

Telework potential in the Philippines

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Abstract

Using work from home (WFH) scores obtained by matching Philippine occupations with U.S. O*NET occupations, this paper estimates that only 12.38% of all workers can WFH and 25.7% of Philippine occupations are teleworkable—mostly from the following occupational groups: professionals, clerical support workers, and technicians and associate professionals. The education, real estate and, professional, scientific and technical sectors account for the largest share of teleworkable jobs. Those workers belonging to lower per capita income deciles, who are male, who have lower levels of education, who are self-employed, aged 55 and older, and who are working in sectors such as agriculture and retail, are also less likely to be in teleworkable occupations.

JEL codes: J240, J280

Keywords

COVID-19, labour market, Philippines, telework

Introduction and objectives of the study

The COVID-19 pandemic has sent shockwaves across the globe, and workplaces are among the most severely affected by the crisis. A recent study, which evaluated the transmission of COVID-19 in workplaces in six¹ Asian countries, identified that transmission in the workplace has been substantial since the early onset of the COVID-19 outbreak, especially for certain occupation groups (Lan et al., 2020). This study identified 103 cases as probable work-related transmissions (14.9%),

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with the most susceptible to work-related transmission being healthcare workers (HCWs) (22%), drivers and transport workers (18%), services and sales workers (18%), cleaning and domestic workers (9%) and public safety workers (7%). Moreover, the study also attributed a significant proportion (47.7%) of the early outbreak to work-related transmission and showed that transmission in several different occupation groups outside of HCWs had severe implications for workplaces.

In the Philippines, one of the most severely affected countries in the region, reports from the National Task Force against COVID-19 and the Inter-Agency Task Force for the Management of Emerging Infectious Diseases have identified workplaces as one of the primary sources of the surge in infections (Clapano, 2020; Mendez, 2020). The Philippine government implemented stringent mitigation measures to curb the spread of the virus beginning in mid-March 2020. All businesses, except those engaged in the production and distribution of essential goods, were ordered to close their physical workplaces.

Information and communications technology (ICT) advancements have supported alternative working arrangements, including work from home (WFH), remote working, teleworking, and telecommuting (International Labour Organization [ILO], 2020a). These terms are often used interchangeably to describe working outside the workplace or the employer's premises (ILO, 2020a). Slight differences are observed in these terminologies, implying either a temporary or long-term arrangement (ILO, 2020a). Work from home is regarded to be home-based telework (Eurofound and ILO, 2017), while teleworking may include various locations away from the employer's premises or from the primary worksite (ILO, 2020a). In this study, the terms 'teleworking' and 'working from home' are used interchangeably.

Telework is defined as the use of ICT, such as laptops, tablets, desktop computers and smartphones, for work performed outside the employer's premises (Eurofound and ILO, 2017). Teleworking employees may also be hybrid workers, splitting their time between the office and their remote work locations, possibly also without the constraint of official work hours (Gratton, 2021).

Prior to the COVID-19 pandemic, discussions of telework in the Philippines were initially borne out of the aspiration to alleviate one of the world's most congested cities and resolve transportation woes. The swift adoption of remote work arrangements as a response to COVID-19 is an opportunity for governments and employers to support employees who are indeed capable of working from home. However, as many jobs still could not be performed from home due to the nature of their tasks, this has raised questions on how many workers in the country can work outside traditional offices if the ICT infrastructure can support the shift to remote work, and which types of jobs are more likely to be worked from home in the medium term.

Using merged data from the 2015 Philippine Family Income and Expenditure Survey (FIES) and 2016 First Quarter Labour Force Survey (LFS), we matched the occupations reported in these surveys with the occupational classifications defined by Dingel and Neiman (2020) in their pioneering study on the teleworkability of jobs in the United States. Dingel and Neiman classified the feasibility of working at home for all occupations

listed in the U.S. O*NET database, containing hundreds of standard and occupation-specific descriptors on almost 1000 occupations. We matched these with equivalent occupations at the 4-digit level classification of the 2012 Philippine Standard Occupational Classification (PSOC) system to apply the teleworkability scores estimated by Dingle and Neiman.

Using WFH scores obtained by matching Philippine occupations with classifications defined by Dingle and Neiman, this paper estimates the proportion of workers who can potentially perform teleworkable jobs based on their occupations, and how this relates to characteristics of the labour force — age, sex, highest educational level attained, and income levels. Moreover, the paper estimates the distribution of workers who can perform teleworkable jobs over occupation groups and industry sectors.

The following section reviews the recent literature that estimated the number of jobs that can be worked from home in various countries. The section *Estimating teleworkability of Philippine occupations* explains the framework and methodology we used for this paper and discusses in detail how we adopted Dingle and Neiman's (2020) framework. The section *Results and discussion* examines the resulting patterns of the distribution of telework workers and occupations, and analyse these results. The section *Policy implications* discusses the policy implications, and the section *Summary and conclusion* concludes our report.

Literature review

Since the onset of the COVID-19 pandemic, numerous studies have been carried out to estimate the potential of jobs that can be worked from home (Berg et al., 2020). While various authors have employed several different methods, the approach of Dingle and Neiman (2020), which uses the descriptions of various occupations from the Occupational Information Network (O*NET) to estimate occupations in the United States can be performed remotely, has been one of the most widely used approaches. The methodology they developed has been applied to several country studies, including Argentina (Foschiatti and Gasparini, 2020), Uruguay (Guntin, 2020), and several European countries (Boeri et al., 2020), including Italy, France, Germany, Spain, Sweden and the United Kingdom (Berg et al., 2020).

Dingle and Neiman (2020) estimated that 37% of jobs in the United States could be performed entirely at home. The estimate is slightly lower for select European countries (Boeri et al., 2020) and significantly lower for several Latin American countries (Foschiatti and Gasparini, 2020; Guntin, 2020). Table 1 below compares the results from various studies that have applied their methodology to estimate teleworkability in different countries.

Although several variations of the Dingle and Neiman (2020) methodology have been applied to various country studies, one limitation is its use of Occupational Information Network (O*NET) data, which is United States based. Thus, several studies have used alternative methodologies to estimate the degree to which jobs can be performed remotely.

Some country studies that have used different methodologies had varying estimates, particularly for the United Kingdom, and to a certain degree, Portugal. While Dingle and

Table 1. Results from various studies that have applied variations of the Dingel and Neiman (2020) methodology.

Author(s) and year	Country coverage	Teleworkable jobs
Dingel and Neiman (2020)	United States	37%
Foschiatti and Gasparini (2020)	Argentina	26–29%
Guntin (2020)	Uruguay	20–34%
Boeri et al. (2020)	Sweden; UK	31%
	Germany	29%
	France	28%
	Spain	25%
	Italy	24%

Neiman (2020) estimated teleworkability potential in the United Kingdom (UK) to be as high as 43%, and in Portugal at around 33%, the estimate of Martins (2020) for Portugal is 30%. The British Office for National Statistics (2020) in Berg et al. (2020), using actual home-based work, estimated that less than 30% of the workforce in the UK could WFH without significant changes in the labour market (Berg et al., 2020).

Teleworkability estimates in Brazil and Ukraine used small-sample surveys (XP Investments as cited in Berg et al. (2020); Sapiens as cited in Berg et al. (2020)) while opinion surveys were used in Holgersen et al. (2020)'s study for Norway. Berg et al. (2020) utilised the Delphi survey approach that relies on a panel of experts from different countries. Utilising a task-based framework and data from the 2018 Labor Force Survey, Generalao (forthcoming) estimated that 4–6% of employed workers in the Philippines are in teleworkable occupations while around 43% are in non-teleworkable occupations.

Variations in the occupational structures of high-income versus low-income countries lead Berg et al. (2020) to conclude that there is a much higher potential for workers in high-income countries to telework relative to low-income countries. For example, it is six times more common to be a street vendor or 17 times more common to be an agricultural worker in low-income countries, and these occupations cannot be teleworked (Berg et al., 2020). They estimated that while around 27% of workers in high-income countries can potentially WFH, only 17% of workers in middle-income and 13% of workers in low-income countries could potentially WFH. In addition to differences in occupational structures, they also noted that the poor quality of physical, social, and information technology infrastructure in low-income countries is a significant factor in the difference of WFH potential between high-income and low-income countries.

The pandemic has forced economies to shift to home-based teleworking arrangements. Persol Research Institute (as cited in Hosada, 2021) estimated that in March 2020, 13.2% of full-time employees in Japan were teleworking. This has increased to 27.9% the following month due to the declaration of a state of emergency. The European Union (EU) has also shifted largely to telework, from 38% of EU workers teleworking in April 2020 to 48% in July 2020 (Eurofound, 2021).

Estimating teleworkability of Philippine occupations

In this study, the authors adopted the methodologies of Dingel and Neiman (2020) and Francisco et al. (2019) to determine whether an occupation in the Philippines can be worked from home. Dingel and Neiman (2020) used the surveys on ‘work context’ and ‘generalised work activities’ of the Occupational Information Network (O*NET) (Figure 1). Those occupations that need to be worked outside the home every day or require the operation of ‘vehicles, mechanised devices or equipment’ are assigned with ‘0’, meaning they cannot be worked from home. Otherwise, they are tagged as ‘1’. Dingel and Neiman (2020) then matched the O*NET occupations with the US SOC occupations and applied the same ‘1’ and ‘0’ assignment of each O*NET occupation to equivalent US SOC occupation/s.

For the analysis of Philippine data in this study, the authors used the merged 2015 FIES and 2016 first quarter LFS data. This is akin to what Francisco et al. (2019) did when they matched Philippine occupations with U.S. O*NET occupations to apply Frey and Osborne’s (2017) framework in estimating the probability of Philippine jobs being at risk of automation.

Based on this FIES-LFS and O*NET matching, we assigned each occupation with either ‘1’ or ‘0’ following the classification of Dingel and Neiman (2020). The teleworkability of an occupation depends on the tasks involved, and thus, its teleworkability can fall anywhere between 0 and 1. However, due to limitations in the data (i.e. information on tasks per occupation is not readily available for the Philippines), we assigned teleworkability based on the description of the occupation alone.

Due to differences in the nature of occupations in the United States compared to the Philippines, we deemed it necessary to verify with the Department of Labour and Employment Institute for Labour Studies (DOLE-ILS) if the Dingel and Neiman-based scores were generally appropriate for occupations in the Philippines. For example, Philippine agriculture tends to be more labour-intensive compared to more developed economies such as Canada and the United States (Parreño-de Guzman et al., 2015; Schmitz and Moss, 2015). Hence, we saw a need to review the US based work from home classifications of agricultural occupations before applying them to Philippine data. Figure 2. shows the framework for assigning WFH scores to occupations in the Philippines based on Dingel and Neiman (2020) and with evaluation from the DOLE-ILS.

Results and discussion

Teleworkability of occupations

Our study included 408 unique PSOCs, each of which corresponds to one or more O*NET occupations. We found that only 25.7% (105 PSOCs) can be classified as jobs that can be worked from home. At nearly 88%, an overwhelming majority of the labour force is engaged in PSOC occupations that cannot be worked from home.

There is a significant wage gap between jobs that can be performed from home and jobs that cannot be performed from home. On average, jobs that can be performed from home

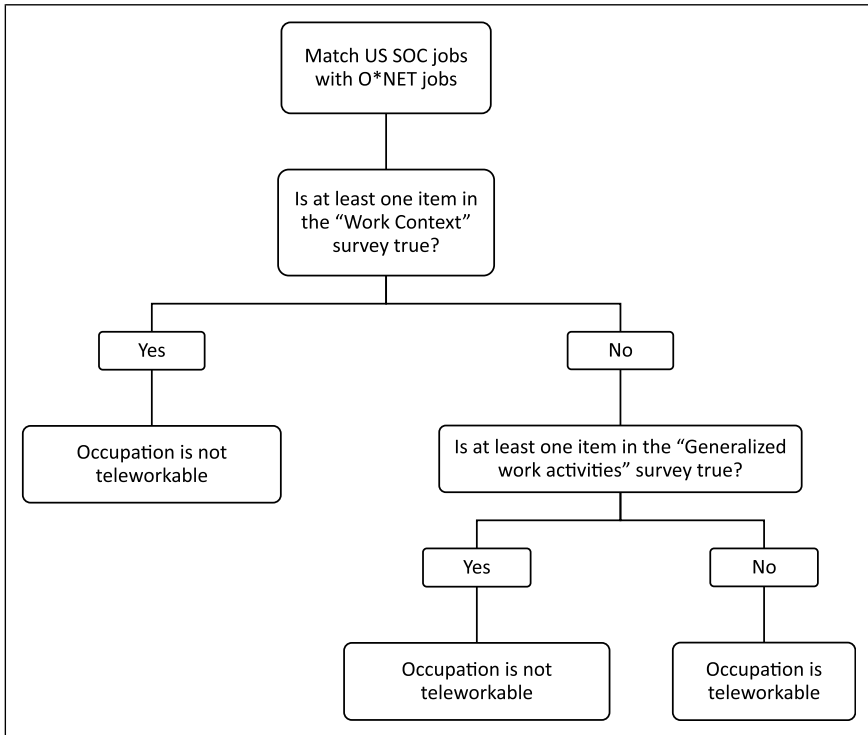


Figure 1. The methodology of Dingel and Neiman (2020).

Source: Authors' layout based on Dingel and Neiman (2020).

(PHP 329,634 or USD 6804 annually) pay more than double the average annual wage of jobs that cannot be worked from home (PHP 145,984 or USD 3013). While the average wage level of teleworkable occupations is substantially higher than that of non-teleworkable jobs, the overall wage level is closer to that of the average wage level for non-teleworkable occupations. This suggests that although teleworkable jobs command high salaries, the number of workers who enjoy this job feature is too few to influence the economy's overall wage level.

Most workers with jobs that can be worked from home are in the services sector, accounting for 83% of all teleworkable jobs. Figure 3. On the other hand, the agriculture sector has very few workers in jobs that can be worked from home, accounting for less than half a percent of all teleworkable occupations. A disaggregation into major sub-industries reveals further the distribution of teleworkable jobs in the economy.

Disaggregating the sectors further (Table 2) the education sector has the largest share of teleworkable jobs at 81%. This is followed by the real estate, and the professional, scientific and technical services sectors at around 67% each. These sectors were also found to have high teleworkability potential by Generalao (forthcoming). Nearly 32% of those in the real estate sector are owners or managers of rental properties. The demand for

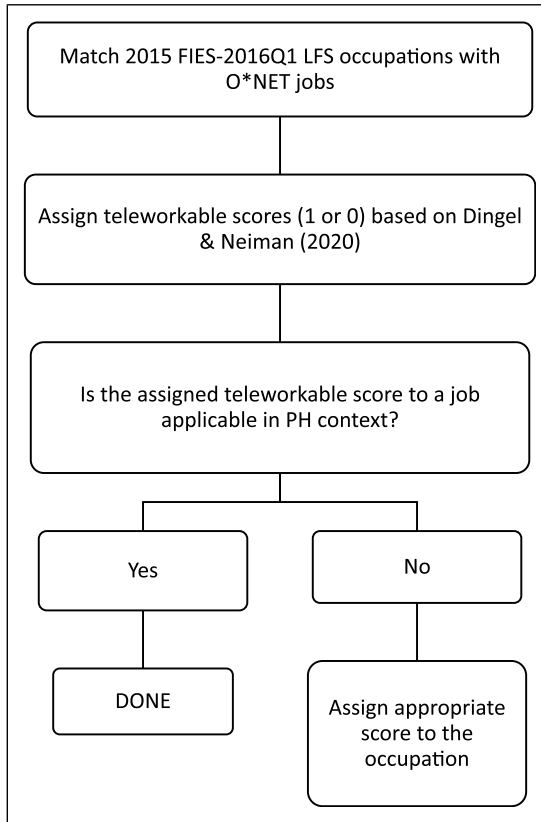


Figure 2. Framework for Assigning WFH Scores to Occupations in the Philippines.

FIES: Family Income and Expenditure Survey

LFS: Labour Force Survey

PH: Philippines

rented office space may fall as teleworking arrangements are adopted more widely and permanently by firms. This is especially true if the digital connectivity at the employees' original areas of residence is reasonably priced and reliable, and if they have a home environment that is conducive to work. The shift to online sales channels by retailers can also result to reduced demand for retail space and increased demand for logistical services even after the COVID pandemic has ended. Telework can also reduce the demand for rented lodgings as fewer workers find it necessary to live near their workplaces to reduce commuting hours.

Teleworkable jobs in the financial and information and communication sectors also account for 56% and 47% of all employment in these sectors, respectively. As the financial firms expand their online platforms, the demand for better digital infrastructure and improved cybersecurity is further highlighted. However, the expansion of teleworking arrangements without corresponding improvements in cybersecurity can



Figure 3. Percentage distribution of workers in teleworkable jobs, by industry.
Sources: Authors' calculation using data from the Philippine Statistics Authority (2016; 2017).

compromise the ICT sector's competitiveness given the increasing demand for data privacy and protection. Unless cybersecurity issues are adequately addressed, teleworking arrangements may not be a long-term alternative for firms in these sectors in the post-COVID era.

On the other hand, the sectors with the smallest share of teleworkable jobs include agriculture, forestry and fishing (0.2%), construction (1.6%), transportation and storage (1.8%), and the wholesale and retail sector (6.2%). This is due to their location-specific or contact-intensive nature. These sectors together claim nearly 61% of the entire workforce, with mostly low-wage, unskilled workers. The COVID pandemic has exposed workers in these sectors to greater health risks as they have no choice but to venture out of their homes and use public transportation to get to their workplaces while not having enough income to buy health insurance and avail of health services should they get sick.

Three occupation groups account for roughly 61% of total employment in the economy: elementary occupations (30%); managers (17%) and service and sales workers (13.5%). Workers in elementary occupations and in service and sales typically do not have the option to telework. These workers are at greater risk of losing their sources of income as the quarantine period extends further, and of getting sick due to the lack of safe means to travel to work.

In terms of occupation groups, professionals account for the largest share of jobs that can be worked from home, at 69% (Table 3). However, in terms of share in total employment, professionals account for only 4.8%. Likewise, 46% of clerical support workers and 30% of technicians and associated professionals are in jobs that can be worked from home, occupations that Generalao (forthcoming) also found to be highly teleworkable. However, these occupation groups account for less than 16% of total

Table 2. Percentage distribution of workers in teleworkable jobs, by industry sub-sector.

Industry	Non-teleworkable	Teleworkable
Education	18.8	81.2
Real estate activities	32.9	67.1
Professional, scientific and technical activities	33.2	66.8
Financial and insurance activities	43.6	56.4
Wholesale and retail; repair of motor vehicles and motorcycles	93.8	6.2
Transportation and storage	98.2	1.8
Construction	98.4	1.6
Agriculture, forestry and fishing	99.8	0.2
Overall	87.6	12.4

Sources: Authors' calculation using data from the Philippine Statistics Authority (2016, 2017).

employment in the economy. Therefore, it is not surprising to observe that although there is a large wage gap between the teleworkable and non-teleworkable occupations, the average wage rate is closer to that of the wage rate of the non-teleworkable sector.

Elementary occupations account for the largest share of jobs for all age groups, but these especially dominate jobs in the 15–24 and below 15 age groups (Table 4). Individuals falling into these age groups have yet to complete their education and qualify for mostly unskilled, elementary jobs. The same reason applies to jobs in the service and sales occupation group. On the other hand, most of the management occupations are concentrated in the above 45 age groups, which could be explained by the required educational and technical experience for these jobs. Most of the professional occupations are in the 25–34 and 35–44 age groups, while clerical support occupations and technicians and associate professional occupations fall in the 15–24, 25–34, and 35–44 age groups.

The increasing share of managers in higher age groups accompanied by the decreasing share of clerical support and service and sales workers implies workers' mobility from their initial rank and file positions to management. Also, there seem to be too few entrants of new skilled agricultural workers suggesting that this sector is primarily dominated by unskilled or elementary workers. This can present a challenge for the growth of the agricultural sector, particularly in terms of adoption of innovative technologies and participation in higher value chain activities.

While less than 15% of teleworking employees belong to the 15–24 years age range, this proportion increases to 26.3% among the 25–34 years age group, with both age groups dominated by professionals and clerical support workers. About 20% of workers that can WFH belong to the 45–54 years age group. This proportion declines to 12.6% (55–64 years age group), and 4.4% (65 years and older). Those who can telework at these advanced age groups are predominantly managers and professionals, again reflecting vertical mobility among some workers (Table 4).

The study also found that 17.5% of female workers are working in jobs that can be performed from home, almost twice the percentage of male workers. This may imply of

Table 3. Share to total employment and percentage distribution of workers in teleworkable jobs, by major occupation group.

Occupation group	Share of total employment	Non-teleworkable	Teleworkable
Professionals	4.80	31	69
Clerical support workers	5.95	54	46
Technicians and associate professionals	5.04	70	30
Craft and related trades workers	6.69	80	20
Managers	17.30	83	17
Service and sales workers	13.54	96	4
Armed forces occupations	0.20	100	—
Plant and machine operators, and assemblers	4.20	100	—
Skilled agricultural, forestry and fishery workers	11.98	100	—
Elementary occupations	30.30	100	—

Sources: Authors' calculation using data from the Philippine Statistics Authority (2016, 2017).

greater employment opportunities and economic participation for women with a more widespread adoption of teleworking in the Philippines.

Figure 4. shows that there is a higher percentage of workers with a college degree or higher who can WFH. This percentage drops as the highest level of education attainment decreases, consistent with the findings of Generalao (2021). Apart from allowing workers to generate more income, having higher educational attainment opens people to more jobs that can provide greater flexibility in work arrangement. This also means that these employees who can telework can cope better during pandemics or other crises that require employees to WFH. Approximately 43.4% of workers with a college degree or higher can WFH, which is about three times higher than for workers with a more advanced degree than high school but lower than college (15.1%). In contrast, only 2.1% of employees with a below elementary degree can WFH.

A look at the distribution of teleworking workers by occupation groups and educational levels shows that those with higher education levels are working in occupations that are highly teleworkable. Nearly all the professionals who can WFH, at 98%, have completed college education or higher. Also, 56% of technicians and clerical support workers in teleworkable jobs have completed tertiary education levels.

On the other hand, workers who cannot WFH are characterised by low education levels. Nearly 74% of skilled agricultural workers have less than high school education. In comparison, the figure is 64% and 36% for those working in elementary occupations and for plant machine operators, respectively.

The study also observed a correlation between per capita income decile and teleworkability (Figure 5.). About 32% of employees belonging to the 10th per capita income decile can WFH. That percentage declines as one moves to lower per capita income deciles, with only about 1.8% of workers belonging to the first decile can WFH.

Table 4. Share of teleworkable vs. non-teleworkable jobs, by age and occupation groups.

Occupation group	Age group											
	15–24 years		25–34 years		35–44 years		45–54 years		55–64 years		65 years and over	
	NT	T	NT	T	NT	T	NT	T	NT	T	NT	T
Armed forces occupations	0.13	—	0.35	—	0.31	—	0.27	—	0.05	—	—	—
Managers	3.91	6.35	11.63	13.36	18.16	23.43	21.31	31.90	23.93	41.70	29.54	60.61
Professionals	1.67	27.85	3.45	30.74	1.35	28.26	1.20	27.05	1.21	20.30	0.67	6.42
Technicians and associate professionals	5.22	13.43	5.74	14.65	4.32	13.20	2.78	9.86	3.06	9.56	1.07	6.78
Clerical support workers	6.07	36.92	6.74	29.61	2.65	19.07	1.95	14.93	1.51	11.98	1.51	6.64
Service and sales workers	24.69	3.86	18.12	3.94	12.82	4.86	10.30	5.25	9.25	4.63	8.07	3.06
Skilled agricultural, forestry and fishery workers	2.84	—	7.61	—	13.42	—	16.96	—	23.26	—	34.38	—
Craft and related trades workers	4.22	11.58	6.86	7.70	7.77	11.17	7.49	11.01	5.14	11.83	1.92	16.48
Plant and machine operators, and assemblers	2.82	—	5.29	—	6.71	—	5.67	—	4.22	—	0.85	—
Elementary occupations	48.43	—	34.21	—	32.48	—	32.06	—	28.37	—	21.99	—
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Sources: Authors' calculation using data from the Philippine Statistics Authority (2016, 2017).

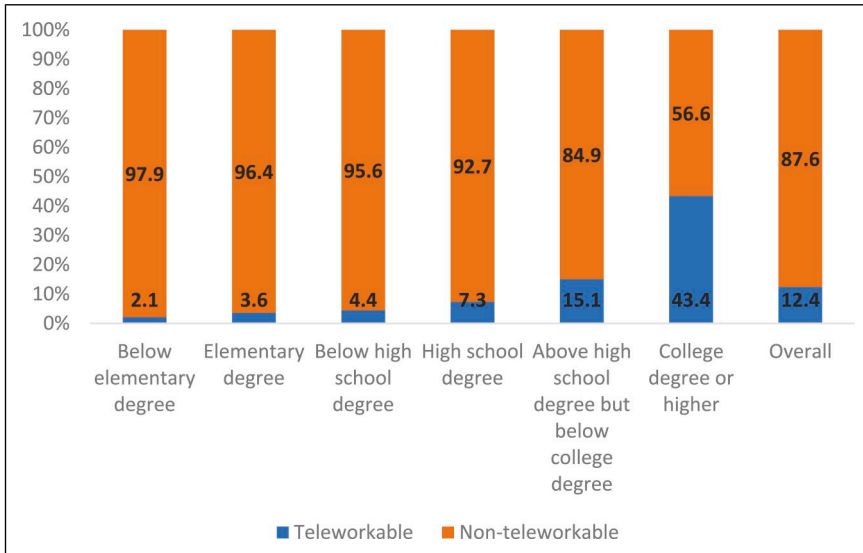


Figure 4. Percentage distribution of workers in teleworkable jobs, by highest education attainment.

Sources: Authors’ calculation using data from the Philippine Statistics Authority (2016; 2017).

Almost half (46%) of workers who can work remotely belong to the top two income deciles. The share of each decile in workers in teleworkable occupations increases as the income deciles increase. Meanwhile, the opposite pattern applies to workers in non-teleworkable occupations. Nearly a third of all workers in non-teleworkable occupations are concentrated in the three lowest income deciles (25%). These further highlight the advantages that the more affluent strata of the population enjoy in terms of higher education accomplishment, better skills, and flexible work arrangements.

By class of worker, about 51.4% of those working in the government or government-owned or controlled corporations (GOCCs) can WFH. The high percentage of workers in the government or GOCCs is primarily due to many of these workers being classified as managers, professionals and clerical support workers. About 13.5% of those in private establishments can WFH, while the share of teleworking workers in other worker classes is in single digits. A large share of employers, and of those who are self-employed are either service and sales workers, skilled agricultural, forestry and fishery workers or work in elementary occupations, jobs that are not teleworkable.

This study also found that 14.5% of workers with permanent jobs can WFH, more than six percentage points higher than those with short term contracts (8.2%). On the other hand, almost all (99.2%) workers with different employers cannot WFH. Many of these workers with different employers are farmers, fishermen, launderers, carpenters and construction workers, who often cannot WFH. This may imply that they need to work

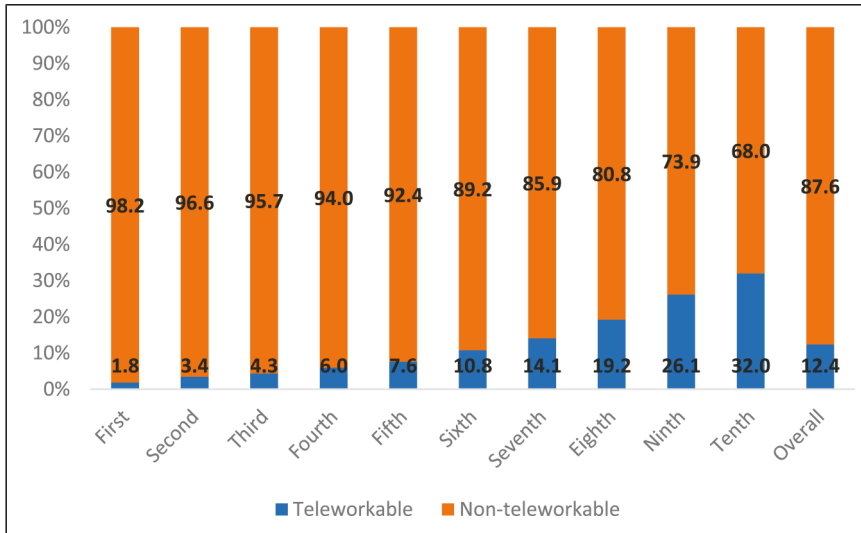


Figure 5. Percentage distribution of workers in teleworkable jobs, by per capita income decile. Sources: Authors' calculation using data from the Philippine Statistics Authority (2016; 2017).

with different employers to earn sufficient incomes and that their livelihoods were heavily affected when quarantine restrictions were put in place.

Policy implications

Even before COVID-19, the clamour for flexible working arrangements was already there due to the worsening traffic situation in urban areas in the Philippines. Amidst the COVID-19 pandemic, workers across the Philippines and the rest of the world are now part of an ongoing WFH experiment. The COVID-19 pandemic is expected to make telework the trend in the Philippines and persist in countries such as the United Kingdom. The persistence of this working from home trend is also because employees increasingly want to have the option to work remotely (Abad, 2020; Partridge, 2020). Hence, this unprecedented event serves as a wake-up call for policymakers to consider the fact that the telework trend is here to stay at least in the short term and should see this as an opportunity to prepare the labour market for the increased adoption of this type of work setup.

Nevertheless, policymakers should be cognisant to the fact that not all jobs are created equal in terms of allowing employees to work remotely. The results above show that the effects of the WFH and quarantine measures that governments and employers have implemented vary among demographic groups. Our study results show that those belonging to lower per capita income deciles, who are male, who have lower levels of education, and who are working in sectors such as agriculture and retail are less likely to be able to WFH.

Our results also highlight that education plays a crucial role in enabling workers to perform telework. Quality education equips an individual with the skills to be employed in jobs that can be performed remotely. Aside from the ability to operate a computer and access related technologies such as the internet, the skills required to enable workers to WFH should be integrated into the K to 12 curricula to make the future workforce more ready for remote work arrangements. Competencies such as critical thinking, service orientation, complex problem solving, cognitive flexibility and digital skills should be taught as part of basic education. Developing these skills early on will not only ensure that the future workforce will have access to more jobs that can be performed remotely but, more importantly, will also future-proof the workforce amidst the ever-evolving labour market. In other words, teaching digital skills to students in basic education will ensure that even those who are coming from lower per capita income deciles, who are male, who have lower levels of education, who are self-employed, and who are working in sectors such as agriculture and retail would be given greater access to more teleworkable jobs.

There is also a need to ensure that those in teleworkable jobs, including those belonging to the age group 24–54, can effectively perform their tasks remotely. This is because a job's potential to be teleworkable does not necessarily lead to actual teleworkability, due to the lack of digital skills and gadgets among employees. Given that a sizeable proportion of this age group is potentially engaged in teleworkable jobs, the government and the private sector can collaborate in up-skilling and preparing these workers to become equipped with ICT knowledge and skills needed for telework.

Private firms can be mobilised to provide access to gadgets and other digital devices for their teleworking employees. Several possible strategies of equipment provision can be adopted by firms, such as cost-sharing with their employees. Different approaches may be adopted depending on the size of the company. Although smaller firms may not be as capable as their larger counterparts, strategies to equip employees working from home must be explored. Additionally, savings from office space rental can be reallocated to support the productivity of employees performing telework. Furthermore, accessing tools and equipment for employees should be shouldered by the employer as part of the telecommuting programme's implementation.

The distribution of WFH occupations reflects the underlying structure of the economy and circumscribes the nature of economic activity. Structural transformation will be accompanied by the shift of subindustries that can be more conducive to remote working. Notably, improvements in agricultural productivity need to be promoted to increase output and agricultural wages. This will also keep people from moving out of the agricultural sector into elementary occupations in the services sector. The expansion of agricultural firms will accompany the increase in output as firms try to cover a broader geographic market and connect with other firms in the value chain. Given the trend that telework is expected to persist at least in the near future (Abad, 2020; Partridge, 2020), there is an opportunity for some parts of the operations of these agricultural firms to be under teleworking arrangements.

Said structural transformation also needs to be accompanied by broader access to technology, the availability of complementary skills for specific tasks, and the fixed costs of migrating from office to home-based work. While there is indeed a trend towards more

opportunities for telework, the study results also highlight the need to strengthen ICT infrastructure build-up to allow more workers to WFH effectively. This is especially relevant for the Philippines, which has perpetually suffered from slow and intermittent internet connections. In the recent 2020 World Competitiveness Yearbook from the International Institute for Management Development ([IMD], 2020), the Philippines ranked 61st out of 63 economies in terms of average internet bandwidth speed and 61st out of 63 economies in terms of the number of broadband subscriptions per 1000 people. More importantly, it is imperative to teach digital and technological skills to workers for them to be able to WFH. In the same yearbook (IMD, 2020), the Philippines ranked 52nd out of 63 economies in terms of the availability of digital and technological skills among the population.

Several industries will continue to have location-specific operations and thus will not be highly worked from home. However, some parts of their functions may be established under WFH arrangements, provided there is sufficient technological infrastructure that will guarantee stable internet connectivity and acceptable connectivity costs. Government support in expanding the existing technological infrastructure includes reducing the number of permits required and the accompanying red tape for telecommunication companies to layout their network and admitting more players in the market. The additional players will be able to cover geographical areas with market potential not currently serviced by existing providers and provide downward pressure on the market price for connectivity services.

Likewise, there is a need to establish labour standards and national legislation for telework and WFH arrangements. The COVID-19 pandemic has made telework a viable option for employers and employees subject to the availability of necessary tools and technologies such as laptops and broadband internet (Asian Institute of Management Rizalino S. Navarro Policy Center for Competitiveness [AIM RSN PCC], 2020). While the Telework Act (Republic of the Philippines, 2018) is already in place, it was not designed for telework in this magnitude. According to the ILO, there are currently no established international labour standards on telework.

At the national level, the government through the Tripartite Industrial Peace Council (TIPC) of the Department of Labor and Employment should work with its tripartite partners from employer and employee groups, and from labour experts to try to discuss and establish reasonable labour standards on teleworking amendable to all stakeholders (Department of Labor and Employment [DOLE], 2014). By involving the TIPC, the government can also ensure that the formulated policies and regulations are in line with existing labour regulations and ILO Conventions. It is also recommended that a comprehensive national employment strategy for the future of work must consider the implications of various disruptors such as the emergence of pandemics, calamities or natural disasters, and the challenges brought by the Fourth Industrial Revolution.

Our estimates show noticeable inequality in workers' demographic characteristics in teleworkable occupations, particularly in terms of income and education. Although one of the main objectives of the K-to-12 programme is to produce employable graduates after completion of senior high school, the industry is still hesitant to hire graduates without a college degree (Philippine Institute for Development Studies [PIDS], 2020). And while

there is a need to update job descriptions to enable senior high school graduates to access jobs that do not require a college degree, this initiative has had a slow uptake in industry primarily due to the perceived lack of skills and training among non-college degree holders (PIDS, 2020). To alter the perception that the K-to-12 program equips, its graduates with meagre competencies needed to perform work-related tasks, the K-12 curriculum should routinely undergo evaluation and revision in line with current job market and industry demands. Moreover, specialised subjects in the K-12 curriculum, such as Empowerment Technologies (ETech): ICT for Professional Tracks and English for Academic and Professional Purposes should be more skill-based to equip students with more applied competencies suitable for the workplace. While core subjects such as General Mathematics and General Physics are essential if the students attend college, specialised subjects, if designed and delivered appropriately, should be adequate to equip senior high school graduates that prefer to enter the labour force.

The education system must ensure that they train students with skills needed by the industries or by the employers, including soft skills. The K-12, Academic Strand, or the Technology and Vocational Education and Training (TVET) must have a well-designed curriculum and employ more qualified teachers. Moreover, the necessary training equipment, specifically for the TVET track, must be available to make the most out of the training students receive.

Income also coincides with access to teleworkable occupations. Competent job applicants in low-income households may be hindered from teleworkable occupations due to a lack of financial resources to remotely meet the job's infrastructure requirements. Even if a worker meets the core competencies needed to perform a job (i.e. communication and technical skills), some employers require high-capacity computers and access to stable, high-speed internet, which is burdensome for a low-income household. One possible option is for firms to shoulder a fraction of the equipment cost, while the employee will shoulder the other portion. The government should also work with telecommunication companies to provide more cell sites that support stable and high-speed internet.

Of course, we also need to consider those belonging to the informal sector, where many jobs, such as street vendors, cannot be worked from home due to the nature of their work. In the Philippines, a significant proportion of the labour force works in the informal sector. Studies such as Hatayama et al. (2020) also mentioned that those in the informal sector often could not WFH, leading to income losses due to quarantine and social distancing measures. To help those from the informal sector, there is a need for income protection policies for informal sector workers as government programmes do not often reach them similar to that of Hatayama et al. (2020). While the pandemic has affected the goal of the Philippine government to reduce the poverty rate and transform the Philippines into an upper-middle-income country in the early 2020s (Kabiling, 2020), this income protection scheme can nevertheless help alleviate the burden that workers in the informal sector face currently and in future disasters or crises that would prevent them from working.

COVID-19 has exposed weaknesses in the Philippines' social protection system. Moving forward, the country's social protection programmes need to be strengthened and adequately funded, such as having the public health and insurance system professionally

managed. Moreover, a method of unemployment income support or unemployment insurance is needed. There are various models and country experiences to learn from in designing a social protection system for the Philippines. This must be pursued as part of a broader conversation on the fourth industrial revolution. Jobs will be more uncertain and fast-changing because of technology, leading to higher frictional unemployment. There must be a robust social insurance system that should be able to cushion the transitory adverse effects arising from these situations.

Lastly, if WFH arrangements were to become part of the new normal, certain aspects of Human Resource Management will be affected — recruitment, work monitoring and evaluation, the system of incentives and reward, and how firms with several operational locations will design work arrangements. It will also affect the way workers collectively deal or bargain with employers. These changes in workplace arrangements should motivate employers, on the one hand, and employees, on the other hand, to have a series of collective bargaining agreements to establish rules and benefits of employees doing telework (ILO, 2020b).

It is also bound to cast the spotlight on existing labour laws, as it already has in relation to the gig economy, especially on who is an employee and who deserves protection under Labour Law. Alternative work arrangements made possible by digitalisation and connectivity disrupt existing employer–employee relations and challenge the current understanding of who is an employee, who is self-employed, the firms' or the employer's responsibilities, and the categories of workers who deserve protection under Philippine labour laws. In light of these changes in the workplace, Philippine labour laws also need to be updated.

Summary and conclusion

While around 25.7% of occupations in the Philippines are teleworkable, only 12.38% of all workers can WFH, a majority of which are found in the following occupational groups: professionals, clerical support workers and, technicians and associate professionals. Most of the occupations that can be teleworked are in the services sector, while agriculture has the smallest share of teleworkable jobs. The education, real estate and professional, scientific and technical sectors account for the largest share of teleworkable jobs. Those belonging to lower per capita income deciles, who are male, who have lower levels of education, who are self-employed, aged 55 and older, and who are working in sectors such as agriculture and retail, are also less likely to be in teleworkable occupations.

Teleworkable jobs are also concentrated in occupations that account for a low share of the economy's total employment. These occupations are typically taken on by workers with at least a college degree. Most workers in non-teleworkable jobs such as elementary occupations or skilled agricultural, forestry and fishery workers typically have lower levels of education relative to workers in teleworkable occupations. Hence, there is reason to believe that the distribution of teleworkable jobs reflects the level of human capital of the labour force. Most of the workers in teleworkable occupations belong to the top three income deciles. The three lowest income deciles account for a substantial portion of workers who cannot WFH.

Additionally, the wage gap between teleworkable and non-teleworkable jobs in the Philippines is substantial. On average, teleworkable jobs pay more than double the average annual wage of non-teleworkable jobs. This highlights the inequalities that workers face, especially during the COVID-19 pandemic.

Moreover, the ongoing pandemic is a significant push for telework to be more utilised at least in the near future. Given that telework will be here in the coming years, the skills required to enable workers to WFH should be integrated into the K-12 curricula to make the future workforce more ready for remote work arrangements. Competencies such as critical thinking, service orientation, complex problem solving, cognitive flexibility and digital skills should be taught as part of basic education. Technological literacy on basic ICT knowledge and skills can further be improved, and this is a potential area of collaboration between the government and the private sector. For workers who cannot WFH due to the nature of their occupation, the government must have income protection schemes to help whenever these workers cannot work due to the occurrence of calamities or pandemics. The experience with COVID-19 has exposed how weak the Philippines' social protection system is. Going forward, the social protection programmes of the country need to be strengthened and adequately funded.

Moreover, facilitating the expansion of the existing technological infrastructure is critical in incentivising firms to consider remote working as part of their business processes. Government support can reduce the number of permits required and the accompanying red tape for telecommunication companies to layout their network and admit more players in the market.

Lastly, alternative work arrangements made possible by digitalisation and connectivity disrupt existing employer–employee relations and challenge the current understanding of who is an employee, who is self-employed, and what are the firms or the employer's responsibilities and what are the categories of workers who deserve protection under Labour Law. The government should work with the tripartite partners and labour experts to establish reasonable labour standards on teleworking. Philippine labour laws also need to be updated to accommodate this rapid evolution of the labour market environment.

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1. Hong Kong, Japan, Singapore, Taiwan, Thailand, and Vietnam

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