Volume LVI Nos. 1 and 2
ISSN 1655-1516
June and December 2019

The Philippine Review of Economics

FESTSCHRIFT FOR RAUL V. FABELLA

Guest Co-editors — **Emmanuel S. de Dios**, **Sarah Lynne S. Daway-Ducanes**

ARTICLES IN THIS ISSUE

A joint publication of the
University of the Philippines School of Economics
and the **Philippine Economic Society**

The Philippine Review of Economics

A joint publication of the UP School of Economics (UPSE)
and the Philippine Economic Society (PES)

Aims and Scope: The *Philippine Review of Economics* (PRE) invites theoretical and empirical articles on economics and economic development. Papers on the Philippines, Asian and other developing economies are especially welcome. Book reviews will also be considered.

The PRE is published jointly by the UP School of Economics and the Philippine Economic Society. Its contents are indexed in the *Journal of Economic Literature*, EconLit, and RePec. PRE's readership includes economists and other social scientists in academe, business, government, and development research institutions.

Publication Information: The PRE (ISSN 1655-1516) is a peer-reviewed journal published every June and December of each year. A searchable database of published articles and their abstracts is available at the PRE website (http://pre.econ.upd.edu.ph).

Subscription Information:
Subscription correspondence may be sent to the following addresses:

- css@pssc.org.ph
- PSSC Central Subscription Service,
  PSSCenter, Commonwealth Avenue, 1101, Diliman, Quezon City, Philippines.
  P.O. Box 205, UP Post Office, Diliman, Quezon City, Philippines 1101
  PHONE: 922-9627, FAX: 924-4178/926-5179

Submissions: Authors may submit their manuscripts to the addresses below:

- pre@econ.upd.edu.ph or pre.upse@upd.edu.ph
- The Editor, The Philippine Review of Economics, Rm 237, School of Economics, University of the Philippines, Diliman, Quezon City, 1101.

Manuscripts must be written in English and in MS Word format. All graphs and tables must be in Excel format. Submission of a manuscript shall be understood by the PRE as indicating that the manuscript is not under consideration for publication in other journals. All submissions must include the title of the paper, author information, an abstract of no more than 150 words, and a list of 3–4 keywords. Complete guidelines can be viewed in the PRE's website.

Acknowledgements: The PRE gratefully acknowledges the financial support towards its publication provided by the Philippine Center for Economic Development (PCED). The Review nonetheless follows an independent editorial policy. The articles published reflect solely the editorial judgement of the editors and the views of their respective authors.

The Philippine Review of Economics

Vol. LVI Nos. 1 and 2
June and December 2019

ISSN 1655-1516
DOI: 10.37907/ERP9102JD

Festschrift for Raul V. Fabella

This special edition of the *Philippine Review of Economics* honors Dr. Raul V. Fabella in his 70th year and recognizes his invaluable contribution to the economics discipline and profession. This edition comprises 13 articles from his colleagues and several generations of former students inspired or mentored by Dr. Fabella who are themselves making their mark in economics. The broad spectrum of topics covered—agricultural economics, competition policy, contract theory, game theory, history of economic thought, international economics, issues in productivity, growth and development, monetary policy, political economy and rent-seeking, public economics, and the theory of teams—are issues that Dr. Fabella himself has written on or taught his students during his long, productive years as a Professor of Economics at the UP School of Economics, nurturing an "oasis of excellence" in his spheres of influence, as well as advocated as a roving academic in his later years, endeavoring to engage policymakers and the public in general, in pursuit of welfare-improving changes for a better Philippines.

The wide gamut of topics in this issue is a testament to Dr. Fabella's eclectic intellectual interests yet unwavering devotion to upholding a high standard of academic excellence. As his biographical sketch at the National Academy of Science and Technology summarizes:

> Fabella's very development as a scholar and intellectual leader presents numerous paradoxes: a classicist turned mathematical economist; a rational-choice theorist who derives material and metaphor from both history and physics; a solitary thinker who agonizes over pedagogy; a pure theorist immersed in policy-debate; an inherently shy, private man who must deal with crowds. His career displays to the fullest the range of issues – from the mathematical to the moral – that economists can and must confront if they are to attain to that "cool head and warm heart" that was Marshall's ideal. A classicist, however, might simply recall Terentius: *Homo sum: humani nil a me alienum puto*.

Indeed, to Dr. Fabella, nothing related to human behavior is outside his interest. At 70 years of age, National Scientist of the National Academy of Science and Technology (Philippines) and Professor Emeritus at the University of the Philippines, he is yet to reach the zenith of his intellectual verve: Fabella the economist is transfiguring into Fabella the social scientist – one to whom *homo economicus* is no longer the norm, but the exception in the vast complexity of human interactions in society. It is thus unlikely that this will be the last festschrift in his honor.

Sarah Lynne S. Daway-Ducanes
Emmanuel S. de Dios

The Philippine Review of Economics 2019
56(1&2):187-218. DOI: 10.37907/10ERP9102JD

Automation, gigs, and other labor market tales: the Philippines in the Fourth Industrial Revolution

Emmanuel F. Esguerra*
University of the Philippines

The paper discusses two topics that frequently surface in conversations about the Fourth Industrial Revolution (4IR): the threat of labor displacement due to automation and the growth of alternative employment arrangements. Using the "task approach" to review recent research on the "future of work" in the Philippines, the paper argues that predictions not informed by the task intensity of jobs are less compelling. The "job polarization" thesis is also examined and the observation made that changes in the occupational distribution of employment seem to be more closely associated with a structural transformation explanation. In the second part, the "gig economy" is discussed in the broader context of work arrangements that have emerged and disrupted the standard employment relationship. The limitations of household-based labor force surveys as a source of data on gig activity are noted. The paper concludes with a brief discussion of 4IR challenges in terms of human resource development, unemployment protection, and the reform of labor laws.

JEL codes: J20, J24, J41, J48, J88, K31, O33
Keywords: technology, tasks, gig economy, non-standard work

1. Introduction

On the cover of *The New Yorker*[1] not too long ago was the image of a beggarly man seated on the pavement holding out his cup as a robot walking by tosses some loose change into it. Other humanoids casually strut by—one reading messages off a mobile phone while another has just been to the coffee station. Meanwhile, the man's best friend resting beside him looks on as a four-legged machine in its likeness passes by guided by another robot. Wittily captioned *"Tech Support"*, the artwork creatively conveys the sense of foreboding elicited by the latest wave

* Please address all correspondence to efesguerra@econ.upd.edu.ph.
[1] Available from: https://www.newyorker.com/magazine/2017/10/23/

of technological advancement dubbed as the Fourth Industrial Revolution (4IR): that machines enabled by artificial intelligence will eventually lord over the workplace, replace humans, and turn them into modern-day hobos.

To be sure, job-separation anxiety also greeted the technological advances of the last few centuries. Nineteenth-century British textile workers destroying machines to protest the mechanization of weaving in textile factories provide the most vivid example. For all the fears, however, the doomsday scenarios imagined failed to materialize as job creation far outstripped destruction during each of the previous industrial revolutions[2]. But for having broken into spheres of activity formerly reserved for humans, the more recent technologies have heightened job insecurity. Driven by the digital technologies that ushered in the Third Industrial Revolution, the Fourth's distinctive character is the convergence of digital, physical, and biological innovations. This interconnection via digital networks has led to the growth of artificial intelligence, big data, the internet-of-things, cloud computing, social media, and other new digital platform technologies.

> "The speed of current breakthroughs has no historical precedent. When compared with previous industrial revolutions, the Fourth is evolving at an exponential rather than a linear pace. Moreover, it is disrupting almost every industry in every country. And the breadth and depth of these changes herald the transformation of entire systems of production, management, and governance." [Schwab 2016]

Thus, along with the promise of raising productivity, lowering costs, expanding opportunities, and improving the quality of goods and services, 4IR is altering existing patterns of production, consumption, work organization, and human interaction. The attendant risks to employment, incomes, personal security, and social inclusion are hard to ignore.

At Brown University's Humans to Robots laboratory, computer scientists are continually studying ways to perfect "cobots", or robots designed to collaborate with humans in executing complex tasks involving fine motor skills (e.g. picking blueberries) as well as recognizing and manipulating things in the environment. In southern Denmark, public hospitals have begun using robotic orderlies to reduce costs in the system. "A decade ago, industrial robots assisted workers in their tasks. Now workers— those who remain—assist the robots in theirs."[3] [Kolhatkar 2017] This has unsettled many observers who are concerned that increasing automation could immiserate the low-skilled and worsen inequality.

Yet for having eased access to services and democratized entrepreneurial opportunities, digitalization is also celebrated. With the aid of online technology and apps, making and receiving payments has become more convenient and less cumbersome—even education is accessible online. Various services, such as transport, food and package delivery, cleaning, and shopping, among others, can

[2] A general description of the technological breakthroughs that characterized each of these industrial revolutions is provided in Dadios et al. [2018].

[3] See Kolhatkar [2017] for more examples.

now be contracted for on-demand. For providers of these services, work can be performed outside of the usual employer-employee relationship and in a string of one-off transactions, or "gigs". The flexibility in hours of work and the relative ease of entry are considered advantageous features for workers in search of new or additional earning opportunities. However, such "alternative work arrangements" have also called attention to the risks inherent in non-standard employment and the inability of existing policy frameworks to deal with it.

The ongoing discussions[4] about 4IR and its implications on the Philippine labor market provide the motivation for this paper. Drawing mostly from the existing literature, two themes in the conversation are taken up here, namely, the specter of labor displacement due to automation and the growth of non-standard or alternative employment arrangements in the so-called "gig economy". The first part discusses related work on how technology affects employment, reviews recent research relevant to the Philippines, and makes some broad observations about "job polarization" in light of the current structure of Philippine employment. The second part discusses the gig economy in the wider context of work arrangements that have emerged and disrupted the standard employment relationship. The limitations of household-based labor force surveys, the current staple source of labor market information, as a source of data on gig employment are also discussed. In the third portion, the paper concludes with a brief discussion of 4IR challenges in terms of human resource development, unemployment protection, and the reform of labor laws.

2. Forecasting the "future of work"

Recent years have seen a flurry of studies predicting the "future of work" in a number of advanced and developing economies. These studies have produced widely divergent estimates of probabilities of occupations being automated in the next ten to twenty years. One such study is by Frey and Osborne [2013], which estimates the probability of computerization[5] for 702 detailed occupations using data from the US Labor Department. It is important to mention this work for the influence it has cast on succeeding research, both in advanced and emerging economies including the Philippines. The study predicts that nearly 47 percent of US' total employment could be automated within a decade. Workers in transport and logistics occupations, the greater part of office and administrative support workers, and labor in production occupations are highly likely to be replaced together with a substantial share of those working in service occupations [Frey and Osborne 2013:268]. On the other hand, tasks that do not easily lend themselves to computerization will increasingly be dominated by low-skill workers as technologies advance.

[4] See the Conference Proceedings of the Fourth Annual Policy Conference on the Fourth Industrial Revolution for an overview of the range of topics discussed [PIDS 2019].

[5] The terms "computerization" and "automation" are interchangeably used by Frey and Osborne.

In their study of jobs at risk of automation in five ASEAN economies[6], Chang and Huynh [2016] estimate that around 60 percent of all employment is at "high" risk of displacement over the next ten to twenty years due to technology[7]. For the Philippines, they note that 49 percent of jobs are at high risk of automation, which could displace about 58 percent of employed wage and salary workers and 19 percent of own-account workers. These percentages represent about 18 million workers based on the 2013 labor force survey data used by the authors. Industry-wise, an estimated 54 percent and 42 percent of wage and salary workers in manufacturing and services, respectively, are at high risk of displacement. Electronic equipment assemblers, who comprise 70 percent of wage and salary workers in the computers and electronics subsector, are particularly vulnerable given the rapid advances in robotics, according to this study. The expansion of automation and robotic processes in the BPO sector could potentially crowd out a majority of workers for whom literacy and basic language skills previously provided a good enough ticket to paid work.

A more recent study by Francisco et al. [2019] reports that, in the aggregate, jobs in the Philippines have a 68 percent average probability of being automated with 65 percent of workers being in jobs facing a high risk of automation. Average probabilities of job automation are also estimated by sector, age, gender, educational attainment, class of worker, region, income decile, and nature of employment; and the shares of workers in jobs with low, medium, and high risk of displacement reported. The study notes, for instance, that jobs held by men and jobs requiring less than a high school degree have higher average probabilities of being automated than jobs held by women and jobs requiring at least a high school degree, respectively. The share of workers in jobs at high risk of automation is also higher among males compared with females. Moreover, a higher proportion of young workers (in the age group 15-24)–72 percent–are in jobs considered highly vulnerable to automation relative to workers in the older age groups where the shares do not exceed 65 percent.

The figures in the preceding studies stand in stark contrast to estimates by Arntz, Gregory, and Zierahn [2016] for 21 OECD countries (except Australia) and Borland and Coelli [2017] for Australia. The authors found significantly lower probabilities: 9 percent on average for the 21 OECD countries, starting from a low of 6 percent for Korea to a high of 12 percent for Austria; and 9 percent for Australia, "almost identical to the risk Arntz et al. [2016] estimate for the US" [Borland and Coelli 2017: 14]. No alternative estimates of comparable magnitude have been found for emerging economies.

[6] Cambodia, Indonesia, Philippines, Thailand and Vietnam

[7] "High" risk is defined as having at least a 70 percent probability of displacement.

To put these studies in perspective, their common element is that they all provide estimates of the probability of labor displacement based only on the availability of labor-substituting technology—a "technological capabilities point of view", according to Frey and Osborne [2013:4], that sees automation as capable of progressing beyond routine tasks limited only by certain "engineering bottlenecks"[8]. They do not account for whether the available technology will in fact be adopted; that depends on other factors, including relative costs, availability of complementing factors (e.g. labor to operate and maintain the machines), and societal readiness in terms of consumer preferences and the institutional and legal infrastructure. Nor do they account for the adjustments that may ensue within workplaces in response to the changed division of labor, or in the macroeconomy as automation itself can create additional or new jobs through scale and income effects.[9] The wide variance in the estimates of labor displacement reported in the preceding studies, however, highlights a basic difference in the way a job or occupation is conceptualized, which is central to an appraisal of how technology affects jobs.

2.1. Occupations and tasks

The view that any given job that delivers a final output consists of several tasks [Autor, Levy and Murnane 2003] provides a useful starting point for analyzing the effect of new technologies on jobs. This is more flexible than the standard production function approach which posits output as a function of capital and labor of varied skills. An important feature of this "task model" is the distinction between skills and tasks [Autor 2013]. In this framework, the fundamental unit of production is a task to which skills are applied and combined to generate output. Thus, the aggregate demand for labor is fundamentally a summation of the demand for specific skills to perform tasks required in particular jobs. Domestic labor, foreign labor, or capital may be used to perform the tasks subject to the usual considerations of cost and comparative advantage.

From this perspective, it is easy to see that technology alters the nature of work by changing the way specific tasks are performed [Levy and Murnane 2013]. Computers (or robots) can substitute for human labor in performing specific tasks, but not an entire job [Autor 2015].[10] The extent of the substitution depends upon the degree to which the cognitive processing of information, which is essentially a human activity, can be codified or translated to a logical procedure amenable

[8] These are tasks involving perception and manipulation, creative intelligence, and social intelligence [Frey and Osborne 2013:24].

[9] On the employment-creating effects of automation, see Autor [2015]. ADB [2018] also provides a discussion.

[10] The introduction of ATMs (automatic teller machines), for instance, did not reduce employment at banks, but merely relieved tellers of the task of receiving and dispensing cash while allowing them to do more relationship banking.

to programming. This is true for most routine tasks whether of the manual (e.g. stacking boxes in a factory warehouse) or the cognitive (e.g. retrieving a book from a library shelf) kind.

Where computers are incapable of replacing humans is in tasks dealing with unforeseen situations or problems where rules-based solutions are not readily available. Drawing up a financial plan for a company in an uncertain business environment or providing psychosocial support to survivors of armed conflict or natural disasters are tasks that cannot be programmed, although computers can certainly complement human effort in systematizing available information. Tasks where personal communication is essential in order to ensure that the information is not only conveyed but also understood the way it is intended also cannot be routinized. Thus teachers, sports coaches, film directors, and managers are safe from automation.

Because tasks vary within occupations and only certain tasks—not entire jobs—are automatable, Frey and Osborne [2013] overestimate the risk of labor displacement by assuming entire occupations, instead of only particular tasks within occupations, can be computerized. This explains the large discrepancy between their estimated risk of displacement and those of Arntz et al. [2016] and Borland and Coelli [2017] who follow a task approach. "Apparently, not taking account of the variation of tasks within occupations exerts a huge impact on the automatability of jobs. This is because even in occupations that [Frey and Osborne] expect to be at high risk of automation, people often perform tasks that are hard to automate, such as interactive tasks (e.g. group work or face-to-face interactions with customers, clients, etc.)" [Arntz et al. 2016:14]. To generate their results, Chang and Huynh [2016] and Francisco et al. [2019] mainly adopted the automation probabilities estimated by Frey and Osborne for US occupations and assigned these to similar occupations in the Philippines and other ASEAN economies through a matching procedure.[11] Though acknowledging the task-based approach, their method is not essentially different from Frey and Osborne's, which explains their similarly high estimates of the risk of labor substitution. The point here is that studies purporting to predict the "future of work", unless informed by the "task intensities" of jobs, are less compelling. Still, as Arntz et al. warn, studies based on the task approach can provide at best only a partial picture of the effect of technology on jobs to the extent that they abstract from the actual use of labor-substituting technologies, the possibilities for machine-human complementation on the shop floor, and the creation of new jobs through gains in productivity and incomes.

[11] For the Philippines, the source of data is the quarterly Labor Force Survey (LFS). US occupations were matched with Philippine occupations from the Philippine Standard Occupational Classification (PSOC) database using the International Standard Classification of Occupations (ISCO) as a reference. See Appendix 1 of Chang and Huynh [2016:26-28] and Francisco et al. [2019:9-10] for a discussion of their methodologies. See also Francisco et al. [ibid.:27-41].

2.2. Taking the data to tasks

The fact that readily available data sets based on representative national surveys do not normally carry information about the types of tasks people perform in their jobs creates problems for implementing the task approach. As gleaned from the criticisms of Frey and Osborne's method, the use of occupations to proxy for job tasks, while expedient, is laden with both conceptual and measurement issues. Apart from the problem of overestimating the risk of labor substitution, using occupations as proxies for tasks can lead to inconsistent results (Arntz et al. [2016:14]; Borland and Coelli [2014:13]). This follows from the nature of jobs, which consist of an assortment of tasks only some of which are automatable[12]. Moreover, when certain tasks are common across occupational groupings (e.g. production assembly line and service occupations both perform routine-manual tasks) resolving how to classify an occupation in terms of task content without information about tasks actually performed leaves much room for arbitrariness [Autor 2013].

Job task information directly collected from workplace surveys (where workers themselves describe what they do and how much time they spend for each task) is ideal for implementing the task approach. The data from the Programme for the International Assessment of Adult Competencies (PIAAC) used by Arntz et al. [2016] is an example. Autor [2013] cites a few more, including the Princeton Data Improvement Initiative (PDII) in 2008. Then there is Germany's Qualification Career Service (QCS) survey, the US' O*NET, and the more recent Skills Towards Employability and Productivity (STEP) survey of the World Bank. Unfortunately, most of these surveys are either unique to particular labor markets or, having been specially designed for a specific purpose, are typically discontinued after their purpose is served. This renders the task information less useful for tracing how occupations evolve over time in the task-input space.

Without more detailed task data, an alternative source would be the International Standard Classification of Occupations (ISCO) which contains standardized descriptions of jobs in terms of the responsibilities to be fulfilled or activities to be performed by the job holder. Occupational information from this data source is based on statistical censuses, surveys, and administrative records and organized as a four-level hierarchical structure where jobs are classified (from lowest to highest) according to 436 unit-groups, 130 minor groups, 43 sub-major groups, and 10 major groups based on similarity in skill levels and specializations required for the jobs. For countries that base their national occupational codes on ISCO, the task descriptions can be mapped to individual occupations in their

[12] As pointed out by Arntz et al. [2016] for example, while Frey and Osborne compute an automation probability of 92 percent for those working in the occupation "Retail Salesperson", the task approach reveals that 96 percent of retail salespersons actually perform their jobs as part of a group or engage in face-to-face interactions, suggesting that the job is not as prone to automation as an occupation-based approach would predict.

standard occupational listings as shown by recent research coming out of the University of the Philippines [Generalao 2019].[13] The rest of this section makes use of some results from that research.

Following the task approach, job tasks may be categorized as either manual or cognitive, and routine or non-routine, resulting in a four-way classification: routine-manual, routine-cognitive, non-routine-manual, and non-routine-cognitive.[14] Routine-manual and routine-cognitive tasks follow exact, straightforward, and repetitive procedures often performed in a stable environment and are typical of many middle-skill jobs. They are more amenable to codification and programming and thus are likely candidates for automation. Factory assembly line work and clerical and administrative support work are prime examples.

On the other hand, non-routine tasks, whether cognitive or manual, are more impervious to automation. Non-routine-cognitive tasks require a good deal of problem-solving skills, insight, imagination, and persuasive ability. These are performed by workers in professional, technical, and managerial occupations who are highly educated, highly analytical, with good communication skills, and a firm grasp of their specializations. Non-routine-manual tasks require the ability to adapt to various situations and engage in personal interactions; physical strength and agility, visual alertness, and verbal communication skills are also needed for these tasks. Tasks associated with jobs involving personal services, such as those in the accommodation and food service businesses, janitorial and maintenance work, caregiving, and security and protective services, belong in this category. Their performance generally requires neither very high skills nor high education credentials.

Using the scheme described above, tasks corresponding to an occupation may be grouped according to the four task categories and then the proportion of each task category to the total number of tasks in the job obtained. Thus, if a given job or occupation consists of ten tasks and five of those are routine-manual tasks and three are non-routine-manual, then the job or occupation is characterized as being 50 percent routine-manual and 30 percent non-routine manual. This is essentially the procedure followed by Generalao [2019] to construct task portfolios for each of the 424 (four-digit level coded) occupations in the Philippines' list of occupations. While subjective judgment cannot be ruled out in categorizing tasks, this procedure is superior to simply using occupations to proxy for tasks. A downside, however, is that actual tasks associated with occupations could be changing faster than the descriptions can be updated. This point should be kept in mind, as the latest available source of task information is the ISCO of 2008 (ISCO-08).

[13] The paper maps 3,279 tasks performed in various occupations identified in ISCO-08 to 424 matched occupations in the Philippine Standard Occupational Classification (PSOC) of 2012 to construct job task portfolios for each occupation. Limitations to this approach are discussed in Autor [2013:190].

[14] Other classification schemes have been used in the literature and are cited in Generalao [2019]. This paper follows the taxonomy of Autor, Levy, and Murnane [2003].

Table 1 presents a highly-aggregated picture showing only the ten major occupation groups (one-digit occupational code) in the PSOC. The figures are based on Generalao's five-category task classification where two categories (non-routine cognitive and non-routine interactive) have been combined to produce a four-way task classification for the present purpose. The figures are the average task intensities of jobs under each of the ten occupational groupings. They are computed by taking the average of the share of each task category over all jobs (four-digit occupational code) per major occupation.

TABLE 1. Skill level and average task intensity of occupations, Philippines, in percent

Occupation	Skill level[1]	Non-routine cognitive	Non-routine manual	Routine cognitive	Routine manual
Managers	4	92.69	0.00	7.31	0.00
Professionals	4	81.87	0.59	17.54	0.00
Technicians and associate professionals	3	51.72	8.07	34.56	5.66
Clerical support workers	2	14.06	2.41	82.84	0.69
Service and sales workers	2	34.90	34.04	24.85	6.21
Skilled farm, forestry, and fishery workers	2	21.79	64.09	12.06	2.06
Craft and related trade workers	2	7.58	62.18	21.06	9.17
Plant and machine operators and assemblers	2	2.16	22.47	19.71	55.66
Elementary occupations: laborers and unskilled workers	1	1.46	65.08	17.77	15.68

[1] 4 - university or post-graduate, 3 - post-secondary, 2 - secondary, 1 - primary
Sources: ISCO-08 for skill levels; Generalao [2019] and author's computation for average task intensities

First, the table shows how jobs vary in task intensity. Managerial and professional occupations are on average highly intensive in non-routine-cognitive tasks (93 percent and 82 percent, respectively) while clerical occupations are mainly routine-cognitive in their task content (83 percent). Jobs in the craft and related trade occupations are largely classified as non-routine-manual (62 percent)[15] as are elementary occupations and agricultural, forestry, and fishery jobs, while plant machine operators and assemblers perform mostly routine-manual tasks (56 percent). Second, even jobs that are high in "routine" task content may contain aspects of "non-routineness" to the extent that the performance of the tasks involves human interaction and calls for the exercise of common sense, judgment, and flexibility. Third, the figures also suggest that some occupations

[15] The characterization of crafts and related trades occupations as non-routine manual may be disputed. However, task intensity is also a function of the actual work environment; local knowledge of what goes on in actual work settings can exert an influence on the analyst's classification.

are more varied in their task content than others. This is the case with service and sales workers whose jobs are 35 percent non-routine-cognitive[16], 34 percent non-routine-manual, and 25 percent routine-cognitive. Being averages, these numbers reflect the wide variation in task intensity among jobs in services and sales, which include for example: cashiers and ticket clerks (88 percent routine-cognitive), domestic housekeepers (67 percent non-routine-manual), beauticians and hairdressers (75 percent non-routine-manual), health care assistants (83 percent non-routine-manual), and driving instructors (100 percent non-routine-cognitive)[17]. The same within-occupation heterogeneity is seen with technician and associate professional jobs which are on average 52 percent non-routine-cognitive and 35 percent routine-cognitive.[18]

2.3. Are Philippine jobs polarizing?

To the extent that only routine job tasks are automatable, automation is not expected to significantly lead to large-scale labor displacements. However, automation is bound to affect the quality of available jobs and possibly give rise to distributional issues through "job polarization" [Goos and Manning 2003]. This refers to the hollowing out of middle-skill jobs as routine job tasks are increasingly automated over time resulting in higher shares of employment in skill-intensive, high-wage jobs to complement the new technologies at one end, and in elementary, low-wage service occupations that require a high degree of face-to-face interaction on the other end [Autor, Levy and Murnane 2003]. International evidence supporting the existence of this phenomenon is extensive.[19] How this hollowing-out process will exactly impact on workers' wages depends upon the interaction of the relevant demand and supply elasticities for a particular economy. As middle-skill jobs decline due to automation, the ability of high-skill jobs to absorb more labor will depend on the growth of demand for goods and services employing highly-skilled labor. Without more upskilling, however, the chances of middle-skill workers unable to retain their former jobs getting employed in high-wage jobs are limited. Wage rates in low-skill occupations could thereby fall. Thus, the problem posed by polarization, according to Autor [2015], is not that workers will lose their jobs; rather it is that many workers will not be able to immediately qualify for the "good jobs". In this sense, technology can worsen inequality.

[16] This is actually the result of combining the task-intensity scores for non-routine cognitive (7 percent) and non-routine interactive (28 percent) to reduce the task types used here to four from Generalao's five.

[17] See Generalao [2019].

[18] Even at lower levels of aggregation, however, variations in job tasks among individuals in the same occupation may exist that are not likely to be captured by the method of assigning tasks to occupations using standard descriptions [Autor 2013].

[19] Various sources are cited in Autor [2015].

Turning to the Philippines, can one find evidence of job polarization? And if so, to what extent is technology driving the trend? For context, the Philippine economy has been growing relatively rapidly—averaging 6.3 percent annually—in the last decade.[20] The service sector accounts for 58 percent of gross value added while the shares of industry and agriculture stand at 34 percent and 8 percent, respectively. Correspondingly, the share of agriculture in total employment has gone down from a third to about a quarter, while those for industry and services have climbed to 19 percent and 57 percent, respectively, over the period 2010-2018. Small firms (less than 20 workers) dominate the Philippine economy accounting for about two-thirds of all manufacturing firms and more than 80 percent of all services firms in 2014 [World Bank 2018]. In recent years, the employment share of wage and salary workers has risen while those of own-account workers (without employees) and unpaid family workers have fallen.

In terms of technology adoption, observers have noted the generally slow uptake among Philippine firms citing inadequate funding and infrastructure support, shortage of skilled workers, and limited exposure to automation solutions. The country was ranked by the International Federation of Robotics among the lowest in the Southeast Asian region for automation adoption in 2016 [Gotfredsen 2018]. According to the Philippine Development Plan 2017-2022 [NEDA 2017], R&D expenditures at 0.14 percent of GDP, and mostly coming from the public sector, fall way below the international benchmark of 1.0 percent of GDP and the global average of 2.04 percent. The country trails behind its ASEAN counterparts: Vietnam (0.19 percent), Thailand (0.36 percent), Malaysia (1.09 percent), and Singapore (2.0 percent). There is also a dearth of human resources deployed in science-, technology-, and innovation-related R&D both in relation to the global norm and what other developing economies in the Asia-Pacific region have been able to achieve. Against this background, any attempt to connect job polarization, if observed, with automation could be a tough sell.

The occupational structure of the Philippine labor market is shown in Table 2 for the period 2003-2018. Based on ISCO-08, which categorizes occupations according to skill level[21], the first three occupations in the table are the high-skill occupations, the next five are middle-skill, while elementary occupations constitute the low-skill group.[22] Closer inspection of the services and sales occupations in PSOC, however, suggests that jobs in this occupation group are more aptly low-skill, and so are grouped here as such for purposes of analysis.[23] As the numbers show, the employment share of the skill-intensive occupations has risen over the 15-year period from 19 percent in 2003 to 26 percent in 2018.

[20] Unless otherwise specified, all figures cited are sourced from the Philippine Statistics Authority (PSA).

[21] Level 1 requires primary education, level 2 secondary, level 3 post-secondary, and 4 university or post-graduate.

[22] Following convention, the last group consisting of military and special occupations is excluded from analysis.

[23] Other studies separate sales from service occupations and consider the former middle-skill and the latter low-skill. See footnote 44 of Acemoglu and Robinson [2011:1087]. That separation is not done here.

On the other hand, the share of middle-skill occupations decreased from 40.2 percent then reversed slightly upward after 2012, but is still lower in 2018 at 32.3 percent than fifteen years earlier. Large, sustained reductions in the share of agricultural, forestry, and fishery workers account for the trend particularly up to 2012 making the decline in the share of middle-skill jobs appear large. The share of low-skill occupations meanwhile only slightly increased between 2003 and 2018 supported mainly by the rising share of service and sales occupations throughout the period. Do these trends support the job polarization story?

TABLE 2. Occupational distribution of employment, Philippines, 2003-2018, in percent

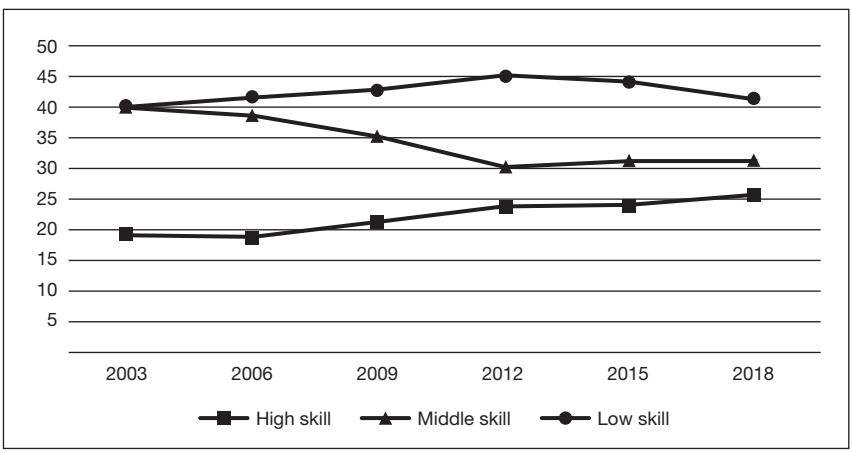
	2003	2006	2009	2012	2015	2018
Total employment ('000)	**31,553**	**32,886**	**35,478**	**37,670**	**39,775**	**41,325**
Occupation						
Managers	11.6	11.5	13.5	15.9	15.7	16
Professionals	4.3	4.3	4.6	4.9	5.2	5.6
Technicians and associate professionals	2.8	2.7	2.8	2.5	2.6	4
HIGH SKILL	**18.7**	**18.5**	**20.9**	**23.3**	**23.5**	**25.6**
Clerical support workers	4.2	4.7	5.5	5.7	6.5	6
Skilled farm, forestry, and fishery workers	19.3	18.8	16.4	13.8	13.5	12.1
Craft and related trades workers	9.2	8.2	7.4	6.5	6.6	7.8
Plant and machine operators and assemblers	7.5	7.7	6.4	5.1	5.3	6.4
MIDDLE SKILL	**40.2**	**39.4**	**35.7**	**31.1**	**31.9**	**32.3**
Service and sales workers	9.1	9.6	10.5	11.9	12.9	15.4
Elementary occupations: laborers and unskilled workers	31.7	31.9	32.5	33.3	31.5	26.6
LOW SKILL	**40.8**	**41.5**	**43**	**45.2**	**44.4**	**42**

Source: Labor Force Survey October round, various years, Philippine Statistics Authority, www.psa.gov.ph

The increasing share of managerial, professional, and technical occupations, all of which are intensive in non-routine-cognitive tasks, suggests rising skill content of jobs. Both a change in the composition of manufacturing activities and internal-to-the-industry changes favoring high-skilled occupations brought this about. Starting in the late 1990s, a gradual shift occurred in manufacturing towards skill-intensive production; from textiles, wearing apparel, and paper products to telecommunications, transport equipment, and chemical products [World Bank 2018]. Between the 1990s and 2012, as noted by the ADB [2018:86], new job titles also appeared on the scene in conjunction with the greater role of information-communication technology in work processes. These were mostly

under professional (e.g. software and application developer and analyst, and database and network professional) and technical (e.g. ICT operation and user support technician) occupations. The preceding observations should, however, be tempered by the fact that, although higher than previously, the highly technical occupations in these three groups, i.e. those that require a STEM (science, technology, engineering, mathematics) background, still constitute a minority. The managerial and professional occupations are dominated by workers with non-STEM backgrounds; the classification also includes legislators and high-ranking government officials.

FIGURE 1. Employment share by skill group, Philippines, 2003-2018, in percent



Source of basic data: Labor Force Survey, Philippine Statistics Authority, www.psa.gov.ph
International Standard Classification of Occupations (ISCO-08) for skill level, except for inclusion of service/sales occupations under low-skill

Among middle-skill occupations, the increasing share of clerical workers seems counter-intuitive to the job polarization thesis since clerical work is mostly associated with routine-cognitive tasks. However, other forces could be at work. The continued growth in service sector activities during 2010-2018, particularly in financial intermediation, real estate, and other business activities, as well as wholesale and retail trade and public administration meant possibly more employment for clerical workers. The off-shoring of routine-cognitive tasks to developing economies from advanced economies, which started much earlier, resulted in the expansion of employment in various business process outsourcing (BPO) activities in the country, opening up many positions for contact centers and back-office operations. Low wages in routine service jobs, achieved partly by hiring non-regular workers, also may have rendered machine substitution for labor uneconomical.

As for craft and related trades workers and plant and machine operators and assemblers, the declining shares of these middle-skill occupations in total employment seem in line with the job polarization proposition. However, the trajectory is not clear. In the first place, the shares were never really high to start with. It is possible that the overseas migration of the country's semi-skilled labor is a contributing factor. Secondly, of the three sectors—construction, manufacturing, transport and storage—that mostly employ workers in these production-related occupations, manufacturing, if at all, is likely to be the most affected by automation given its strong participation in global value chains [Mendoza 2018]. The OECD [2018] notes in particular that automation of labor-intensive industries in Southeast Asia has been limited to automotive and electrical and electronics manufacturing. Electrical and optical equipment is the Philippines' leading export accounting for 70 percent of the country's GVC participation.[24] However, as noted by Mendoza [2018:11], "Philippines' participation in electronics GVCs remains predominantly backward and characterized by labor-intensive operations and low value-addition."

Meanwhile the decline in the share of skilled agricultural, forestry, and fishing occupations has probably more to do with the decreasing importance of the agricultural sector in gross value added than automation. Agriculture-related occupations are usually excluded in the analysis of job polarization in the literature (see Acemoglu and Autor [2011]; ADB [2018]); however, one would be hard pressed to explain the evolution of the employment structure in the country without considering intersectoral shifts. From a third of total employment in the early 2000s, the share of agriculture declined to about a quarter in 2018. This would have certainly had an effect on employment in the rest of the economy. It would be careless though to attribute this to automation.

Finally, the combined share of service activities and elementary occupations in total employment rose during the period. The increasing share of these occupations is consistent with the growth of the wholesale and retail sub-sector, the largest and fastest growing sub-sector under services. Jobs in this sub-sector require situational adaptability and human interaction skills given the smallness of most enterprises and the idiosyncratic nature of doing commerce in the country.

To sum up, changes in the occupational distribution of employment appear to be more closely associated with shifts in the sectoral composition of output favoring some occupations over others rather than changes in the task intensity of certain occupations within industries due to automation[25]. Globalization and technological change, responsible for FDI in manufacturing and expanding trade in services, are undoubtedly causative factors in the changing occupational

[24] Table 1.2 of Mendoza [2018:11].

[25] A more rigorous inquiry beyond observing broad sectoral trends should be able to determine if such changes are better explained by structural transformation or by routine-biased technical change as the job polarization thesis suggests. For such a test, see Acemoglu and Autor [2011].

landscape, although these may have been less important before the 1990s. The off-shoring by multinational companies of certain parts of their value chains to the Philippines, in particular, supported the growth of activities employing both high- and middle-skill occupations. But these would suggest that while technological change has been a factor, it has been mostly externally induced through trade and foreign investments rather than driven by an internal dynamic. For this reason, the decline in middle-skill occupations as postulated by the job polarization hypothesis is not a foregone conclusion.

Automation, though not expected to lead to large-scale labor shedding as some observers have predicted, may yet worsen inequality depending upon how it affects the quality of available jobs. Concern over the growing use of alternative employment arrangements is related to this.

3. The "gig" economy

The gig[26] economy describes a labor market environment in which jobs are short-term in nature, workers are predominantly independent contractors, and no employer-employee relationship exists between the transacting parties. The notion is more popularly associated with college-educated youth freelancing on jobs mediated through digital platforms, but it can be broader than that. Unfortunately, no estimate exists on the size of the gig economy in the Philippines despite the attention it has gotten from academics, media, and lawmakers[27]. Neither is there an accepted definition in the literature. Abraham et al. [2019] instead locate gig activity within a spectrum of alternative work arrangements and define a gig worker as someone who is not paid a wage or salary, has no implicit or explicit contract for a continuing work relationship, and whose work schedule and earnings when working are not predictable. The defining element is the relation between the worker and the party for whom work is performed which deviates from the conventional employer-employee relation[28]. As such, it covers not only workers whose services are engaged via digital platforms but also day jobbers and various other on-demand workers hired through outsourcing contracts and not part of the firm's regular payroll. This is the sense in which the term gig employment is used in this paper.

[26] The term "gig" derives from the word "engagement" and was originally coined in the 1920s by jazz musicians to refer to a paid performance usually of short (one night) duration. https://en.wikipedia.org/wiki/Gig_(music)

[27] See, for example, House Bill 5369, An Act Providing Protection and Incentives to Freelancers, Republic of the Philippines House of Representatives, Available from: http://www.congress.gov.ph/legisdocs/basic_17/HB05369.pdf.

[28] Such relation is characterized by the submission of the worker to the authority of the employer during the period of engagement in exchange for a wage and other remuneration. The basic ideas about what constitutes an employment relationship are set forth in Simon [1951]. For a more recent and less technical discussion from a legal perspective, see Schoukens and Barrio [2017].

3.1. Non-regulars and freelancers

Gig workers may be divided into two main types from here on referred to as: "non-regulars" and freelancers. Non-regulars are establishment-based; they work mainly on the employers' premises and are hired on a fixed-term basis with or without the possibility of renewal. This type includes casuals, contract workers ("contractuals"), temporary employees, and workers hired through service agreements with a third party. Firms normally resort to employing these types of workers to perform non-core activities (e.g. janitorial and security services), fill in temporary vacancies, or meet seasonal surges in demand [Abraham and Taylor 1996; Segal and Sullivan 1997]. But since about three decades ago these arrangements have also been increasingly applied to workers performing core activities by employers seeking to adjust to greater competition brought about by globalization and technological innovation.

Essentially, non-regular employment is a departure from the norm of a full-time, continuous employer-employee relationship whose evolution had also witnessed an expansion of workers' entitlements under the rubric of social protection. In the face of greater competition, the standard employment contract was seen as a constraint to the employer's ability to adjust wages as well as decisions about hiring and terminations to changes in market demand. The resulting contractual adjustments have led to the erosion of certain features of the standard employment relationship, notably its open-ended nature and the stability and security of income that derive from the permanence of the relationship and the built-in protections afforded by the state and collective bargaining. While these did not always diminish the employer's authority over the laborer or reduce the latter's dependence for income on a single source, they have blurred the distinction between subordinated employment and self-employment. Without the protections associated with regular employment, non-regular workers are more directly exposed to the business risks faced by their employers even as opportunities for diversifying income risk are more limited in their situation compared with the self-employed [Schoukens and Barrio 2017].

The second type of gig worker, the freelancer, is a more recent phenomenon and is associated with jobs mediated through web-based platforms that link consumers with providers of goods or services. Workers in these jobs are generally presumed to be working for their own account (i.e. are self-employed) having no commitment to a specific employer. As a mode of labor force participation, self-employment is not new; it is commonly identified with individuals who operate their own businesses or engage in the practice of certain professions (e.g. medical doctors, lawyers, architects, accountants), including those in the creative arts. But in a labor-surplus economy, it is a source of livelihood, though perhaps an inferior one, for many individuals who are unable to qualify for a regular job in the non-agricultural wage sector.

In recent years, self-employment has become an increasingly popular option even among the college-educated owing to the outsourcing opportunities opened up by the unbundling of production processes and the greater ease with which new technologies have allowed firms to farm out jobs as discrete tasks. The freedom to work from any location, flexibility in hours of work, autonomy from the employer's direction and control, and the expectation of a higher income (possibly from multiple job-holding) make freelancing especially attractive for the young and tech savvy.[29] The most prominent Philippine examples are persons performing online tasks[30] for local and overseas clients (via *Upwork* or *Freelance.com*), and those performing in-person tasks such as passenger transport (e.g. *Grab*[31]) or delivery services (e.g. *Lalamove*[32]) for clients connected through a mobile app or website.

The non-regular nature of their work and the difficulty of enforcing contractual agreements with their clients make online freelancers similarly susceptible to income risk. A survey of Philippine online freelancers revealed non-payment, if not delayed remuneration, for their services to be a major concern [PayPal Study 2017]. Freelancers are also generally outside the coverage of existing social protection laws, the argument being that they are independent contractors, not regular employees. This line of reasoning underscores the importance attached to the presence of an "authority relationship" (in the sense discussed by H. Simon) as a determinant of workers' entitlement to protection under labor laws. One response has been to develop more rigorous criteria to delineate between an employee and an independent contractor. In California, for instance, legislation has been proposed making it more difficult for companies to classify their workers as independent contractors. Some authors (e.g. Fudge [2006]; Schoukens and Barrio [2017]), however, find the approach unsatisfactory in light of constantly evolving organizational forms that muddy the definitions of "employer" and "employee" and make reclassification of employees as independent contractors too easy for employers to be able to circumvent labor laws.

3.2. Measures of gig activity

The nature of gig employment does not neatly fit into the labor force framework underlying standard labor force surveys. As de Ruyter et al. [2018:40] note, that framework "is linked to an epoch in which full-time jobs were the norm and labor-market activity required only that one was involved in an active job search or employed a certain number of hours". Consequently, difficulties arise

[29] A recent study describes freelancers as "those doing contract or freelancing work as or alongside their main income on a computer and via the internet" [PayPal 2017].

[30] According to a 2017 survey conducted among freelancers using PayPal, a worldwide online payments system, most tasks involved data entry, internet research, general office administration (virtual assistant), and graphic design and illustration.

[31] *Grab* is a ride-sharing company serving the Southeast Asian market including the Philippines. It used to share the Philippine market with *Uber* until the latter decided to exit in 2018.

[32] *Lalamove* is a logistics company headquartered in Hongkong that provides on-demand delivery and courier services.

when measuring the extent of gig work using only data from standard labor force surveys. For one, these surveys do not probe into how respondents' labor supplies are matched with demand, which is key to identifying non-regular workers and online freelancers from the rest of the employed. For example, the category "wage and salary worker" includes both regular and non-regular workers; "self-employed" includes both the traditional self-employed and freelancers on digital platforms. Secondly, the focus of survey questions on the primary job discounts possible gig activity, if not totally ignores multiple job holders, thus likely underestimating gig employment. Queries on whether a respondent holds another job stop short of probing further about the other job(s). Thirdly, the fixed intervals at which the surveys are conducted fail to capture the intermittent, short-term jobs that are created and dissolved within the interval. Lastly, with respect to online freelancers, the simultaneous use of several platforms and the "footloose" character of their operations complicate problems of identification, classification, and measurement [de Ruyter et al. 2018].

In the Philippines, data on non-regular employment is systematically and regularly collected. The same cannot be said for data on electronically mediated freelancing for which there is no national database. The Integrated Survey on Labor and Employment (ISLE) is the main instrument used to track non-regular employment. It is a nationwide sample survey conducted biennially. The ISLE is establishment-based and is undertaken independently of the quarterly household-based Labor Force Survey (LFS). ISLE covers establishments with at least 20 workers.

According to the ISLE, there are an estimated 1.2 to 1.6 million non-regular workers[33] in the Philippines (Table 3). This corresponds to a share of between 3.0 and 4.2 percent of total employment. As a proportion of total employment in the covered establishments, the average of 33 percent for 2011-2018 represents a nontrivial increase from the 24 percent reported by the Bureau of Labor and Employment Statistics of the Department of Labor (BLES-DoLE) in June 2008.[34] Earlier reports from DoLE placed the share of non-regulars in surveyed establishments at 13.7 percent and 14.2 percent in 1989 and 1994, respectively [Ozaki 1999]. These numbers are more likely underestimates considering that ISLE excludes establishments with less than 20 workers which account for nearly 40 percent of total employment. In 1990, 64 percent of surveyed firms hired non-regular workers, according to a survey by DoLE and ILO [Ozaki 1999]; in 2000, a similar survey reported a much higher proportion at 86 percent [Esguerra 2010]. However, no comparable estimates are available for more recent years.

[33] Probationary workers and apprentices/learners are excluded here although they are counted among non-regular workers in the ISLE.

[34] The noticeable decline in the number of contractual workers in 2017-2018 is probably due to a government directive in 2016 prohibiting the hiring of workers on short-term contracts to fulfill an election promise.

Agency-hired workers account for the largest average share (44 percent) of non-regular workers followed by contractual or project-based workers (38 percent). Casual and seasonal workers account for 18 percent. Of the 30,000 or so establishments covered in the ISLE, those with at least 200 workers hire between 60 and 70 percent of non-regular workers (Table 4).

TABLE 3. Non-regular workers by type, Philippines, 2011-2018, in percent

	2011-2012	2013-2014	2015-2016	2017-2018
Total employment (all establishments)	3,769,259	4,471,785	4,384,678	5,077,410
Total non-regular workers	1,377,396	1,604,154	1,503,310	1,217,435
Casual workers	14.7	13.0	10.6	12.2
Contractual/ project-based workers	43.6	41.9	38.1	29.3
Seasonal workers	4.1	6.4	5.4	5.6
Agency hired	37.6	38.8	46.0	52.9

*Casual workers – workers whose work is not part of the core business or trade of the employer; contractual/ project-based workers – workers whose employment has been fixed for a specific project/undertaking, the completion or termination of which has been determined at the time of engagement; seasonal workers – workers whose timing and duration of employment is determined by seasonal factors; agency-hired – workers hired through contractors to perform or complete a job, work or service pursuant to a service agreement within the premises of the establishment.

Source: Integrated Survey of Labor and Employment, Philippine Statistics Authority www.psa.gov.ph

TABLE 4. Non-regular workers by size of firm, Philippines, 2011-2018, in percent

	2011-2012	2013-2014	2015-2016	2017-2018
Total non-regular workers	1,377,396	1,604,150	1,503,312	1,217,436
20 - 99 workers	19.2	23.0	20.0	20.4
100 - 199 workers	10.7	14.4	13.5	12.1
200 workers or more	70.0	62.6	66.5	67.6

Source: Integrated Survey of Labor and Employment, Philippine Statistics Authority, www.psa.gov.ph

In terms of industry distribution, manufacturing, administrative and support services activities, construction, wholesale and retail trade/repair of motor vehicles and motorcycles, and the accommodation and food service activities employ the highest numbers of non-regular workers (Figure 2). With establishments as the unit of analysis, the ISLE does not include information about worker characteristics.

FIGURE 2. Number of non-regular workers by year and by industry

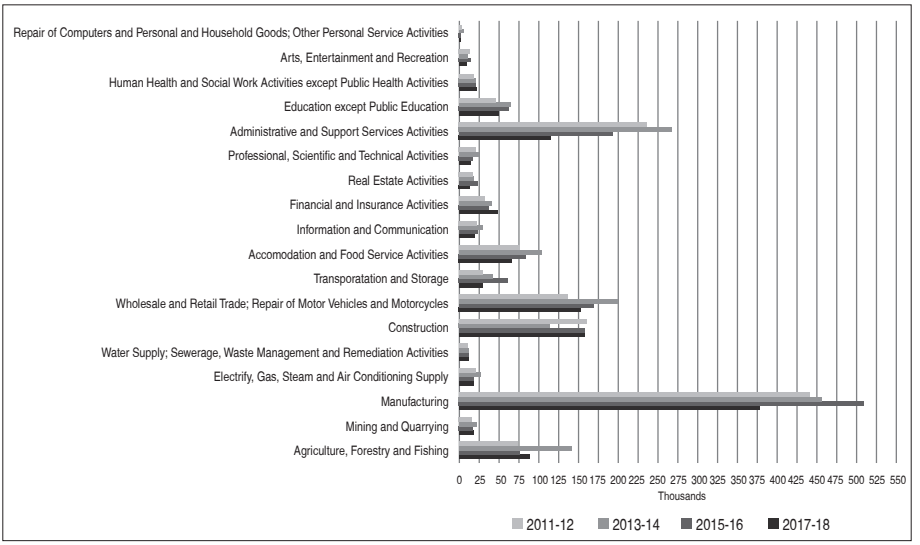
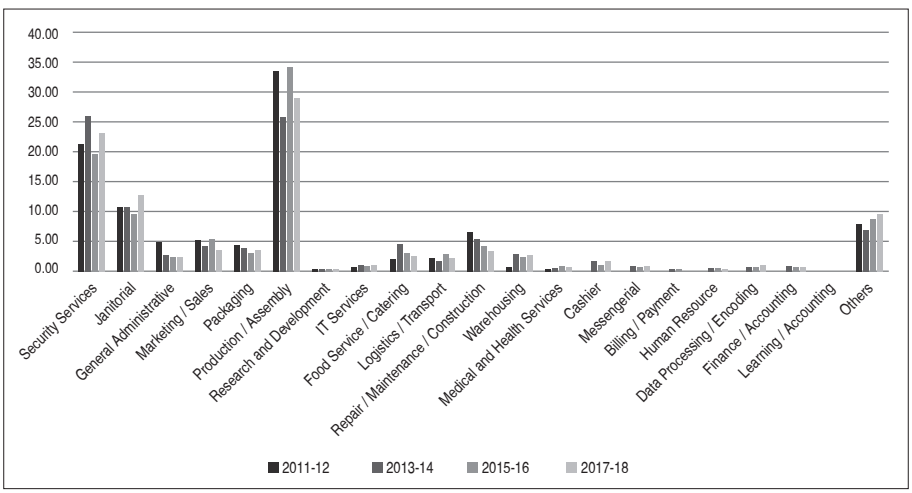


Figure 3 shows the types of services agency-hired workers perform for establishments. In terms of the task classification discussed above, a significant share of these services involves non-routine manual tasks, such as security and janitorial services, food service and catering, and marketing sales. Some others are routine-manual in nature and thus are potentially automatable, such as production/assembly, packaging, warehousing, repair/maintenance/construction. That workers are still being employed, albeit under a different arrangement, to perform these tasks strengthens the view that Philippine firms as yet are not ready to turn to automation.

FIGURE 3. Percentage share of agency-hired workers in establishments with 20 or more workers by type of job, Philippines, 2011-2018



With respect to freelancers using online platforms, obtaining an estimate is more challenging. A reasonable starting point for tracking them is the class of own-account workers with no paid employees in the quarterly LFS. At about 10-11 million workers (Table 5), this group includes both these freelancers and those in self-employment even before the digital economy kicked in. A major challenge is thus ferreting out the freelancers to see if technology has had any appreciable effect on the labor market. These freelancers are distinguished by how their services are provided: in-person or online. While freelancers performing online tasks are more dispersed across various activities (and therefore more difficult to trace), freelancers doing in-person tasks tend to be concentrated in a specific line of activity: transportation.

As Table 5 shows, the share of the self-employed in total employment has been declining. However, Table 6 also shows that the composition has not remained the same. Particularly noteworthy are the shares of the self-employed in wholesale and retail trade and in transportation. Not only do these two industries account for the highest shares of self-employment outside of agriculture, their shares also markedly increased between 2012 and 2018 while the shares of the rest mostly decreased.

TABLE 5. Employment by class of worker, Philippines, 2010-2018, in percent

	2010	2011	2012	2013	2014	2015	2016	2017	2018
TOTAL EMPLOYMENT ('000)	**36,035**	**37,192**	**37,600**	**38,118**	**38,651**	**38,741**	**40,837**	**40,334**	**41,160**
CLASS OF WORKER									
Wage and salary workers	**54.5**	**55.2**	**57.2**	**58.4**	**58**	**59.3**	**61.7**	**62.5**	**63.8**
Worked for private household	5.3	5.2	5.3	5.2	5	5.1	5.1	4.8	4.7
Worked for private establishment	40.4	41.5	43.6	44.9	44.8	45.6	48.2	49.0	50.1
Worked for government or government corporation	8.4	8.2	8	8	7.9	8.3	8.1	8.4	8.7
Worked with pay in own family-operated farm or business	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Own account workers	**34.8**	**33.2**	**31.9**	**31.3**	**31.2**	**30.7**	**30.2**	**31.5**	**30.6**
Self-employed without any paid employee	30.9	29.6	28.3	28	28.1	27.6	26.9	27.8	26.9
Employer in own family-operated farm or business	3.9	3.6	3.6	3.3	3.1	3.1	3.3	3.7	3.6
Unpaid family worker	**11.5**	**11.6**	**11**	**10.3**	**10.8**	**10**	**8**	**6.0**	**5.6**
Worked without pay in own family-operated farm or business									

Source: Labor Force Survey, various years, Philippine Statistics Authority, www.psa.gov.ph

TABLE 6. Industry distribution of self-employed without employees, 2012 and 2018, in percent

	2012	2018
Total employment ('000)	**10,641**	**11,072**
Share by industry (%)		
Agriculture	42.0	40.0
Mining	0.7	0.2
Manufacturing	5.1	4.1
Electricity	0.0	0.0
Water	0.0	0.0
Construction	0.1	0.2
Wholesale and retail trade	31.0	35.0
Transportation	**9.4**	**14.0**
Accomodation	6.0	2.4
ICT	0.4	0.4
Financial	0.1	0.1
Real Estate	0.7	0.4
Professional	0.3	0.1
Administrative	0.3	0.1
Public administration	0.0	0.0
Education	0.2	0.1
Human Health	0.1	0.2
Arts	0.3	0.3
Other services	3.4	2.5

Source: Labor Force Survey, Philippine Statistics Authority, www.psa.gov.ph

TABLE 7. Self-employed without employees in PSIC 4932

	2012	2013	2014	2015	2016	2017	2018
Total employment in PSIC 4932	**2,078,267**	**2,185,016**	**2,084,325**	**2,266,557**	**2,337,544**	**2,155,592**	**2,318,094**
Wage and salary workers	1,122,534	964,218	939,574	963,489	963,440	812,209	843,175
- private establishment	1,112,364	961,284	936,680	957,638	960,853	810,105	841,344
- private household	–	–	–	–	–	–	–
- government/government corporation	–	–	–	–	–	–	–
Own account workers	955,733	1,220,798	1,144,751	1,303,069	1,374,104	1,343,383	1,474,919
- self-employed	**897,975**	**1,186,970**	**1,104,707**	**1,257,738**	**1,330,177**	**1,320,510**	**1,449,025**
- employer	47,709	25,849	32,288	36,223	36,000	20,952	21,393
- work with pay in family-owned business)	10,170	2,934	2,893	5,850	2,587	2,104	1,831
Unpaid family worker	10,049	7,978	7,756	9,108	7,927	1,921	4,501
Memo: Total employment, Philippines	37,554,580	38,175,187	38,452,625	39,177,317	40,953,781	40,171,003	41,325,026

Source: Labor Force Survey, Philippine Statistics Authority

Of specific interest is the increase in the share of transportation and storage (Section H of the Philippine Standard Industrial Classification or PSIC) in self-employment from 9.4 percent in 2012 to 14 percent in 2018. This corresponds to a period marked by the entry of ride-sharing companies *Uber* and *Grab*[35] in the passenger land transport business. In the same period, the motorcycle taxi service, *Angkas*,[36] also entered the scene. Zooming in further on 'other passenger land transport' (PSIC 4932), the share of self-employment is indeed seen to rise from 43 percent to 63 percent of employment in the sub-sector even as its share in total employment remained stable between 5.4 and 5.8 percent (Table 7). In absolute terms, this meant yearly additions of close to 90,000 self-employed partly due to a reallocation effect within the sub-sector as shown by the decline in the number of wage workers employed by private companies. PSIC 4932, however, includes regular taxicabs, jeepneys, Asian utility vehicles (AUVs), tricycles and pedicabs; so, whether the growth of self-employment in the passenger land transport sub-sector can be unambiguously attributed to the growth of jobs mediated online is an empirical question whose answer requires better microlevel data possibly from special surveys or administrative records, or both.

A further consideration is that self-employment does not apply to an undetermined—though probably not insignificant—proportion of drivers who do not own the cars they drive. Mostly middle-aged and without a college degree, unemployment or a less pleasant job in the informal sector are the only other options for these drivers [Moraga-Galvez 2018]. Totally dependent on driving for their livelihood, they pay a fixed sum ('boundary") to the car owner—who is deemed the partner of the ridesharing firm—for the use of the vehicle for a specified number of hours during the day, keeping the residual after deducting all costs incurred.[37] They are unlike the *Uber* driver-partners described by Hall and Krueger [2017]—freelancers—in their detailed analysis of the labor market for *Uber* driver-partners in the US for whom the absence of other job opportunities was not an important reason for partnering with *Uber*.[38]

As for freelancers performing online tasks, there is not enough information from the LFS that would allow distinguishing them from other self-employed individuals. Online freelancers tend to be more dispersed across activities in the PSIC system making them difficult to track without additional information. Furthermore, since the focus of LFS is primary employment—even if it includes

[35] In 2018, 55,000 slots were reported to have been allocated to *Grab* by transport regulators but the ride-sharing company claims that only 35,000 were active.

[36] *Angkas* started operations in 2017 with 27,000 riders.

[37] This arrangement is commonly used by taxicab companies and jeepney operators to compensate drivers. In the LFS, these drivers are counted as wage workers.

[38] A large share of drivers partnered with *Uber* while they had another job, whether full-time or part-time; only 38 percent worked exclusively with *Uber*. About half (48 percent) consider income earned from partnering with *Uber* as merely supplementary "but not a significant source" [Hall and Krueger 2017:713].

a question on additional market work—it is unable to provide more information about the nature of the additional work; that is, if it is electronically-mediated, whether performed online or in-person. Estimates based on industry sources (i.e. online payment services and freelancer registries) place the number of online Filipino freelancers between 250,000 and 1.5 million [Ofreneo 2018]. Figures closer to the lower bound are likely the more reasonable estimate due to varying definitions and potential overestimation due to double counting and the difficulty of sorting out active from inactive accounts.

To sum up, alternative employment arrangements spawned by the forces unleashed by globalization and technological change have blurred the distinction between employment and self-employment. Current labor market statistics leave much to be desired from the standpoint of knowing the extent of labor market activity carried out under these arrangements. By themselves, the conventional categories such as "class of worker" and "nature of employment" do not adequately capture the salient aspects of work relations that define gig employment and distinguish it from the standard employment relation and traditional self-employment. From a workers' rights and welfare perspective, this is a blind spot for policy.

To address the inadequacies inherent in labor force surveys, special or supplementary surveys can be designed to capture the idiosyncrasies of non-standard employment arrangements and work mediated by electronic platforms. Alternatively, existing administrative data can be used to complement the household-based surveys. Growth in freelancer activity, which cannot be readily detected from the trend in self-employment, may be validated with data harvested from freelancing platforms, if not transactions data generated from online payment systems used by freelancers. In the US, tax returns of the unincorporated self-employed combined with data on self-employment from the Current Population Survey have been used to confirm the growth of gig activity (Abraham et al., 2019). This is not an option that is readily available for the Philippines, however.

Employer-employee matched data sets are ideal; perhaps the ISLE data can be matched with a sub-sample from the LFS. A supplementary survey of LFS households could also be developed specifically to track non-regular workers and freelancers as the Contingent Worker Supplement (CWS)[39] in the US. In light of the difficulty in eliciting information about non-standard work in household surveys, Katz and Krueger [2019] recommend "a more deliberate approach to probing" about such activities and avoiding the use of proxy respondents as is typical in labor force surveys.

[39] The CWS is an adjunct to the monthly Current Population Survey (CPS), the US's regular source of employment and unemployment data. See https://www.bls.gov/news.release/conemp.htm. The 2017 CWS also includes questions to identify individuals who used an electronic medium to find short-term employment and to get paid. See https://www.bls.gov/cps/electronically-mediated-employment.htm.

4. Preparing for 4IR

There is no shortage of recommendations regarding how the Philippines should be preparing for 4IR. The proposals range from modernizing infrastructure, which is critical for the digital technologies to become widely accessible, to pursuing an industrial strategy focused on innovation; from equipping the population with 21st century skills to work with the new technologies, to reforming regulatory frameworks so that they support rather than impede innovation while safeguarding public welfare. Details of these recommendations can be found in various official documents, commissioned studies, academic papers, and conference proceedings.[40] This final section picks up on a few concerns relating to jobs and the labor market.

The fact that technology will not obliterate jobs but in fact may generate more of them through complementarities, productivity, and other effects does not mean that employment will not be at risk or that incomes will remain secure. As the preceding discussion has pointed out, in altering the way that specific tasks in a job are performed, technology creates a demand for new skills without which a worker may become temporarily unemployed or experience a fall in income. Yet another source of employment and income risk in the 4IR environment is the increasing use of alternative employment arrangements that essentially substitute market mediation or a digital platform for the standard employer-employee relationship with its built-in protections.

4.1. On human capital development

With respect to the risk of technological unemployment, there is general agreement that investment in human capital is the right response. In fact, it is probably not an exaggeration to say that everything else depends upon having a population that is prepared for a knowledge-based and technology-driven society. To this end, various quarters have called—and correctly so—for improving the quality of science and math teaching at the basic level, putting more resources to support STEM programs at the tertiary and higher levels, strengthening industry-academe linkages particularly in TVET, and building a culture of lifelong learning.

All these are fine except that they tend to focus on the development of cognitive skills which are an important predictor of earnings and an attribute of high-skill occupations. Non-cognitive[41] or "soft" skills have received less attention. Recent research, however, has found that in fact non-cognitive skills, such as ability to work in a team and oral and written communication skills are more highly valued

[40] See, among others, PIDS [2019].

[41] Also referred to as socioemotional skills. These refer to "a broad set of skills, competencies, behaviors, attitudes, and personal qualities that enable people to navigate their environment, work well with others, perform well, and achieve their goals." [Lippman et al. 2015]

by employers than problem-solving skills, analytical and quantitative skills and other qualities that are emphasized in formal educational settings [Deming 2017]. Gunewardena et al. [2018] report positive returns to non-cognitive skills specified as openness to new experiences and risk taking, and negative returns to hostile attribution bias. Moreover, as Aghion et al. [2019] are able to show, non-cognitive skills, which are relatively more important for workers in low-skill occupations, can explain their observed higher wages in highly innovative firms than in non-innovative firms. The reason, Aghion et al. theorize, is that workers in some low-skill occupations possess non-cognitive skills that are complementary with the innovative firm's other assets (e.g. workers in high-skill occupations) and so are highly valued by the firm. This makes such workers costly to replace conferring on them greater bargaining power. More generally, non-cognitive skills raise firm productivity by facilitating cooperation among workers of varying abilities on the basis of their comparative advantage to perform specific tasks.

Given the positive effects of non-cognitive skills on labor market outcomes, the question is how non-cognitive skills can be acquired or developed given that a common remark among employers is the shortage of job candidates who possess desired workplace attributes included under non-cognitive skills such as communication skills, grit, and self-motivation. How are such skills related to academic and technical skills? Can they be incorporated into general and technical education? Which non-cognitive skills are critical for workplace success given that workplace environments vary? Are they differently or similarly rewarded for men and women? As noted by Gunewardena et al. [2018], the literature on the connection between schooling and non-cognitive skills and non-cognitive skills and labor market outcomes outside advanced countries is still in its infancy. Clarifying terms and developing metrics would go a long way towards a more enlightened discussion of the research and policy issues.

4.2. On unemployment protection

Because of the greater risk of job loss posed by globalization and the introduction of new technologies, some measure of protection has become necessary to tide workers over during the transitory phase of unemployment. The objective is to replace income lost due to involuntary unemployment whether the job loss is due to a macroeconomic shock or a local event such as a factory closure or redundancy. The intended effect is to smooth consumption by preventing its sharp decline resulting from the job loss.

Publicly provided unemployment income support is necessary because informational asymmetries prevent private markets from providing the service. Without it, private individuals may engage in consumption smoothing behavior, such as delaying needed health care or withdrawing children from school, that have high welfare costs extending to the future. Without unemployment income support, individual consumption could also fall below the minimum threshold to

remain productive trapping the worker in a state of chronic poverty. In the absence of unemployment protection, alternative policies to save jobs become attractive despite their unintended consequences. Lobbying could continue for legislative measures that make terminations more costly, thereby raising the cost of hiring and jeopardizing future employment growth.

It is time to seriously consider instituting unemployment protection in the Philippines. There are a number of such programs at present but they are really in the nature of active labor market policies aimed at reducing the occurrence of unemployment, not mitigating the income loss due to unemployment. On the other hand, various proposals to institute unemployment insurance have been introduced in the legislature since 1954; the latest ones in the period 2010-2016 [Piza et al. 2016]. There have also been proposals from the executive branch and the International Labour Organization. None of these has yielded any palpable result.

In Asia, the main types of unemployment protection schemes are: mandatory unemployment insurance, unemployment savings accounts, severance pay, non-contributory programs, social assistance and programs operated by non-governmental organizations (NGOs)[42]. Other countries outside of Asia also have variants of these schemes so there is a wide range of models to study and country experiences to learn from [Isgut and Weller 2016].

Choosing and designing an appropriate unemployment income support scheme for the Philippines will require resolving questions about client selection, work incentives, funding, institutional viability, administrative capacity, and a large, heterogeneous informal sector. Tradeoffs are unavoidable[43]. Funding and benefit generosity are certainly key issues. Among the options, unemployment savings accounts (also called unemployment insurance savings accounts or UISA) seems to be most appealing for its potential to provide the same protection as conventional unemployment insurance while reducing problems of work incentives by being integrated with social insurance [Vodopivec 2004]. While present in several Latin American countries, UISAs are rare to find in Asia. The Department of Labor and Employment (DoLE) had previously considered the introduction of unemployment insurance with UISA linked with active labor market policies as one option under the Philippine Labor and Employment Plan of 2011-2016 [Piza et al. 2016]. That initiative should be pursued with the piloting of a UISA scheme.

Any discussion of policy options, however, ought to be preceded by agreement on certain objectives. In the context of globalization, technological change, and the ensuing process of job destruction and creation, the risks facing both firms and workers has increased. This has caused firms to innovate and resort to alternative

[42] Vodopivec [2004] provides an evaluation of these schemes. For the Philippines, see Esguerra, Ogawa, and Vodopivec [2001].

[43] For a discussion with reference to independent workers, see Krueger [2018].

contractual arrangements that provide greater latitude to deploy labor and stay competitive. Efficiency requires that labor regulations not restrict employers' flexibility to adjust to market demand and competition, but fairness and equity require that labor not be made to bear all the risk. This provides the broad rationale for unemployment protection. Unemployment income support policy should include both regular workers and those under alternative employment arrangements (the non-regulars and freelancers). They should also be crafted in a way that does not encourage employers to convert regular jobs to non-regular jobs. Portability of benefits should be a feature and cumbersome administrative procedures minimized. Finally, whatever scheme is chosen should be bundled with training programs supported by an effective labor market information system to enhance employability and reduce the cost of job search.

4.3. On reforming labor laws

Existing labor laws were crafted at a different time when firms were vertically integrated organizations and employment was based on a long-term relationship. Globalization and the new information technology are fast changing that landscape leading to complex employment relationships that challenge current understanding of the terms "employee" and "employer", and the appropriate bargaining unit for the conduct of collective agreements. Labor law has not yet caught up with new forms of organization and employment arrangements.

Thus far, efforts to fit the new and more complex employment relationships into the existing legal framework for entitlement to labor protection have proceeded in one of the following ways: formulating more meticulous tests to distinguish between regular employment and freelancing, developing the concept of an independent contractor, or devising criteria to ascertain the "real" employer, where multiple parties are involved, for assigning responsibility for legal obligations to workers [Fudge 2006].

The following example is illustrative. Are *Grab* drivers considered its employees, or are they freelancers and thus not covered by existing labor protection laws? Is *Grab* in fact an employer or, as it describes itself, merely a "technology company" that provides a platform to link users to third-party providers of transport services? It is argued, for instance, that *Grab* drivers have to abide by certain company policies and submit to certain forms of direction and control, such as the manner of booking and cancellation of rides or the pick-up and drop-off of passengers, suggestive of an employer-employee relationship [Moraga-Galvez 2018]. A counter argument is that, *Grab* drivers are free to determine which day of the week and hours of the day they are going to work; they are also free to choose the area to service. They have also freely decided to assume the economic risk. So these drivers—and similarly-situated workers—are in limbo. Should they be entitled to protection under labor laws?

To persist in using the old legal framework to resolve the issue of whether non-regular workers and freelancers should be entitled to protection under labor law is to forget about its fundamental purpose, which is to safeguard workers' well-being. Moreover, in the context of continually evolving organizations and the accompanying fragmentation of employment, some legal scholars [e.g. Fudge 2006] have opined that insisting on regular, subordinated employment as the basis for coverage of protective labor law is bound to disqualify an increasing number of workers. A point could be reached where labor law becomes irrelevant. 4IR is a good time as any for a re-think.

Acknowledgements: This paper is an expanded version of a lecture delivered at the forum, "Catching up with the Fourth Industrial Revolution", jointly organized by the UP School of Economics and the Ayala Corporation on 6 September 2018, and also during the Fourth Annual Policy Conference of the Philippine Institute for Policy Studies on the same theme on 18 September 2018. A summary of the lecture appears in the Conference Proceedings [PIDS 2019] under the title "FIRe and the Employment Challenge". The author thanks Ian Nicole Generalao and Mae Kiocho for research assistance.

References

Abraham, K., Haltiwanger, J., K. Sandusky, and J. Spletzer [2019] "The rise of the gig economy: fact or fiction", *AEA Papers and Proceedings* 109: 357-361. Available from: https://doi.org/10.1257/pandp.20191039

Abraham, K. and S. Taylor [1996] "Firms' use of outside contractors: theory and evidence", *Journal of Labor Economics* 14(3): 394-424.

Acemoglu, D. and D. Autor [2011] "Skills, tasks and technologies: implications for employment and earnings", Chapter 12 in *Handbook of labor economics*, vol 4B: 1043-1171, Elsevier B.V.

Aghion, P., U. Akcigit, A. Bergeaud, R. Blundell and R. Griffith [2019] "The innovation premium to soft skills in low-skilled occupations", CEPR Discussion Paper 14102. Asian Development Bank (ADB) [2018] *Asian development outlook*. Mandaluyong City, Philippines: ADB.

Arntz, M., T. Gregory and U. Zierahn [2016] "The risk of automation for jobs in OECD countries: a comparative analysis", OECD Social Employment and Migration Working Papers, No. 189, OECD Publishing, Paris. Available from: http://dx.doi.org/10.1787/Sjlz9h56dvq7-en.

Autor, D. [2015] "Why are there still so many jobs? The history and future of workplace automation", *Journal of Economic Perspectives* 29(3): 3-30.

Autor, D. [2013] "The 'task approach' to labor markets: an overview", *Journal of Labor Market Research* 46(3): 185-199.

Autor, D, F. Levy, and R. Murnane. [2003] "The skill content of recent technological change: an empirical exploration," *Quarterly Journal of Economics* 118(4): 1279-1333.

Autor, D. and M. Handel. [2013] "Putting tasks to the test: human capital, job tasks, and wages," *Journal of Labor Economics* 31(2) The Princeton Data Improvement Initiative Part 2, April: S59-S96.

Borland, J. and M. Coelli. [2017] "Are robots taking over our jobs?" *Australian Economic Review* 50(4): 377-397.

Chang, J., and P. Huynh [2016] "ASEAN in transformation: the future of jobs at risk of automation," Bureau for Employers' Activities Working Paper No. 9, International Labour Office, Geneva.

Dadios, E, A. Culaba, J. Albert, V. Paqueo, A. Orbeta, R. Serafica, A. Bandala, and J. Bairan [2018] "Preparing the Philippines for the fourth industrial revolution: a scoping study", Discussion Paper Series No. 2018-11. Philippine Institute for Development Studies: August.

Deming, D. [2017] "The value of soft skills in the labor market", NBER Reporter Number 4.

de Ruyter, A., M. Brown, and J. Burgess [2018] "Gig work and the fourth industrial revolution:conceptual and regulatory challenges," *Journal of International Affairs* 72(1): 37-50.

Esguerra, E. F. [2010] "Unemployment, work security, and labor market policies," in: *In search of a human face: 15 years of knowledge building for human development in the Philippines*. Quezon City: Philippine Human Development Network and UNDP.

Esguerra, J., M. Ogawa, and M. Vodopivec [2001] "Options for public income support for the unemployed in the Philippines", *Philippine Review of Economics 38*(2): 37-66.

Francisco, J., S. Flores, T. Canare, C. Caboverde, B. Borja, and C. Monterola [2019] "Mapping Philippine workers at risk of automation in the fourth industrial revolution", Rizalino S. Navarro Policy Center for Competitiveness Working Paper 2019-001, Asian Institute of Management: April.

Frey, C. and M. Osborne [2013] "The future of employment: how susceptible are jobs to computerisation?" Oxford Martin School Working Paper.

Fudge, J. [2006] "Fragmenting work and fragmenting organizations: the contract of employment and the scope of labour regulation", *Osgoode Hall Law Journal* 44(4): 609-648. Available from: http://digitalcommons.osgoode.yorku.ca/ohlj/vol44/iss4/1

Generalao, I.N. [2019] "Mapping tasks to occupations using Philippine data," University of the Philippines School of Economics DP 2019-04, Diliman, Quezon City: November.

Goos, M. and A. Manning [2003] "Lousy and lovely jobs: the rising polarization of work in Britain", *Center for Economic Performance Discussion Papers* DP0604, December.

Gotfredsen, S. [2018] "Driving the future of manufacturing in the Philippines through automation", *Business World,* May 17.

Gunewardena, D., E. King, and A. Valerio [2018] "More than schooling: understanding gender differences in the labor market when measures of skill are available", Policy Research Working Paper 8588, World Bank Group: September.

Hall, J. and A. Krueger [2017] "An analysis of the labor market for *Uber's* driver-partners in the United States," *Industrial and Labor Relations Review* 71(3): 705-732.

Isgut, A. and J. Weller (eds.) [2016] *Protection and training: institutions for improving workforce integration in Latin America and Asia*, ECLAC Books No. 140 (LC/G.2687-P), Santiago: Economic Commission for Latin America and the Caribbean (ECLAC).

Katz, L. and A. Krueger [2019] "Understanding trends in alternative work arrangements in the United States," Working paper 25425, National Bureau of Economic Research: January. Available from: http://www.nber.org/papers/w25425

Kolhatkar, S. [2017] "Welcoming our new robot overlords," *The New Yorker*, October 23. Available from: https://www.newyorker.com/magazine/2017/10/23/welcoming-our-new-robot-overlords

Krueger, A. [2018] "Independent workers: what role for public policy?" *Annals of the American Academy of Political and Social Science* 675: 8-25.

Levy, F. and R. Murnane [2013] "Dancing with robots: human skills for computerized work," Washington, DC: Third Way NEXT. Available from: 2013-thirdway.imgix.net.

Lippman, L., R. Ryberg, R. Carney, and K. Moore [2015] "Key 'soft skills' that foster youth workforce success: toward a consensus across fields", Child Trends Publication 2015-24.

Mendoza, A. [2018] "Philippine firms in global value chains: innovation, governance, and upgrading," Unpublished PhD dissertation, University of the Philippines Diliman.

Moraga-Galvez, C. [2018] "Nature and determinants of employment among *Grab* and *Uber* drivers in Metro Manila", *Philippine Journal of Labor and Industrial Relations*

OECD [2018] *Economic outlook for Southeast Asia, China and India 2018: fostering growth through digitalization*. OECD Publishing, Paris. Available from: http://dx.doi.org/9789264286184-en.

Ofreneo, R. [2018] "Rise of freelance work force," *Business Mirror*, August 16. Available from https://businessmirror.com.ph/2018/08/16/rise-of-freelance-work-force/

Ozaki, M. (ed.) [1999] *Negotiating flexibility: the role of social partners and the State*. Geneva: International Labour Office.

PayPal [2017] "PayPal and freelancers: understanding and identifying opportunities to inform product development and marketing communications", PowerPoint presentation slides, PP0091N PayPal Freelancers Philippines Report, October.

Philippine Institute for Development Studies [2019] *Harnessing the fourth industrial revolution: creating our future today*. Proceedings of the Fourth Annual Public Policy Conference 2018. Quezon City.

Piza, S., R. Edillon, and M. del Mundo [2016] "Unemployment protection in the Philippines", Chapter VI in Isgut, A. and J. Weller (eds.).

Schoukens, P. and A. Barrio [2017] "The changing concept of work: when does typical work become atypical?" *European Labour Law Journal* 8(4): 306-332. Available from: https://doi.org/10.1177/2031952517743871.

Schwab, K. [2016] "The fourth industrial revolution: what it means, how to respond", Geneva, Switzerland: World Economic Forum. Available from: www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-how-to-respond/

Segal, L. and D. Sullivan [1997] "The growth of temporary services work", *Journal of Economic Perspectives* 11(2): 117-136.

Vodopivec, M. [2004] *Income support for the unemployed: issues and options*. Washington, DC: World Bank.

World Bank [2018] *Growth and productivity in the Philippines: winning the future*. Washington, DC.

The Philippine Economic Society

Founded 1961

The Philippine Economic Society (PES) was established in August 1962 as a nonstock, nonprofit professional organization of economists.

Over the years, the PES has served as one of the strongest networks of economists in the academe, government, and business sector.

Recognized in the international community of professional economic associations and a founding member of the Federation of ASEAN Economic Associations (FAEA), the PES continuously provides a venue for open and free discussions of a wide range of policy issues through its conferences and symposia.

Through its journal, the *Philippine Review of Economics* (PRE), which is jointly published with the UP School of Economics, the Society performs a major role in improving the standard of economic research in the country and in disseminating new research findings.

At present the society enjoys the membership of some 800 economists and professionals from the academe, government, and private sector.

- Lifetime Membership – Any regular member who pays the lifetime membership dues shall be granted lifetime membership and shall have the rights, privileges, and responsibilities of a regular member, except for the payment of the annual dues.
- Regular Membership – Limited to individuals 21 years of age or older who have obtained at least a bachelor's degree in economics, or who, in the opinion of the Board of Directors, have shown sufficient familiarity and understanding of the science of economics to warrant admission to the Society. Candidates who have been accepted shall become members of the Society only upon payment of annual dues for the current year.
- Junior Membership – This is reserved for full-time college or graduate students majoring in economics. Affiliation for junior membership is coursed through the Junior Philippine Economic Society (JPES).

For more information, visit: www.phileconsociety.org.

Volume LVI Nos. 1 and 2 THE PHILIPPINE REVIEW OF ECONOMICS June and December 2019