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TECHNOLOGY UPGRADATION IN ARTIFICIAL INTELLIGENCE AND ITS ECONOMIC EFFECTS

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Abstract
The results find a positive and significant relation between AI using firms and total factor productivity growth. In fact, given that the firm is an AI using firm, total factor productivity growth increases with increase
in AI intensity. The estimate suggests that a unit increase in AI intensity will increase the TFP growth by 0.05%. The growth co-efficient suggests that on average a unit increase in AI intensity, measured as the ratio of AI
to total sales, can return USD 67.25 billion or 2.5% of GDP to the Indian economy in the immediate term. The business as usual growth in AI investments is unlikely to increase current levels of AI intensity. In order
to trigger a positive growth shock, AI intensities should be sharply increased. For example, the investment of Rs. 7000 crore approved by the Ministry of Finance towards an Artificial Intelligence program could increase. AI investments at rates higher than the business as usual rates. This increase in investment will lead to an approximate 1.3 times increase in AI intensity, translating into spillover benefits of USD 85.77 billion for the
Indian economy (3.2% of GDP)..

Keywords:
Artificial Intelligence, Economy

I. Introduction

We find that adoption of technology by Indian industry is largely concentrated within the top 10 percentile, firms that have a capacity to invest in both technology and skilled personnel. More specifically, current AI adoption in India is driven by large global technology conglomerates, select startups and Global Capability Centres (GCCs) located in India (Given the low-levels of digitization across the small and medium sized firms, the ICRIER report using data of almost 1500 Indian firms, presented relatively low impacts of AI on TFP, albeit positive. This report extracts from the older data set, a group of firms that belong to the top 500 firms listed in India's Bombay Stock Exchange to demonstrate the potential of AI adoption in the Indian industry. Recent developments in artificial intelligence (AI), robotics and Internet of- Things embark a new automation age. Many refer to it as Industry 4.0, where AI-led technologies, robotics and computers are capable of performing not only the routine tasks but also those tasks which hitherto were believed to be accomplished by humans only such as those involving judgments. AI can, thus, have impact on jobs in three ways. First, it can complement human in some tasks; second, it can altogether replace human in some other tasks and third, it can generate new types of work for humans. In this scenario, it is an imperative to understand the level of impact of this technological development on employment and jobs in India. This policy

brief aims to provide an overview of the impact of AI on jobs by reviewing the studies done nationally and globally with reference to India. At the end, this policy brief attempts to provide a way forward and some suggestions for policy makers.

II. Literature

AI and New Job Roles in the Indian Context–Many studies have pointed out that there will be creation/generation of new jobs in light of the deployment of AI in work places. The NASSCOM-FICCI-EY (2017) study on future of jobs in India, in light of the increasing deployment of exponential technologies such as AI, projected that 9 per cent of the workforce in India would be deployed in the new jobs that do not exist today while 37 per cent would be deployed in jobs that have radically changed skill sets and 54 per cent will fall under unchanged job category. The report also argued that the impact of these three primary forces is expected to be disruptive on sectors such as IT-BPM (Information Technology- Business Process Management) and BFSI (Banking, Financial Services and Insurance) and relatively lower on core manufacturing sectors such as apparel and leather. Going deeper at the sectoral levels, the report presented the following changed job scenarios in 2022 for the sectors namely IT-BPM, automotive, Retail (food and grocery), textiles and banking in India. According to study done by Broadband India Forum (BIF), in consultation with the Electronics Skill Council of India, Agriculture Skill Council and Healthcare Sector Skill Council, Internet of Things (IoT) and Artificial Intelligence (AI) based applications will create over 2.8 million jobs in rural India over a period of 8 to 10 years with an annual value of INR 60,000 crore (app. USD 9 Bn). Out of 2.8 million jobs, at least 2.1 lakh jobs will be created in the agriculture sector and the other 0.7 million jobs in the rural
healthcare sector (BIF, 2019). NASSCOM (2018) in its report has classified job roles in AI and Big Data Analytics into five major job families, viz. architecture, administration/governance, Some of these new job roles would be as follows: • Advisory and teaching roles for AI and related technologies • In Healthcare sector: Bioinformatics experts, counselors, data analyst and technicians who could run AI assisted diagnostics and robotics • In IT/ITeS sector: Data scientists, data analysts, language processing specialists, data architects, AI programmer etc. MeitY (2019) observed that by 2025, digital interventions (including AI) would lead to the redeployment of about 40-45million workers (through retraining andre-skilling) and create about 20 million new jobs in India. The major sectors created includes IT-BPM, manufacturing, agriculture, transport and logistics. The study by Microsoft and IDC (2019), based on the survey of 200 business leaders and 202 workers in India (belonging to various verticals such as healthcare, agriculture, manufacturing, automotive, retail, services etc), found that Indian business leaders and workers have positive views about the AI's impact on the future of jobs. More than half (64 percent of business leaders and 63 per cent of workers) believe that AI will either help to do their existing jobs better or reduce repetitive routine tasks. When it comes to creating or replacing jobs, 16 per cent of business leaders believe that AI will create new jobs, while 18 per cent think that AI will replace workers. Interestingly, workers are more optimistic, with only 4 per cent expecting AI to replace jobs, and 21 per cent to create new ones NASSCOM (2020), in its latest report, has stated that AI and Data have the potential to add USD 540-500 billion to India's GDP by 2025 and nearly 45 per cent of this value is likely to be delivered by three sectors namely consumer goods and retail; agriculture; and banking and insurance. Other contributing sectors include telecom, media and IT; energy; transport and logistics and auto manufacturing and assembly, followed by
healthcare. The report has not spelt the impact on the jobs as such, but stated that there is a need to define AI roles such as data scientists, data engineers and translators to effectively fill the demand supply gaps in AI workforce that might be seen in these sectors. In light of the recent technological developments, especially related to automation technologies such as AI, there has also been renewed discussion happening around the notion of "technological unemployment" as warned by notable

thinkers of yesteryears such as Ricardo, Marx and Keynes.1 In early times, this fear had gone unrealised because the new technologies led to creation of more jobs elsewhere by fostering entrepreneurship and improving productivity and the allocation of resources. However, whether the fear has been realised this time (in the automation era), will depend on the ability to create new jobs elsewhere quickly; will depend on how individuals, companies and governments respond to the need for education and training of new skills; and will depend on how well the social protection measures are put in place to deal with the issue of displaced workforce. There is considerable literature on the issue of the impact of AI on the jobs and employment (Frey and Osborne, 2013;McDonald, 2017; Finnigan, 2016; Bessen, 2018; Acemoglu and Restrepo,2018; Walch, 2019; Petropoulos, 2018; Krasadakis, 2018; Thomas, 2020; MAPI, 2019; Wilson *et al*, 2017; Frank *et al*,2019). This set of literature depicts a mixed scenario, where it is envisaged that there will be job losses in certain sectors while there will be generation of new jobs in some other sectors. However, most of the available literature has taken into account the impact of AI on jobs in the developed countries. There are not many studies in the Indian context. There have been number of studies carried out globally, estimating the

overall impact of automation (inclusive of AI and other technologies) on job loss. Frey and Osborne (2017) in their study predicted that 47 per cent of the jobs in the USA are at risk of displacement in the next 10 to 15 years due to automation. Similarly, McKinsey (2017) found that about 1/3rd of the activities in 60 per cent of jobs are automatable. There are also studies which have estimated future job creations due to the deployment of AI. Gartner in their study found that AI would lead to a creation of about 2 million jobs by 2025.3 WEF (2018), based on their extensive global survey ofcompanies representing 15 million workers, estimated that by 2022there would be decline of about 0.98 million jobs and a gain of about 1.74 million jobs, owing to Industry 4.0. technological developments (inclusive of AI). The WEF (2018) Report also stated that across all industries, by 2022,the cluster of emerging professions will increase its share of employment from 16 per cent to 27 per cent, whereas the employment share of declining roles will decrease from currently 31 per cent to 21 per cent. The recently released Future of Jobs Report 2020 (WEF, 2020) has found that there has been a significant increase in the number of firms expecting to adopt non-humanoid robots and artificial intelligence in the near future. The Report further states that the artificial intelligence is finding wide adaptation among the sectors such as digital information and communications, financial services, healthcare, and transportation industries. It estimates that by 2025, "85 million jobs may be displaced by a shift in the division of labour between humans and machines, while 97 million new roles may emerge that are more adapted to the new division of labour between humans, machines and algorithms".

CIS (2018), in its report on "AI and the Manufacturing and Services Industry in India" has stated that it has been been estimated that "employment opportunities will increase from 38 million to 46-48 million by 2022 in the organised manufacturing and services sector with the rise in AI technologies. The Task Force on AI, constituted by the Ministry of Commerce and Industry, in its report (MoCI, 2018) had identified ten important domains of relevance forIndia, wherein AI can play a critical role in India's economic transformation. These domains are namely manufacturing, fin-tech, healthcare, agriculture/food processing, education, retail/consumer engagement, aid for differently-abled/ accessibility technology, environment, national security and public utility services.

III. Conclusion

***3.1. Need for Setting-Up of an Inter- Agency Coordination Authority for AI*:** Since the AI technology is all pervasive, it would be useful to have a national level Inter-Agency Coordination Authority for AI which would work as a central monitoring and guiding institutionfor coordinating the research and applications of AI across various sectors, while also taking policy decisions around the issues of job replacements, job creation, job re-skilling/training, and also on the social protection measures, in order

to minimise the negative impact of AI deployment in a particular sector. Such an Inter-Agency. Authority should have members from all the relevant stakeholders such as ministries/departments, industry, academia, research, civil society and media.

3.2. Need for India-specific Studies: There have been very limited or few studies done so far on analysing the impact of AI on jobs in India. Both NITI Aayog (2018, 2021) and MoCI (2018) AI Task Force Report have acknowledged this fact and advocated for more India-specific studies. Even the data from the available studies seems to be inadequate to enable policy makers make appropriate policy interventions across various sectors. Therefore, detailed technology impact assessment and socio-economic assessment studies are required to be undertaken across various sectors that are important to India in terms of providing large-scale employment such as automobile, textile, retail, customer services, ITeS, banking services, etc. Such an assessment would greatly help in gauging the intensity of the problem that may rise due to increasing deployment of AI in these sectors. This will help the policy makers in charting out appropriate measures such as need for re-skilling and training, creation of new avenues, shifting of the vulnerable workforce to the sectors that are not easily automatable due to AI, devising a supporting social security policy etc. Finally, it is seen that most of the studies or reports have placed a positive outlook in terms of the impact of AI on jobs in India. There is an observation by the majority of the studies that in future there will be more jobs created in India due to AI. But in short-term, there could be job losses across some sectors. To prepare the workforce for the future opportunities and to offset the negative impact, there is an imperative to invest more on capacity building, skilling and training and also on devising appropriate social policy measures to help the low skilled workforce in wake of any job loss. There is a need for all the stakeholders to work in a concerted manner to harness the opportunity and to address the challenge through appropriate policies and programmes.

References

[1]NITI. 2021. Responsible AI #AIforAll: Approach Document for India Part I: Principles for Responsible AI. NITI Aayog. Government of India
[2]NITI. 2018. National Strategy for Artificial Intelligence.NITI Aayog. Government of India.^
[3]NASSCOM. 2020. Unlocking Value from Data and AI: The India Opportunity.
[4]NASSCOM. 2018. Talent Demand and Supply Report: AI and Big Data Analytics.
[5]Wilson, H. James , Paul R. Daugherty and Nicola Morini-Bianzino. 2017. The Jobs That Artificial Intelligence Will Create. Magazine Summer Issue. MIT Sloan Management Review. https://sloanreview.mit.edu/article/
[6]WEF. 2020. Future of Jobs Report. World Economic Forum.
[7]WEF. 2018. Future of Jobs Report. World Economic Forum.
[8]MoCI. 2018. Report of the AI Task Force. Department for Promotion of Industry and Internal Trade. Ministry of Commerce and Industry. Government of India.
[9]MeitY. 2019. India's Trillion Dollar Digital Opportunity. Ministry of Electronics and Information Technology. Government of India.
[10] PwC. 2018. Artificial Intelligence in India: Hype or Reality.
[11] World Bank. 2016. World Development Report 2016:Digital Dividends.
[12] PwC-ASSOCHAM. 2018. Advance Artificial Intelligence for Growth: Leveraging AI and Robotics for India's Economic Transformation.
[13] Intel. 2020. The Impact of AI on the Indian Labour Market.
[14] ICRIER. 2020. Implications of AI on the Indian Economy.
[15] Gent, Edd. 2017. "Why Automation Could be a Threat to India's Growth". Future Now. Artificial Intelligence. BBC.
[16] FICCI-NASSCOM-Ernst &Young. 2017.Future of Jobs in India: A 2022 Perspective.