

What is Driving the Platform Economy? An Examination of Underlying Trends and Implications.¹

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Abstract: This paper is an attempt to understand the nature of the gig economy, its impact on labour productivity and income distribution, and policy interventions which are required by the government and central bankers when technology-aided gig works are spreading across the globe. From an economic perspective, the rise of the gig economy is likely to increase overall productivity. Increase in productivity arises from an increase in labour force participation and getting access to lower salaried workers from cross borders, leading to more specialization and standardization of work. At the same time, full-time employment in a gig type set up may lead to lower income, and economic vulnerability of workers in developed countries. The government should also address the challenges associated with some workers getting displaced from technological disruption. There is a need to find ways to absorb these labourers for alternative employment. Governments can work closely with business and training centres to impart necessary additional skills for the displaced workers. At the same time, for the spread of gig works, there is a need to invest in ICT-related infrastructure such as telecommunication and internet connection, particularly in emerging economies, like India.

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1. Introduction

The gig economy is defined as digital, service-based, on-demand platforms which are characterized by the prevalence of short-term contracts as opposed to permanent jobs (Greenwood et al., 2017). Approximately 33% of the workers in USA are part of the digital platform economy.³ A Federal Reserve Report (2017) puts a more conservative estimate, with 31% of the population engaged in digital platform related work, and analysis predict it will rise to nearly half of the workforce by 2020. In a digital platform enabled world, there are two types of works: web-based work platform such as Freelancers and Upwork, which can be done from anywhere; and location-based work platform, which is done in the physical world through market-style apps such as Uber and Ola.⁴ Independent contractors use their skills or assets such as houses and cars, to complete tasks or *gigs* during a defined period of time to earn income.

Worldwide, a major demand for work, arises from Information Technology (IT), IT-enabled services, e-commerce and start-up, retail, hospitality and fast-moving consumer good (FMCG) sector,⁵ wherein sudden and short-duration talents at the lateral level are very much in demand (Asian Development Bank, 2018). The job market portal Upwork ranks job categories which are most in demand. During 2015, some of the in-demand jobs dealt with internet marketing, blogs, and e-commerce jobs. There were about 26,000 open jobs, paying hourly rates between \$16 to \$22 on average (World Bank, 2015).

The rest of the paper is organized as follows. Section 2 is about the literature on the gig economy. Section 3 is about the impact of the gig economy on employment and productivity; followed by section 4 which is about the impact of the gig economy on income distribution. Section 5 is about demand management policy in a gig world, and the section 6 thereafter is about policy interventions in a gig world. Section 7 is about hypothesis testing followed by results. Section 8 concludes.

³A digital platform refers to the software or hardware of a site. For example, Facebook, LinkedIn, etc. are examples of a digital platform.

⁴ Uber and Ola are taxi service aggregator employing thousands of people worldwide.

⁵Fast moving consumer goods are consumer packaged goods such as beverages, toiletries, over-the-counter drugs, etc., which are sold quickly at a relatively lower cost.

2. Gig Economy: The Definition

Gig economy is a part of 'digital platform economy'. The term 'platform economy' is discussed in business press/journals to loosely describe the digitally enabled marketplaces (Kenny and Zysman, 2016). Over time, other terms such as 'sharing economy', 'digital platform economy', 'online platform economy' have entered the lexicon of scholars and business media (Farrell and Greig, 2017). The rise of 'digital platform economy' has been hailed variously as the 'next industrial evolution', Web 2.0, the 'next frontier' etc., and has been accompanied by notable generation or redistribution of wealth and productive economic assets, as well as a greater degree of flexibility in labor markets accompanied by changing nature of work and work contracts. What differentiates the 'gig' from other type of informal market is the use of 'platform-based technology', enabling peer-to-peer exchanges without the middlemen taking an unfair cut. A market place which is characterized by gathering of informal labourers (comprising of plumbers, carpenters, painters, day labourers, etc.) wherein a contractor or middlemen hire them daily for a work done for a third party in sectors such as construction and agriculture is not part of a 'gig' economy. Such a type of work is not platform enabled and usually involves transfer of wage surplus from the informal workers to the middlemen who facilitate the former to find a work. There appears to be a broad consensus that platform economy consists of a few basic characteristics: digital platforms as market intermediaries, reducing entry barriers to suppliers and customers having access to digital resources, and dealing in services which are relatively unambiguous to the transacting parties. Gig economy is an '*on-demand service economy*' wherein the parties use their skills and assets to complete tasks or *gigs* during a defined time to earn income (Frenken and Schor, 2016). It entails connecting the workers to the hirers, and the owners of assets to the customers. For example, delivery-boys, cleaners, researchers, consultants, writers, bloggers, etc. are all part of gig economy when they use online platforms to connect with their potential recruiters.⁶ They work on a project or piece basis, and get paid once the job is done. The nature of the jobs performed is *standardized and outcome* oriented. As the job performed is *outcome* based, problem associated with moral hazard or asymmetric information does not arise. For instance, in

⁶ Gig work is emerging as a livelihood option for job seeking students, low-skilled workers, retirees, and women who quit jobs to fulfil family responsibility.

case of a long-term contract, persons once hired cannot be fired without serving a notice period or trade unions agreeing to such a decision. The onus of risk associated with employee type once hired (good/bad) lies with the employers.⁷ However, in a gig-economy type setup which is driven by task-based job problems associated with information asymmetry and/or moral hazard does not arise. Uber, TaskRabbit, Swiggy, Zomato, etc., are all part of *labor platform*. As the work is job specific, workers has the flexibility to work for more than one contractor.⁸ Then there is *capital platform*. For example, when a house owner is away for a business trip, or has a spare bedroom, the asset is not utilized, something which s(he) can now rent out using digital platform such as Airbnb.⁹ Other examples include car rental services such as Zipcar and Hertz. The platform economy unlocked resources that ordinarily remain latent due to structural imperfections in the socio-economic orders. The transaction on a capital platform - such as renting out cars or properties - takes place between the buyer and sellers on a temporary basis and is distinct from online buying and selling goods where transfer of ownership happens on a permanent basis.¹⁰ A digital platform can transform work previously done by traditional employees (enjoying social security benefits) to the ones that are filled by the contingent workforce. There is no scope of compassion for the workers, should they fail to perform the job in eventuality of falling sick or for some other personal reason.¹¹ In this paper, we examine the context within which the gig economy operates in terms of the underlying persistent trends, its impact on income distribution, the outcome in terms of standardization of products and services, increasing flexibility of the labor, and unlocking latent value of private assets. We also examine the role of government and other institution such as central bank, in sustaining the platform economy. We argue that these trends are persistent, irreversible and relevant for future economic growth.

⁷ Although the owner can hire a manager or micro-manage himself to ensure that the job is performed.

⁸ For instance, many driver partners take rides from both Uber and Ola cab aggregators.

⁹ Airbnb is an online hospitality service brokerage firms wherein the members can use the service to arrange or offer lodging, primarily for tourism purposes.

¹⁰ Long-term transactions over platform, for example buying and selling of properties, may not be considered as part of the gig economy as they fail the connotation of short-term contract. Here ownership of goods changes hand from the sellers to buyers, permanently. In case of gig, transactions mediated through a capital platform, consumers get temporary access to goods and services.

¹¹ Worldwide, bills are passed for ensuring social security of the workers. For instance, legislators in California, USA, approved a bill which mandates online platforms to treat their contract workers as their employee. European Union has approved a new framework to give minimum rights to gig workers, although it is not a law yet.

3.The Gig Economy:Its impact on Employment and Productivity

From an economic perspective,the rise of the gig economy is likely to increase overall productivity. Increase in productivity arises from an increase in labour force participation and getting access to lower salaried workers from cross borders, leading to more *specialization* and *standardization* of work. High skilled workers from a faraway place also get connected. Also, as the search cost of finding a work is reduced, with no role of middlemen, deadweight loss associated with *middlemen fee* no longer exists.

Over the last two decades, Europe, for example, is witnessing a fall in labour productivity. With a fall in birth rate, ageing population, and a strong anti-immigration policy in place, it is difficult to increase productivity but through technological innovation and labour force participation.The spread of gig-type work is about increasing productivity through a combination of increase in labour force participation and technological innovation (read, digital platform). In Europe the working age to old person ratio will drop from 3.5 today to 2.2 by 2040 (Atkinson, 2018). The birth ratio has also fallen. To maintain replacement rate of population growth, 2.1 children should be born to each family in an economy, assuming an average death rate applicable to the world's population. In contrast, the figures for some Euro-Zone economies are much lower: 1.38 for Greece, 1.39 for Spain, 1.41 for Italy and 1.94 for the UK. For Spain and Greece, the over-65-year population will increase from around 17% now to 25% by 2030 (Banik, 2012). There has been almost no increment inEuropean productivity, with that in UK it has ceased. In an ageing society and with a presence of strong trade unions it is always not possible to get a more productive workerSherk (2009).¹²

With the advent of a gig world, this may change.In line with Adam Smith's principle of economic specialization, rather than hiring one generalist to complete all tasks, companies can designate task to various freelancers specialized in that area.¹³ Workers are also more accountable as performance standards dictate future income.Higher productivity growth creates a rational exuberance where consumers and businesses feel more confident, and

¹² According to United Nations, an ageing country is one with a 10% or more of its population are above 60 years of age.

¹³ Adam Smith published his book titled, Wealth of Nations, in 1776.

spend and invest more, leading to greater number of jobs getting created (Atkinson, 2018). Connecting world labour market may lead to rise in economic productivity even in countries in Europe, facing shortage in supply of labour.

Workers from labor abundant developing countries are likely to gain. By creating a level playing field for workers worldwide, the gig economy represents factor price equalization outcome in a Heckscher-Ohlin-Samuelson (HOS) model type set-up. When trade happens between countries with differential factor proportions, the labour-abundant country starts exporting labour intensive goods, and the capital abundant economy starts exporting capital-intensive goods. As the labour-abundant economy is exporting labour-intensive goods, the price of labour-intensive goods goes up. Under perfect competitive assumption (which is the case with HOS model), this would mean price of labour (wages) will increase in the labour-abundant economy. Similar is the case with the relatively capital-abundant economy where return to capital will increase. Trade is expected to equalize return to factor incomes across countries. As trade allows each country to specialise in what it does best, global income goes up, and as a result, it is possible to compensate the losers from the gains accrued to the winners.

In line with factor price equalization outcome, in a gig-world, low-salaried service workers from India and elsewhere can now earn more by engaging in similar job profiles in a developed country like USA and countries within the European Union. There are no entry barriers, and all that is needed is access to mobile/internet connection. With the advent of the gig economy it is possible to find a job online without having the trouble of going through all the logistic cost. Gig economy has helped to reduce information asymmetry associated with job search cost (Zhao, 1999). In India, for example, before the advent of the digital world, job seekers regularly wait in line –sometimes all day – in national employment exchanges to initiate the first step in the job search process. In present day, digital platforms allow the job seeker to conduct most of the search and enquiry process, online.

[INSERT FIGURE 1]

Within any economy, the increment in labour productivity can happen not only because of presence in gig work but also from structural transformation brought in through technological innovation.¹⁴ Figure 2 shows gig world and technological innovation have led

¹⁴ As the literature on growth theory suggests, in addition to technology, an increase in per-capita income can happen from an increase in labor force participation rate.

to gain in productivity by shifting employment from lower to higher productivity sector (structural change), but also through an increment in productivity within a specific sector.

[INSERT FIGURE 2]

Labour participation in a gig world has come from a variety of sources. J.P. Morgan Chase and Company Institute (2018) examined a sample size of 240,000 anonymized individuals. The sample was collected between October 2012 and June 2016, from one or more of 42 different platforms. The results suggest, lower-income individuals are more likely to participate in labor platforms than higher-income counterpart. As of June 2016, 0.6% of the people in the lowest income quintile earned income from *labor platforms* such as Upwork and Uber, whereas the remaining 0.4% is dependent on *capital platform* like Airbnb. These lower income group, are also more persistent in using the *labor platform*: 44% of the participants in the lowest income quintile stopped accessing platform within 12 months compared to 53% of middle-income participants, and 60% from the highest income quintile. Other related study points out towards more gender equality. For instance, it has helped women labour force participation. Women comprise more than a third of 15,000 users of the digital platform Souktelin the West Bank and Gaza region, but only 19% of the entire labour force in the same area (Santos and Imaizumi, 2016). There are no barriers based on caste, religion, gender, and location. In USA, Afro-American Airbnb hosts can charge 12% less rent than other American citizens for the same type of house in the same type of location (Edelman and Luca, 2014).¹⁵ Spatial location of workers whether urban, rural, or small towns, does not matter. Online labour markets such as Freelancer and Upwork are likely to substitute for physical labour migration and hence uptake in working opportunities in digital platforms.

Because of the emergence of the gig economy, IT and IT-enabled service sectors have created millions of employments worldwide. According to an estimate by OECD (2017) for the economy, 5.74% employment originates in the information and communication technologies (ICT) space. For the G20 member countries, the range of employment in the ICT space is between 4.66% and 6.45%. For emerging economies such as

¹⁵ Although, the organized labour market comes with a tag of equal opportunity employer, wherein the employer agrees not to discriminate against employee or job applicants because of race, colour, national origin, and gender.

Brazil and India, the ICT sector has employed over 1.3 million and 3.5 million people, respectively, by 2014.

The gig jobs have spill-over effect on other sectors as well. A World Bank study (2015) estimates digital jobs generate between two and four times more employment for other sectors in the economy. The lower price of service associated with gig economy has generated consumer surplus which can be spent on other sectors, with a multiplier effect on income and employment generation. For example, after introduction of taxi service by Uber and Ola, taxi fares were reduced in major cities in India. This additional money saved from lower commuting cost is an addition to the disposable income, which can be used for buying other goods and services. Interestingly, gig economy has other societal benefits such as reduction in alcohol-related motor vehicle accidents (Greenwood and Wattal, 2017) and traffic congestion (Li et al., 2016). Taxi service providers such as Uber are allowing people to experience the benefit of share ride, leading to lesser traffic congestion (lesser time) and other motor vehicle accidents. There are also environmental benefits. As cars stand idle, carpool and car sharing, contribute to low carbon-footprint.

4. The Gig Economy and Income Distribution

The benefit from the advent of gig economy is not uniformly distributed. There are a few concerns. Full time employment in gig type set up may lead to lower income and economic vulnerability of lower skilled workers in developed countries (Bergman and Jean, 2016). As the workers from less developed countries get connected to the potential recruiters in developed regions, their wage rates are likely to increase at a faster rate, akin to the prediction of the Stolper-Samuelson theorem.¹⁶ Similarly, a low-skill worker from the developed country is likely to lose out in presence of global competition. Things may get more difficult for these unskilled laborers in presence of technological innovation - knowledge-based workers are likely to gain more than the manual labourers. Even within a country a contractual skilled worker is going to charge a higher fee in comparison to the lower skilled workers. For example, doctors, professors and scientists, who deliver their services on a contractual basis, are always going to charge higher wage rates compared to their full-time employed peers. This is not necessarily true for plumbers or a technician or

¹⁶ The theorem states that—under specific economic assumptions (constant returns to scale, perfect competition, equality of the number of factors to the number of products)—a rise in the relative price of a good will lead to a rise in the real return to that factor which is used most intensively in the production of the good, and conversely, to a fall in the real return to the other factor.

even a cab driver. This in itself may lead to a skewed income distribution within a society. There are also apprehensions that technological innovation may lead to machines replacing humans in economic activity (Nica, 2016). However, as Atkinson (2018) argues, much part of the job loss will be mitigated through the spread of gig economy, although at the cost of growing income inequality between high-skilled and lower-skilled workers, worldwide. An International Labour Organization report suggests gig workers in some developed countries are making less than the government-mandated minimum wage rate. About two-thirds of the US workers using the Amazon platform (popularly known as *Turkers*) made less than the federal minimum wage rate of \$7.25 an hour and only 7% of Germans on the Clickworker platform made the statutory minimum wage of 8.84 Euros (\$10.40) an hour (Bershidsky, 2018). Critiques also argue the *virtual sweatshop* created by technology platforms are largely unregulated with no floor on minimum wage rates. The workers do not have access to other fringe benefits such as health insurance, sick leaves, working hours, continuation of contracts, and settlement of disputes (Chandy, 2017). In fact, services such as Uber and Airbnb are coming under increasing pressure to adhere to the rules that are applicable to traditional service providers in those fields. The city of Seattle has passed a law permitting Uber and Lyft drivers to unionize (Wingfield and Isaac, 2015). In a court rules against a garment manufacturer in India, Supreme Court of India passed a judgement stating the women contractual laborers who are working from home doing piece work would be considered as “employees” of the company who has engaged them to do work (Kumar, 2019).¹⁷

The ability to take advantage of the benefits arising from spread of technology is likely to vary across individuals. Workers with higher level of skills are likely to benefit, whereas the ones protected through labour unions and until now enjoying the benefit of higher wage rates because of spatial/geographical segregation, are likely to lose out. Their jobs are more likely to be shipped over to other emerging economies such as India and Philippines with a better access and adoptability to ICT, and an English-speaking workforce. New flexible ways of working could benefit groups that were traditionally marginalized such as women, young people, and disabled (OECD, 2017).

¹⁷ In a similar judgement the Supreme Court in India, also ruled that bidi (type of cheap cigarettes) workers who work from home should also be eligible for social security benefit. It is however noted these bidi making workers are not part of gig economy.

Another possible source of unequal income distribution arises from ownership of capital platforms. Although platform software has become ubiquitous, the market valuation of companies such as Uber, Airbnb, Facebook, and Amazon, put together, may in fact be higher than GDP of many low-income countries. Uber was valued at \$82 billion in share listing.¹⁸ The Uber platform is owned by a small group of entrepreneurs and their venture capitalists, wherein the valuation can be capitalized through either acquisition or stock offering. The drivers using Uber as a platform in the US, was embroiled in a long-drawn legal battle, arguing they should be treated as employee and not as an independent contractor, with a better non-pecuniary benefit (Lobel, 2016). For instance, although drivers using Uber platform are paid by the job and have control over their work hours and geographical preference for operation, Uber set the passenger pay-rate and displace the drivers falling below a minimum rating point. Drivers filed a class-action suit during 2013, with Uber finally agreeing to pay \$20 million to settle the case in 2019 (Dickey, 2019). However, not all platform justifies unequal income distribution. Take for example, Wikipedia, a knowledge-based platform, where the network is managed by a consensus set of rules. In fact, polls from the US market show that the gig workers are happy. They are with jobs, and value the flexibility and freedom with which they can work in a gig type setup (Hall and Krueger, 2018). Research from the McKinsey Global Institute found that the biggest impact of the freelance economy is the boost in labour force participation – for those who were unemployed now find them with a varied way to earn income (McKinsey Report, 2018).

5. Demand Management Policy in a Gig World

For any economy, demand management is all about managing demand for a given supply of output (read, GDP). Managing demand is important, because when there is a greater demand for output relative to its supply, it causes inflation. On the other hand, slack demand conditions lead to excess supply. Firms unable to sell goods and services do not hire, and may even retrench workers, leading to unemployment. Hence, demand management policies are important to curb inflation and unemployment.¹⁹

¹⁸ For more on this refer: <https://www.bbc.com/news/business-48222567>. Accessed 19/10/2019.

¹⁹ When the real GDP is growing for two consecutive quarters, the economy is said to be in an expansion stage. Expansion is marked by a spurt in economic activity, industrial production, employment, and real income. A recession, on the other hand, is marked by a significant decline in economic activity. Generally speaking, recession is a condition where the real GDP has declined for two consecutive quarters.

The government and central bank of any country undertake demand management policies through fiscal and monetary policy. The government undertakes fiscal policy using instruments such as taxes and subsidies, whereas the central bank undertakes monetary policy using instruments such as money supply and rate of interest. And all these policy instruments are used to control the difference between demand and supply of output, better known as 'output gap'. Policymakers have two important roles to play. First, managing the output gap to control for inflation and unemployment. Demand management policies, that is, fiscal, monetary, or combination of both, are quite effective in the short-run but not in the long-run. Second, the policymakers should also find ways to increase the long-term availability of per-capita output. Any policy measure to increase the supply of output requires time. For India to double its per capita income per annum, its GDP must grow at an average annual rate of 9% for the next ten years. Ergo, managing supply-side components is not that effective in the short-run; however, in the long-run, components like investment in education, healthcare, and physical infrastructure such as ICT, electricity, etc., will have an influence over the availability of future supply of output and per-capita income.

6. Policy Interventions

In a gig world, policy interventions require facilitating spread of digital economy and at the same time ensuring an environment which will guarantee the welfare objective of the state is met, that is, the workers are not over-exploited. Some of the interventions are as follows:

(5.1). Human Capital: From the supply-side perspective it is important government undertakes policy which will create additional number of skilled labour force. Building schools and investing in quality education is important. For instance, during 2018, no Indian university was in the top 200 of the Times Higher Education World University Ranking.²⁰ Hence, fewer jobs are getting created, with lower number of graduates having the ability to execute. There is a need to facilitate stronger linkages between universities and the private sectors. The United Kingdom government is promoting robotics, 5G wireless internet and smart technologies while asking private sectors to sponsor 300 master students and 200 doctoral students in artificial intelligence every year (Banik, 2017).

[INSERT FIGURE 3]

²⁰ See: https://www.timeshighereducation.com/world-university-rankings/2017/world-ranking#!/page/0/length/25/sort_by/rank/sort_order/asc/cols/stats.

(5.2). Ease of Business in a Digital World: The government should be an enabler enabling policy and regulatory environment so that entrepreneurship and innovation associated with digital technology expand. As much of the growth is supported through the ICT, government should undertake investment in telecommunications, cyber-security, internet, and ensure wide spread access. Investing in complementary infrastructure such as electricity connection, lowering logistic cost for setting up business, and enforcing contracts will help. For example, referring to the Ease of Doing Business Report 2020²¹, the World Bank has placed India in the 63rd position, which is a marked improvement from its 134th position out of a sample of 190 countries, five years back in 2014. A reason for this to happen is because of the initiative government took on digital economy, lowering the logistic cost.

(5.3). Convenience for Commercial Payment: It is necessary that small and medium enterprises in a digital-world get proper policy support in terms of access to credit and necessary demand creation wherein the government bodies commit to some amount of captive service generated in the digital start-up eco space. To facilitate growth of digital business there is a need for ensuring access to electronic payment systems. Online payment systems are required for the workers to get paid for their works. At the same time the central bank and other regulatory bodies should ensure that these payment systems are secure and in compliance to global standards. For example, in recent times, Facebook has announced an ambitious plan to launch their own digital currency – Libra (something like cryptocurrency Bitcoin) – within next 6 to 12 months.²² Libra, which will be pegged to the US dollar, can be used by the online Facebook user to send money across borders. Digital currency, such as Libra, will be beneficial for those who does not have bank account and can act as a great way for financial inclusion. However, it can be a cause of concern for the central bankers, as digital currency such as Libra can be used for money-laundering activities and evading tax.

(5.4). *Welfare State* in the wake of Disruptive Technology: A concern with the gig workers is that they do not adhere to laws involving (i) fair labour standards governing the minimum wage and work hour overtime, (ii) occupational, health and safety hazard covering the work related insurance, (iii) medical and sick leave allowance, and (iv) pensions and annual

²¹ World Bank, 'Ease of Doing Business in India' (2020), <<http://www.doingbusiness.org/content/dam/doingBusiness/country/i/india/IND.pdf>> accessed 19 October 2019.

²² Reuters (2019). See <https://www.france24.com/en/20190618-facebook-launch-global-libra-cryptocurrency-internet>.

leave/holidays. There is a need for the government to take this up with the gig companies so that some of these benefits can be passed on to the concerned parties. Typically, in a gig setup, the government loses money because of lack in tax collection since the platforms do not give them access to user data. These platforms are protected under privacy laws, while the alternative way of monitoring does not outweigh the costs involved. There is a problem in tracking how much gig workers are earning (from abroad) as some of the money transfer platforms are not integrated with the income tax portal in respective specific countries. Also, the big companies such as Facebook, NETFLIX, Google, etc., and the so-called UNICORN, have no social obligation and continue to pour money for growth of their respective company, with the objective to please their shareholders.²³ Seldom there is an effort by these companies to reach out to individual governments for taking up any social clause. Individual governments can clamp down on tax evasion by making it mandatory, and use the money raised to invest in public services that counteract the growing inequality that is a policy challenge for many economies.

[INSERT FIGURE 4]

(5.5). Targeted Assistance Program and Job-less Growth: There is also a requirement that government address the challenges associated with some workers getting displaced from technological disruption, and jobs shifted elsewhere. There is a need to find ways to absorb these labourers for alternative employment. For understanding which one of the sectors these displaced workers' skill and experience are better suited, the policymakers can make use of big data and AI.²⁴ Governments can work closely with business and training centres to impart necessary additional skill for the displaced workers. One policy that government can undertake to offset rising income inequality and fears that jobs that are made redundant will not be replaced by new ones in other areas is to start giving universal basic income (UIB). Many current welfare programs take away benefits when recipients find work, sometimes leaving them financially worse off than before they were employed. UIB is for all adults, regardless of employment status, so recipients are free to seek additional income, which most everyone does.²⁵

7. Hypothesis Testing

²³ UNICORN is privately held start-up companies with a valuation of \$1 billion or more.

²⁴ It should however be noted that such capabilities of using AI and big data lies with handful of countries.

²⁵ There is however a cost associated with UIB, as it is likely to increase fiscal deficit and may not be able to identify the target group requiring such intervention.

In the context of gig economy, we want to examine the following two hypotheses.

First, does the advance of gig-type work have any impact on employment? The popular perception is a gig-type employment opportunity will lower the number of professionals in the organized labour market. Typically, during recession, there will be a lesser number of people in the organized labour market. During the time of recession laid-off workers find it difficult to get a job (Rothstein, 2011). Reinhart and Rogoff (2009) argue that the gig economy can help reduce unemployment as the workers at the time of recession adopt more flexible type lower paid jobs. Rather than participating in the organized labour market, workers will prefer to work in a more flexible work environment (for instance, work from home or without any binding on work hours) rather than sitting idle. The gigeconomy provides a cushion wherein a job looker can find alternative employment without government intervention. Therefore, we expect to see the number of professional workers in the organized labour market fall during the time of recession, and with the spread of a gig economy.

The second hypothesis is the number of professional workers is typically likely to benefit from the spread of a service-led economy and mobile subscription. As the new-age world is increasingly generating value addition from services (platform based economic activities), we anticipate there will be a larger number of professional workers with the spread of mobile/internet connectivity and advancement of service-led gig world.

[INSERT FIGURES 5 and 6]

DATA

For estimation, we have data for 6 countries in the Asian region covering the period between 2000 and 2018. Three of these countries, namely, Japan, Republic of Korea, and Singapore are categorized as high-income countries.²⁶ And the other three countries are Bangladesh, India, and Philippines, which fall under middle-income category countries. Although at a different level of development, one thing is particularly common among these

²⁶World Bank classifies countries into three groups: low income, middle income and high income. As of 1 July 2018, low-income economies are defined as those with a gross national income (GNI) per-capita of \$995 or less in 2017; lower middle-income economies are those with a GNI per capita between \$996 and \$3,895; upper middle-income economies are those between \$3,896 and \$12,055; high-income economies are those with a GNI per capita of \$12,055 or more.

six countries: they all have a relatively *open* economy and have welcomed operation of gig firms. Gig workers in India, for example, hold a 24% share of the global online gig economy. Data on the number of professionals in each country are collected from the International Labour Organization (ILO), from their publication ILOSTAT.²⁷ ILOSTAT contains statistics from national sources on employment by occupation, also disaggregated by gender, available using both aggregate and detailed categories of occupation. The data are both nationally reported and imputed data, and where all estimates are national, meaning there are no geographic limitations in coverage. ILO estimates of employment by occupation are presented only using broad categories of occupation: skill level 1 (low), skill level 2 (medium) and skill levels 3 and 4 (high). *Professionals* are put in the highest skilled category, level-4. The data on number of mobile subscriptions per 100 people, and services as percentage of GDP are sourced from World Development Indicators, World Bank.²⁸

We also use three types of dummy variables. First is the country dummy captured through variable D_i in equation 1. Second is the recession dummy which takes value 1 between 2008 and 2013, and zero otherwise. The recession dummy is to control for the US financial crisis, which impacted economic activities worldwide. The third dummy is the gig dummy. Going by the literature we take the year 2011 as the advent of the gig economy. The word gig economy was coined in 2009. As we have considered the middle-income countries, we took 2011, as a more conservative estimate to give some space for the spread of gig economies, worldwide. Accordingly, the gig dummy takes value 1 between 2011 and 2018, and zero, otherwise.²⁹

ESTIMATION

We estimate the following model:

$$P_i^t = \alpha_1 + \alpha_2 S_i^t + \alpha_3 M_i^t + \alpha_4 D_i + \alpha_5 RecD + \alpha_6 GigD + e_i^t \text{ ---- (1)}$$

²⁷ Available at: https://www.ilo.org/ilostat/faces/wcnav_defaultSelection;ILOSTATCOOKIE=CgBvIYKcLYPs-arXRjMILEuDcsbDiGtTJeGhbnE-zyGkRf4STSD1!595095360?_afLoop=1828381741967760&_afWindowMode=0&_afWindowId=null.

²⁸ Available at: <https://databank.worldbank.org/source/world-development-indicators>.

²⁹ For the year which is acknowledged as the start of gig economy see this article in Financial Times. Available at: <https://www.ft.com/content/b5a2b122-a41b-11e5-8218-6b8ff73aae15>. . The definition of advent of gig economy with relation to individual country is not available. However, the results do not change even if we take gig dummy value as 1 starting the year 2010.

P_i^t is the number of professionals in country i for the time period t . The unit of measurement for P_i^t is percentage of total work force. S_i^t captures contribution of service sector in percentage to national income (read, GDP) for country i during time period t . M_i^t relates to mobile subscription per 100 population in country i during time period t . $RecD$ stands for recession dummy and $GigD$ stands for gig dummy. Subscript i stands for countries whereas the superscript t stands for time-period.

If e_i^t is observed for all countries, then the entire model can be treated as an ordinary linear model and fit by least squares. For estimating in a panel framework, we consider *fixed effect* model. If e_i^t contains only a constant term, then the ordinary least squares estimation provides consistent and efficient estimates of the common intercept terms and the slope vectors. This is a classic pool model (also known in the literature as least square dummy variable model). D_i stands for country specific dummy variables.

The regressions are run initially for the high-income countries and later for the middle-income countries. We run these two sets of regressions to check for the robustness of our results.

The expected signs for α_2 and α_3 are assumed to be positive. Also, we expect the signs for α_5 and α_6 to be negative— the professional workers in the organized labour market will tend to fall during the time of recession, and with the spread and advancement of gig economy.

As we are considering panel framework, the term e_i^t captures both country-specific (cross sectional) and temporal effects at time t . A general expression for e_i^t is: $e_i^t = \gamma + \beta_i + \mu_t + \eta_{i,t}$ where, $\gamma + \beta_{i-1}$ can be thought of country-specific intercept; μ_t capture time effect and $\eta_{i,t}$ the over all purely random disturbance term. The combined, time and country-specific fixed effect terms, eliminates omitted variables bias arising both from unobserved variables that are constant over time and from unobserved variables that are constant across countries.

If $\gamma + \beta_{j-1}$ is observed for all countries, then the entire model can be treated as an ordinary linear model and fit by least squares.

RESULTS

Table 1: Panel Results from High-Income Countries– Japan, South Korea, and Singapore

Variables	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	14.27	3.79	3.77	0.00	6.67	21.87
Service as %GDP	0.04	0.08	0.50	0.62	-0.12	0.20
Mobile per 100 Popn.	0.06	0.01	8.92	0.00	0.05	0.07
D1	-2.48	0.39	-6.43	0.00	-3.25	-1.70
D2	-5.35	1.23	-4.37	0.00	-7.82	-2.89
Gig Dummy	-1.18	0.43	-2.74	0.01	-2.04	-0.31
Recession Dummy	0.18	0.24	0.76	0.45	-0.30	0.67
Number of observations:	57					
Adjusted R-Square:	0.90					
Time Period:	2001 – 2018					

Table 2: Panel Results from Middle-Income Countries - Bangladesh, India, and Philippines

Variables	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Intercept	-1.32	0.57	-2.31	0.02	-2.46	-0.17
Service as %GDP	0.09	0.01	8.08	0.00	0.07	0.12
Mobile per 100 Popn.	0.02	0.00	23.72	0.00	0.02	0.03
D1	-0.48	0.07	-6.78	0.00	-0.62	-0.33
D2	-0.24	0.09	-2.54	0.01	-0.43	-0.05
Gig Dummy	-0.20	0.09	-2.28	0.03	-0.37	-0.02
Recession Dummy	-0.09	0.04	-2.18	0.03	-0.17	-0.01
Number of observations:	57					
Adjusted R-Square:	0.98					
Time Period:	2001 – 2018					

The results from our regression analysis are in line with our hypothesis that we tested. A negative sign on gig dummy and recession dummy for the middle-income country indicates gig-types employment opportunity will lower the supply of professionals in the organized labour market. Similarly, during recession, there will be a lesser number of professionals in the organized labour market. The recession dummy is, however, not statistically significant for the high-income countries. This may be because high-income countries are governed by the presence of strong trade unions, making it difficult to capture supply of professional labour in the market.

The results also point out a strong positive relationship between the number of professional workers with the spread of the service economy and mobile subscription. The spread of the services sector is likely to generate demand for high skilled professional workers. Likewise, to sustain and facilitate growth of the services economy and aid professional workers involved in gig type works it is necessary for the government to invest in infrastructure related to ICT such as mobile and data connection. One limitation of this statistical analysis is that we have treated professional workers as proxy of gig workers. Although a considerable number of professional workers perform gig-type works, however, there are a considerable number of university professors, doctors, engineers, and other high-paid workers who are part of the organized labour market but do not participate in the gig economy. Ideally, one should look at the number of people employed with any gig sectors such as Uber or Freelancer, but this can be material for future work.

8. Conclusion

This policy paper is an attempt to understand the nature of the gig economy, its impact on labour productivity and income distribution, and policy interventions which are required by the government and central bankers when technology aided gig works are spreading across the globe. From an economic perspective, the rise of the gig economy is likely to increase overall productivity. Increase in productivity arises from an increase in labour force participation and getting access to lower salaried workers from cross borders, leading to more specialization and standardization of work. In a gig-world, low salaried service workers from India and elsewhere can now earn more by engaging in similar job profiles in a developed country like USA and countries in European Union. There are no entry barriers, and all that is needed is access to mobile/internet connection. However, there are a few concerns. Full time employment in gig type set up may lead to lower income and economic

vulnerability of workers in developed countries. Governments should also address the challenges associated with some workers getting displaced from technological disruption. There is a need to find ways to absorb these labourers for alternative employment. For understanding which one of the sectors these displaced workers' skill and experience are better suited the policymakers can make use of big data and AI. Governments can work closely with business and training centres to impart necessary additional skill for the displaced workers. At the same time, for the spread of gig works there is a need to invest in ICT-related infrastructure such as telecommunication and internet connection.

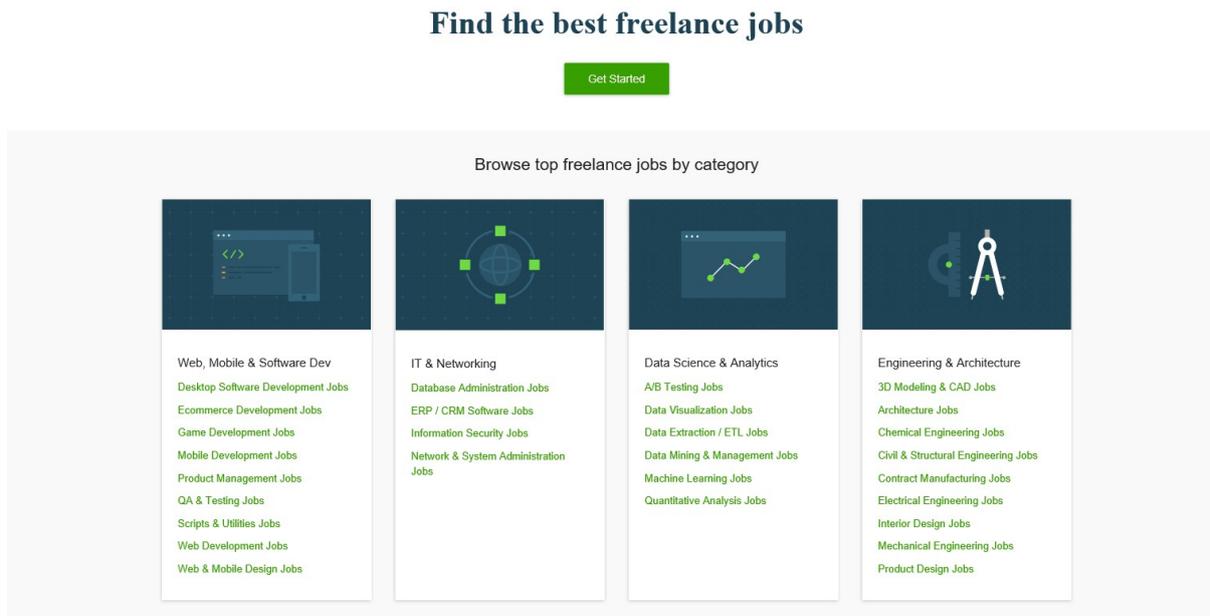
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Figure1: UPWORK a popular portal for gig workers



Source: UPWORK.

Figure 2: Source of Labour Productivity Growth (%)



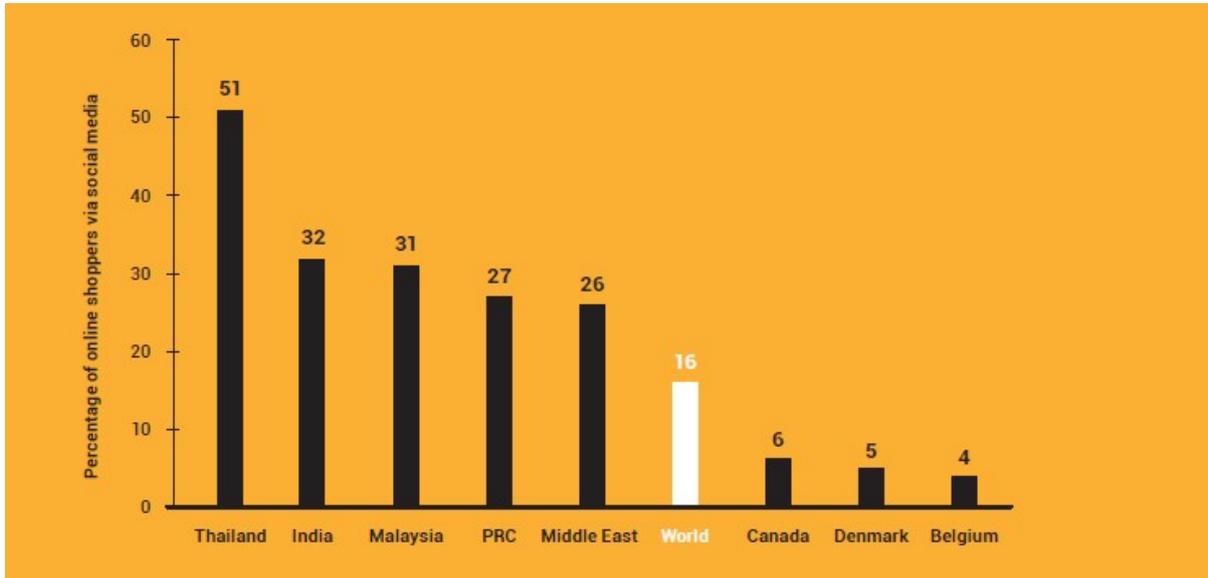
Source: Adopted from Asian Development Bank Report (2018)

Figure 3: Gig Work by Education (%)

Activity	High school degree or less	Some college	Bachelor's or more	Overall
Offline services	17	15	10	14
Offline sales	9	8	9	9
Online activities	13	16	19	16
Unspecified activities	3	4	5	4
Overall	30	31	31	31

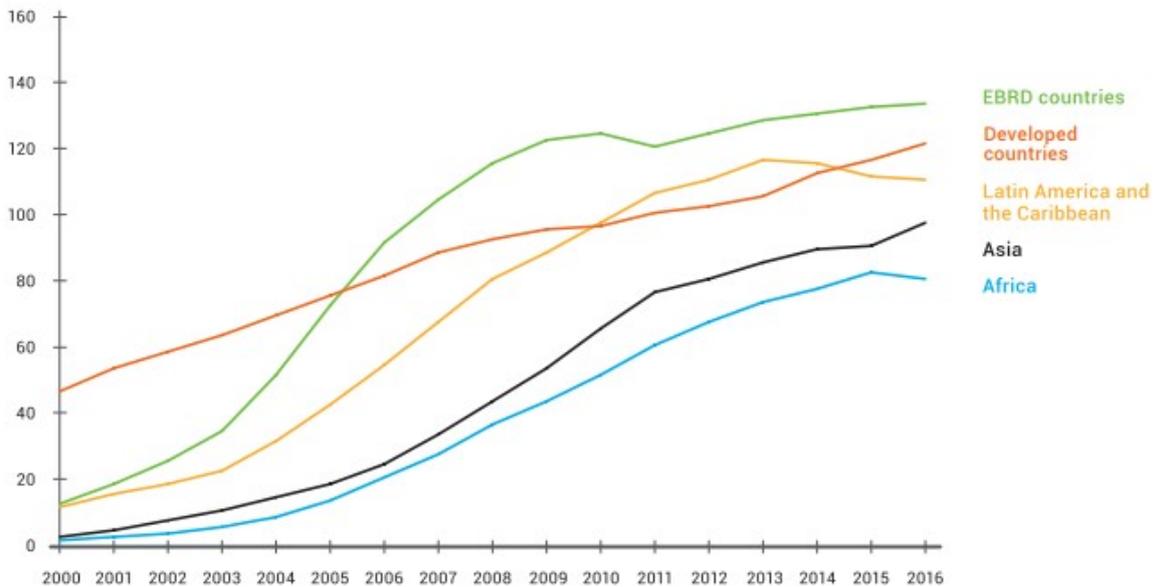
Source: Adapted from Federal Reserve Report (2018).

Figure 4: Online Shoppers Who Prefer to Buy from Social Media (%)



Source: PricewaterhouseCoopers (2016).

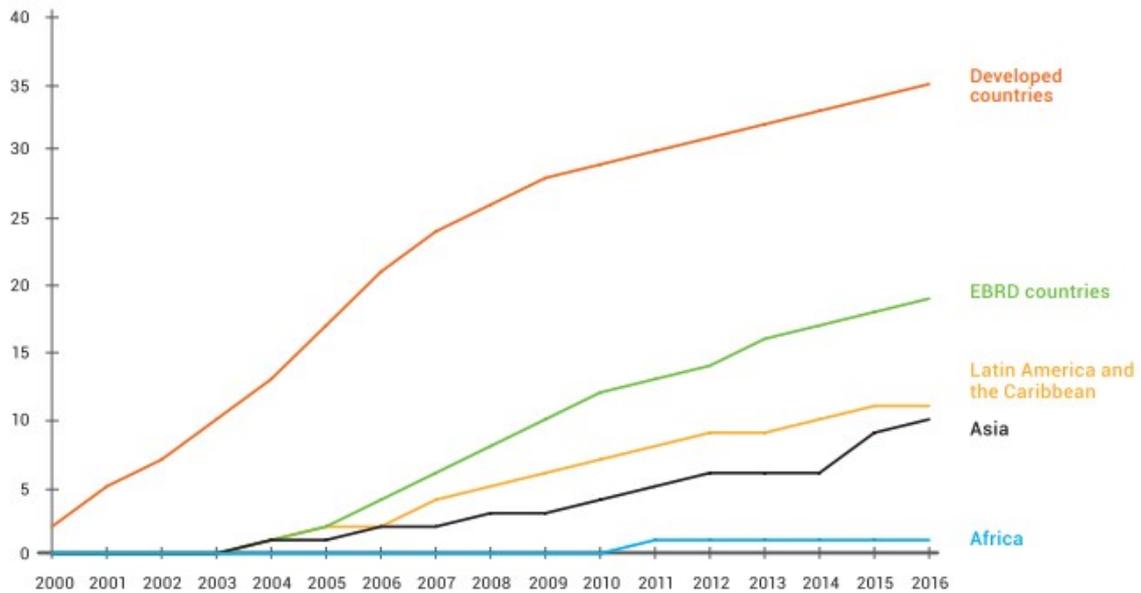
Figure 5: Mobile Cellular Subscriptions (per 100 people)



Source: World Bank (2018). EBRD stands for European Bank for Reconstruction and Development (EBRD) and comprise of countries in Central, Eastern and South-Eastern Europe, the Southern and Eastern Mediterranean, Central Asia, and Mongolia.

Adopted from Asian Development Bank Report (2018)

Figure 6: Fixed Broadband Subscriptions (per 100 people)



Source: World Bank (2018). Adopted from Asian Development Bank Report (2018).