player's decision-making process, the player's decisions are mainly driven by their desire to reach their final destination. As a result, even though there are costs associated with changing the present state of motion, the drivers will still do so in order to reach their destination.

Therefore, total utility after the 2nd encounter is given by

$$U2_{i=2} = [p +3q -2pq] \{1+ 1/(1+\lambda)\}$$

Where $1/(1+\lambda)$ is the discount factor or in this case, the impatience factor since the driver's impatience increases as he encounters such a scenario again and again as a result of which his utility falls by some amount. $[1/(1+\lambda) < 1$ and $\lambda > 0]$

Therefore, the expression for the Nth encounter will be the sum of a GP,

$$U2_{i=N} = [p +3q -2pq] (1+\lambda)- [p +3q -2pq]/\lambda(1+\lambda)^{N-1}$$

The above expression shows a term with a negative sign. This can be thought of as the effort cost of bringing the car back into motion after having played at least one game. That is, after having lost game N-1, they would have to bring their car back into motion in order to proceed towards the Nth game, thus costing them effort which takes away some utility. As N rises, this discomfort term falls to 0, which would mean that at the end of the N-1th game, the players would have been so used to stopping that the effort cost of doing so falls to 0. This would mean that player 2 has become so used to losing the game that losing it again won't cost them anything. Going by this chain of thought, as a driver encounters more and more obstacles, they should be expected to become more and more patient, but as we know that is not the case.

This is because there is another effect in play that might get the best of the driver, this effect is due to his/her ultimate desire to reach his/her end destination. This can be seen by taking the derivative of $U2_{i=N}$ with respect to N which is shown below

$$\delta U2_{i=N}/\delta N = [p +3q -2pq] \lambda^{-1}(1+\lambda)^{1-N} (\ln(1+\lambda)) >0$$

$$\delta^2 U2_{i=N}/\delta N^2 = - [p +3q -2pq] \lambda^{-1} (\ln(1+\lambda))^2 (1+\lambda)^{1-N} <0$$

Therefore, as N increases, $U2_{i=N}$ increases but at a diminishing rate.

Figure 1: *As N increases, $U2_{i=N}$ increases but at a diminishing rate.*

SUn= y-axis

N= x-axis
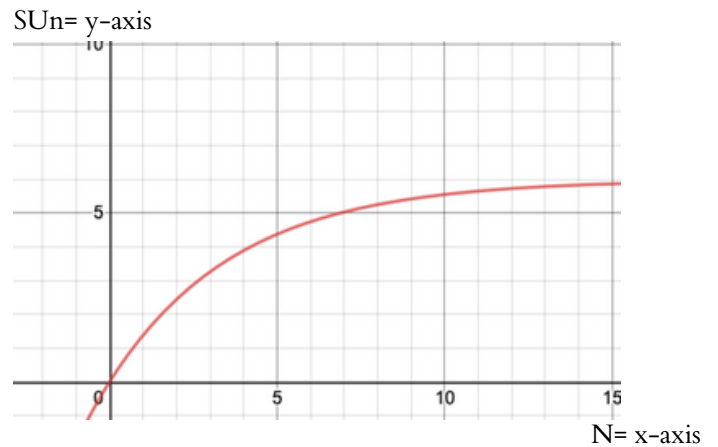
Source: Author's calculation

This would mean that as N rises, due to increased impatience the total utility of the driver increases but at a diminishing rate. Thus, our assumption of "one big jam being better than many small jams" holds.

We have till now assumed that the players are rational, player 2 makes a threat and player 1 can decipher which threat is credible and which non-credible and acts accordingly to reach SGPNE.

However, by incorporating the assumption of bounded rationality we shall soon derive a realistic conclusion. What does rationality mean in this context? Rationality is not only associated with getting a higher payoff but also with the threats that the players make. A player would be considered rational only if they understand the credibility of his/her threat (something that is known to him/her) and acts accordingly. That is, if player 2 makes a non-credible threat, they understand the emptiness of his/her threat and accordingly chooses the final strategy (in this case "not move") to avoid an accident which is the worst outcome and vice versa.

Rationality would appear to be bounded when player 2 gives a non-credible threat, and despite having full knowledge of his/her threat's emptiness they expect player 1 to yield (not move). This false belief of one's threat's credibility comes from the incorporation of bounded rationality (due to rising impatience) into our model. As N increases, the rationality behind player 2's actions and belief of his threat's credibility start to fade, as a result, they begin to question the possible outcome of the next game (till now the possible outcome of the next game being player 2 must lose). It is only when N is sufficiently large that player 2's impatience reaches a level where instead of just questioning the outcome of his threat in the next game he believes (or rather wants to believe) that the outcome will be different.

Here, in our scenario where player 2 has to play the same game again and again in a single day, each time with a different player (having similar strategies and preferences). When player 2 makes a threat, he has full knowledge of it being credible or not.

Here we will make a distinction between giving a threat and acting on a threat. With the assumption of rationality, if player 2 gives a non-credible threat, then he is expected to act on it as though it really were non-credible, i.e., "chicken out" at the last moment if player 1 chooses not to respond to his/her empty threat. As a result, player 2 will lose every game up to the point where the assumption of his rationality gets violated.

Consider the following chain of arguments when we incorporate bounded rationality in the present scenario. Player 2, who has played this game N number of times, has started to grow more and more impatient. Taking derivatives tells us that as N increases, his utility increases but at a diminishing rate. His utility increases because he has to play the game again as compared to just once but at a diminishing rate because as N rises his impatience rises as well.

In the early games, the value of $p > \frac{1}{2}$. That is, player 2 is more likely to make an empty threat and yield at the beginning (not move), showing that if N is small, defeat is more likely to be accepted. As N rises, p approaches 0, this is because the impatience is making the driver believe his non-credible threat to be credible and making him act upon them. q remains constant throughout as we are focusing only on player 2 and q of each new player 1 must be the same as each new player analyses the situation rationally for the first and last time as per our assumptions. This would mean that as N grows larger, defeat for player 2 becomes harder to accept. This can be seen from the following equations.

For some constant value of utility (U)

$$[p + 3q - 2pq](1+\lambda) - [p + 3q - 2pq]/(1+\lambda)^{N-1} = U$$

$$\Rightarrow p = [(U(1+\lambda)^{N-1}/(1+\lambda)^N - 1) - 3q] [1/(1-2q)]$$

$$\Rightarrow dp/dN = \{[U(1+\lambda)^{N-1}\ln(1+\lambda)] (1+\lambda)^N - 1$$
$$- (1+\lambda)^N U(1+\lambda)^{N-1}\ln(1+\lambda)\} / ((1+\lambda)^N - 1)^2$$

$$\Rightarrow dp/dN = -(U(1+\lambda)^{N-1}\ln(1+\lambda))/ ((1+\lambda)^N - 1)^2 < 0$$

5. SUMMARY

We observe that as N grows larger, p tends to 0. For a large enough N, the driver would have grown so impatient that he would rather violate his homo-economicus nature and never choose to stop and an accident in such a case is inevitable.

In an ideal scenario where the driver manages to never lose rationality, due to the diminishing nature of his utility function, his utility at the end of N = ∞ would converge to a singular value given by

$$U_\infty = [\, p + 3q - 2pq\,](1+\lambda)\,/\,\lambda \quad \text{(from sum of infinite GP)}$$

For utility to take the above value, player 2 must stay true to his/her homo-economicus nature to the very end, and by extension; this means they will have to lose each game before they reach their destination.

For player 2 to violate his/her rationality assumption in the Nth game,

$$U2_\infty < U2_{i=N}$$

(That is, the utility derived from only playing N games must be higher than playing ∞ games.)

$$\Rightarrow [p+3q-2pq](1+\lambda)/\lambda < [\, p + 3q - 2pq\,](1+\lambda) - [p+3q-2pq]/(1+\lambda)^{N-1}$$

$$\Rightarrow 0 < [\lambda(1+\lambda)^N - \lambda]\,/\,(1+\lambda)^N$$

(Since λ is assumed to be positive, and $1/(1+\lambda) < 1$)

The above inequality is only possible when both terms are positive

$$\Rightarrow (1+\lambda)^N > 1$$

$$\Rightarrow \lambda > 0$$

Therefore, for any value of $\lambda > 0$, $\quad U2_\infty < U2_{i=N}$
which suggests that as N increases, an accident is bound to happen, the chances of which depend on the particular individual in the role of the second mover. The sooner they violate their homo-economicus nature (which can be attributed to their idiosyncrasies, in this case, the value of λ).

The higher the value of λ, the sooner the accident occurs.
(See graph below for reference)

Figure 2: *Higher the value of λ, the sooner the accident occurs*

SUn = y-axis

Source: Author's calculation
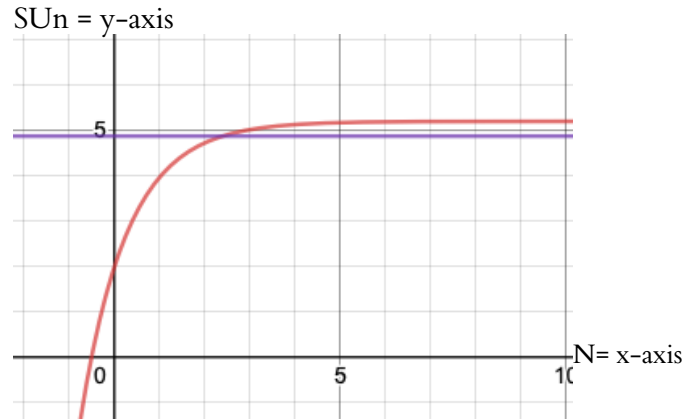
As λ takes a higher value, the red-coloured curve moves upwards, thus intersecting the purple-coloured curve $U2_\infty$ earlier on the X-axis, and therefore, the value of N (accident occurring at the Nth game) will be smaller.

6. CONCLUSION

By means of the aforementioned model, the author has attempted to give a plausible explanation of the practical outcomes (as opposed to the ones derived from theory) by addressing the dynamic nature of human patience and bounded rationality and the process through which a player might reach such outcomes. In this case, perfect rationality would suggest accidents due to "driver impatience" may never happen, but as explained by this paper, in the real world players are not homoeconomicus, and neither do they always maximise their outcome and how an individual's idiosyncrasies play a role in the determination of "breaking point". Their trade-off options change with a change in their state of mind (along with other changes in their surroundings) and the "accident" in question is no more a matter of "if" but "when". It should also be noted that the model does not serve as an end, rather as a means to an end. By virtue of repetition of encounters, the model attempts to incorporate the human nature of the players due to which they tend to violate the assumption of perfect rationality and deviate from ideal behaviour.
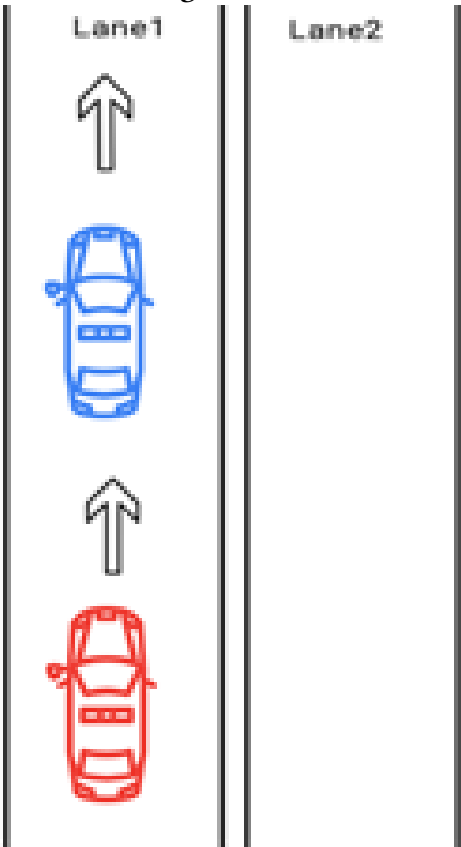
APPENDIX A

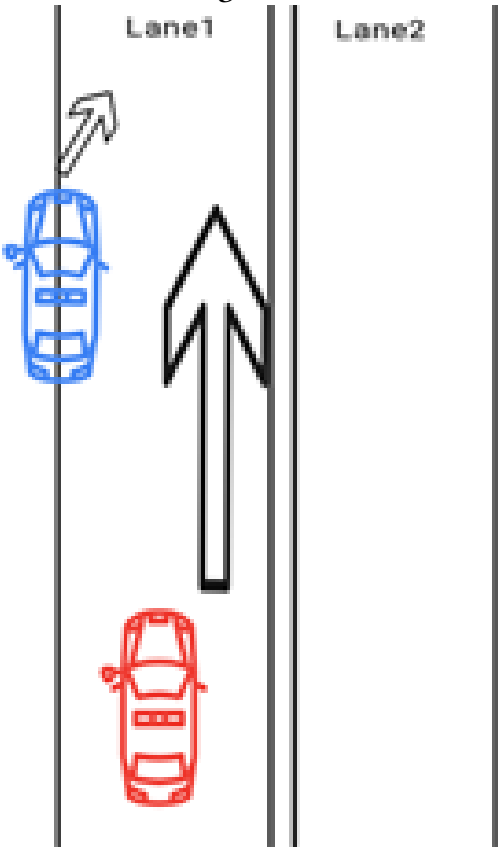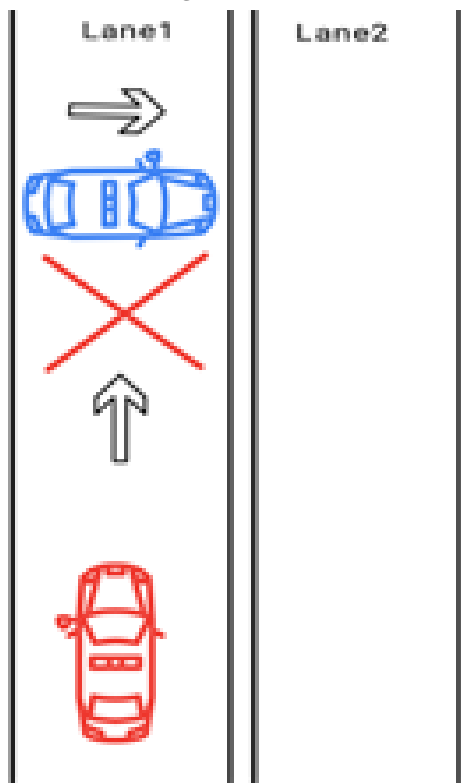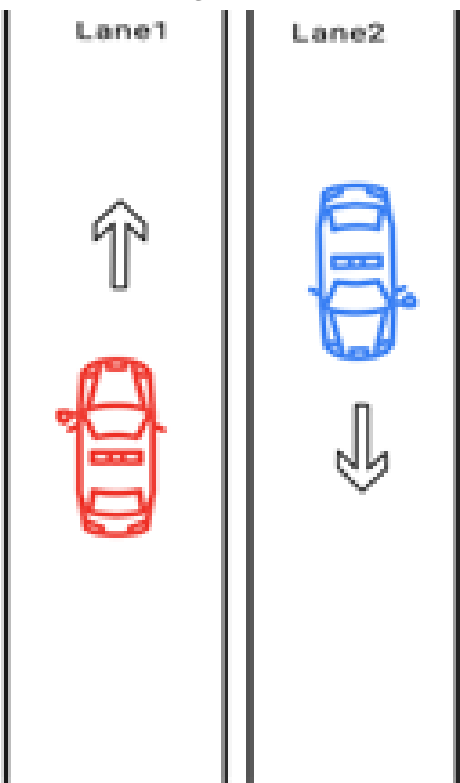**Figure A.1**

Figure A.2

Figure A.3

Figure A.4

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FDI, RURAL–URBAN MIGRATION AND UNEMPLOYMENT: THEORY AND EMPIRICS

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Abstract

Migration is a global phenomenon characterizing human inclination towards safety and well-being. We provide a theoretical background by proposing a three-sector general equilibrium model with rural-urban migration and show the impact of various changes of exogenous variables on migration. We first propose a microeconomic framework by utility maximization to determine the behaviour of the person who decides to migrate. Next, we link the framework with a three-sector general equilibrium model. Following that, we explore the effect of FDI in the urban formal sector on unemployment and rural-urban migration. We find that both the variables increase while foreign capital in the agricultural rural sector leads to lower unemployment and rural-urban migration. We then test the propositions made in the model through time series and cross-sectional regressions.

JEL Classification: R23, F21, J64, C32, C31

Keywords: Rural-urban Migration, Foreign Direct Investment, Unemployment, Time series model, Cross-sectional models, Informal sector, General equilibrium

1. INTRODUCTION

Human migration is subject to various complex factors interlinked with each other, viz. economic, environmental, social, political and demographic. Migration can be across countries or within a particular country as internal migration. While migrants highly contribute to the destination countries, in this paper, we analyse the aspects of migration in the backdrop of source countries. In reality, migration and displacement across countries may be in the form of forced migration, seeking asylum in the said countries among various other things. However, there may be major economic reasons behind migration that can be beneficial for the migrant. Foreign Direct Investment (FDI) is one of such major components. Theoretically, FDI and migration can either be complements or substitutes but empirics suggest them to complement. This is because of several reasons: by transferring knowledge and language skills across zones, migrants can significantly lower communication costs. They also possess information on market structure, consumer preferences, business ethics and commercial codes of their source and destination countries. This can encourage new business opportunities and cross-border links. It also lowers the fixed cost of

undertaking FDI. The rural areas of India suffer from high unemployment due to the scarcity of FDI. As a result, they are forced to migrate to urban areas in search of a job. Thus, we build relationships between FDI and rural-urban migration through the channel of unemployment which we can use in future projections and herein lies the essence and relevance of this paper.

If we do a trend analysis of unemployment and FDI of India for the past 30 years (1990-2020), then we will find that the unemployment rate is quite high while the inflow of FDI as a percentage of GDP is quite low. Only in the year 2008, FDI inflow was highest with a magnitude of 3.62 per cent. As a result, unemployment was lowest with a value of 5.28 per cent. This is clear from the graph below:

Figure 1: *Trend of unemployment and FDI (% of GDP) in India*
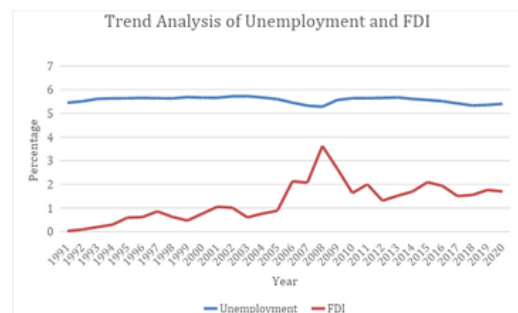
Source: Authors' calculation using data from World Bank's open data

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Figure 2a: *Total migrants in India during Census 2001 and 2011*
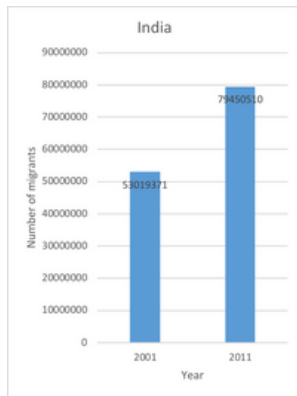
Figure 2b: *Comparison of total migrants between 2001 and 2011 in Indian States and Union Territories*
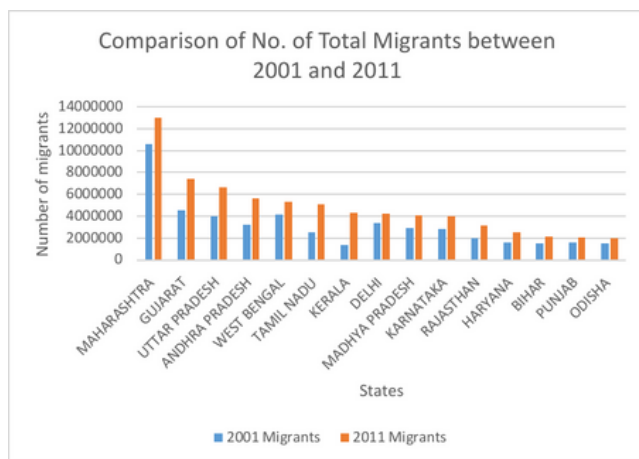
Source: Authors' calculation using data from Census of India

However, the inflow of FDI has always been rising which can be seen from the above graph. As a result, the total number of migrants from rural to urban has also increased from 2001 to 2011, not only at a national level but also for various states.

The rest of the paper is structured in the following way: Section II presents a review of the literature. Section III presents a theoretical model with comparative statistics of FDI in the urban formal sector and rural sector. Section IV presents the empirical study. Section V offers the concluding remarks along with policy suggestions.

2. REVIEW OF LITERATURE

Numerous studies and articles are devoted to finding the causes behind migration across countries. Different econometric methods have been used to assess the number of migrants for economic purposes and other issues. Theoretical models have been developed by Harris and Todaro

(1970) which talk about how wage differences in rural and urban places have led to urbanisation and migration. Kundu (2009) stated that there is an increase in the inflow of people in countries with higher economic development which again looks for the economic reason. Extending the H–T framework, Fields (1975, 1989) introduced a new model in which involuntary unemployment may exist in the presence of wage flexibility in the informal sector when the migrant is lured by a higher paying formal sector job instead of an easier to find informal sector job. Consequently, they face a trade-off between informal sector employment and the search for formal sector jobs. Field's model is more general and realistic which is also supported by empirical evidence. Gupta (1993) proposes a rural-urban migration model with a special reference to the informal sector where he showed the simultaneous existence of open unemployment and informal sector. However, the model has a problem as rural wage has to be lower than the urban informal sector.

There is huge empirical literature on migration and trade, but the literature relating to the relationship between migration and FDI is much smaller. Gao (2003) finds a positive association between the FDI stock in China and the population share of ethnic Chinese in the cross-section of source countries. Aleksynska and Peri (2014) supported the fact that migrants with tertiary education encourage FDI flows. Cuadros et al (2016) also suggest a positive correlation between migration and FDI inflows into the migrant's origin country.

Lee and Vivarelli (2004) found that, although FDI is expected to positively affect employment, employment creation cannot be unambiguously assured as the employment effect can vary from country to country. Spiezia (2004) finds that the FDI has a positive impact on employment with per-capita income for a group of 49 countries, but the effect is not significant for low-income developing countries.

There is a lack of proper microeconomic foundation about the migration decision in the general equilibrium models with unemployment. Further, there is a lack of models showing the effects of FDI on migration. Therefore, we try to model the entire framework in a theoretical model with a proper microeconomic foundation.

3. THEORETICAL MODEL

3.1 Microeconomic Framework

Here we present a simple model showing the microeconomic foundation of the rural-urban migration process in basic economic modelling and how a change in these variables can lead to migration. Migration is a person's decision that is heterogeneous from person to person and region to region. Thus, attributing any single cause to migration is not fair or true. In fact, migrating to any other place is an outcome of several issues confronted by that person.

We introduce the prime variable of interest, α_i which is the migration coefficient of an individual. Here α_i denotes the variable or indicator of whether the person thinks of migrating to another place. So, $\alpha_i = 1$ denotes he permanently leaves the place and $\alpha_i = 0$ denotes he stays at the place.

We consider an economy with two divisions – urban and rural. We assume there are N individuals in the rural economy, living for one period who are involved in the rural sector and face an opportunity of migrating to the urban sector for a job. We consider a discrete choice framework where a representative agent decides whether to migrate or not based on the values of maximised utility functions i.e., indirect utility functions. We normalise the total labour endowment available to each agent as 1.

Thus, the individuals maximise utility $U_R = U(C_{Ri}, l_{Ri})$ subject to the budget constraint $C_{Ri} = (1 - l_{Ri})w_R$
Where C_{Ri}, l_{Ri} are the consumption and leisure of the ith agent in the urban sector.

In the urban sector, they face a higher wage $w_u > w_R$ but have to bear the cost of migration to travel D.
$$C_{ui} = (1 - l_{ui})w_u - D \dots (1)$$

Where C_{ui} and l_{ui} are the consumption and leisure of the ith agent in the urban sector, D is the cost of migration. Thus, they maximise utility $U_u = U(C_{ui}, l_{ui})$ subject to eqn (1).
Let $V_R = \max U_R$ and $V_U = \max U_U$ are the two indirect utility functions obtained after maximization.

The migration decision is made on the basis of the values of V_R and V_U
The agent migrates when he derives more utility from the urban sector i.e. when $V_U > V_R$.

Thus, we have $\alpha_i = \{1 \quad V_U > V_R \quad 0 \quad V_R > V_U \}$

We consider the Cobb Douglas utility function to demonstrate some results for analysis purposes.

$$U_U = C_{ui}^{\beta_i} l_{ui}^{1-\beta_i} \quad 0 < \beta_i < 1$$

$$U_R = C_{Ri}^{\beta_i} l_{Ri}^{1-\beta_i} \quad 0 < \beta_i < 1$$

The agent maximises the following utility function

$$max_{C_{ui}, l_{ui}} \ U_U = C_{ui}^{\beta_i} l_{ui}^{1-\beta_i} \ \text{s.t.} \ C_{ui} = (1 - l_{ui})w_u - D$$

and $max_{C_{Ri}, l_{Ri}} \ U_R = C_{Ri}^{\beta_i} l_{Ri}^{1-\beta_i} \ \text{s.t.} \ C_{Ri} = (1 - l_{Ri})w_R$

The optimal values of
$$C_{ui} = \beta_i(w_u - D), l_{ui} = (1 - \beta_i)(\frac{w_u - D}{w_u})$$

and $C_{Ri} = \beta_i w_R \quad l_{Ri} = (1 - \beta_i)$

Thus, the values of the indirect utility function are

$$V_R = \frac{\beta_i^{\beta_i}(1-\beta_i)^{(1-\beta_i)}}{w_R^{(1-\beta_i)}}(w_R) \text{ and}$$

$$V_U = \frac{\beta_i^{\beta_i}(1-\beta_i)^{(1-\beta_i)}}{w_u^{(1-\beta_i)}}(w_u - D)$$

Comparing V_R and V_U we get

$$V_U - V_R > 0 \ \text{ when } (w_u - D) - w_R^{\beta_i} w_u^{(1-\beta_i)} > 0$$
Or, $w_u^{(1-\beta_i)}(w_u^{\beta_i} - w_R^{\beta_i}) - D > 0 \ \dots(2)$

When the inequality (2) is satisfied, then $\alpha_i = 1$ i.e. the agent decides to migrate.

We can interpret the inequality as when the wage difference weighted by β_i is sufficiently greater than the cost of migration, the agent will migrate. Any increase in the difference in the weighted wage rates leads to an increase in the utility derived in the urban sector relative to the rural sector and thus, an increase in migration. An increase in the cost of migration D, on the other hand, leads to a decrease in the difference of V_R and V_U. Consequently, it leads to a fall in migration. In this case, the role of the β_i introduces heterogeneity in the model by which not all agents migrate since the weights on

migrate since the weights on wage rates are based on the preference parameter β_i. Hence, the wage rate difference $\left(w_U{}^{\beta_i} - w_R{}^{\beta_i}\right)$ is different for all individuals in the economy. β_i is the elasticity of utility with respect to consumption (C_{ui}) (A higher wage rate ensures higher consumption. Thus, the wage rates are weighted by β_i In an uncertain world, could be interpret β_i as relative risk aversion which often plays a key role in migration decisions. (Dustmann et.al (2017))

We consider another case of utility functions for the agents as

$$U_U = C_{ui}{}^{\beta_i} l_{ui}{}^{1-\beta_i} \quad 0 < \beta_i < 1$$

$$U_R = C_{Ri}{}^{\beta_i} l_{Ri}{}^{1-\beta_i} \quad 0 < \beta_i < 1$$

ρ_i denotes a discounting factor applied to the migrant's utility function denoting the effect of staying in the urban sector due to network effects or other real perceived costs etc. (Brucker et.al (2011))

The agent maximises the following utility function

$$max_{C_{ui},l_{ui}} U_U = \rho_i{}^{(1-\eta_i)} C_{ui} l_{ui} \text{ s.t. } C_{ui} = (1 - l_{ui})w_u - D \text{ and}$$

$$max_{C_{Ri},l_{Ri}} U_R = C_{Ri} l_{Ri} \text{ s.t. } C_{Ri} = (1 - l_{Ri})w_R$$

The optimal values of

$$C_{ui} = \frac{(w_u - D)}{2}, l_{ui} = \frac{(w_u - D)}{2w_u}$$

and $C_{Ri} = \frac{w_R}{2}, l_{Ri} = 1/2$

Thus, the values of the indirect utility function are

$$V_R = \frac{w_R}{4} \text{ and } V_U = \rho_i{}^{(1-\eta_i)} \frac{(w_u - D)^2}{4w_u}$$

Comparing V_R and V_U we get $V_U > V_R$ when

$$(\rho_i{}^{(1-\eta_i)} w_u - w_R)w_u + \rho_i{}^{(1-\eta_i)} D^2 - 2w_u \rho_i{}^{(1-\eta_i)} D > 0 \dots (3)$$

When the inequality (3) is satisfied then $\alpha_i = 1$ i.e. the agent decides to migrate.
Thus, with an increase in the difference of wage rate in the urban and rural sector (where the urban wage rate is weighted by the preference parameter), the right-hand side of the inequality increases and the agent will migrate.

The decision of whether to migrate or not depends on differences in parameters of utility and differences in the discount factor for staying in the urban sector, thus depending on the values of β_i and ρ_i.

Hence, we define now the aggregate migration coefficient for the economy α, which gives the fraction of the rural people who will migrate

$$\alpha = \frac{\sum_1^N \alpha_i}{N}$$

The value of α lies between 0 and 1.

3.2 Production side of the economy – A General Equilibrium Analysis

Following Jones (1965,1971) we present a three-sector general equilibrium model. We have three sectors – one rural sector (R) producing agricultural commodities and two urban sectors – urban informal (I) and urban formal sector (M). The rural sector produces an agricultural export good. The urban informal sector produces a non-traded good which is used as an input in Sector M. Both sectors R and I use labour and capital while the land (fixed coefficient input) is specific to sector R. We also assume that sector I uses an imported input in a fixed quantity. Sector M is the import-competing sector that produces its output M using labour, capital and the non-traded input produced by sector I. Since we assume a small open economy, there are constant product prices for the two internationally traded goods, whereas the price of the non-traded good is determined in the domestic market using demand and supply forces. The wages of labour in the informal and rural sectors are assumed to be perfectly flexible while wages of formal sector labour are fixed through some bargaining process between firms and labour unions. Since capital is assumed to be perfectly mobile between the two urban sectors M and I, we have a common rate of return on capital in both sectors.

The institutional rate of return on formal capital is also the same in the urban formal sector and the rural sector.
The following symbols are used for the formal representation of the model:
a_{LR}, a_{TR} = labour and land coefficient of the rural sector R;
a_{KI}, a_{LI} = capital, labour and intermediate input coefficient in the urban informal sector;
a_{KM}, a_{LM} = capital, labour coefficient in the urban formal sector

L = Endowment of labour; **K** = Endowment of capital; **T** = Endowment of land;

W_R = Wage of labour in the rural sector;

W_I = Wage of labour in the urban formal sector;

r = Rate of return on capital; **g** = rate of return on land;

P_R, P_M = International price of commodity R and M;

P_I = Price of the non-traded product I;

p_m^* = Prices of the intermediate input used in the sector I;

$\lambda_{LR}, \lambda_{TR}$ = Proportion of labour and land employed in rural sector R;

$\lambda_{KI}, \lambda_{LI}$ = Proportion of capital, labour employed in the urban informal sector;

$\lambda_{KM}, \lambda_{LM}$ = Proportion of capital, labour employed in the urban formal sector;

θ_{LR}, θ_{TR} = Distribution share of labour and land employed in rural sector R;

θ_{KM}, θ_{Lm} = Distribution share of capital, labour employed in the urban formal sector

$\theta_{KI}, \theta_{LI}, \theta_{mI}$ = Distribution share of capital, labour employed in the urban informal sector

Given this situation, we follow Fields (1975) to model the rural-urban migration equilibrium which is a modified and general version of the Harris-Todaro equilibrium. Let us denote

J_M = job seekers in the urban formal sector;

L_M = total labour force in the rural sector;

L_I = total labour force in the informal sector;

L_R = total labour force in the formal sector;

E_M = total employed in the formal sector M;

h = job search parameter in the urban sector by urban informal sector worker; **n** = job search in the urban sector by rural sector worker migrating in the urban sector;

Given the migration coefficient α, we have the total number of job seekers in the urban formal sector as

$$J_M = L_M + hL_I + \alpha n L_R$$

Given this, we determine the probability of finding a job in the urban formal sector

$$p = \frac{E_M}{J_M} \qquad (4)$$

Then, the expected wage in the rural sector (R) is

$$E(R) = \alpha np\underline{w} + (1 - \alpha np)w_R$$

The expected wage in the informal sector (I) is

$$E(I) = hp\underline{w} + (1 - hp)w_I$$

The expected wage in the urban formal sector (M) is

$$E(M) = p\underline{w}$$

Now, we equate E(R) = E(M) = E(I) so that the expected wage is equal in all three search strategies.

$$\alpha np\underline{w} + (1 - \alpha np)w_I = p\underline{w} = hp\underline{w} + (1 - hp)w_I$$

This is the rural-urban migration equilibrium in the model.

Finally, the general equilibrium structure of the model is given as follows –

Given the assumption of perfectly competitive markets, the usual price–unit cost equality conditions relating to the three sectors of the economy are given by the following three equations, respectively:

$$a_{LR} w_R + a_{TR} g + a_{IR} P_I = P_R \qquad (5)$$

$$a_{KI} r + a_{LI} w_I + a_{mR} p_m^* = P_I \qquad (6)$$

$$a_{LM} \underline{w} + a_{KM} r = P_M \qquad (7)$$

The full employment conditions are given as follows:

$$L = L_u + a_{LM} M + a_{LI} I + a_{LR} R = L_M + L_I + L_R \quad (8)$$

$$K = a_{KM} M + a_{KI} I \qquad (9)$$

$$T = a_{TR} R \qquad (10)$$

Also, from the above equation:

$$\alpha np\underline{w} + (1 - \alpha np)w_R = p\underline{w} \qquad (11)$$

$$p\underline{w} = hp\underline{w} + (1 - hp)w_I \qquad (12)$$

We can also write

$$(1 - \alpha np) L_R = a_{LR} R \qquad (13)$$

$$(1 - hp)L_I = a_{LI} I \qquad (14)$$

Combining (4), (8), (13) and (14) we have the following the equation

$$w_R a_{LR} R + w_I a_{LI} I = (\underline{w}p) - \underline{w}a_{LM} M \qquad (15)$$

Aggregate demand of Sector I is given by total consumption demand and intermediate product demand by sector M. It is assumed that a fraction of the total wage income is spent on the produce of the informal sector. It also produces an intermediate input for the rural sector. Hence, it reflects the dual economy present in the urban economy. Thus, we have:

$$\delta\left(a_{LM}\, \underline{w}\, M + a_{LI}\, w_I\, I + a_{LR}\, w_R\, R\right) + a_{IR}\, P_R R = P_I I \qquad (16)$$

This completes the framework of the model.

The urban formal sector is relatively more capital intensive than the urban informal sector in both value and physical sense i.e.

$$\frac{\theta_{KM}}{\theta_{LM}} > \theta_{KI}/\theta_{LI} \text{ and } \frac{\lambda_{KM}}{\lambda_{LM}} > \frac{\lambda_{KI}}{\lambda_{LI}}$$

Working of the Model – Here we have 11 endogenous variables in the system:
$w_R,\ w_I,\ g,\ r,\ R,\ I,\ M,\ P_I,\ L_u,\ p, \alpha$

and 11 independent equations: (3),(5)-(12),(15),(16). We obtain r from equation (7) and R from equation (10). Then, we can solve the equations (5), (6), (13) and (14) to obtain $w_R,\ w_I,$ g, p in terms of P_I.

Given these values, we insert them in equation (15) and (16). Then we can obtain three equations (15), (16) and (9) to obtain the values of M, I and P_I.

With all the endogenous variables solved in terms of parameters, we can obtain α from equation (3) which given the maximized value of α, L_u is obtained from equation (8).

3.3 Comparative Statics

We show effects on the endogenous variables due to changes in the flow of capital through increases in FDI inflows, changes in foreign-owned land or changes in environmental degradation of land, changes in world prices and effects of COVID-19 pandemic. (All necessary calculations are shown in appendix 1.1)

1. Change in Foreign investment in land – This kind of change can be interpreted as an increase in the usage of land in agricultural and allied activities. Investments in the agricultural sector in rural India can transform barren or arable lands into productive lands through an increase in proper water storage

facilities and other modern agricultural techniques. It may also lead to more agro-based industries which can strengthen the prospects of agri-business farming.

Thus, we have $T = T_D + T_F$

Thus, with an exogenous rise in T_F with the increase in land, we have the following effects on the economy.

We consider FDI in the agricultural sector. By FDI in agriculture, we mean expanding the land endowment. An inflow of foreign capital in the rural sector affects both the factor prices and the output composition of the economy. This immediately lowers the rate of return to land. This, in turn, should imply an increase in and from the equation. (5) This shall be seen gradually. Now being a specific factor, with an increase in land we have an increase in the output of rural sector R. With an increase in output of R we have an increase in employment of labour. With an increase in employment and wages in the rural sector, there will be less attraction for migration. With an increase in output of R (since it uses the output of sector I as intermediate input), output of sector I also increases. Since the informal sector is labour intensive, it will expand with more labour employment. With lesser availability of labour in the Heckscher Ohlin subsystem formed by both the urban sectors with eqn (5), (6), (11) and (12), M will contract to release more labour. Now the increase in the price of I, the output of the informal sector thus will be reflected in a rise in wage rate in the informal sector.

$$\hat{M} < 0.\ \hat{R} > 0\ .\ \hat{I} > 0$$

Since the wage–rental ratios in the second sector have risen, producers of I would substitute labour by capital. Thus, we have an increase in employment in sectors I and R while employment is likely to fall in sector M. But we will find since migration has fallen so the number of job seekers in the urban formal sector has decreased. With an increase in employment in the rural and urban informal sector, this effect is likely to dominate the effect of a contraction in the urban formal sector. This is again true since the expansion of the urban informal sector (which is labour intensive) will create more employment opportunities. Thus, the overall effect of FDI in agriculture will lead to lesser migration as well as lead to lesser employment. That is, we have

$\widehat{L_U} < 0$ and $\ \hat{\underline{\alpha}} < 0$ if the (3.1) is satisfied which in

general will be satisfied.

($\underline{\alpha}^*$ is the average migration rate for the whole rural labour force.)

We can similarly imagine environmental degradation due to low rainfall which can wear out the productivity of the land. Less rainfall or any other adverse impact on the marginal productivity of land will lead to a fall in lower the effective endowment of land and lower land usage.

Proposition – Given the informal sector as labour intensive in our production structure, an increase in FDI in the agricultural sector will increase the output of the urban informal sector and the rural sector. This will further lessen the rate of rural-urban migration and the overall unemployment of labour.

2. Change in Capital inflows through FDI –

Within the lockdown period and after that period, India has seen a surge of FDI inflows. Such huge inflows have major implications for the output of various sectors as well as incomes of different agents in the economy for different parts of the income distribution. This may have a major impact on rural-urban migration as well. We can use the framework constructed above to analyse the changes in FDI inflows. Similarly, we have $K = K_D + K_F$.

With the increase in capital, we have sector M expanding at the expense of sector I as we assume sector M to be labour intensive in both value and terms. As sector I contracts, but also faces a fall in demand due to a fall in employment, the sign of the price of sector I output is indeterminate. If there is a decrease in price, it will be reflected in the fall in wage rates of labour in both sectors R and I from the equation. Thus, with increased FDI in the capital, we have a decrease in rural wage rates in our model satisfying condition. Now since the rural wage rates fall (and return on land rises), we must have a rise in rural-urban migration. However, the probability of getting an urban job increases this time due to the expansion of the sector M. Thus, the net effect on migration will be determined by the relative forces. Urban unemployment of labour may fall or increase as both the sectors here expand and contract simultaneously. But in general, given the nature of factor intensity as the informal sector is labour intensive, unemployment may rise as it contracts.

A Re-modification in the inputs used – This seemingly paradoxical result in our model as shown here is due to the fact of using the same type of capital in both sectors. Thus, we can easily solve the problem by considering two types of capital. K1 used in informal and suppose rural sector and K2 used in the formal sector and assume there is no land input in the model to keep it a 3×4 structure.

The only changes in the equations are

$$K_1 = a_{KI} \, I + a_{KR} \, R \quad (17) \quad K_2 = a_{KM} \, M \, (18)$$

Now we have an increase in K_2 due to foreign direct investment so there is an increase in output of M only. This will lead to an increase in output employment in the formal sector but the output and employment in the informal sector and the rural sector remains unchanged. However, with an increase in employment, demand for the commodity I will rise. It will be translated into a rise in the price of sector I and therefore, on the wage rates of the rural and urban informal sector.

$$\widehat{L_U} = -\lambda_{LM} \, \widehat{M} < 0 \text{ as } \widehat{P_I} > 0 \quad \widehat{w_R} > 0 \, \underline{\widehat{\alpha}^*} < 0$$

if the (3.1) is satisfied which in general will be satisfied ($\underline{\alpha}^*$ is the average migration rate for the whole rural labour force).

But the major finding is the unambiguous fall in the unemployment rate of labour with an increase in FDI. In this case, as well with a rise in rural wage rate, there will be a lesser rate of migration.

Proposition – With an increase in FDI inflows, if the urban informal and formal sectors use the same type of capital, then it will intensify unemployment problems given the formal sector is relatively more capital intensive. If the two sectors are using different types of capital, then a flow of capital in the formal sector will lead to an increase in employment. In other words, it will decrease the unemployment rate among labourers.

3. International lockdown –

Due to COVID 19 lockdown and lack of free flow of imports, it is difficult for the informal sector to buy imported raw materials. This kind of trade restriction will lead to an increase in prices of the intermediate input or products p_m^*. Now given the trade balance and production of the exportable good R remains

unchanged, such a restriction may lead to a fall in the total imported intermediate input. Consequently, there will be a fall in the output of I. As the output of I falls, capital is released in sector M and there is an increase in the equation of M. Therefore, the sector M expands absorbing some labour. However, since sector I is labour intensive, we have an increase in unemployment of labour and lesser rural-urban migration as the increase in the price of I will lead to an increase in rural wage rates. Nonetheless rural-urban sector production R remains unaffected as it is still completely determined by the land endowment. Thus, we have $\widehat{P_I} > 0 \quad \widehat{w_R} > 0 \; \underline{\widehat{\alpha^*}} < 0$ and $\widehat{L_U} \gtrless 0$

Proposition – With international lockdown and restriction in the trade, we have an increase in unemployment of labour due to the factor intensity issue as the informal sector contracts and the urban formal sector M expands. The model also supports a reversal of rural-urban migration variables.

# 4. EMPIRICAL STUDIES

4.1 Time Series Regression

Data: Data for both FDI inflow and unemployment have been collected from World Bank Open Data. We have taken data on India for 30 years (from 1991 to 2020).

Variables:
- Our **Dependent Variable** is Unemployment as a percentage of the total labour force. It is a modelled ILO estimate.
- Our **Explanatory Variable** is net Foreign Direct Investment inflow as a percentage of GDP.

Methodology: Firstly, we try to plot Unemployment and FDI.

Figure 3: *Scatter plot of Unemployment and FDI (% of GDP)*
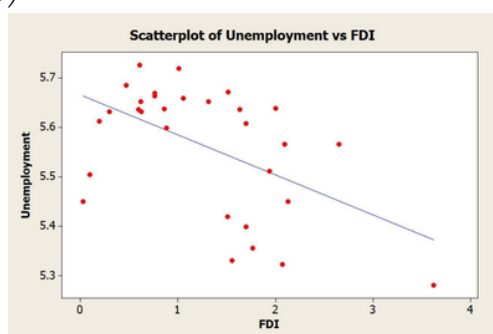
Source: Authors' calculations using data from World Bank's open data

The downward sloping line suggests the inverse relationship between the two variables with a high negative correlation of -0.57.

But correlation doesn't signify the entire picture. Due to the presence of significant positive autocorrelation (Durbin Watson d-statistic as 0.299), we used the Prais-Winsten method of estimating the regression using the Cochrane-Orcutt procedure to estimate the autocorrelation coefficient (rho). So, we have estimated the effects of FDI inflow on unemployment using GLS estimators with the Cochrane-Orcutt procedure in this time-series regression.

Regression Analysis: We estimate the equation as

$$(\text{Unemployment})_t = \alpha_0 + \alpha_1 (\text{FDI Inflow})_t + e_t$$

Table 1: *Regression results of Unemployment and FDI inflow*

Unemployment	Coefficient	Std. Err.
FDI inflow	(-0.07698980 (0.005)***	0.0250726
constant	5.682956 (0)***	0.1004596
Number of obs	30	
F(1, 27)	9.43 (0.0048)***	
R-squared	0.2588	
Adj R-squared	0.2314	
Estimated rho	0.86	

P- values in parentheses (** $p < 0.05$ *** $p < 0.01$)

Source: Authors' calculations using data from World Bank's open data

Persistent unemployment is an alarming feature of developing countries, be it skilled or unskilled. FDI in different sectors improves the situation of employment of either type of labour. The result thus proves empirically the result from our theoretical model. A negative coefficient between unemployment and FDI suggests that FDI reduces unemployment. The relation is statistically significant.

4.2 Cross–Sectional Regression

Data: Data for FDI inflow has been collected from figures released by the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India. Data for rural to urban migration has been taken from the Census of India, 2011. We have taken data on 35

states and union territories of India for the year 2011.
Variables:

- Our **dependent variable** is the total number of migrants from rural to urban in different states. This is a quantitative proxy variable for rural-urban migration.
- Our **explanatory variable** is net inflow of Foreign Direct Investment as a percentage of GDP.

Methodology: We have estimated the effects of FDI inflow on rural-urban migration using OLS estimators in this Cross-sectional regression.

Regression Analysis: We estimate the equation as

$$(\text{Rural-urban migration})_i = \alpha_0 + \alpha_1 (\text{FDI Inflow})_i + e_i$$

Table 2: *Regression Results of Rural-Urban migration and FDI inflo*

Migration	Coefficient	Std. Err.
FDI inflow	0.00366 (0.001)***	1E-05
constant	1638515 (0.001)***	454742
Number of obs	35	
F(1, 33)	12.4 (0.0013) ***	
R-squared	0.2732	
Adj R-squared	0.2511	

P- values in parentheses (** p <0.05 *** p < 0.01)

Source: Authors' calculations using Data from Census of India and DIPP

Migration and FDI inflow are complements. As FDI inflows in urban industrial zones, more job opportunities are created. This encourages rural people to migrate to cities in search of jobs. As a result, the tendency of rural to urban migration increases with an increase in FDI. The positive coefficient between FDI and total migrants, which is a proxy variable for rural to urban migration, proves this result. The relation is statistically significant as well.

5. CONCLUSION AND POLICY RECOMMENDATIONS

Given the proposition of the theoretical model, we propose the need for strong FDI in both the rural and urban formal sectors. An increase in the flow of capital in the agricultural sector in India can have a tremendous effect on the rural development and wellbeing of people. This is also desirable as it shows the lesser tendency of agents in the economy to migrate from rural to urban, leading to lesser pressure in some specific cities. With the increase in FDI in the agricultural sector, modern technology can be implemented to increase the productivity of the land as well as transfer the non-usable arable or barren land into productive usable land. This will lead to an increase in agricultural output and create more job opportunities in rural India. An increase in formal sector capital flow will mainly specify greater investment in the capital intensive service sector. This is often criticized to create jobless growth as we have shown in our basic model. Though with a slightly changed model which is closer to reality (as the type of capital can be different), we found an increase in employment. Our empirical analysis also supported the claim of such an overall fall in the unemployment rate of labour due to increased FDI inflows.

APPENDIX

Appendix A.1

$$Z = C_{ui}{}^{\beta_i} l_{ui}{}^{1-\beta_i} + \lambda(C_{ui} - (1 - l_{ui})w_u - D)$$

The FOC are:

$$\frac{\partial Z}{\partial C_{ui}} = \beta_i (C_{ui}/l_{ui})^{-\beta_i{}^{\square}} + \lambda = 0 \dots (1.11)$$

$$\frac{\partial Z}{\partial l_{ui}} = (1 - \beta_i)(l_{ui}/(C_{ui})^{1-\beta_i} + \lambda = 0 \dots (1.12)$$

$$\frac{\partial Z}{\partial \lambda} = (C_{ui} - (1 - l_{ui})w_u - D) = 0 \dots (1.13)$$

Eliminating λ from (1.11) and (1.12) and putting the value of C_{ui} in (1.13) we obtain

$l_{ui} = (1 - \beta_i)(\frac{w_u - D}{w_u})$ and then $C_{ui} = \beta_i(w_u - D)$. Similarly, we can find C_{Ri} and l_{Ri} for the rural sector.

Appendix A.2

Differentiating $(5) - (7)$

$$\Theta_{LR}\,\hat{g} + \Theta_{TR}\,\widehat{w_R} - \Theta_{IR}\,\widehat{P_I} = 0$$
$$\Theta_{KI}\,\hat{r} + \Theta_{LI}\,\widehat{w_I} + \Theta_{mI}\,\widehat{p_m^*} = \widehat{P_I}$$
$$\Theta_{KM}\,\hat{r} = 0$$

Differentiating (11) and (12)

$$\hat{p} = (1 - \alpha np)\,\widehat{w_I} = (1 - hp)\,\widehat{w_R}$$

We get $\widehat{a_{KM}} = \widehat{a_{LM}} = 0$ as there is no change in input prices for sector 3. We assume $\widehat{a_{TR}} = \widehat{a_{LR}} = 0$

Thus, we obtain $\widehat{w_R} = \frac{\widehat{P_I}(1 - hp)}{\Theta_{LI}(1 - \alpha np)}; \hat{g} = - \frac{\Theta_{LR}\,\widehat{P_I}(1 - hp)}{\Theta_{TR}\,\Theta_{LI}(1 - \alpha np)};$

$$\widehat{w_I} = \frac{\widehat{P_I}}{\Theta_{LI}}; \hat{p} = \frac{\Theta_{LR}\,\widehat{P_I}(1 - hp)}{\Theta_{LI}}$$

Differentiating (8) and (10)

$$\hat{T} = \lambda_{TR}\,\hat{R}$$

$$\hat{K} = \lambda_{KM}\,\widehat{M} + \lambda_{KI}\,\hat{I} + \widehat{a_{KI}}\,\lambda_{KI}$$

$$\hat{L} = \lambda_{LM}\,\widehat{M} + \lambda_{LI}\,\hat{I} + \lambda_{LR}\,\hat{R} + \lambda_U\,\widehat{L_U}$$

Given the demand equation as

$$\delta\left(a_{LM}\,\underline{w}\,M + a_{LI}\,w_I\,I + a_{LR}\,w_R\,R\right) + a_{IR}\,P_R R = P_I\,I$$

Differentiating it we get

$$w_R\lambda_{LR}\,\hat{R} + w_I\,\lambda_{LI}\,\hat{I} = \left(\underline{w}\hat{p} - w_R\lambda_{LR}\,\widehat{w_R} - w_I\lambda_{LI}\,(\widehat{w_I} + \widehat{a_{LI}})\right) - \underline{w}\lambda_{LM}\,\widehat{M}$$

$$w_R\lambda_{LR}\,\hat{R} + w_I\,\lambda_{LI}\,\hat{I} = \left(\underline{w}\hat{p} - w_R\lambda_{LR}\,\widehat{w_R} - w_I\lambda_{LI}\,(\widehat{w_I} + \widehat{a_{LI}})\right) - \underline{w}\lambda_{LM}\,\widehat{M} \quad (1)$$

$$\delta\left(\lambda_{LM}\,\underline{w}L\,\widehat{M} + \lambda_{LR}\,w_R L\hat{R} + \lambda_{LR}\,\widehat{w_R}L + \lambda_{LI}\,\widehat{w_I}L\right) - P_I\,I\widehat{P_I} = P_I\,I\hat{I} - \delta\lambda_{LI}\,w_I L\,\hat{I} \quad (2)$$

$$\hat{K} = \lambda_{KM}\,\widehat{M} + \lambda_{KI}\,\hat{I} + \widehat{a_{KI}}\,\lambda_{KI} \quad (3)$$

Arranging (1) (2) and (3) we have

$$C\widehat{M} + D\,\widehat{P_I} + E\hat{I} = -w_R\hat{T}$$

$$F\widehat{M} + G\,\widehat{P_I} + H\,\hat{I} = \delta w_R L\hat{T}$$

$$\lambda_{KM}\,\widehat{M} + \lambda_{KI}\,\hat{I} + \lambda_{KI}\,\sigma_2\widehat{P_I} = \hat{K}$$

1, change in land input - $\hat{R} = \hat{T}/\lambda_{TR} > 0$

We again solve by Cramer's rule taking $\hat{K} = 0$ and $\hat{T} \neq 0$

$$\widehat{M} = \frac{-\delta w_R L\hat{T}(w_I\lambda_{LI}\,\lambda_{KM}\,\lambda_{LM}\,L + \theta_{KI}\,\lambda_{KI}\,L\sigma_2 + P_I\,I\underline{w}\lambda_{KM})}{J_1} < 0$$

$$\hat{I} = \frac{\delta w_R L\hat{T}(\sigma_2 w_I\lambda_{KI}\,L\delta + P_I\,I\underline{w}\lambda_{LM}/\delta + \underline{w}\lambda_{LM}\,L\delta + w_I\lambda_{LI}\,\lambda_{KM} - w_I\lambda_{KI}\,\underline{w}\lambda_{LM}/\delta)}{J_1} > 0$$

$$\widehat{P_I} = \frac{\delta w_R L\hat{T}(\underline{w}\lambda_{KM}\,L\delta + P_I\,Iw_I\lambda_{LM} + \underline{w}\lambda_{LM}\,L\delta - \lambda_{KM}\,\lambda_{LI}\,\theta_{LI}\,w_I)}{J_1} > 0$$

$$J_1 = \frac{\delta}{J_2}(\underline{w}\lambda_{KM}\,\lambda_{LI} - w_I\lambda_{KI}\,\lambda_{LM}) + P_I\,I\left(\frac{\theta_{KI}\,\underline{w}\lambda_{LM}}{J_2} - 1\right) > 0$$

$$J_2 = \left(\theta_{LI} - \frac{\theta_{KI}\,\theta_{LM}}{\theta_{KM}}\right) > 0 \text{ given the assumption of factor intensity}$$

$$\hat{L} = \lambda_{LM}\,\widehat{M} + \lambda_{LI}\,\hat{I} + \lambda_{LR}\,\hat{R} + \lambda_U\,\widehat{L_U}$$

Or, $\widehat{L_U} = -\lambda_{LM}\,\widehat{M} - \lambda_{LI}\,\hat{I} - \lambda_{LR}\,\hat{R} < 0$ (due to labour intensive I)

as $\widehat{P_I} > 0 \quad \widehat{w_R} > 0 \quad \widehat{\alpha^*} > 0$ if the (3.1) is satisfied which in general will be satisfied.

2, change in capital input - We solve by Cramer's rule taking $\hat{R} \neq 0$ and $\hat{T} = 0$ $\widehat{R} = 0$

$$\hat{M} = \frac{\hat{K}(\underline{w}^2 \lambda_{LI} L + \theta_{KI} \lambda_{KI} L\sigma_2)}{J_1} > 0$$

$$\hat{I} = -\frac{\hat{K}(\underline{w}\lambda_{LM} L\delta + P_I I\underline{w}\lambda_{LM} + \underline{w}\lambda_{LM} L\delta)}{J_1} < 0$$

$$\widehat{P_I} = \frac{\hat{K}(-\underline{w}\lambda_{LM} L\delta + P_I I\underline{w}\lambda_{LM} - \underline{w}\lambda_{LM} L\delta)}{J_1} \lessgtr 0$$

$J_1 = \frac{\delta}{J_2}(\underline{w}\lambda_{KI} \lambda_{KI} - w_I\lambda_{KI} \lambda_{KI}) + P_I I(\frac{\theta_{KI} \underline{w}\lambda_{LM}}{J_2} - 1)$

$J_2 = (\theta_{LI} - \frac{\theta_{KI} \theta_{LM}}{\theta_{KM}}) > 0$ given the assumption of factor intensity

$\hat{L} = \lambda_{LM} \hat{M} + \lambda_{LI} \hat{I} + \lambda_{LR} \hat{R} + \lambda_U \widehat{L_U}$

Or, $\widehat{L_U} = -\lambda_{LM} \hat{M} - \lambda_{LI} \hat{I} > 0$ (due to labour intensive I)

Assuming $\widehat{P_I} > 0$ $\widehat{w_R} > 0$ $\hat{\alpha} > 0$ if the (3.1) is satisfied which in general will be satisfied.

With the remodification as done by (17) and (18) we have

$\hat{M} = \widehat{K_2}/\lambda_{K2M}$

$\hat{R} = \hat{T}/\lambda_{TR} = 0$ as T doesn't change. So, by differentiating (18) we have

$\lambda_{K1R} \hat{R} + \lambda_{K1I} \hat{I} = 0$. Then we have $\hat{I} = 0$

$\hat{L} = \lambda_{LM} \hat{M} + \lambda_{LI} \hat{I} + \lambda_{LR} \hat{R} + \lambda_U \widehat{L_U}$

Or, $\widehat{L_U} = -\lambda_{LM} \hat{M} < 0$

as $\widehat{P_I} > 0$ $\widehat{w_R} > 0$ $\hat{\alpha} > 0$ if the (3.1) is satisfied which in general will be satisfied.

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THE DETERMINANTS OF ROAD TRAFFIC FATALITIES ACROSS COUNTRIES

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Abstract

Concerning policy attention, Road Traffic Accident (RTA) is among the most overlooked causes of death worldwide. Unlike various other health and mortality indicators, road traffic fatality rates do not necessarily decline with economic growth. In recent decades, low-income countries have witnessed a rapid increase in the death rate associated with traffic accidents, whereas high-income countries have registered a decline. The observed pattern is in accordance with the hypothesised 'inverted U-shaped' relationship that road traffic fatality rate has with per capita income. This econometric study attempts to identify the core determinants responsible for the evolution of such mortality rates across countries. The associations were tested using cross-sectional data from 102 countries for the year 2016. The results reveal that a high rate of motorisation and greater per-person energy consumption for road transportation increase the fatality rate. Income inequality is also positively linked with traffic mortality; greater inequality increases the proportion of vulnerable road users and restricts access to emergency healthcare. Effective legislation and enforcement emerge as important mitigating factors. Finally, based on the results, key policy imperatives in the Indian context are identified.

JEL Classification: I14, I15, I18

Keywords: Road Traffic Fatality, Per Capita Income, Inequality

1. INTRODUCTION

Road traffic injury is unlike other causes of mortality in various respects. Firstly, most people do not view it as a major health crisis. In 2016, however, it ranked higher than HIV/AIDS, tuberculosis and diarrhoeal diseases in the list of causes of mortality for all age groups worldwide; more people aged 5-29 years died in a road accident than of any other cause (World Health Organisation 2018). The developing world accounts for a disproportionate share of such fatalities. In these countries, passengers of two-wheelers and three-wheelers along with pedestrians are at most risk.

Secondly, road traffic fatalities are caused due to a multiplicity of factors, making diagnosis and treatment highly context-specific. The underlying cause may be systemic (such as flawed road design) or concerned with the actions of an individual (such as driver negligence) or a combination of both. The option of rolling out a standard vaccine, medication or treatment plan is not available to policymakers when designing strategies to combat road traffic accidents.

For illustration, penalties on violation of traffic laws should ideally be complemented with the construction of safe road infrastructure.

Thirdly and most interestingly, the road traffic fatality rate in a country does not simply reduce with economic progress. With increasing per capita income, it initially rises, peaks and falls gradually thereafter (Kopits and Cropper 2003). Economic progress generates counterforces that give rise to an inverted U-shaped curve. A rise in average income stimulates higher vehicle ownership and greater use of roadways. At the same time, it leads to an improvement in the standard of vehicles, roads and inpatient healthcare. In the beginning, the former is the dominant force. Eventually, the latter takes over and the situation reverses.

Roads are ubiquitous; every economy is reliant on road transportation. Even in the presence of alternative modes of transportation, last-mile travel is unfeasible without roadways. Certain factors, such as topography, may restrict countries from developing alternatives in the form of railroads and waterways. Thus, road safety is a matter of concern for every

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nation. This study aims to identify the determinants of road traffic fatalities by comparing countries. Apart from economic progress and its relationship with road safety, the major themes explored in this paper are the role of income inequality and the significance of legislation and enforcement. Sections 2 and 3 summarise the existing literature on the subject and establish the conceptual basis of the study. Sections 4 and 5 describe the design and results of the econometric exercise. Section 6 is a detailed discussion of the findings. The paper culminates in the identification of critical policy imperatives regarding India.

2. LITERATURE REVIEW

Previous cross-country studies found road traffic fatality rate to be an inverted U-shaped function of average income (van Beeck, Borsboom and Mackenbach 2000, Kopits and Cropper 2003, Bishai et al 2006). From figure 1, which plots the fatality rate against per capita income, it is observable that the pattern still holds in the year 2016. In the beginning, the fatality rate rises sharply with average income. Eventually, it attains a maximum; the highest values are recorded in the income range of Int'l $10,000-20,000 (international dollars 2017 PPP). Thereafter, it falls gradually and reaches a floor.

Kopits and Cropper (2003) explained the phenomenon by expressing the fatality rate as a product of fatalities per vehicle and motorisation rate (vehicles[1] per capita).

$$\frac{fatalities\ (F)}{population\ (P)} = \frac{fatalities\ (F)}{vehicles\ (V)} \times \frac{vehicles\ (V)}{population\ (P)} \quad (1)$$

As per capita income increases, fatalities per vehicle (F/V) fall whereas the motorisation rate (V/P) rises. From figures 2 and 3, it is evident that the relationships have remained steady over the years.

As household income rises, passengers switch from two-wheelers and three-wheelers to relatively safer vehicles such as cars while existing car owners upgrade to models equipped with better safety features. At the same time, expenditure on the construction of better-quality roads rises. Ambulance services and post-crash healthcare are more accessible in high-income countries. In low-income countries, the percentage of casualties who succumb to injuries before receiving attention in a hospital is more than twice that in high-income countries (WHO 2018). These factors are mitigating in nature and cause F/V to fall. V/P is positively correlated with average income. A rise in the number of vehicles per capita indicates greater use of road transportation. A higher volume of passengers and freight move through the system. These factors are aggravating in nature and increase the probability of road accidents.

The interplay between these two forces gives rise to the inverted U-shaped curve. In low-income countries, high growth in the rate of motorisation subdues the decline in fatalities per vehicle. The aggravating effect is dominant over the mitigating effect. As a consequence, the fatality rate rises. Beyond a point[2], the trend reverses. The mitigating forces take over the aggravating forces. With further economic progress, the road traffic fatality rate falls.

3. THEORETICAL FRAMEWORK

Based on the preceding discussion, it can be remarked that the hypothesised evolution of the road fatality rate with increasing per capita income is not automatic in nature. Suppose economic progress is not accompanied by a rise in the motorisation rate and leads to an improvement in the health and road infrastructure. In that case, the fatality rate is expected to fall. Thus, a simple log-linear[3] model of road traffic fatality rate can be structured as
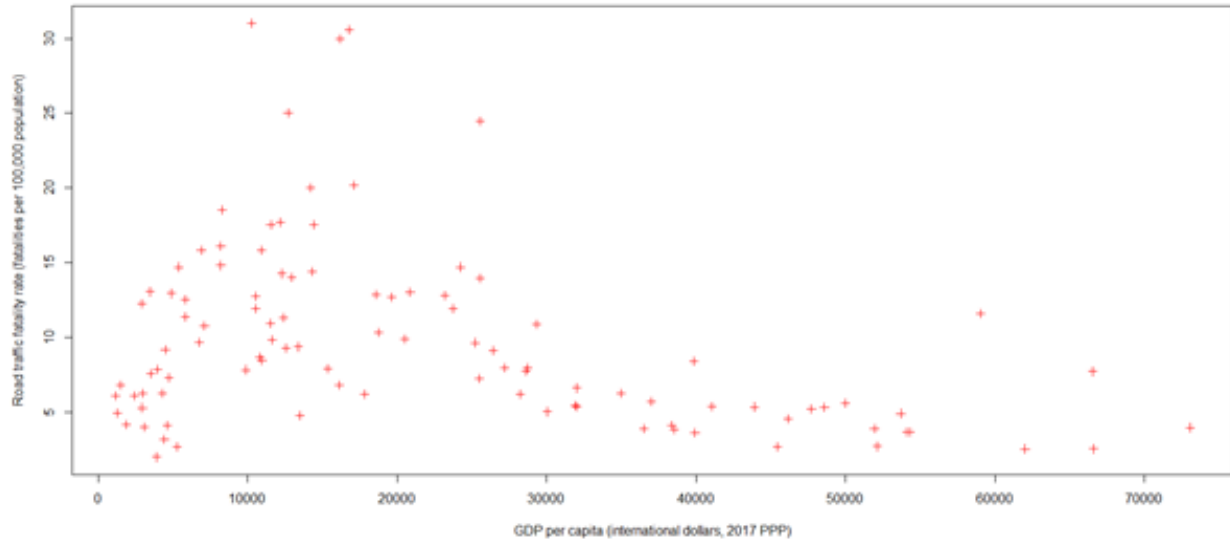
$$\ln(Fatality rate) = \alpha_0 + \alpha_1 \ln(GDP per capita) + \alpha_2 \ln(Vehicles per capita) + u \quad (2)$$

Keeping the motorisation rate fixed, an increase in GDP per capita is expected to generate only positive developments and reduce the fatality rate. GDP per capita, in this case, is effectively a proxy variable for the mitigating factors——quality of healthcare and road infrastructure. Hence, a priori, we expect the elasticity of fatality rate with respect to per capita income to be negative.

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[1] Throughout the text, the term 'vehicles' refers to all kinds of passenger and transport vehicles

[2] Kopits and Cropper (2003) estimated the fatality rate to peak at approximately Int'l $8,600 (international dollars 1985 PPP)

[3] The model is broadly derived from equation 1. Fatalities per vehicle (F/V) is a function of income per capita (and possibly other variables). Logarithmic transformation has been used to simplify the multiplicative terms.

Figure 1: *Road traffic fatality rate versus GDP per capita, 2016 (102 countries in the compiled dataset)*

Source: GDP per capita: Human Development Data Center | Road traffic fatality rate: WHO, various national databases

Figure 2: *Road traffic fatalities per vehicle versus GDP per capita, 2016 (102 countries in the compiled dataset)*
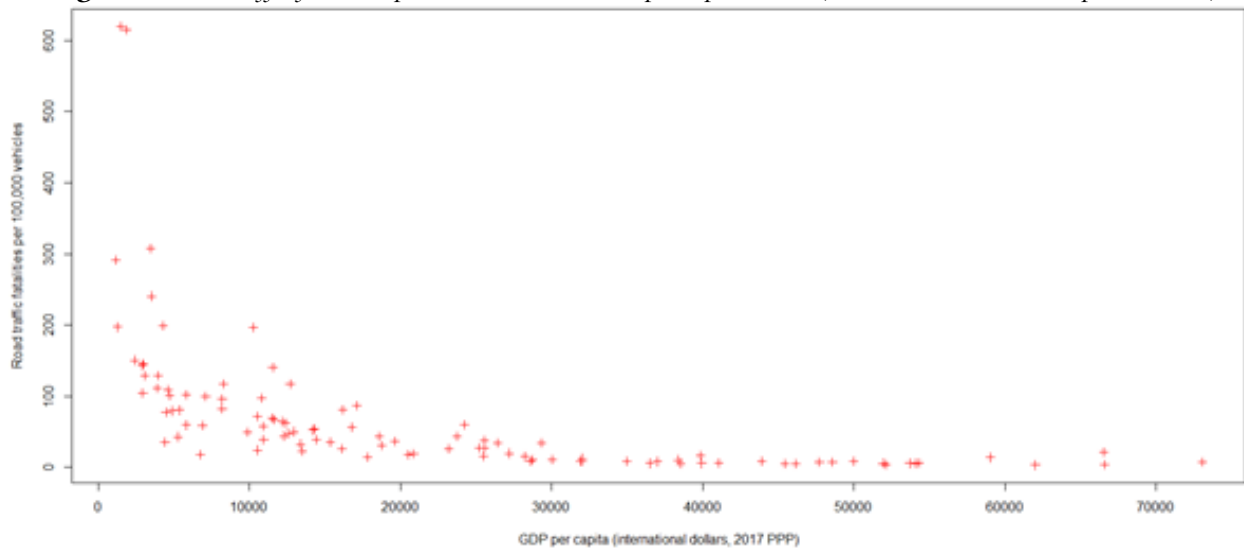
Source: GDP per capita: Human Development Data Center | Road traffic fatalities and Vehicles: WHO, various national databases

Figure 3: *Vehicles per capita versus GDP per capita, 2016 (102 countries in the compiled dataset)*
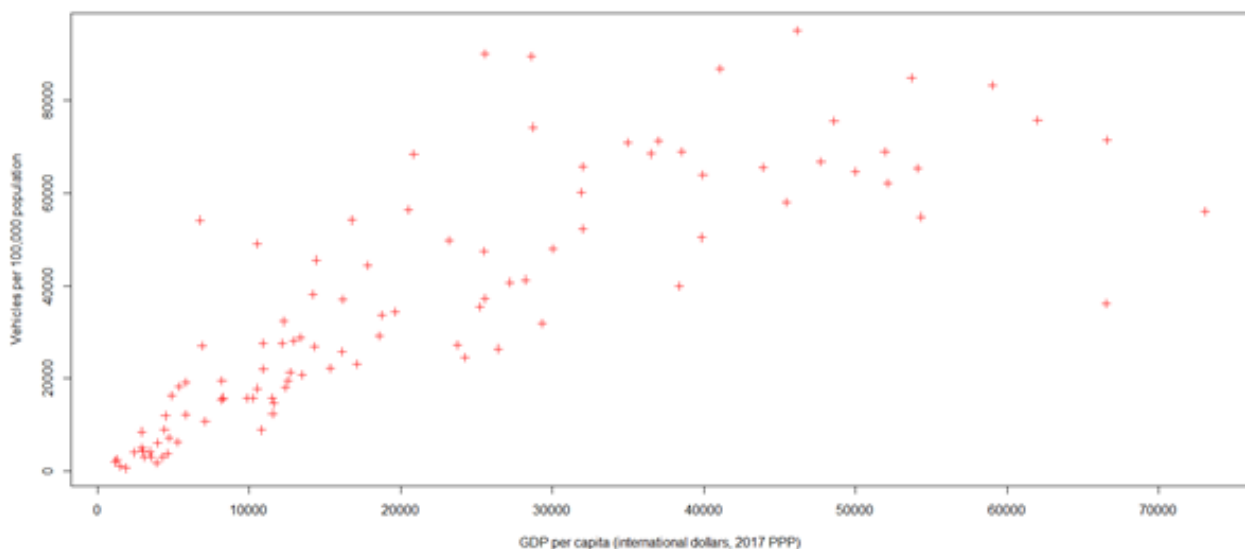
Source: GDP per capita: Human Development Data Center | Vehicles: WHO, various national databases

The motorisation rate measures the reliance of a country on road transportation. Based on figure 3, it can be said that the variability in the motorisation rate is higher among middle and high-income countries. The motorisation rate of a country depends on various factors apart from its per capita income. The availability of alternative means of transportation is among them. A well-developed public transportation system can reduce the use of private vehicles in urban areas. Similarly, rail and waterways can effectively substitute for large-scale freight transportation through highway networks. From the former, we expect the elasticity of fatality rate with respect to vehicles per capita to be positive.

Although figure 1 supports the hypothesised inverted U-shaped pattern, it also reveals significant deviations from it. The deviations may be a result of various other factors not yet considered. Thus, a search for additional determinants is warranted.

Motorisation rate is not the sole indicator of an economy's dependence on roadways. Higher vehicle ownership may not necessarily lead to higher movement of vehicles. Wider distribution of population or higher freight movement may result in a greater number of trips through the system. Thus, apart from the density of vehicles, the dimension of the volume of vehicular movement should also be considered. Per capita consumption of energy in road transport is one such metric. Everything else constant, greater per-person energy consumption in road transportation is expected to increase the possibility of an accident and thereby the possibility of a fatality.

Distribution in income within a country affects road safety in multiple ways. Firstly, income inequality creates heterogeneity among road users in a country (Anbarci, Escaleras and Register 2009). High-income households can own vehicles that are relatively safer to drive, for example, cars. Low-income households[4] have to settle for bicycles, motorcycles or no vehicle at all. Thus, the proportion of vulnerable road users is greater in income-unequal societies. Secondly, income inequality translates into inequality in access to post-crash care. In the absence of adequate public healthcare, affordability of treatment becomes an

issue of huge concern. Trauma centres are often located in urban settlements and there is limited availability of ambulance services in remote areas. The importance of legislation and enforcement cannot be overstated when it comes to road safety[5]. Irrespective of the economic setting, its role in ensuring safety on roads is indispensable. Law and vigilance have to complement each other. While regulations need to be dynamic and evidence-based, in the absence of effective enforcement any law will fail to achieve its purpose. This study is an attempt to find evidence in support of these propositions.

4. DATA AND METHODOLOGY

This is a cross-sectional study involving 102 countries with data for the year 2016. Countries were selected based on the availability of relevant data. A complete list of countries can be found in Appendix A.1. Across countries, different time-based definitions are used to classify deaths as road traffic fatalities. For example, certain countries declare the cause of death as road accident injury only if it occurs on-site. Other countries consider a death to be a traffic fatality even if it happens a few days post the accident in a medical centre. Thus, two countries with otherwise similar attributes but different definitions will record a significantly different number of fatalities. The country with the narrower definition is expected to under-report. The World Health Organisation (WHO) recommends a 30-day definition. However, 26 out of the 102 countries in this dataset do not follow this standard. Thus, to account for this heterogeneity, the data were adjusted using WHO's scheme. The adjustment scheme has been described in Table 1.

Table 1: *Adjustment factors for road traffic fatality rate*

Time period (post-accident) specified in road fatality definition	Adjustment factor
At the scene or within 24 hours	1.30
3 days	1.15
6 days	1.09
7 days	1.08
30 days	1.00
365 days and more	0.97
adjusted fatalities = reported fatalities × adjustment factor	

Source: Data Systems: A Road Safety Manual for Decision-Makers and Practitioners, World Health Organisation, 2010

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[4] Passengers of two- and three-wheelers and pedestrians account for fifty-four per cent of road traffic deaths worldwide. Twenty-nine per cent of the fatalities are car users (WHO 2018).

[5] For example, correct helmet use can reduce the probability of sustaining injuries to the head by sixty-nine per cent. (WHO 2018)

Data sources and descriptions can be found in Table 2. Descriptive statistics of the variables can be found in Appendix A.2.

Table 2. Data Description

Variable	Description	Time period	Source
Aggregates			
rtf	Reported number of fatalities attributable to road traffic accidents	2016	Global Status Report on Road Safety 2018, WHO
veh	Number of registered vehicles	2016[a]	Supplementary data from various national statistical databases. *See Appendix A.3 for the complete list*
renergy	Units of energy consumed in road transportation (in ktoe)	2016	World Energy Balances, International Energy Agency
pop	Total population count	2016	World Population Prospects 2019, United Nations
Derived Ratios			
rtfrate	Reported road traffic fatality rate: road traffic fatalities per 100,000 population, adjusted for reporting definition		
vehpc	Motorisation rate: registered vehicles per 100,000 population		
renergypc	Energy consumption per capita: consumption of road transport energy (ktoe) per 100,000 population		
Others			
gdppc	GDP per capita (in international dollars, 2017 PPP)	2016	Human Development Data Center, United Nations Development Programme
gini	Gini coefficient of income inequality Range: 0 (perfect equality) to 1 (perfect inequality)	2016 or latest available	
rulelaw[b]	'Rule of Law': one among the six indicators of governance quality developed by the World Bank *(official definition) reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.* Range: -2.5 (weakest) to 2.5 (strongest)	2016	Worldwide Governance Indicators, World Bank

Notes
[a]*Vehicle counts for France, Iraq, Kyrgyzstan and Senegal are for the year 2015*

[b]*In the absence of a composite index measuring the effectiveness of road safety legislation and enforcement, the 'rule of law' indicator from Worldwide Governance Indicators has been used as a proxy. Disregard for law, in general, is expected to translate into disregard for road safety regulations also.*

Using the method of Ordinary Least Squares (OLS), the parameters of the following equation were estimated.

$$\ln(rtfrate_i) = \beta_0 + \beta_1\ln(gdppc_i) + \beta_2\ln(vehpc_i) + \beta_3\ln(renergypc_i) + \beta_4 gini_i + \beta_5 rulelaw_i + u_i \qquad (3)$$

5. REGRESSION RESULTS

Results of the OLS regressions have been presented in Table 3. Supplementary information can be found in Appendices A.4 and A.5.

Table 3. OLS Regression Results | Dependent Variable: ln(*rtfrate*)

Independent Variables	Coefficients	
	(1)	(2)
Intercept	2.7227 (5.23)***	−0.5066 (−0.46)
ln(*gdppc*)	−0.6639 (−5.37)***	−0.3517 (−2.35)**
ln(*vehpc*)	0.5692 (5.01)***	0.3985 (4.49)***
ln(*renergypc*)	—	0.2467 (2.21)**
gini	—	3.2500 (5.85)***
rulelaw	—	−0.3756 (−5.33)***
R-squared	0.22	0.58
Adjusted R-squared	0.21	0.56
F statistic	14.52***	27.41***
Akaike criterion	165.27	107.04
Schwarz criterion	173.15	122.79
Number of Observations	102	102
t-ratios in parentheses		
Significance codes: 0.01 ***, 0.05 **, 0.10 *		
Source: Author's calculations		

6. DISCUSSION OF RESULTS

In the simpler Model 1, the signs of the coefficients are as expected. The elasticity of fatality rate with respect to per capita income (gdppc) is negative and the elasticity with respect to motorisation rate (vehpc) is positive. The coefficients are individually as well as jointly highly significant. Higher motorisation, indicative of greater reliance on road transportation, causes higher fatalities. Keeping the motorisation rate constant, an increase in average income brings the fatality rate down. This occurs primarily because of two reasons. Firstly, economic progress brings about a change in the composition of road users. Two- and three-wheelers are substituted with relatively safer four-wheelers. Secondly, post-crash healthcare becomes more accessible; the chances of surviving a severe accident increase when emergency treatment is delivered in time.

In Model 2, even as more variables are added, both per capita income and vehicles per capita retain their signs. They also remain statistically significant. However, the magnitude of the elasticities declines markedly. Based on the information criteria, it can be said that Model 2 is an improvement over Model 1. There is a substantial rise in the value of R-squared also. The R-squared value is considerably high for a cross-sectional study of this nature. The coefficients are jointly significant.

The coefficients of the remaining three variables bear the expected signs and are individually statistically significant. Road energy use per capita (renergypc) and motorisation rate are used to measure a country's dependence on road transportation. A higher volume of traffic increases the probability of accidents. The coefficient of income inequality, as measured by the Gini coefficient (gini), is positive. This supports the proposition that the income distribution within a country affects its health indicators, including the road traffic fatality rate. Higher inequality increases the percentage of vulnerable commuters (pedestrians, cyclists, motorcyclists) on the roads. At the same time, it deprives low-income households of quality hospital treatment. Inequality exposes more people to the risk of being involved in an accident and diminishes their chances of surviving such an accident. 'Rule of law' (rulelaw), used as a proxy to judge the effectiveness of road safety legislation and enforcement, carries a negative coefficient.

Greater compliance with traffic regulations reduces the number of mishaps and brings the fatality rate down. The analysis provides ample evidence to support the propositions put forward in the beginning.

Model 2 was put through diagnostic tests to check for multicollinearity, heteroskedasticity and model misspecification. Detailed results can be found in Appendix A.4. The Variance Inflation Factors (VIFs) indicate the presence of multicollinearity. The VIFs of gdppc and renergypc are in particular very high. A high pair-wise correlation exists between them and with the remaining variables (see Appendix A.5). Breusch-Pagan and White's tests refute the presence of heteroskedasticity even though it is a common occurrence in cross-sectional datasets. The result of Ramsey's RESET supports the claim that the model is not misspecified. Adequate specification may be a reason behind the absence of heteroskedasticity. A test to verify the normality of residuals was also conducted. Based on the results it can be concluded that the residuals are normally distributed.

7. CONCLUSION: POLICY IMPERATIVES

Given the complexity surrounding road traffic fatalities, individual country analysis becomes highly context-specific. In India, the road traffic fatality rate has risen from 7.9 per 100,000 persons in 2001 to 11.5 per 100,000 persons in 2019. The fatality rate rose consistently in the first decade of the new century and plateaued thereafter (MoRTH 2020). In 2019, passengers of two-wheelers accounted for the highest share in the fatality rate at thirty-seven per cent. In the same year, the number of registered vehicles stood at 297 million (22,600 vehicles per 100,000 persons), around sixty per cent of which were two-wheelers. In 2001, the vehicle fleet size was 54 million (5,600 vehicles per 100,000 persons) (ibid).

Based on conservative estimates, the national vehicle fleet is projected to expand to the size of 507 million (33,700 vehicles per 100,000 persons) by the year 2040 (Arora, Vyas and Johnson 2011). Under these circumstances, curbing road traffic fatalities will continue to be a major challenge for the country in the years to come.

In light of the findings of this study, three key policy imperatives can be identified- (a) managing greater traffic volumes, (b) addressing the inequality in access to emergency healthcare and (c) adopting evidence-based legislation and ensuring greater compliance. Reducing private vehicle ownership is easier said than done; the convenience offered by road transportation is unparalleled. However, efficient public transport can reduce the burden on roads. By expanding the network of buses and metro systems, urban roads can be decongested. Urban planning is of great significance. Constructing transit systems that reduce travel time will help curb vehicular pollution and prevent accidents. In the meantime, existing networks can be improved by identifying and upgrading perilous road stretches. Healthcare in India is marked by grave inequalities. Access to healthcare is skewed, even more so in the case of emergency and trauma care. Therefore, increasing public expenditure in this sector is of utmost priority. Traffic regulations are undoubtedly the most cost-effective solution to minimising the number of road accidents. By making best practices as legal requirements, ensuring compliance and reducing corruption in law enforcement, the status of road safety can be improved. The issue of road safety deserves more attention from the public and government alike. Like in any other health crisis, reducing road traffic fatalities requires dedicated efforts from the side of the authorities and devoted participation of the masses.

APPENDIX

A.1 List of countries (102) in the dataset

Albania, Algeria, Argentina, Australia, Austria, Bangladesh, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Cameroon, Canada, Chile, China, Colombia, Costa Rica, Cote d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hungary, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Kenya, Korea (Republic of), Kyrgyzstan, Laos, Latvia, Lithuania, Malaysia, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Netherlands, Nicaragua, Niger, Nigeria, North Macedonia, Norway, Pakistan, Panama, Paraguay, Peru, Poland, Portugal, Romania, Russian Federation, Senegal, Serbia, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Togo, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States of America, Uruguay, Viet Nam, Zambia, Zimbabwe

A.2 Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
rtfrate	9.76	6.11	2.02	31.00
gdppc	21865.00	17886.00	1150.00	73035.00
vehpc	36057.00	25739.00	683.00	94909.00
renergypc	37.39	30.07	1.71	163.50
gini	0.37	0.08	0.24	0.63
rulelaw	0.14	0.94	-1.63	2.04
Number of observations: 102				
Source: Author's calculations				

A.3 List of supplementary data sources

Algeria
National Office of Statistics. https://www.ons.dz/
Argentina
National Directorate of Road Observatory. https://www.argentina.gob.ar/seguridadvial/observatoriovialnacional
Bangladesh
Bangladesh Bureau of Statistics. http://www.bbs.gov.bd/
Benin
National Institute of Statistics and Economic Analysis. https://insae.bj/
Botswana
Statistics Botswana. https://www.statsbots.org.bw/
Brazil
National Observatory of Road Safety. https://www.onsv.org.br/19076-2/
Canada
Statistics Canada. https://www.statcan.gc.ca/eng/start
China
"Number of fatalities in traffic accidents in China from 2008 to 2018". Statista.
https://www.statista.com/statistics/276260/number-of-fatalities-in-traffic-accidents-in-china/
Colombia
Single National Registry of Traffic. https://www.runt.com
Costa Rica
Costa Rican Observatory of Road Safety. https://www.csv.go.cr/observatorio

Cyprus
Statistical Service of the Republic of Cyprus. https://www.mof.gov.cy/mof/cystat/statistics.nsf/index
Czech Republic
Czech Statistical Office. https://www.czso.cz/csu/czso/home
Ecuador
National Institute of Statistics and Census. https://www.ecuadorencifras.gob.ec/institucional/home/
India
Union Ministry of Road Transport and Highways. https://morth.nic.in
Ireland
Central Statistical Office. https://www.cso.ie/en/index.html
Italy
National Institute of Statistics. https://www.istat.it/en/
Lithuania
Statistics Lithuania- Official Statistics Portal. https://www.stat.gov.lt/en
Mexico
National Institute of Statistics and Geography. https://en.www.inegi.org.mx/
"Number of road traffic fatalities in Mexico from 2007 to 2018". Statista.
https://www.statista.com/statistics/957976/mexico-road-traffic-fatalities/
Myanmar
Central Statistical Organisation. https://www.csostat.gov.mm/
Netherlands
Statistics Netherlands - Central Bureau of Statistics. https://www.cbs.nl/en-gb
"Number of road traffic fatalities in the Netherlands from 2006 to 2019". Statista.
https://www.statista.com/statistics/437942/number-of-road-deaths-in-netherlands/
Nicaragua
Ministry of Transport and Infrastructure. https://biblioteca.mti.gob.ni/
North Macedonia
State Statistical Office. https://www.stat.gov.mk/Default_en.aspx
Pakistan
Pakistan Bureau of Statistics. https://www.pbs.gov.pk/
Poland
Statistics Poland- Central Statistical Office of Poland. https://stat.gov.pl/en/
Portugal
PORDATA- Contemporary Portugal Database. https://www.pordata.pt/en/Portugal
South Africa
National Traffic Information System. www.enatis.com/
Spain
Directorate-General for Traffic. https://www.dgt.es/es/
United Kingdom
Department for Transport. https://www.gov.uk/government/organisations/department-for-transport
United States of America
Bureau of Transportation Statistics. https://www.bts.gov/
Zambia
Road Transport and Safety Agency. https://www.rtsa.org.zm/

A.4. Diagnostic Tests: Model 2

Regression Diagnostic	Test/Criterion	Result		
Multicollinearity	Variance Inflation Factors	ln(*gdppc*)		14.27
		ln(*vehpc*)		5.92
		ln(*renergypc*)		8.60
		gini		1.26
		rulelaw		2.82
Heteroscedasticity	Breusch-Pagan Test	p-value = 0.340		
	White's Test (squares and cross products)	p-value = 0.477		
Model Specification	Ramsey's RESET (squares and cubes)	p-value = 0.574		
Normality of Residuals	Jarque-Bera Test	p-value = 0.114		
Source: Author's calculations				

A.5. Correlation matrix of the regressors

ln(*gdppc*)	ln(*vehpc*)	ln(*renergypc*)	*gini*	*rulelaw*	
1	0.90	0.93	-0.39	0.79	ln(*gdppc*)
	1	0.88	-0.33	0.66	ln(*vehpc*)
		1	-0.28	0.70	ln(*renergypc*)
			1	-0.35	*gini*
				1	*rulelaw*

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ASSESSING INDIA'S TOTAL FACTOR PRODUCTIVITY GROWTH: DETERMINANTS, TRENDS AND CONTRIBUTION TO OUTPUT LEVELS

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Abstract

Total Factor Productivity (TFP) is defined as the fraction of output growth that is not explained by the inputs of the production function such as capital and labour. This unknown component is often attributed to technological progress. However, it can be determined by a multitude of factors that are not directly observable and thus not accounted for. This paper tries to determine those factors, particularly in the Indian context, and see which of these factors has relatively more impact on the TFP growth of India. It also tries to analyse the trends in India's TFP growth by identifying potential structural breaks. Lastly, it tries to ascertain to what extent the TFP contributes to India's output.

JEL Classification: C01, C02, D24, F43, O11, O47

Keywords: Total Factor Productivity, Technological Progress. Trends in India's TFP Growth

1. INTRODUCTION

Robert Solow laid the foundation for the concept of Total Factor Productivity. He predicted that countries would converge to their respective steady states in the long run and permanent growth will be possible only through technological progress. Solow (1957) further provided an analytical framework for calculating what is called 'Solow Residual', that is, the portion of output growth that is not explained by the inputs of the production function. This unexplained portion or residual is called Total Factor Productivity (TFP). This residual component is often attributed to technological progress which was also the case in Solow's study. However, there could be several other factors that can determine this residual component. Such factors can enhance productivity directly or indirectly by causing a technical change (Musso et al., (2005)).

The significance of TFP in determining output growth has been stressed by numerous studies of the past (See, for example, Romer (1986); Lucas (1988); Krugman (1994); Klenow and Rodriguez-Clare (1997); Hall and Jones (1999); Easterly and Levine (2001)). There has been detailed research showing

evidence for advanced countries to have positive links between innovation, research and development and productivity (Griffth et al. (2004); Griffth et al. (2006); Mairesse and Mohnen (2010)). Human capital also plays a key and positive role in enhancing productivity (Romer (1990)). Bonga- Bonga and Phume (2018) found a strong and positive correlation between Foreign Direct Investment (FDI) inflows and TFP. Miller and Upadhyay (2000) have found a positive relationship between the openness of trade and TFP. In the first section of this paper, the author tries to determine the major factors that affect the TFP growth of India and see which of these factors is relatively more significant.

India's TFP growth has been fluctuating over time as it has gone through a series of wars, oil crises, political unrest and economic reforms. Throughout the 1960s and 1970s, India experienced a technical regression and the productivity growth was negative. However, the TFP growth shows noticeable change post the reforms that started in the late 1980s. The financial crisis of 2008 does not seem to have a considerable impact on India's TFP (Saha, (2012)). To understand these fluctuations in detail, the author will try to determine the trends in India's TFP

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growth in the next section of the paper. Moreover, a lot of scholars have contrasting opinions on whether TFP growth contributes as significantly to the Indian output as factor accumulation. This debate is the subject matter of the last section of the paper.

2. REVIEW OF LITERATURE

2.1 Determinants of TFP growth

There has been detailed research in this field. Griffth et al. (2006); Griffth et al. (2004); Mairesse and Mohnen (2010); and Shabbir (2016) have successfully shown that innovation in the form of patents and R&D expenditure has positive links with TFP growth. Romer (1990); Black and Lynch (1995) have shown that investment in human capital in the form of education plays a key role in improving the productivity of the economy. Miller and Upadhyay (2000) have talked about how trade can enhance productivity. Bonga- Bonga and Phume (2018) found a strong and positive correlation between FDI inflows and TFP. Jajri (2007) has stressed the role of the manufacturing sector as well as the political stability in enhancing the TFP growth of Malaysia.

2.2 Trends in TFP growth in India

Saha (2012) has examined the trends in TFP growth of India using the growth accounting methodology. This paper stressed the role of the economic reforms of 1991-92 in accelerating TFP growth in India. Veeramani (2004) and Gupta (2008) have also used the growth accounting method to stress the fact that TFP growth has been significant and rising over time. Das et al (2010) have emphasised the importance of factor accumulation in India's high growth period starting late 1980s while Bosworth et al (2007) and Gupta (2008) have highlighted the importance of productivity growth.

3. THEORETICAL FRAMEWORK

3.1 Solow Residual

The Solow residual allows us to find out the TFP growth of a country using the growth accounting method.

TFP growth = Growth Rate of Output – (Elasticity of Output with respect to capital times the growth rate of capital + Elasticity of Output with respect to Labour times the growth rate of Labour). (1)

The derivation of the result shown in equation (1) has been done in Appendix A at the end of the paper. This result shows the importance of TFP in determining output growth.

3.2 Determinants of TFP growth

Given below is a detailed description of the factors affecting TFP considered in this paper and the economic logic behind their inclusion:

a) **Growth Rate of Manufacturing Sector Output:** If an economy undergoes restructuring with a shifting of resources between sectors, and if more resources are devoted to the manufacturing sector, it can significantly enhance the productivity of the economy.

b) **FDI Inflows:** FDI in an economy, in the form of physical assets such as heavy machinery and capital, can provide for a technical change and enhance the economy's productive capacity.

c) **Innovation:** It is one of the most important factors in determining the TFP growth of a country. Innovation and R&D expenditures along with investments in technology are keys to ensuring competitiveness and progress, which in turn, ensures sustained growth. Enhancing investments in the research areas and the creation of new property rights by granting patents fosters the development of the private and public sectors and therefore, enhances the productivity of the factors of production.

d) **Education:** Human capital in the form of education, and training of the workforce to enhance their skills and widen their knowledge base, produces highly skilled and efficient workers. Manpower development has proven to be a significant means of improving the productivity of an economy.

e) **Political Stability:** Political stability is another instrumental factor in how well the inputs get utilized in the production process. An unstable government may result in several policy changes. Violence and terrorism can lead to huge economic

losses. Hence, the absence of political instability and violence is also important in maintaining high TFP.

4. DATA AND METHODOLOGY

The paper has three segments. The first seeks to determine the factors that affect India's TFP growth and examine if it underwent a structural break following the global financial crisis of 2008. The second segment deals with the trends in India's TFP growth and sees at what points the TFP has undergone structural changes. The final segment of the paper tried to assess the contribution of TFP to overall output levels and compare it with the contribution of other inputs using the dominance analysis technique.

The list of all the variables used in the paper along with their interpretation has been presented in Table D.1 of Appendix D while the descriptive statistics have been presented in Table D.2. The data for TFP, CAPITAL, and LABOUR have been obtained from Penn World Table Version 9.1 available on the website of Groningen Growth and Development Centre, University of Groningen. The data for R&D, FDI, PATENT, EDUCATION, and POLITICAL have been obtained from the World Bank database. Lastly, the data for MANUFAC have been obtained from the website of 'MacroTrends.'

5. RESULTS AND DATA ANALYSIS

5.1 Determinants of India's TFP growth

5.1.1 Factors that affect India's TFP growth

To examine the relationship of the variables described in the theoretical framework, Log (TFP) will be regressed on the following variables to obtain a log-lin regression model:[1]

Model 1: $\text{Log (TFP)}_t = \beta_1 + \beta_2 \text{MANUFAC}_t + \beta_3 \text{RD}_t + \beta_4 \text{PATENT}_t + \beta_5 \text{FDI}_t + \beta_6 \text{EDUCATION}_t + \beta_7 \text{POLITICAL}_t + u_t$

Our econometric model is of log-lin form which will allow us to ascertain the TFP growth of India corresponding to a unit change in each of the dependent variables. The regression results are presented in Table D.3 of Appendix D.

All the partial slope coefficients are *positive* and *statistically significant.* Their interpretation goes as follows: holding other factors fixed, if we increase MANUFAC by 1 unit, then TFP grows by 0.08 per cent. Similarly, when RD, PATENT, FDI, EDUCATION, and POLITICAL grows by 1 unit, TFP grows by 0.65, 0.0003, 0.5, 0.4 and 0.2 per cent respectively, *ceteris paribus.* The results are consistent with the existing economic theory and literature. Hence, all the variables of our model are *positively related* to India's TFP growth.

The model *does not suffer* from high multicollinearity as suggested by the small values Variance Inflation Factor[2] of each of the 6 variables (see Table D.4 of Appendix D). The model does not suffer from heteroscedasticity as well, as the Breusch-Pagan[3] chi-square value comes out to be 9.93 with 6 degrees of freedom which is insignificant at 5 per cent level. The Durbin-Watson d-statistic obtained from the results was 1.8167 which rules out the presence of autocorrelation in the model as well. Lastly, the F-statistic of 451.800 and a high R-squared suggest that the model fits the data quite well. The residuals are normally distributed as the Jarque-Bera chi-square statistic so obtained was 0.07091 with 2df. Hence, at 5 per cent level, *we do reject the null hypothesis* that the residuals are normally distributed. This implies that hypothesis testing results are valid.

5.1.2 Relative Importance of the Factors Affecting India's TFP Growth

The author also tries to assess which independent variables have relatively more impact on India's TFP. To do so, the dependent, as well as the independent variables, are expressed in a *standardized* form which makes the variables unit-free and facilitates direct comparison on the basis of the estimated partial slope coefficients. Hence, the new model looks like the following:

Model 2: $\text{Log(TFP}^*)_t = \beta_1 + \beta_2 \text{MANUFAC}^*_t + \beta_3 \text{RD}^*_t + \beta_4 \text{PATENT}^*_t + \beta_5 \text{FDI}^*_t + \beta_6 \text{EDUCATION}^*_t + \beta_7 \text{POLITICAL}^*_t + u_t$

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[1] This model will use the data for the time period 1996-2017. This is the largest sample possible given the simultaneous availability of data for all the variables.

[2] VIF tells the extent to which the variance of the estimators is inflated due to collinearity among the independent variables.

[3] See Appendix C for a detailed description of all the statistical tests used in the paper.

The dependent, as well as the independent variables in this model, are in standardized form[4] and the stars against the names of the variables are indicative of this fact. The linear regression was run and the results are presented in Table D.5 of Appendix D.

As it is evident from the results, *the number of patent applications* has the most significant impact on TFP, followed by the manufacturing sector output growth. Therefore, in the Indian context, innovation in the form creation of new technologies and obtaining patents for them contributes most significantly to productivity growth.

5.1.3 TFP growth and the Global Financial Crisis of 2008

It was mentioned in the Introduction that research suggests that India's economy was not gravely affected by the 2008 Financial Crisis. This should allow us to hypothesize that India's TFP growth was also not severely affected by the crisis. The author looks to test this hypothesis. An attempt to examine if India's TFP growth underwent a structural break in 2008 has been made. In order to do so, a Chow test has been performed. The pooled regression (P) for the test will be Model A in section 5.1.1 for the entire time period of 1996-2017. The first restricted regression (A) will be the same model for the period 1996-2007 and the second restricted regression (B) for the period 2008-2017 (see Appendix C). The test was run and the F–statistic, so obtained, was 0.56307 which is insignificant at 5 per cent level. Thus, we do not reject the null hypothesis of no structural break. Hence, there seems to be no structural change in India's TFP growth following the global financial crisis of 2008. Hence, the results suggest that our hypothesis indeed holds true.

5.2 Trends in India's TFP growth

In this part, the author tries to examine how the TFP growth in India has performed over a period of time starting from 1960. As evident in Figure D.1 of Appendix D, the graph of log(TFP) sees sharp turns at various points which is indicative of possible structural breaks. To ascertain whether or not has

India's TFP growth undergone significant changes at these points, we develop the following regression model using dummy variables:

Model 3: $\text{Log(TFP)}_t = \beta_1 + \beta_2 t + \beta_3 D_{2t} + \beta_4 D_{3t} + \beta_5 D_{4t} + \beta_6 D_{5t} + \beta_7 D_{6t} + \beta_8 D_{2t}.t + \beta_9 D_{3t}.t + \beta_{10} D_{4t}.t + \beta_{11} D_{5t}.t + \beta_{12} D_{6t}.t + e_t$

The points examined for breaks are 1966, 1976, 1992, 2007, and 2009 as suggested by the graph. Thus, the definition of the dummies goes as follows:

When, $D_{2t} = D_{3t} = D_{4t} = D_{5t} = D_{6t} = 0$, the time period is 1960-1965;[5]

$D_{2t} = 1$ (1966-1975)
$\quad = 0$ (otherwise);
$D_{3t} = 1$ (1976-1991)
$\quad = 0$ (otherwise);
$D_{4t} = 1$ (1992-2006)
$\quad = 0$ (otherwise);
$D_{5t} = 1$ (2007-2008)
$\quad = 0$ (otherwise);
$D_{6t} = 1$ (2009-2017)
$\quad = 0$ (otherwise)

The regression results are presented in Table D.6 of Appendix D and the estimated equations for each period separately are presented in Table D.7 of Appendix D.

It is evident from the results that the coefficient of D_{2t} is statistically significant at 10 per cent level while the coefficients of D_{3t} and D_{4t} are significant at 5 per cent level and 1 per cent level respectively. This implies that the average value of log(TFP) is significantly different in periods 1966-1975, 1976-1992, and 1992-2006 from the reference period of 1960-1965. So, only the points 1966, 1976 and 1992 cause a structural change in the level of TFP. As far as the growth rate is concerned, only the coefficient of $D_{4t}.t$ is statistically significant (significant at 10 per cent level). This implies that the growth rate of TFP during 1992-2006 is significantly different from the growth rate[6] during 1960-1965. The compounded growth rate during 1992-2006 is 0.76 per cent while the compounded growth rate during 1960-1965 is much lesser (0.39 per cent). This is a strong conclusion as it reaffirms the fact that the landmark

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[4] See Appendix B for understanding the logic behind standardization.

[5] This time period is the reference category, the benchmark against which the comparisons are made.

[6] Compounded Annual Growth Rate = antilog (b2) – 1. The author has taken compounded rather than instantaneous rate of growth because we are concerned with growth over a period of time and not at a point of time.

reforms of 1991-92 had a positive and significant effect on the Indian economy's performance. Additionally, it must be noted that the growth rate of TFP during 2007-2009 is not statistically different from the reference category which suggests that India did not suffer much during the 2008 Financial Crisis, not at least in terms of TFP growth. This is consistent with the result obtained in section 5.1.3.

5.3 Contribution of TFP to India's Output

In this final segment, the author tries to compare the contribution of TFP to India's output over the years relative to the other factors of the production function – labour and capital. In order to do so, the technique of dominance analysis has been used. Dominance analysis is a method that helps to ascertain the contribution of each of the independent variables to the dependent variables. This exercise involves calculating the additional contribution of each independent variable to each subset model that is measured by the increase in R-squared value that results from adding that variable to the original subset model.

Bodescu (1993) explains dominance by stating that the independent variable X^{3i} dominates X^{2i} when X^{3i} is chosen over X^{2i} in all possible subsets of models where only one of these two variables is to be entered.

Consider the following regression model:

Model 4: $OUTPUT_t = \beta_1 + \beta_2 TFP_t + \beta_3 CAPITAL_t + \beta_4 LABOUR_t + u_t$

We are trying to assess whether the contribution of factor productivity was as significant as factor accumulation to India's output. We use the R-squared metric to do this analysis. First, we regress only TFP on output and obtain an R-squared value of 0.765, and when we add CAPITAL to the model and regress it along with TFP on OUTPUT, we get an R-squared of 0.981. The difference between the two values which is 0.216 is what we call the additional contribution of CAPITAL. We repeat this exercise for CAPITAL and LABOUR by regressing them individually on OUTPUT and finding out the additional contribution of the other variables. The average of all these contributions gives us the average contribution of each of the three variables at Level 1. At Level 2, we first regress any two variables on

OUTPUT and then try to assess the additional contribution of the third variable. For example, if we regress only TFP and CAPITAL on OUTPUT, we get an R-squared value of 0.981. But if we also include LABOUR in the model and regress all three on OUTPUT, we get an R-squared value of 0.993. So the difference of 0.012 (0.993-0.981) gives us the additional contribution of LABOUR. Averages of these contributions give us the averages for Level 2. At Level 3, all the three variables are regressed on OUTPUT. Naturally, the additional contributions will be zero as there are only three variables in the model. See Table D.9 in Appendix D for the complete matrix.

The final contributions come out as follows: TFP: 0.287, CAPITAL: 0.451, LABOUR: 0.255. TFP's contribution is just greater than that of LABOUR which reaffirms the fact that factor productivity contributes as significantly to output as factor accumulation, at least in the Indian context. It also emphasizes the need to focus on factors that can enhance TFP, such as those discussed above, besides those affecting labor and capital in order to achieve higher output levels.

6. CONCLUSION

Total Factor Productivity (TFP) is defined as the fraction of output growth that is not explained by the inputs of the aggregate production function. TFP growth plays a key role in overall economic growth and there could be a series of factors that can affect it. Along these lines, the first objective of this paper was to determine the factors that affect India's TFP growth. After an extensive review of the literature and examining the economic theory, the author tried to determine the relationship of TFP with six key factors: Growth rate of manufacturing output, R&D expenditure (as % of GDP), number of patent applications by residents and non-residents, FDI inflows (as % of GDP), expenditure on education (as % of total government expenditure), and political stability. Log(TFP) was regressed on these six variables and the results suggested that there exists a strong and positive relationship between TFP growth and each of the six variables. The next objective was to see which of these six factors affects the TFP growth the most. To do so, standardized regression was run and it was found that the number of patent applications has relatively the most significant on

TFP growth in India.

The next objective of the paper was to discuss if the TFP growth of India underwent a structural break during 2008. A Chow test was run to determine this and it was found that India's TFP growth did not undergo a structural break during 2008. The next section of the paper examined trends in India's TFP growth and test for structural changes during the period 1960-2017. Based on graphical analysis, the points- 1966, 1976, 1992, 2007, 2009 were chosen to test for structural changes and a dummy variable model was used. It was found that the structural breaks in the level of TFP were observed in 1966,

1976, and 1992. It was also found that the growth rate of TFP during 1992-2006 was much higher than the reference period of 1960–1965 which stressed the positive impact of the 1991-92 structural reforms on the Indian economy.

The final section of the paper looked to determine if the contribution of TFP to India's output relative to the other two factors (labour and capital) was significant or not. Dominance technique was used to ascertain this and it was found that the factor productivity's contribution to output levels was as high as the main inputs, that is, labour and capital.

APPENDIX

Appendix A: Appendix A: Understanding TFP growth using the growth accounting equation

Consider the following production function:

$$q = A(t)f(K, L) \quad (2)$$

Here, A is generally conceded to be the technical progress parameter but in a broader sense, it's the parameter capturing the factors not captured by the inputs of the production function.

Differentiating both sides of equation (2) w.r.t time (t)

$$\frac{dq}{dt} = \frac{dA}{dt}f(K, L) + A(t)\frac{df(K,L)}{dt} \quad (3)$$

$f(K, L)$ can be written as $\frac{q}{A(t)}$ and $A(t)$ can be written as $\frac{q}{f(K,L)}$ (from equation (2)). Substituting these values in equation (3), we get:

$$\frac{dq}{dt} = \frac{dA(t)}{dt} \cdot \frac{q}{A(t)} + \frac{q}{f(K,L)} \cdot \frac{df(K,L)}{dt}$$

Total differentiating $f(K, L)$ on the right-hand side, we get:

$$\frac{dq}{dt} = \frac{dA(t)}{dt} \cdot \frac{q}{A(t)} + \frac{q}{f(K,L)} \left(\frac{df(K,L)}{dK} \cdot \frac{dK}{dt} + \frac{df(K,L)}{dL} \cdot \frac{dL}{dt}\right)$$

Dividing both sides by q

$$\frac{1}{q}\frac{dq}{dt} = \frac{dA}{dt}\frac{1}{A} + \frac{1}{f(K,L)} \left(\frac{df(K,L)}{dK} \cdot \frac{dK}{dt} + \frac{df(K,L)}{dL} \cdot \frac{dL}{dt}\right)$$

Doing some manipulation, we get:

$$\frac{1}{q}\frac{dq}{dt} = \frac{dA}{dt}\frac{1}{A} + \frac{df(K,L)}{dK}\frac{K}{f(K,L)} \cdot \frac{1}{K}\frac{dK}{dt} + \frac{df(K,L)}{dL} \cdot \frac{L}{f(K,L)} \cdot \frac{1}{L}\frac{dL}{dt}$$

Using the definitions of growth rates and elasticity, we get:

$G_q = G_A + EI_{q,K} \cdot G_k + EI_{q,L} \cdot G_L$

$G_A = G_q - (EI_{q,K} \cdot G_k + EI_{q,L} \cdot G_L)$

TFP growth $= G_q - (EI_{q,K} \cdot G_k + EI_{q,L} \cdot G_L)$ (4)

Hence, equation (4) gives us the mathematical derivation of TFP growth.

Appendix B: Understanding Standardised Regression

Consider a simple linear regression model:
$Y_t = \beta_1 + \beta_2 X_t + e_t$

Then the standardised variables $Y^\star$ and $X^\star$ are defined as follows:

$$Y^* = \frac{Y - Y_m}{SD_Y}$$

And

$$X^* = \frac{X - X_m}{SD_X}$$

Where Y and X are means of Y and X respectively while SD and SD are the standard deviations of Y and X respectively. This standardisation process makes the variables unit-free which allows us to directly compare the relative impact of each of the independent variables on the dependent variables. After the estimation of the model, the intercept is approximately zero.

Appendix C: Statistical Tests used

1. Breusch–Pagan test for heteroscedasticity
H_0: Error variance is homoscedastic.
H_1: Error variance is not homoscedastic.
BP statistic = $nR^2 \sim Chi - square_{No.of\ regressors}$

2. Jarque–Bera test of normality of residuals
H_0: Residuals are normally distributed
H_1: Residuals are not distributed

$$JB = \frac{n}{6}\left(S^2 + \frac{1}{4}(K - 3)^2\right)$$

3. Durbin–Watson d-statistic test for auto-correlation

$$d = \frac{\sum_{t=2}^{t=n}(e_t - e_{t-1})^2}{\sum_{t=1}^{t=n} e_t^2}$$

If $d_L < d < d_U$, then, there is no evidence of positive or negative autocorrelation.

4. Chow test for structural change

Regression 1 (pooled): $Y = A_1 + A_2X_1 + \ldots\ldots\ldots + A_{n+1}X_n$

Regression A: $a_1 + a_2X_1 + \ldots\ldots\ldots + a_{n+1}X_n$

Regression B: $b_1 + b_2X_1 + \ldots\ldots\ldots + b_{n+1}X_n$

H_0: No structural change ($a_1 = b_1$, $a_2 = b_2$, and so on)

H_1: Structural change observed ($a_1 \neq b_1$, $a_2 \neq b_2$, and so on)

The corresponding F-statistic equation for the test is:

$$F = \frac{(RSS_p - RSS_A - RSS_B)/k}{RSS_A + RSS_B/(n - 2k)}$$

Appendix D: List of Tables and Charts

D. 1 List of variables used in the paper

Variable Name	Interpretation
TFP	Natural logarithm of Indian's Total Factor Productivity
MANUFAC	Growth Rate of India's Manufacturing Output
RD	Expenditure Incurred By India on Research and Development (as % of GDP)
PATENT	Patent Applications Filled by Resident and Non-Resident Indians.
FDI	Foreign Direct Investment Net Inflows (as % of GDP)
EDUCATION	Government Spending on Education (as % of total government expenditure)
POLITICAL	Estimate of governance in terms of Political Stability and Absence of Terrorism/Violence (ranges from approximately -2.5 (weak) to 2.5 (strong) governance performance)
CAPITAL	Capital stock at constant 2011 national prices (in mil. 2011US$)
LABOUR	Number of persons engaged in Employment (in millions)

D. 2 Descriptive statistics of the variables

	log (TFP)	MANUFAC	RD	PATENT	FDI	EDUCATION	POLITICAL	LABOUR	CAPITAL
Interpretation	-0.42177	8.954090	0.7409	27363.09	1.447272	13.3692761	-1.109	346.866488	6429660.12
Mean	0.011318	1.943837	0.0124	3311.09	0.168230	0.3514	0.0396	14.6167833	1093416.85
Standard Error	-0.402	7.2575	0.731	31607.5	1.41	13.366	-1.0856	346.045456	2030588.63
Median	0.053087	9.117405	0.0584	15530.39	0.789071	1.6482	0.1857	N/A	N/A
Standard Deviation	0.002818	83.12707	0.0034	2411931	0.622633	2.7167	0.0345	113.221117	8469570.49
Sample Variance	-1.80655	-0.83224	-0.5654	-1.80460	1.127247	-0.002	-0.5495	12819.0213	7.1734E+13
Kurtosis	-0.19357	0.484782	0.3640	-0.1573	0.997401	0.6022	-0.2475	-1.2130256	2.58187548
Skewness	0.141	29.704	0.22	41756	3.148	5.7686	0.7440	0.00498377	1.90034321
Range	-0.491	-3.584	0.639	4826	0.473	11.191	-1.5087	427.044623	32586619.1
Minimum	-0.35	26.12	0.859	46582	3.621	16.959	-0.7646	110.790277	798800.875
Maximum	-9.279	196.99	16.3	601988	31.84	294.12	-24.403	537.8349	33385420
Sum	22	22	22	22	22	22	22	20811.9893	385779607
Count	-0.42177	8.95409	0.740	27363.09	1.447272	13.369	-1.109	60	60

D. 3 Regression results of Model 1

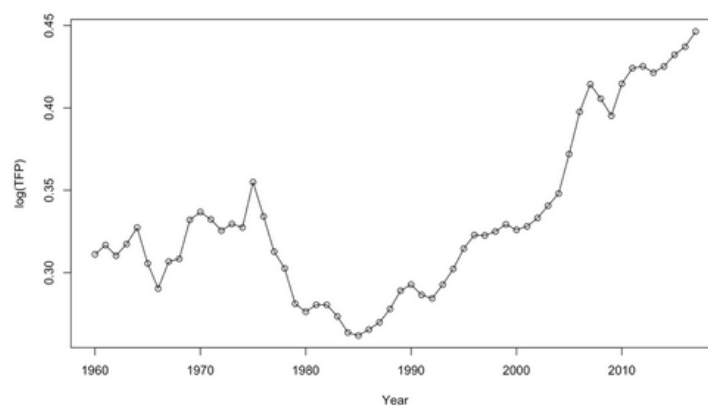|	Coefficients	Standard Error	t Stat
Intercept	-0.5966978	0.0261732	-22.7980412
MANUFAC	0.0008094	0.0001539	5.259242****
R&D	0.00650058	0.0343533	1.8922696*
PATENT	0.0000031	0.0000001	21.81264****
FDI	0.0050356	0.0027293	1.8449798*
EDUCATION	0.0040474	0.0009716	4.165700****
POLITICAL	0.0246452	0.0116506	2.1153637*

****: Significant at 0.01%, ***: Significant at 0.1% level, **: Significant at 5% level and *: Significant at 10% level

R-squared: 99.4%
 Standard Error of Regression: 0.004
F-statistic: 451.800

D. 4 Variance Inflation Factors for Model 1

Variable	Variance Inflation Factor
MANUFAC	1.90
RD	3.89
PATENT	4.78
FDI	4.48
EDUCATION	2.48
POLITICAL	4.52

D. 5 Regression results of Model 2

	Coefficients	Standard Error	t Stat
Intercept	-0.5966978	0.0261732	-22.7980412
MANUFAC	0.0008094	0.0001539	5.259242****
R&D	0.00650058	0.0343533	1.8922696*
PATENT	0.0000031	0.0000001	21.81264****
FDI	0.0050356	0.0027293	1.8449798*
EDUCATION	0.0040474	0.0009716	4.165700****
POLITICAL	0.0246452	0.0116506	2.1153637*

****: Significant at 0.01%, ***: Significant at 0.1% level, **: Significant at 5% level and *: Significant at 10% level

R squared = 99.4%
Standard Error of Regression = 0.089
F-statistic = 451.800

Figure D. 1 Trends in TFP growth in India

D. 6 Regression results for model 3

	Coefficients	Standard Error	t Stat
Intercept	-0.5035244	0.01862666	-27.032457
Time	0.00039431	0.00478289	0.08244231
D2i	-0.0545085	0.03462319	-1.5743341*
D3i	0.0648197	0.03058877	2.11906854**
D4i	-0.2868322	0.05158721	-5.5601422***
D5i	0.56601317	1.37255192	0.41238015
D6i	-0.1355294	0.14088102	-0.9620133
D2i.t	0.00543281	0.00543582	0.99944598
D3i.t	-0.0046733	0.00488438	-0.956776
D4i.t	0.00726709	0.00493009	1.47402922*
D5i.t	-0.0096682	0.02869731	-0.3369015
D6i.t	0.0045468	0.00543582	0.83645065

****: Significant at 0.01%, ***: Significant at 0.1% level, **: Significant at 5 % level and *: Significant at 10 % level

R squared = 92.19%
Standard error of regression = 0.02
F statistic = 49.37

D.7 Period–wise estimated equations for Model 3

Time Period	Dummy Variable criteria	Estimated equation
1960-1965	$D_{2t} = D_{3t} = D_{4t} = D_{5t} = D_{6t} = 0$	$Log(TFP) = -0.503 + 0.0039t$
1966-1975	$D_{2t} = 1$ (1966-1975) = 0 (otherwise);	$Log(TFP) = -0.041 + 0.0058t$
1976-1991	$D_{3t} = 1$ (1976-1991) = 0 (otherwise);	$Log(TFP) = -0.438 - 0.0042t$
1992-2006	$D_{4t} = 1$ (1992-2006) = 0 (otherwise);	$Log(TFP) = -0.7903 + 0.0076t$
2007-2008	$D_{5t} = 1$ (2007-2008) = 0 (otherwise);	$Log(TFP) = 0.0624 - 0.0092t$
2009-2017	$D_{6t} = 1$ (2009-2017) = 0 (otherwise)	$Log(TFP) = -0.639 + 0.00049t$

D. 8 Regression results of Model 4

	Coefficients	Standard Error	t Stat
Intercept	1.2429E-16	0.01122152	1.1076E-14
TFP*	0.00812935	0.02442384	0.3328447
CAPITAL*	0.85158042	0.02876218	29.6076415
LABOUR*	0.17161891	0.01770864	9.69125494

D. 9 Dominance Analysis

Model	R-squared	Additional Contribution		
		TFP	CAPITAL	LABOUR
Subset Model 1 (Only one independent variable is regressed)				
OUTPUT= TFP + ui	0.765	-	0.216	0.116
OUTPUT= CAPITAL + ui	0.981	0.000	-	0.012
OUTPUT= LABOUR + ui	0.690	0.191	0.304	-
AVERAGE FOR LEVEL 1	-	0.096	0.26	0.064
Subset Model 2 (Only two independent variables are regressed)				
OUTPUT= TFP + CAPITAL + ui	0.981	-	-	0.012
OUTPUT= TFP + LABOUR + ui	0.881	-	0.112	-
OUTPUT= CAPITAL + LABOUR + ui	0.993	0.000	-	-
AVERAGE FOR LEVEL 3	-	0.000	0.112	0.012
Subset Model 2 (All three independent variables are regressed)				
OUTPUT = TFP + CAPITAL + LABOUR + ui	0.993	-	-	-
OVERALL AVERAGE CONTRIBUTION (LEVEL 1+ LEVEL2)	-	0.287	0.451	0.255

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ASSET OWNERSHIP AND WOMEN: EXAMINING THE HINDU SUCCESSION AMENDMENT ACT, 2005

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Abstract

This paper aims to verify whether the Hindu Succession Amendment Act, 2005, has improved the position of women in a household via an increase in asset ownership. The implications of women having a claim to ancestral assets are observed through four different perspectives: the effect on health, education, quality of domestic life, and the financial freedom of women. Due to the nature of the law, it is expected that an increase in personal assets would directly and positively influence the position of a woman in a household. However, a deeper analysis reveals that this is not the case. While an improvement in health and education indicators is noticed, a steady decline in the quality of domestic life has also been observed. This could be due to hesitancy on part of women to have a legal battle with their families, increased instances of dowry-related violence, and social boycott of women who assert their rights over the property. It is expected that these factors would contribute to the worsening of women's physical and mental health, which would further inhibit their prospects in the future. This paper aims to verify whether an amendment meant for women has benefitted them or not.

JEL Classification: K360, K10, K15, K380

Keywords: Asset Ownership, Amendment, Family, Productivity

1. INTRODUCTION

Feminist literature has long recognised the rights of women, their position in society, and how these affect their status within a household. The existence of power structures between genders and the dynamics that drive such social differences have been examined at length in feminist analyses. However, to conduct an economic analysis of feminist issues, we need to look at the economic implications of any change in the status quo. Development processes have highlighted that a higher endowment of resources or wealth leaves a country or an individual better off than with a lower endowment. However, whether this is the case for women in a traditional Indian familial structure is what we seek to examine.

The position of women in a traditional Indian familial structure has always been inferior to men for millennia. Discrimination within households, not just in the form of domestic violence, dowry demands, and sex-selective abortion but also in the form of unequal claim over shared assets and restrictions over financial decisions is a common theme in the institution of the family. A major hindrance in elevating the status of women as equals in the family has been that most women actually do not have claims of ownership over shared assets of a family. While it is widely recognized that financial independence is necessary to escape marital violence (Panda and Agarwal, 2005), it may not be enough. So while we see more women joining the labour force, without strong claims to ownership over family assets, it may not be of much use. Most schools of economic thought directly link the importance of endowments to economic prosperity or the ownership of the means of production to economic security.

Efforts have been made through legislation to bring about financial independence among women via a claim over ancestral property. One such legislation is the Hindu Succession Act, 1956. It aimed to codify unwilled succession among communities of Hindus, Jains, Buddhists, and Sikhs. The act granted ownership of property acquired by women before and after the passing of the law and put an end to

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their "limited owner" status. But it was only after the 2005 amendment that daughters were given equal share in the property as sons. The 2005 amendment was seen as a major step towards equalising the rights of sons and daughters making them coparceners to the property of their parents. Having acknowledged the Act, its amendment, the situation of gender dynamics in the Indian society, and the importance of asset ownership as an intervention to equalising the status of men and women in the society, the authors wish to study whether it has translated into an improved position of women in a household.

This paper seeks to examine whether the Hindu Succession Amendment Act, 2005 has improved the life of Indian women within the patriarchal institution of the family.

The paper is structured as follows, Section 2 contains a Review of Literature, Section 3 specifies the Data and Methodology used, Section 4 deals with the analysis, and Section 5 gives the conclusion to the paper. Lastly, Section 6 of the paper deals with the limitations of this study.

2. LITERATURE REVIEW

Ownership of assets is a huge determinant of women's domestic wellbeing in terms of their exposure to violence and decision-making within a household. In Kerala, 49 per cent of women without any claim to ownership of property faced domestic physical violence whereas the corresponding figure among women owning some property was only 7 per cent (Panda and Agarwal, 2005). A preliminary review of the literature indicates that the Hindu Succession Act, 1956, although a step in the right direction was not enough. The 1956 Act prevented women from complete ownership of certain property, did not allow for coparcenary, and was only meant for unmarried daughters of a family. The idea was that married women now belong to a different family and another man (the husband) is responsible for her.

However, the 2005 amendment extended the scope of ancestral property and made it available equally to daughters, irrespective of their marital status[1] Since then, the daughter and the son share the same right over the ancestral property in the Hindu undivided family (Halder and Jaishankar, 2008). The gaps in the law have been recognised by certain southern states, which had customs very different from those in a typical Hindu upper-caste patriarchal North Indian family (Menon 2012, 23). Based on this recognition of gaps, some states have passed their own succession laws. Andhra Pradesh passed a succession law in 1985 which stated that under any circumstances, the rights of a daughter are equal to that of a son. States such as Tamil Nadu, Maharashtra and Kerala also amended the law to include women as members of the coparceners. (Halder and Jaishankar, 2008). However, this is not applicable throughout the country. This situation was changed when the Hindu Succession Act, 1986 was amended in 2005.

While domestic violence is a horrible practice in and of itself, its effect on a woman's productivity is also an area of legitimate concern. A study conducted in Nigeria indicates that instances of domestic violence lead to absenteeism, loss of work time, a higher labour turnover and low productivity. The study indicated that domestic violence variables such as physical, psychological and sexual abuse strongly predict the performance of workers in industries[2] Instances of sex-selective abortion are also indicative of discriminatory practices towards women to the end that they are not even allowed to be born. This could be because of worry over paying huge sums as dowry. The ratio of males to females in a population, i.e., the sex ratio indicates the level of sex-selective abortion in a society. It is assumed that 106 is the natural sex ratio and any number above 107 or below 103 is suggestive of sex-selective abortion (Ranjan and Sheetal 2013). While in India, this has been a problem since 1789 (Vishwanath, L. S. 2007) the sex ratio has remained around 92 from the period 2001 to 2014.

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[1] Under the 2005 amendment, the daughter and the son by birth share the same right over their ancestral property of the Hindu undivided family. This amendment also repeals Section 23 of the Hindu Succession Act which disentitled a female heir to ask for partition in respect of a dwelling house, wholly occupied by a joint family, until the male heirs choose to divide their respective shares. Section 24 of the Act which denied the rights of a widow to inherit her husband's property upon her re-marriage has been repealed.

[2] The independent variables taken together predicted the dependent variable by yielding a coefficient of multiple regression of 0.683 and a multiple regression square of 0.467.

It was noted that most national surveys such as the NFHS (The National Family Health Survey) do not include questions that indicate whether a woman or man in a family owns a particular asset. It is therefore difficult to establish a direct link between women's claim to the property and an improvement in their household life. Hence, to work around this, the authors assume that the Hindu Succession Amendment Act, 2005 led to an increase in the ownership of assets of women. What we then look at is whether this increase has led to an improvement in their domestic life in terms of better health, education, financial freedom and a reduction in violence and dowry-related deaths.

Most literature that was reviewed for this study indicated separate links between ownership of property and economic well-being or instances of domestic violence and productivity in the workplace. However, except for the localised study conducted in Kerala, no nationwide study has indicated how providing claim to the ownership to the family will benefit women, not just in terms of more resources, but also in terms of reduced instances of violence, more bargaining power in a family and higher control over decisions of the self. This paper seeks to examine these implications of the law and whether they translate into a fair distribution of resources in a household.

3. DATA AND METHODOLOGY

The data for this study was compiled by the authors from various sources: (1) National Family Health Survey of India to analyse the educational and nutritional indicators of women between rounds 2, 3 and 4. (2) The World Bank data set to analyse labour force participation data which covers data from 1990 to 2020; and (3) The annual publication of crime statistics by the National Crime Records Bureau to analyse data on total crime against women, cases of domestic violence and dowry-related deaths from the period 2001 to 2014.

Comparisons were made to study any improvements in the educational and nutritional indicators of women between rounds 2, 3 and 4 of the NFHS keeping in mind that round 3 occurred in the year in which the amendment was passed and round 4 occurred in 2014-15.

Trends of domestic violence, dowry-related deaths and their share in the total crime against women was observed via means of graphs computed by the authors with 2005 being the point of special interest.

4. ANALYSIS

The NFHS fact sheet at national level provides data of the nutritional and educational indicators among women between the period 2005-06 and 2015-16.

4.1 Financial Independence

We first look at indicators of financial independence among women. These suggest if women have control over their own and their family's wealth and income. To make this assessment, we look at savings accounts registered solely in the name of women. We believe that having a separate savings account allows women to make financial decisions independently. It was found that the percentage of women with their own savings account has risen by more than three times, from 15.1 per cent to 53 per cent. Data on the share of women taking household decisions indicate that this indicator rose from 76.5 per cent to 84 per cent between rounds 3 and 4 of the NFHS. This suggests that having financial independence, in fact, does give more decision-making power to women in a household.

4.2 Health Indicators

We now turn to trends of health and nutritional indicators in women. To understand their relevance, we need to see how an average family makes decisions in a patriarchal society. As the resources, such as income and value of assets of a family increase, the wellbeing of all family members increases. However, this increase in wellbeing is not proportional because the allocation of resources within a family is not equal. Resources are allocated first to the head of the family, typically a male, then the children, elders (if any), and finally the woman. This means that even if a rise in the income of most families between 2001 and 2014 was observed, it may not have adequately translated into better health indicators of women. To that end, we believe that a claim to ownership of assets changes the position of a woman in a household. She now commands more bargaining power and can decisively contribute to decisions of resource allocation. We focus on nutritional indicators such as the a) Body Mass Index

(BMI), b) Fertility Rates, and c) Deaths per Live Births. More than 50 per cent of all adult women surveyed in 1998-9 (NFHS-2) were found to be anaemic with 36 per cent having a BMI below 18.5, which is the cutoff (Dreze 2012). The percentage of women with a BMI below the cutoff only fell 0.5 percentage points between 1998 and 2005 but saw a substantial decline from 35.5 per cent to 22.9 per cent between 2005-6 and 2015-16.[3] This has been coupled with a fall in total fertility rates, from 0.5 per cent to 0.2 per cent between NFHS-2 and NFHS-3. A substantial fall in deaths per 1000 live births from 54 to 41 between NFHS-4 and NFHS-3 was also noted. The prevalence of anaemia came down from 55.3 per cent to 53.1 per cent. A very small fall in the BMI of women was noticed between 1998 and 2005, however, the fall was quite steep between 2005-06 and 2015-16. Moreover, we saw a large fall in both fertility rates and death per 1000 live births during this period. As women have greater control over resources, they are also able to make decisions of family planning (hence a decline in fertility rates) and the ability to choose decent healthcare (hence the decline in deaths per 1000 live births). These trends could be attributed in part, to the Hindu Succession Amendment Act, 2005.

4.3 Education Indicators

In terms of education, it is observed that there is a significant upward trend in the rate of gross enrollment ratios at primary and tertiary levels. We naturally expect the primary enrolment ratio to increase due to a generational effect, i.e., daughters of financially independent women are more likely to attend schools just like their male siblings as opposed to a financially dependent woman. This suggests that there has been a major change in the intra-household distribution of resources since 2005-06. Moreover, it is also expected that those women who are not married but have acquired a claim to the ancestral property will have more freedom to make decisions about their higher education. Thus, an increase in both primary and tertiary education may have been influenced by the Hindu Succession Amendment Act, 2005, among other factors.

4.4 Domestic Violence and Dowry Deaths

We now look at indicators of violence against women in a household, i.e., dowry-related deaths

and domestic violence. Data suggests that crime against women has been on a rise since 2003 and only in recent years has the rate of increase come down (Figure 1).

**Figure 1:** *Total Crime in India against time between 2001 and 2014.*
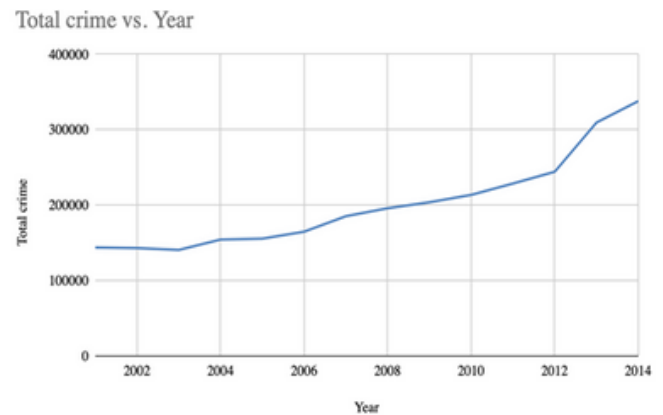
Source: Authors' compilation based on crime statistics (2001-2014)

One would expect the numbers to fall with time, as society progresses and becomes more aware of individual rights and women empowerment. We expect that as women now have a claim to assets and have an increased contribution to household decisions, instances of domestic violence against women to reduce. Intuitively it seems like the only plausible course of things. However, since the passing of the 2005 Amendment, no change in the trend of total crime against women in India has been observed. In fact, it has been on a consistent rise. However, these crime numbers include crime against women both within and without households. An inspection of violence against women either by their natal families or their marital families is more important to assess the intra-household situation for women. Therefore, we shall turn to figures depicting cases of domestic violence. Domestic violence in Indian households has been a common practice. This violence mainly comes from marital families, for reasons related to dowry or to establish power dynamics. If we are to take these two as the main reasons behind domestic violence, then if a woman has a claim to her ancestral property (from her natal family), may threaten the superior position enjoyed by her husband and her marital family. This threat to their superior position, therefore may not lead to a fall in domestic violence. A review of the data suggests that the cases of domestic violence as a proportion of total crime against women averaged out to be around 25 per cent from the period 2001 to 2012 with some increase around 2009-10. In the post-2005 period, this

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[3] NFHS-2, NFHS-3 and NFHS-4

percentage showed no fall and the figures came down to their initial levels (2001) only in recent years. However, the numbers showed no immediate response to the 2005 Amendment.

Figure 2: *Domestic violence cases in India as a percentage of total crime between 2001 and 2014*
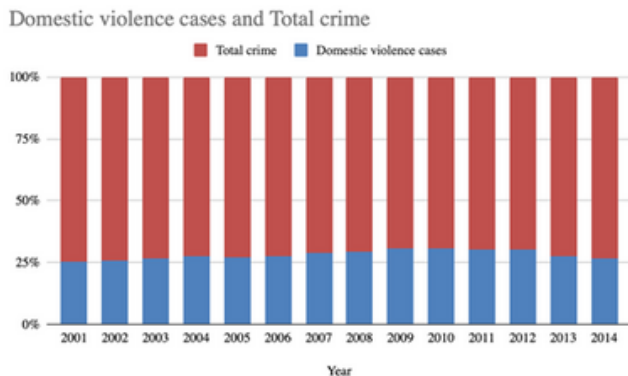
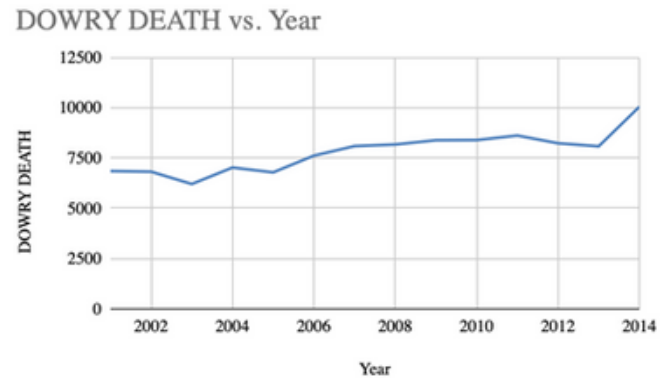*Source: Authors' compilation based on crime statistics (2001-2014)*

Although the practice of dowry has been outlawed in India, it continues unchecked. Dowry is a practice where the family of the bride provides the husband with either a sum of money or an asset such as a house or a car or both. Families are sometimes unable to fulfil these dowry demands, which lead to violence against the woman in her marital home which may even lead to the death of the victim. A review of the data suggests the following story. A decline in the percentage of dowry-related deaths in proportion to total crime in India was seen between 2001 and 2014 (Figure 3). It should be noted, however, that an increase in the absolute number of dowry deaths was noted (Figure 4). This increase in the absolute number could be explained through an overall increase in the total crime against women. This means that although the law was passed to improve the position of women, their social condition may not have really improved. Positive change on this front is yet to be realised.

Figure 3: *Dowry deaths in India as a percentage of total crime between 2001 and 2014*
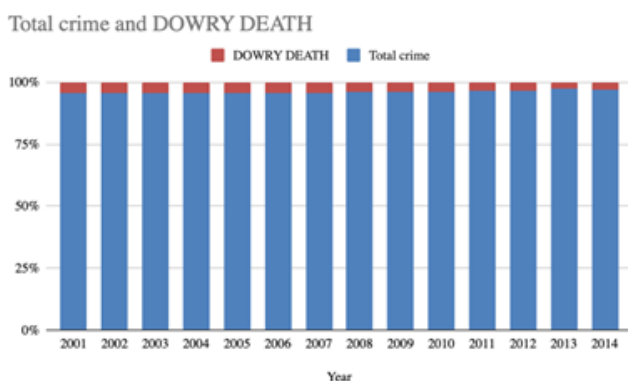
Source: Authors' compilation based on crime statistics (2001-2014)

Figure 4: *Trend of dowry deaths in India between 2001 and 2014*

Source: Authors' compilation based on crime statistics (2001-2014)

India has noticed an uptick in the participation of women in the labour force which has largely contributed to the growth of the economy. To sustain this growth, it is important that women continue to be a part of the workforce and do not leave due to socially unfavourable factors. We observe data on the labour force compiled by the International Labour Organisation. The estimates modelled for India show a steep decline in the ratio of female to male labour force participation rate. A plausible explanation could be that the increased wealth of households due to redistribution of ancestral property to women along with men may have made them better off but this is not the case as the Gini coefficient for India has been steadily increasing. Instead, what has happened is that due to a rise in the cases of domestic violence, there has been increased absenteeism among female workers. This was also proved empirically in the study conducted in Nigeria, where instances of domestic violence led to absenteeism. Although this only partly explains a low rate of female labour force participation, other macro-economic factors are also important in its determination.

Figure 5: *Trend of ratio of male to female labour force participation in India between 1990 and 2020*

Source: World Bank

We have observed a huge rise in the number of savings accounts of women and with it, an increase in their decision-making ability in the household. There has been a large fall in the prevalence of anaemia, total fertility rate, deaths per live births coupled with the number of women with BMI below cutoff since 2005. Cases of dowry-related deaths showed an upward trend, even though their share in the total crime against women fell and the share of domestic violence cases averaged out around 25 per cent. A significant upward trend in primary and tertiary enrollment was observed along with a sharp decline in the female labour force participation right after 2005. While we do see an improvement in some development indicators of women such as health and education, social indicators such as domestic violence do not see any improvement. Consequently, this ensures that the passing of the law puts India in the spotlight as an adverse performer in treating women with equity and dignity which has serious repercussions for their productivity and contribution to overall economic growth and development.

5. CONCLUSION

A focus on the rights of women from the perspective of economic growth and development demands that we see the implications of an increase in the ownership of assets by women on their immediate material condition. For this purpose, the Hindu Succession Amendment Act, 2005 which provided daughters with an equal claim to the ancestral property and made them coparceners was analysed. The effects of this provision on the position of women in a household, where resources are not distributed equally were examined. A preliminary analysis of data from NFHS-2, NFHS-3 and NFHS-4 suggests that indicators of financial freedom, health and education of women significantly improved. These indicators can be categorised as depicting the socio-economic status of women. While this could be a direct consequence of having increased claims over ancestral property, it should be kept in mind that these indicators are also affected by an increase in income levels, which were witnessed after 2005 in India. Indicators that may have a more direct effect

from the legislation, such as domestic violence and dowry deaths did not see an improvement. Their instances rose in absolute numbers even after the passing of the amendment. These indicators can be categorised as purely social in nature. However, their economic implication lies in the inability of women to participate in the labour force and contribute to productive activities. A primary study was conducted in Kerala which examined how ownership of assets affects domestic violence. The results of the study indicate that instances of domestic violence were far lower in cases where women had a claim to the property and were much higher where they did not. This finding is in contradiction to the results of this paper. We believe that due to a lack of primary survey. which can establish a direct link between the two, the results may be skewed. Moreover, it is also acknowledged that most nationwide household surveys in India do not ask questions that indicate who owns which assets in a family. Only the head of the household is identified via the survey, which serves as the basis for determining ownership of all family assets.

The results of this paper point to the fact that an amendment meant to improve the position of women in a household may have achieved that in terms of 'socio-economic' indicators, however, it fails to achieve that in terms of 'social' indicators. To that end, it may be possible that the legislation needs rework.

6. LIMITATIONS

There are several limitations of this study that the authors would like to acknowledge. First, this study does not use a regression model to explain the behaviour of the chosen indicators. Therefore, the exact causation and the significance of the amendment cannot be ascertained statistically but only intuitively. Second, the data from the NFHS is not available in a continuous manner and the only years of interest are 1998-9, 2005-6 and 2014-15 so there is a large gap between points before and after the year of interest. Third, the absence of micro-level data makes it difficult to ascertain the exact effect of the amendment on the desired target group.

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DEVELOPMENT IN THE EDUCATION SECTOR: A COMPARATIVE STUDY OF KERALA AND GUJARAT

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Abstract

This paper aims to analyse the concept of growth versus development based on empirical evidence. It discusses the states of Kerala and Gujarat by analysing their growth in terms of GDP and expenditure in education with development in the quality of education provided. To discuss and analyse this sector, parameters used include gross enrolment ratio, drop-out rate, pupil-teacher ratio, and government expenditure on education. The analysis resulted in the conclusion that mere GDP growth or increased spending in the education sector does not lead to the development and effective growth in the sector.

JEL Classification: C1, H1, H7, I2, I3, O1, Y1

Keywords: GDP and expenditure in education, Growth v/s Development, Kerala v/s Gujarat, Gross Enrolment Ratio, Pupil-Teacher Ratio, Drop Out Rates, Effective Growth

1. INTRODUCTION

Education in any state is a key basis for judging the nature of the economy and its market structure. The government of a country focuses on several areas for the development and progress of the nation as a whole. In the process, a lot of factors are improved over the years, whereas some of them remain left behind. In the race of nations to expand their economy at a global level, the growth rates and GDP of a country have played a key role. But economic growth cannot solely guarantee a nation's development in the complete sense. According to Sen (1992), the capability of a person to lead a good life is what stands for economic development. What constitutes a good life depends on the opportunities provided to them and based on their capabilities only can they make progress.

Regarding capabilities, better opportunities for an individual to grow are necessary. This includes various political, social, and economic opportunities such as education, healthcare and employment for everyone in the society. Therefore, good quality education can have a positive impact on a person's capabilities.

This paper aims at studying certain parameters of education, and their growth for a period of ten years from 2006-2016.

The states chosen are Kerala and Gujarat. The parameters are Gross Enrolment Ratio, Pupil-Teacher Ratio, Dropout Rates and Government Education. The data that we have discussed further in the paper is that of secondary public schools in the states. The reason behind this is that the number of students in secondary schools decreases drastically, after a good number of enrolments in primary schools. (This has been further analysed with the help of various parameters.) This may have to do with the fact that education is free of cost till primary school, and the poor population mainly loses interest in pursuing further education (Joshi, 2016).

2. LITERATURE REVIEW

There is plenty of literature discussing the education sector and making comparisons. We have emphasised on literature where development parameters were discussed as well as on the history of economic growth and development of the two states.

Kingdon (2007) compares India with its South Asian contemporaries. It is observed that it has been lagging in youth literacy and secondary school participation. Despite its improvement in many aspects over the years, it is still behind in terms of the development of secondary school education.

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There is a lot of scope for improvement in this area. This shows how despite developing infrastructure, there is a poor quality of teaching and poor results. Various factors affecting the quality of education such as teacher absence, lack of teaching materials and incentives have been discussed here.

Joshi (2007) highlights that enrolment and attendance are different. Attendance should be given more importance to judge the progress of education. A lot of students drop out after enrolling which must be considered. The quality of teaching and the presence of teachers is also something that is lacking in Indian classrooms. Teacher absenteeism in government schools is a very big problem that has been prevailing. It discusses secondary level education by saying that the major difference in education can be seen in the secondary school data, as the primary schools have shown better results in recent years, but students tend to drop out once they reach secondary school. The reasons behind this are reflected upon a lot of economic and social hindrances faced by people. Apart from poverty and the low standard of living, there are various problems rooted in gender, teachers, lack of resources, and cultural inhibitions as well.

Alongside, Tilak (2007) explores the difference between income poverty and education poverty, along with exploring poverty amongst the poor in India. It states a close relationship between income and education poverty, as income poverty forces children to leave school, leading to education poverty. Education is a link to many basic needs. The focus of poverty alleviation has mainly been on primary education, and not secondary or higher education. Only recently have researchers been paying attention to secondary and higher education having any role in poverty alleviation, as well as growth.

3. WHY CHOOSE THESE PARAMETERS?

Similarly, Parwez (2016) talks about the difference in demographic structures in Kerala and Gujarat. Kerala is a state-developed by public investment more focused on education and health. On the other hand, Gujarat develops by FDI and focuses on growth through entrepreneurial savings. It considers plenty of factors for making a comparison between the two states based on employment, poverty, health, and education and explaining the reasons behind them as well.

Tharamangalam (1998) explores Kerala's social development in comparison to the rest of the countries. It tells us how the state's history has been recorded well and we see through that how it has developed over the years. Despite upward trends, it's been seen that there has been a lot of glorification of its achievements, leading to stagnation. But overall, it has shown much more progress than the rest of the states in the country. It discusses how Kerala became a model for other states and even contemporaries from other countries.

PARAMETERS	DEFINITION	REASON FOR CHOOSING
1. Gross Enrolment Ratio (GER)	Gross Enrolment Ratio shows the general level of participation of students in education.	GER was considered appropriate for the study since it can reflect on the education sector by showing its capacity to accommodate students. It can help us study how the number of students attending school at the secondary level is affected by the expenditure by the government in this sector as well as the GDP of the state.
2. Drop-out Rate	The drop-out rate is the percentage of students who drop out from a given level of education.	This parameter was chosen because it tells us the ability of the sector to be able to retain its student population. Mere enrollment to students is not enough to study the population of students involved in education. Drop-outs play a crucial role in this determination. For this study, annual average drop-out rates are taken.

3. Pupil-Teacher Ratio (PTR)	The pupil-teacher ratio is the number of students under a teacher in a classroom.	This parameter indicates the efficiency of teaching in the class. If the PTR is high, more students are being taught by one teacher. Consequently, the quality of education declines. This follows from the fact that the more students under one teacher, the less is the chance for one student to get attention from the teacher. By comparing the PTR for the two states, Kerala, and Gujarat, we can assess the quality of education in the states.
4. Government Expenditure	The amount of spending by the public sector for acquiring goods and services in various fields such as education, healthcare, Defence, etc.	The reason for choosing this parameter was simply to assess the amount the government invests in education and comparing it with other development parameters. This can show us, in a way, the returns from the investment made by the government. Despite the great headway made by India in terms of per capita income, several human development indicators have not made much progress. The HDI index of 2020 ranked India at 131 out of 189 countries. Therefore, comparing government expenditure with certain educational parameters can help in understanding the development in the field.

A major difficulty faced by us while studying the existing literature was the lack of such comparisons in India. Where there are states like Kerala which are way ahead in performance, there are also states like Gujarat, Uttar Pradesh and Rajasthan with dismal progress in the quality of education and participation. It shows the need to do such studies and suggest policy measures and implications for the same. These conclusions aided us in exploring the nature of the economies of the two states.

The data for the parameters have been taken from the Ministry of Human Resource Development Report on Education, Education Statistics at a Glance, for the years 2006-2016. Government expenditure has been taken from the MHRD Planning, Monitoring and Statistics Bureau Report for the same years.

3.1 WHY CHOOSE THE TWO STATES?

KERALA
Kerala is one state in India that has focused more on

development than mere economic growth. It has prioritised the welfare of the population over economic growth and has worked towards this goal even before independence. According to a report by Yale Review of International Studies, in 1991, Kerala had a per capita GNP of $298, but it nearly had a 100 per cent literacy rate.

The reason for choosing Kerala was to study this development pattern adapted by the state over the years and compare it with its growth rate. This would help in understanding how a state can allocate its resources and focus on development and not only growth parameters.

GUJARAT
Gujarat is a state which has shown an immense increase in economic growth parameters like the state gross domestic product. However, it has not focused much on the developmental parameters. When it comes to education, it has not worked much on development, as we will see by analysing various parameters for education.

Gujarat has also incurred the least expenditure on education sector development, considering the education outlay as a percentage of the state's GDP (ASSOCHAM, 2013). Therefore, Gujarat was deemed appropriate to study how a state can develop in terms of GDP but not improve sectors involved in development like education.

Hence, we have taken two states with diametrically opposite approaches to growth and development for our analysis.

4. ABOUT THE PARAMETERS

4.1 Gross Enrolment Ratio

According to the Department of School Education and Literacy Statistics Division (Ministry of Human Resource Development), 2015; Gross Enrolment Ratio (GER) is defined as the total enrolment of pupils in grade or cycle or level of education, regardless of age, expressed as a percentage of the corresponding eligible official age group population in a given school year.

In this case, GER at secondary education is thought to be appropriate by us. This is because secondary education marks the completion of basic education at the primary level. It also sets the basis for further development of human capital by imparting appropriate knowledge and skill set by more specialised teachers.

GER is calculated by considering the enrolment in all types of schools and educational institutions including public, private and other institutions. This indicator shows us in general the level of participation of the population at a given level of education. This helps us in identifying how the education system is being able to accommodate the population of students. It should be noted that this indicator also includes late admissions, underage and overage students as well in the data collection process.

4.2 Dropout Rate

According to the Ministry of HRD, 2015; drop-out rate is defined as the percentage of pupils who drop out from a given grade or cycle or level of education in a given academic year.

Drop-out rates negatively impact the education level of a country. They affect not only the development of human capital but also promote social exclusion and poverty. There can be several reasons behind drop-out which include financial constraints, involvement in economic or domestic duties and lack of interest in education. According to the District Information System for Education (DISE), students' disinterest towards education is due to the lack of educational and vocational counselling at the school level to the students.

4.3 Pupil–Teacher Ratio (PTR)

The pupil-teacher ratio is defined as the number of teachers relative to the number of pupils in a school. PTR is important to study the efficiency of teachers, which in turn is important for the quality of education.

The pupil-teacher ratio reflects the quality of education in an education system. The quality of education provided in a school, private or public, is important to assess as it helps us understand the development indicators as well as how efficient and fruitful the investment, again, both private and public, is. The governments of countries devote a certain amount from the GDP for education and it varies from country to country, as well as state to state.

In India, the government also spends, as of now, 4.6 per cent of its total GDP on education, according to the Union Budget, 2020. Whether it is a sizable amount or not is not an objective, but looking at certain growth and development parameters, like PTR, can help us understand this better.

5. ANALYSIS

5.1 Kerala

A. Gross Enrolment Ratio (GER)

The higher the level of GER, the greater participation of students depicting a higher capacity of the education system to accommodate students of a particular age group. In the case of Kerala, GER reaches 103.24 per cent in the year 2014-15 depicting its ability to accommodate all of its school-

aged population but it does not indicate that the full cohort for secondary education which is eligible is enrolled.

Since secondary level education is imperative in developing an appropriate skill set for a given set of population, it is imperative to have a high GER for a country to develop its human capital which can lead to further development of the country soon. This shows that Kerala has made credible efforts towards educational development in the state.

Figure 1: *Gross Enrolment Ratio for the period of 2006-07 to 2015-16*
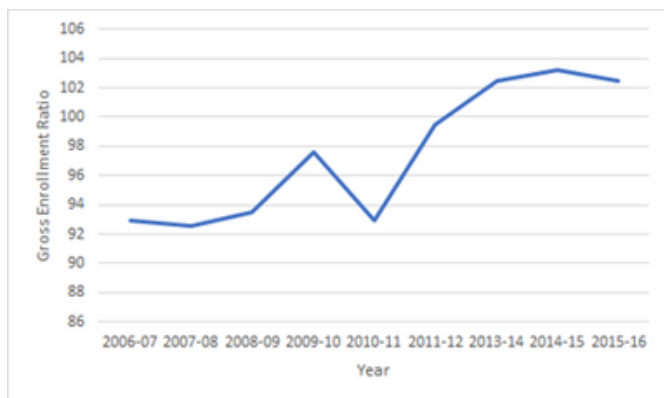
Source: MHRD data (2006-16)

This diagram shows the Gross Enrolment Ratio for Kerala for the period of 2006–07 to 2015–16. As seen in this trend line, GER for Kerala can be seen increasing over the years being consistently higher than 100 per cent since 2011-12. It was the lowest in the year 2006-07 at 92.93 per cent but has seen an upward trend ever since. This increase shows that the government can accommodate a greater sector of this set of population. In 2015–16 it was 102.44 per cent when the GER for the entire nation was 80 per cent showing that Kerala has been better than most states in terms of GER. This is because the state has invested in infrastructure by opening a large number of institutes in not only the main cities but the backward areas increasing its capacity and facilitating people with easy access to education.

B. Drop-Out Rate

The behaviour of drop-out rates in Kerala can be seen from the following chart. Kerala is among the states with the lowest drop-out rate in the country.

**Figure 2:** *Annual Average Drop Out Rate 2012-15*
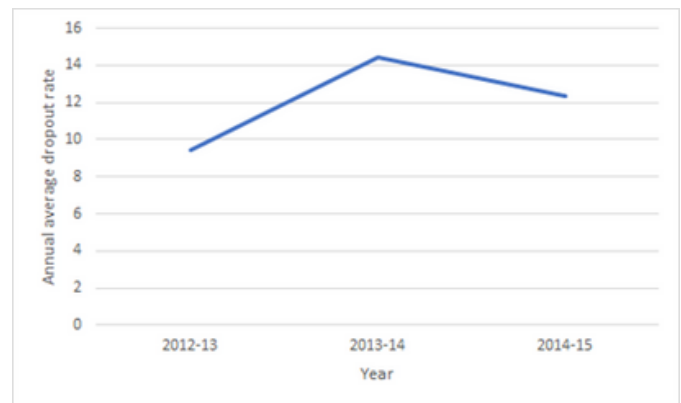
Source: MHRD data (2006-16)

This reflects a lot upon its education sector. As seen in the chart, drop-out rates increased from 2012-13 to 2013-14. Then they decreased from 2013-14 to 2014-15 to 12.32. This happened when the average annual drop-out rate for the country was 17.06. The reason behind students drop-out in Kerala can be attributed to family and socio-economic needs.

C. Pupil–Teacher Ratio (PTR)

The pupil-teacher ratio for secondary education in Kerala over the years has seen a lot of improvement and has gone as low as 17 students per teacher in the year 2015-16. The importance of this is that the number of students per teacher describes how much attention is given to each student. This leads to better performance and increases the education attainment levels of the students.

Here, the pupil-teacher ratio of secondary schools is being discussed. The secondary schools in Kerala have been lowering over the years and are much better than the rest of India. A low pupil-teacher ratio has a lot of benefits as it helps the teacher to manage the students more efficiently. The quality of education is also improved, and the teacher is less burdened and can do their work in a much better manner. It is important to see that the teachers are also sharing their burden, for them to perform.

**Figure 3:** *PTR of secondary schools in Kerala from 2006-07 to 2015-16*
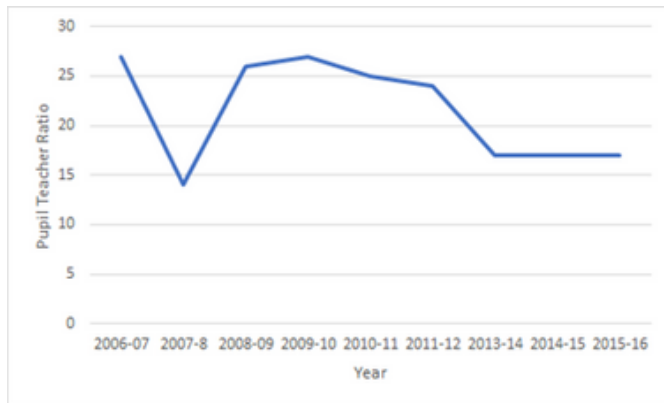
Source: MHRD data (2006-16)

We can see that it was at a high number of 27 students per teacher in 2006-07 and falling over the next few years. The progress of PTR has not been uniform but scattered. Although, in the later years there has been a downward trend, with PTR being at a constant for three years, from 2013-14 to 2015-16. This shows that the government has paid attention to this aspect of educational development.

5.2 Gujarat

A. Gross Enrolment Ratio

On one hand, where Kerala seems to be performing better than most states, Gujarat on the other hand seems to be different.

Figure 4: *Gross Enrolment Ratio for the period of 2006-07 to 2015-16*
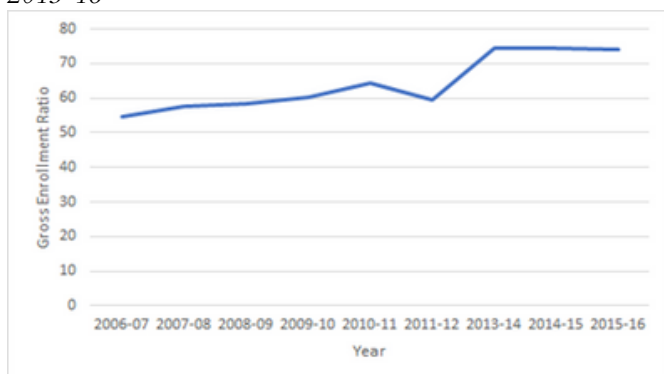
Source: MHRD data (2006-16)

Even though the GER of Gujarat has also been rising over the period, the increase has been rather slow, being nearly consistent from 2013-14 to 2015-16. GER for Gujarat was highest at 74.34% for the year 2014-15. For 2015-16, when the nation's GER was at 80%, Gujarat was below average at 74.13%.

The reason behind why Gujarat has a lower than average GER is the state's inability to invest in crucial aspects of this sector. Another reason is universities showing an inward approach. Massification of education seems to be an issue here (Prof. Mohan B Menon).

B. Drop-Out Rates

As seen in the chart below, it can be seen that the average annual drop-out rates have been continuously increasing in the state of Gujarat. This reflects upon the quality of the education sector and the standard of living of people in the state of Gujarat as high drop-out rates indicate the inability of the sector to retain students due to either economic or financial hardships or the lack of interest in education.

Figure 5: *Annual Average Drop Out Rate 2012-15*
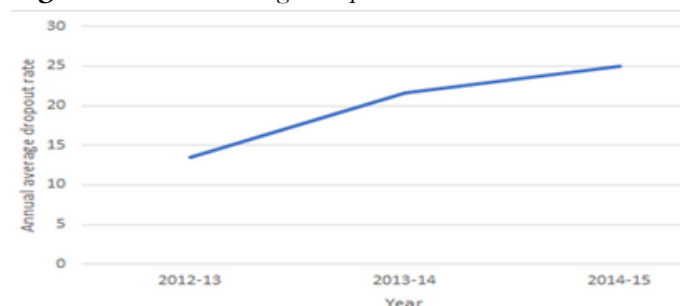
Source: MHRD data (2006-16)

The drop-out rates increased from 2012-13 to 2013-14 from 13.55 to 21.61. It further increased to 25.04 in 2014-15. In this year, the average annual drop-out rate for the country was 17.06.

C. Pupil–Teacher Ratio

In Gujarat, the pupil-teacher ratio has been high over the period of ten years we have looked at in this paper. According to the latest AISHE report, only 10 other Indian states have a PTR which is worse than that of Gujarat. This shows the lack of development in the education system of the state. Gujarat has also shown a shortage of teachers and professors at the higher education level; including secondary schools.

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[1]Bharat Yagnik, TNN, Updated: Nov 8, 2019. "Pupil-Teacher Ratio in Higher Education Worrying IN Gujarat: Ahmedabad News - Times of India." The Times of India.

Figure 6: *PTR of secondary schools in Gujarat from 2006-07 to 2015-16*
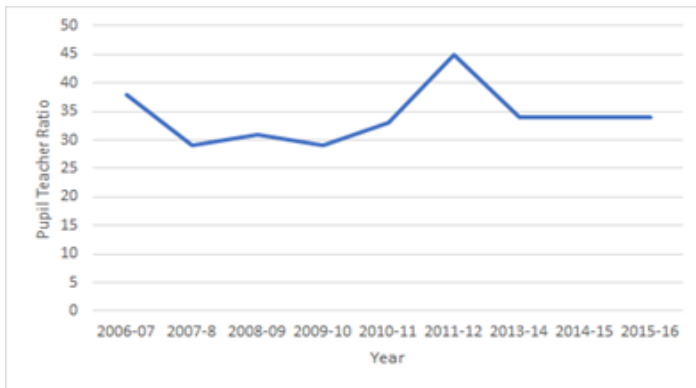
Source: MHRD data (2006-16)

Looking at the data for secondary schools in Gujarat of ten years between 2006-07 and 2015-16, we also see the same pattern with the PTR. It started at a high level in 2006-07 and continues to rise, reaching a maximum of 45 students per teacher in 2011-12, and going down, only slightly, over the next few years. For the last three years (2013-14 to 2015-16), it has been at a constant number of 34 students per teacher.

Another aspect of maintaining an optimum PTR is not only that of government expenditure in education, but also the correct deployment of existing teachers and appointing new staff wherever needed. Hence, a correct approach is needed as well as government expenditure in education.

6. COMPARISON WITH GOVERNMENT EXPENDITURE

Government expenditure is the funds used by the government in the public sector in various sectors like education, healthcare, etc., to influence the economy as well as to stimulate economic growth.

In India, the government also spends a part of its budget on education. The responsibility for the same is with the state governments. Although, what India spends on education is not adequate for the proper development of the sector. According to the Economic Survey 2016-17, the total government expenditure on education, combining both Centre and state, was 10.2 percentage. This is low compared to the average of over 11 per cent spent on education by OECD countries.

The reason for comparing government expenditure with the different parameters discussed above is that it reflects the investment made by the government in the field and will show us the returns for the same. It would put light on whether the parameters grow in proportion with expenditure, or not.
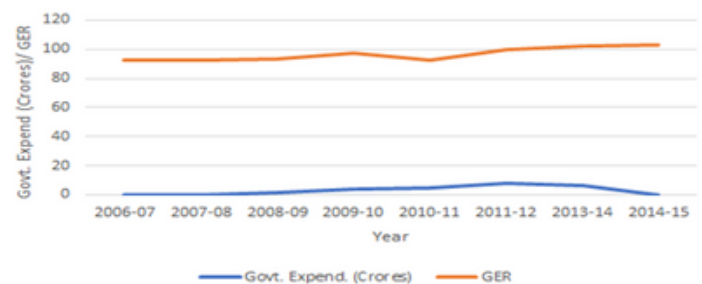
6.1. GOVERNMENT EXPENDITURE AND GER

The relationship between government expenditure and Gross Enrolment Rate is crucial. It tells us how the capacity of the education sector to accommodate students is increasing with the amount invested in the sector. It determines whether the expenditure on education is leading to an expansion by either increasing infrastructure or other factors motivating students to attend school at the secondary level.

The following charts show us a comparison between the behaviour of GER and government expenditure. Ideally, GER must increase with an increase in government expenditure showing us that the investment is leading to positive returns. We will analyse the basic trends in the two variables to judge the impact they have on one another, assuming both parameters are not affected by other variables like the population of students, total state budget among other things. We will study these trends further below.

KERALA

Figure 7: *Government Expenditure and GER from 2006-07 to 2015-16*

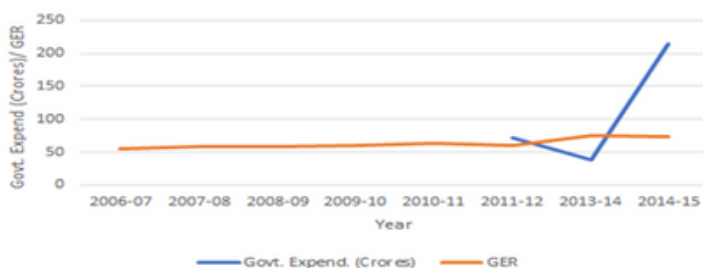*Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau*

As seen in the diagram above, for the state of Kerala, initially with an increase in government expenditure, GER increases showing us that the expenditure on education helped in expansion and therefore, enrolment of new students. Afterwards, GER and government expenditure both showed scattered and

not uniform trends but overall, both increased over the period of 10 years. Therefore, for the state of Kerala, it can be said that government expenditure and GER are positively related. The reason for the same can be an investment in crucial aspects of this sector. Improving the overall capacity and the quality of education provided.

GUJARAT

The following chart depicts the behaviour of government expenditure and gross enrolment ratio for the year from 2006 to 2015. As seen in the chart, till the year 2011, government expenditure on education was not very significant. After that period, with an increase in government expenditure by a huge amount from 2011-12 to 2014-15, the enrolment ratio went up only a little.

Figure 8: *Government Expenditure and GER from 2006-07 to 2015-16*

Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau

This indicates that investment was not made in the crucial parts of the sector. Mere investment in infrastructure is not enough for an increase in education, the government needed to spend on other factors like subsidised education at the secondary level to increase enrolment.
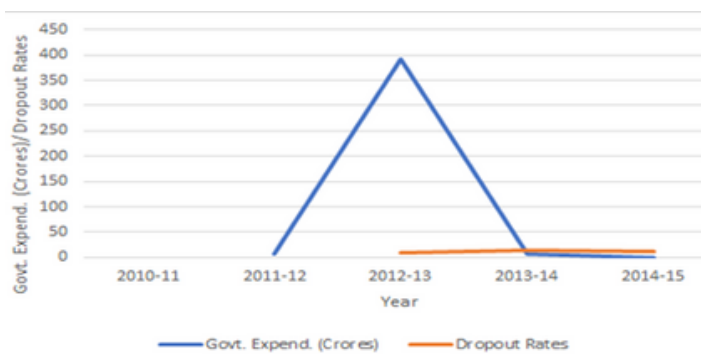
6.2. GOVERNMENT EXPENDITURE AND DROP-OUT RATE

The relationship between drop-out rates and government expenditure tells us whether the expenditure by the government in this sector can retain the students enrolled. A major reason for dropouts in secondary education is the lack of interest of students in education due to either the quality of teaching leading to an increased level of difficulty or inadequate facilities provided.

As per common knowledge, drop-out rates must decrease with an increase in government expenditure

This is because with additional expenditure the quality of education provided must increase. Therefore, they must have a negative relationship. We will study their behaviour and discuss it for the states of Kerala and Gujarat.

KERALA

Figure 9: *Government Expenditure and Drop Out Rates from 2010-15*
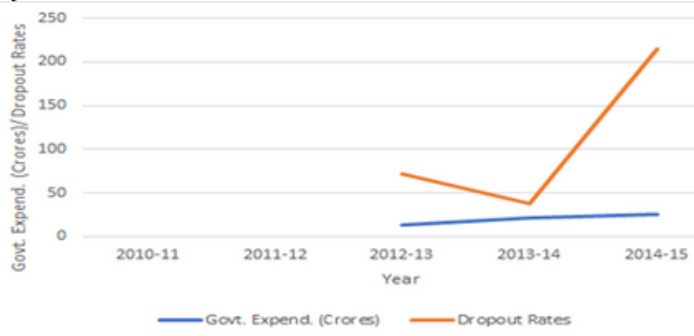

Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau

In the above chart, we observe the relationship between dropouts and the government expenditure for the state of Kerala. Government expenditure should have a negative relationship with drop-out rates according to common knowledge and existing literature. To assess the relationship, we observe from the chart that with a great degree of fall in expenditure during the period of 2012-13 to 2013-14, the drop-out rates increase from 9.45 to 14.46. With further decrease in government expenditure to not a very significant amount, the drop-out rates now fall to 12.32. With such a vast decrease in expenditure on this sector, not having a vast difference in dropouts is appreciable. The reason that can be attributed to this behaviour can be an already developed education sector in which expenditure is made only in the necessary aspects which is enough to motivate people to continue education.

GUJARAT

As seen in the diagram, drop-outs are increasing throughout whether government expenditure increases or decreases. However, we observe that the amount of increase varies. With a decrease in government expenditure, drop-out rates increase by a larger proportion as compared to an increase in government expenditure.

Figure 10: *Government Expenditure and Drop Out Rates from 2010-15*
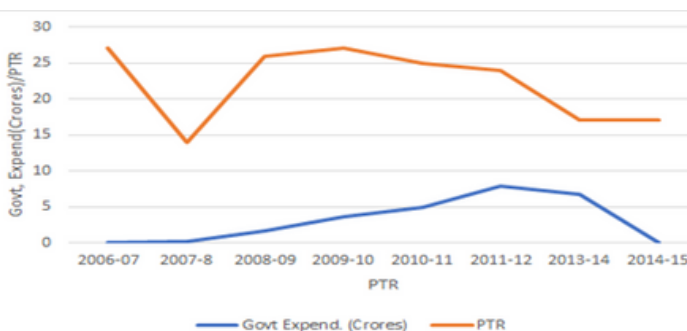

Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau

Therefore, we see that the trend in the state of Gujarat does not go along with common knowledge as it shows no concrete relationship between the two. However, the degree of increase in dropouts varies with changes in government expenditure.

6.3. GOVERNMENT EXPENDITURE AND PTR

KERALA

Kerala has shown an improving PTR, and in recent years has even presented an ideal ratio of 17 teachers per student. This, when compared with the expenditure done by the government will tell us how much the government has focused on this parameter. The importance of a better PTR and its relationship with government expenditure will tell us in which field has the government been paying more attention. Mere infrastructural growth will not be sufficient for a better performance by the students.

Figure 11: *Government Expenditure and PTR from 2006-15*
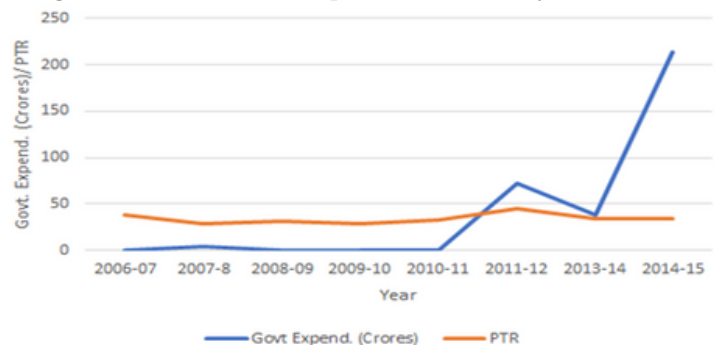

Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau

The above graph gives the relationship between Government expenditure and the pupil–teacher ratio of secondary schools in Kerala, for the period of ten years, between 2006-2016. We can see how PTR

progresses along with how much the government spends each year. As the years' progress, Kerala's investment has gone down, lowest in 2007-08 at 0.1377 Crores and what is more shocking is that the same year, it also has the lowest PTR, at 14 students per teacher, which is a very commendable number to maintain. The PTR has risen after 2007-08, along with more investment in education by the government. It continues to show the same pattern of a falling PTR along with a fall in government expenditure. The reasons for the same can be due to various fields of education that the government could have invested in, but it has paid attention to this development parameter, nevertheless.

GUJARAT

Gujarat has also been spending a large amount on education, and over the years it has only increased in value. The following diagram is the data for government expenditure and PTR of secondary schools in Gujarat for the years 2006-2016.

Figure 12: *Government Expenditure and PTR from 2006-15*

Source: MHRD data (2006-16) & MHRD Planning, Monitoring and Statistics Bureau

As we can infer from the figure, the government expenditure by the Gujarat government has been rising continuously for the last three years of the period taken by us (2006-2016). Before that, it was showing an increasing trend, except in 2010-13. A lot of data has not been provided for all the years of government expenditure. But the general trendline tells us how the PTR has been rising, seeing a high point of 45 students per teacher, and going down only slightly, and has remained at a constant of 34 students per teacher for the years 2013-2016. A lot can be said about this trend. The government of Gujarat has been investing in infrastructure areas, and not paying attention to human development. The investment it makes in education would make little impact on the quality of education received by the students.

7. GDP AND THE PARAMETERS

The two states studied in the paper have both shown tremendous progress in their respective areas of growth and development. Kerala has been a model of human development for other states and has shown tremendous improvements in the field of healthcare and education. However, it has not shown similar trends in industrial and economic growth (Yale Review of International Studies, 2013). This shows us how economic development is incomplete without social and human indicators.

Although growth rates and HDI indicators not going in the same proportion is not necessarily negative for an economy; however, true development cannot be achieved without paying attention to the social development requirements.

Gujarat can be seen as the flip side of this situation. It has been showing tremendous growth rates, especially in recent years. However, it has failed to show similar successes in its HDI indicators despite accounting for 7.6 per cent of the country's GDP. (Report of the Planning Commission, 2014). It also spends a large sum on the education sector every year, as shown by our data on government expenditure above. Nevertheless, the parameters discussed have not shown improvement.

For a long time, Kerala has shown growth lower than that of the rest of the states in the country, but it has consistently done better at the HDI indicators.

The opposite has been seen in Gujarat where the expenditure on education has increased over the years, but the HDI indicators are not reflecting the same.

There is a definite need to improve infrastructure but also the quality of education needs to be emphasised as well. Other factors may also affect the same, but an active government action at the state level and appropriate measures and policies can change the path of development in education in any state.

8. CONCLUSION

The paper was aimed at showing how two states with opposite approaches towards economic development have progressed in indicators pertaining to education. Through this analysis, we were able to conclude that educational growth is not something that can only be achieved via government expenditure; it also needs the correct approach and allocation of these funds. The quality of education needs more attention than just infrastructural investments. The quality of education has a huge role to play in the welfare of the people and in improving their standard of living. Therefore, the comparisons are shown via the parameters discussed in the paper inform us about the importance of a correct approach towards the development of a country, one that is not solely based on growth rates.

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