Working From Home across Countries*

Charles Gottlieb† Jan Grobovšek‡ Markus Poschke§

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Abstract

We study how the share of employment that can work from home changes with country income levels. We document that in urban areas, this share is only about 20% in poor countries, compared to close to 40% in rich ones. This result is driven by the self-employed workers: in poor countries their share of employment is large and their occupational composition not conducive to work from home. At the level of the entire country, the share of employment that can work from home in poor countries compared to rich countries depends on farmers' ability to work from home. This finding is due to the high agricultural employment share in poor countries.

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†University of St. Gallen. Email: charles.gottlieb@unisg.ch

‡University of Edinburgh. Email: jan.grobovsek@ed.ac.uk

§McGill University. Email: markus.poschke@mcgill.ca

1 Introduction

Many countries are implementing drastic measures of social distancing to tame the spread of COVID-19. These measures often involve closure of workplaces to limit interpersonal contact. While they are in place, work can only continue if it can be conducted from workers' homes.[1] The extent to which work can be conducted from home therefore is a key factor determining the economic consequences of social distancing policies.

The ability to work from home (WFH) has been measured for the United States (Dingel and Neiman, 2020*a*, henceforth DN) and for a set of European countries (Barrot et al., 2020; Boeri et al., 2020). These authors have found that around 40% of jobs could potentially be carried out from home.[2] Evidence on the ability to work from home in poorer countries is more scant, with the exception of two papers, which we discuss below. Such evidence is particularly timely and valuable as some low-income countries have started to implement social distancing policies. We put a particular emphasis on how differences in the economic structure across countries contribute to differences in the ability to work from home.

The starting point of our analysis are the occupation-level measures of ability to work from home computed by Dingel and Neiman (2020*a*). We combine these measures with information on the distribution of employment over occupations across countries to obtain measures of the aggregate ability to work from home by country and by country income group. We obtain this information from a micro level dataset we built, which consolidates information from labor force and household surveys for 612 country years for 57 countries.[3] The key advantage of this data is that it allows for the analysis of detailed subgroups. This is important, since lockdown policies affect such groups very differently.

Our main analysis focusses on urban areas. We find that the ability to work from home is significantly lower in poor countries. Only about 22% of workers can work from home, in contrast to 37% in rich countries.

We then investigate the extent to which this conclusion is driven by two particularities of the employment structure in poor countries. First, we show that the lower ability to WFH in poor countries is particularly pronounced for the self-employed. For wage and salary workers, WFH

[1] Exceptions consist in sectors considered to be essential.

[2] Hensvik et al. (2020) find that in the US, the share of workers who actually worked from home in 2011 to 2018 is around 15%, with substantial variation across occupations.

[3] Table 4 provides an overview of all the data sources.

ability in poor countries is not far below that in rich countries. This implies that the large share of self-employment in poor countries contributes to the low WFH ability in these countries. We verify that this is also the case when we use a new measure of the ability to run a household enterprise from home, which we compute using data from the Indonesia Family Life Survey.

Second, we go beyond urban areas and compute measures of WFH ability at the level of the entire country. Due to the predominance of agricultural employment in rural areas of poor countries, the WFH ability of farmers crucially affects our findings here. If farmers are assumed to have a negligible ability to work from home, as indicated by DN's measure, the gap in WFH ability between poor and rich countries is even larger, 15 and 35%, respectively. If, in contrast, we assume that all farmers can work from home, the aggregate WFH ability in poor countries in fact exceeds that of rich countries.

In summary, the share of workers in urban areas who can work from home is clearly lower in poor countries. This result is principally driven by urban self-employed workers. At the level of the aggregate economy, poor countries may or may not have lower ability to work from home, depending critically on the WFH ability of farmers. A lower ability to work from home implies a greater potential cost of social distancing policies.[4] The trade-off between the costs and benefits of such policies might thus be different in low-income countries. The existing literature has pointed out several other reasons why the trade-off may differ across countries (Mobarak and Barnett-Howell, 2020; Loayza and Pennings, 2020). Our findings constitute an additional factor. They also point to a particularly important role of self-employment and agriculture.

Related literature. We are aware of two other efforts to build WFH ability measures for poor countries. Dingel and Neiman (2020b) combine their WFH measures with ILO data on the distribution of occupations across countries. They find that the share of employment that can be done from home is significantly lower in poor countries. Saltiel (2020) analyzes data for urban areas in ten developing economies. Using a country-specific measure of WFH ability, he finds a similar cross-country pattern. He also investigates how the WFH ability is related to individual characteristics. While we find similar results to this work at the aggregate level, our analysis also allows us to point out the main sources of differences in WFH ability across countries.

[4]Our analysis does not address additional factors that might reduce the ability to work from home in poor countries even further, in particular the digital infrastructure. See e.g. Chiou and Tucker (2020).

2 The distribution of occupations across countries and the ability to work from home

In this section, we measure the share of employment that can be done remotely, across countries of different levels of income per capita. To do so, we use the classification by Dingel and Neiman (2020*a*) to measure the share of jobs that can be done from home for each ISCO-1 level occupation.[5] As in DN, the share of WFH jobs refers to the fraction of detailed occupations within a broad occupation group that can be done from home. The measure is computed based on characteristics of each occupation. It does not depend on the distribution of employment in the United States.

Table 1 shows that the ability to work from home differs very strongly across broad occupation groups. In managerial and professional occupations, the majority of jobs could be carried out from home, at 76.8 and 70.6%, respectively. In contrast, very few elementary occupations or occupations involving plant or machine operation (common in manufacturing) can be done remotely. In particular, 96.1% of craft or trade occupations are tied to the location of the activity. The ability to work from home in services and sales occupations is also relatively low.

Table 1: Percent of detailed occupations that can be done from home by main occupation category

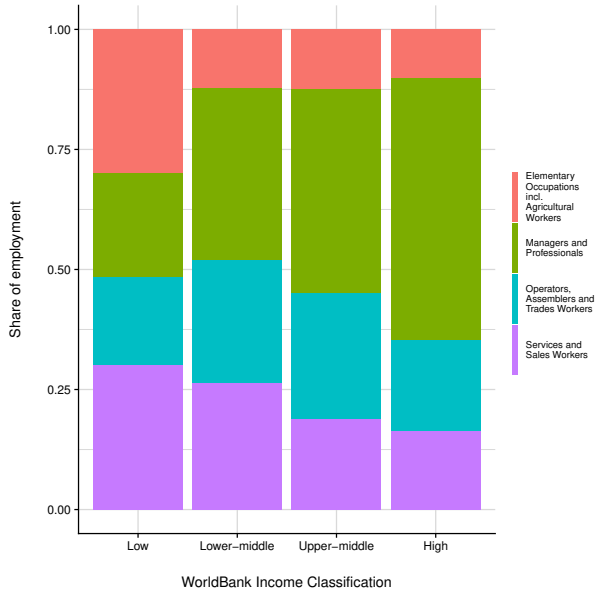
	Occupation, ISCO 1 digit	WFH (in %)
1	Managers	76.8
2	Professionals	70.6
3	Technicians and Associate Professionals	39.6
4	Clerical Support Workers	49.6
5	Services and Sales Workers	20.7
6	Skilled Agricultural, Forestry and Fishery Workers	8.3
7	Craft and Related Trades Workers	3.9
8	Plant and Machine Operators and Assemblers	7.4
9	Elementary Occupations	9.6

Note: We take the classification based on ONET data provided by Dingel and Neiman (2020*a*) and use a cross-walk to the ISCO-1 classification.

The distribution of employment across occupations varies significantly with economic development. We show this using a dataset we built combining household surveys and labor force surveys from 57 countries, covering 612 country years. The total sample size approaches 18 million

[5] This is the level of aggregation at which occupation data can be harmonized across countries. DN's measure is reported using the SOC occupation classification. We use a crosswalk to map this into the ISCO classification. We report WFH shares from DN at the ISCO-2 level in the Appendix, Table 5.

Figure 1: Distribution of occupations by country income level, urban areas



Note: This figure reports the share of occupations in employment of all countries that belong to a certain country income category as defined by the World Bank. The occupation categories are defined as follows, whereby the number refers to the rows (ISCO codes) of Table 1: Managers and Professionals = 1-4, Operators, Assemblers and Trade Workers = 7-8, Elementary Occupations (incl. Ag Workers) = 6+9, Services and Sales Workers = 5. Data sources: The occupation data are computed from the data sets listed in Table 4, GDP per capita is taken from Penn World Tables (Feenstra et al., 2015; Zeileis, 2019).

observations. Country coverage ranges from countries that are among the poorest, like Ethiopia and Uganda, via middle-income countries to high-income countries including the United States and many European countries. Table 4 in the Appendix contains the full list. The advantage of this dataset is that it allows cross-country comparisons over the entire income spectrum, and allows us to measure occupational composition for many subgroups, in particular by geographic area (urban or rural) and employment status (employee or self-employed).[6]

In this section, we measure the occupation distribution in urban areas. We begin here, since these are more comparable across country income groups. Measures for urban areas are also less sensitive to the treatment of farmers, which we explore in Section 4.

Figure 1 shows employment shares in four broad occupation groups

[6]In the Appendix, we present alternative calculations based on ILO data, which have a somewhat more comprehensive coverage and include more recent observations for some countries. Results are similar to the ones in the main text (see D for details). They are also similar to the results computed by Dingel and Neiman (2020*b*) using ILO data. The disadvantage of the ILO data is that they do not permit a disaggregation of the occupational composition along several dimensions at once, and therefore do not allow analyzing urban wage and self-employment separately.

Table 2: Percent of workers who can work from home by country income level

	Low	Lower-middle	Upper-middle	High
Urban	22.1	29.6	31.2	37.1
Urban, wage employed	28.0	32.9	31.7	36.7
Urban, self-employed	15.5	23.8	28.8	40.4
Urban, WFH for self-empl. from IFLS	19.5	24.6	27.6	33.1
Urban and rural	14.7	24.8	28.8	34.7
Urban and rural, WFH for farmers =1	64.3	42.9	34.2	37.5

Note: The numbers represent averages across country-years' WFH employment shares within each income group as defined by the World Bank classification in 2018.

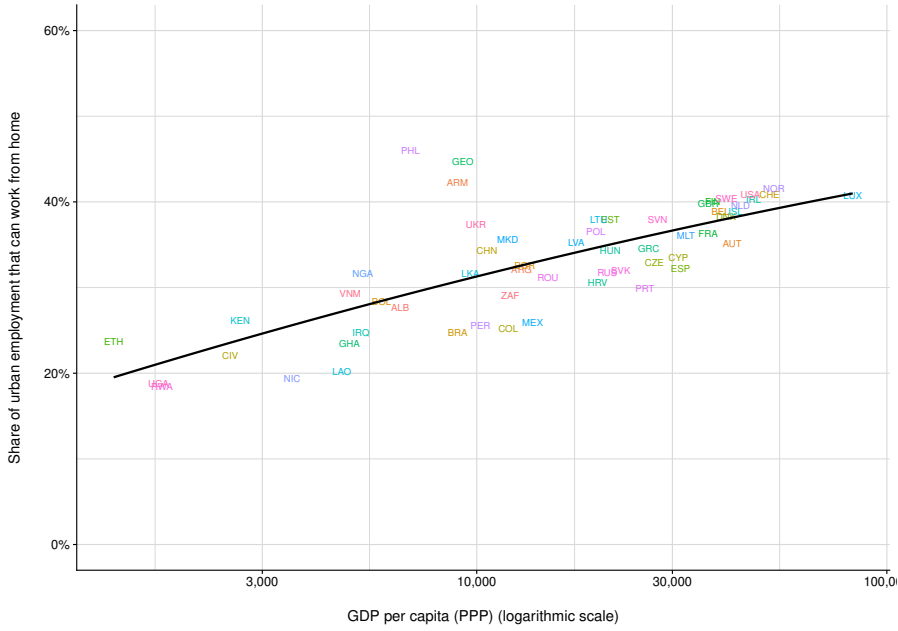
for four country income groups. It is evident that in high income countries, a very large share of employment is in managerial and professional occupations.[7] This share decreases monotonically as one goes from the highest to the lowest country income group, from 55 to 22%. In contrast, employment in low income countries is concentrated in elementary occupations and agricultural activities (30%). The share of employment in such activities is minor in rich countries (10%). The share of employment in services and sales occupations is also much larger in low income countries (30%) than in high income ones (17%). The share of employment as operators, assemblers and trades workers is hump-shaped in country income per capita.

The large differences in the occupation composition of employment with income per capita, combined with large differences in the ability to work from home across occupations, imply that the ability to work from home varies strongly with income per capita. Figure 2 shows that the share of workers with occupations that can be done from home is increasing with income levels. The first line of Table 2 proposes a summary, grouping countries by income levels defined by the World Bank. While in the least developed countries the share of occupations that can be executed from home accounts for just over 20% of workers, this share rises to close to 40% in the most developed countries.

This analysis applied the WFH measures by (Dingel and Neiman, 2020*a*) to all countries, so that cross-country differences only reflect differences in the composition of employment across occupations. The next section addresses another potentially important difference between rich and poor countries that affects the ability to work from home, namely the prevalence of self-employment in poor countries. The section after that investigates the importance of the agricultural sector.

[7] We include technicians and clerical support workers in this broad group. See Table 6 in the Appendix for exact figures for all groups.

Figure 2: Percent of urban workers who can work from home by income per capita



Note: Figure 2 shows the share of the urban employed population with an occupation that can be executed remotely by country year. The data sources for the occupation employment shares are displayed in Table 4. The GDP data is taken from Feenstra et al. (2015); Zeileis (2019), and the share of WFH jobs by occupation is from Table 1.

3 Ability to work from home by employment status

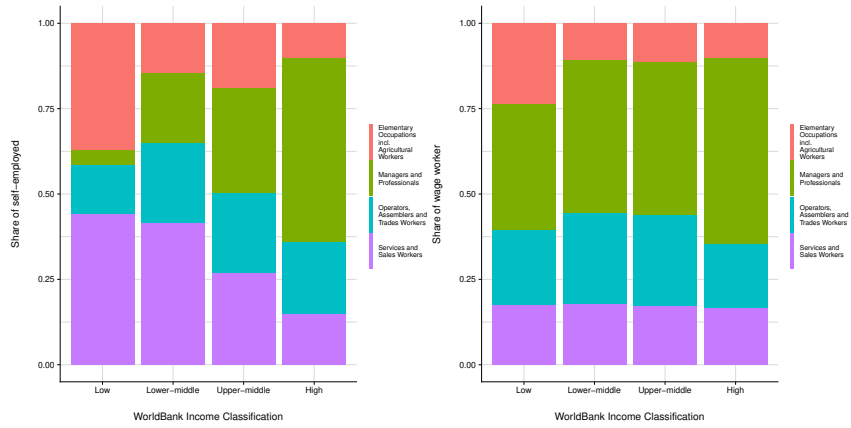
The organization of work differs significantly with country income per capita. In particular, the importance of self-employment varies very strongly with income per capita (Gollin, 2008). While in low-income countries, more than half of the working population is self-employed, only 10% of the working population is self-employed in rich countries. To assess the importance of this pattern, we analyze the WFH ability of the self-employed and wage employees separately. We also compute an alternative measure of WFH ability for household enterprises.

3.1 Ability to work from home for self-employed workers

3.1.1 Baseline results

The third line of Table 2 summarizes the WFH employment shares of the urban self-employed by country income group. Notice that the gap between low and high-income countries is substantially larger than in line 1. In other words, the self-employed in low income countries are

Figure 3: Distribution of occupations by country income level, urban areas, by type of employment



(a) Occupations of urban self-employed (b) Occupations of urban wage workers

Note: See Figure 1.

particularly limited in their options to carry out work from home.

This is due to the cross-country variation in the occupation composition of the self-employed. Figure 3 documents the occupation distribution of urban employment for wage employees (panel (a)) and the self-employed (panel (b)) separately, again by country income level (see Table 6 for the corresponding numbers). What stands out is that in rich countries, the occupational composition of the self-employed is similar to that of employees, and therefore to the aggregate occupation composition. In poor countries, in contrast, household enterprises are concentrated in occupations characterized by low WFH scores (notably elementary occupations and services and sales occupations), with only a negligible share of employment in the high-WFH score managerial and technical professions.

3.1.2 Alternative WFH measure

How easy is it to operate a household business from home? It is conceivable that the WFH measures computed by DN do not fully capture the ability to run a small household business from home in a poor country, given that they are based on a survey of work arrangements from a country where employment is concentrated in relatively large firms. For example, it may be possible to operate small production businesses, e.g. for food or garments, from the household. To assess the ability of running a household enterprise from home, we therefore compute an alternative

WFH measure, directly using data on household businesses.

A WFH measure for household enterprises. For this, we use the 2014 Indonesia Family Life Survey (IFLS Wave 5).[8] The survey is useful for our purposes as it records information on the location of business activity and on job characteristics. It collects detailed information on household businesses, including sector, ownership, and many others. We use information on urban non-farm businesses without paid employees. The survey also records, for each business, the identity of the household member most involved in the business. We use this to match their occupation to the business. We restrict our analysis to those who are self-employed as their main activity, to ensure that the recorded occupation actually refers to the household business.

We build a WFH measure based on two criteria, paralleling Dingel and Neiman (2020*a*). First, the survey records whether a business is operated entirely or partially outside the household's home, or not. Our first "loose" measure for the ability to run a household business from home is one for businesses not operating outside the home, and zero otherwise.[9] Second, the survey records information on job characteristics at the individual level. The one that most closely matches our objective is "My job requires skill in dealing with people." Our strictest measure for the ability to operate a household businesses from home takes the value one if the loose measure is one and the reply to this question is "None/Almost none of the time." We also define an intermediate measure, which is one if the loose measure is one and the reply to this question is "None/Almost none of the time" or "Some of the time". These two stricter criteria capture the fact that even when the location of a business is in the household's home, it may still require interaction with people from outside the household. This can be close, as in the case of a hairdresser, or more distant, as in the case of a business selling prepared food (a very common type of business).[10]

Table 3 shows the proportion of household businesses that can be operated from home, for the three measures, by ISCO 1 occupation. While a significant fraction of businesses are operated from home (loose criterion) in several broad occupation groups, our measures for the ability

[8]Indonesia is a lower-middle income economy. The IFLS has been used very widely in research.

[9]Since this question asks whether a business is currently operated at home, and not whether it could in principle be operated from home, this aspect of our criterion is stricter than DN.

[10]Ideally, the question would ask about the frequency or importance of customer interaction, not the required skill. Yet, we presume that if no skill in dealing with people is required, this probably indicates no or very few interactions with people.

Table 3: Percent of household businesses that can operate from home by ISCO1 occupation

Occupation, ISCO 1 digit	WFH criterion		
	loose	inter.	strict
Managers	0.0	0.0	0.0
Professionals	30.0	0.0	0.0
Technicians and Associate Professionals	27.6	6.3	0.0
Clerical Support Workers	6.9	0.0	0.0
Services and Sales Workers	21.7	10.8	4.2
Skilled Agricultural, Forestry and Fishery Workers	18.2	7.4	6.6
Craft and Related Trades Workers	23.6	22.4	12.0
Plant and Machine Operators and Assemblers	6.3	0.0	0.0
Elementary Occupations	12.8	3.5	0.0

Note: Data sources: Indonesia Family Life Survey (IFLS) 2014. Loose criterion: The business is not operated outside the home (question NT05b). Intermediate/strict criterion: Loose, and the job of the main person responsible for the business requires skill in dealing with people some or none of the time/never.

to WFH decline to very low levels once customer interaction is taken into account.

In the following, we will use the intermediate measure. Depending on occupation, the share of businesses that can be operated from home ranges from zero to 22% according to this measure. Compared to the figures for employees shown in Table 1, a significantly larger share of craft and related trades can be operated from home, if they are conducted by the self-employed. In contrast, household enterprises in managerial or professional occupations, technicians, and clerical support work can barely be conducted from home (note though that there are very few household enterprises of these types). The ability of service work to be conducted from home is also lower for household enterprises. Overall, this measure thus reports a lower ability to WFH.

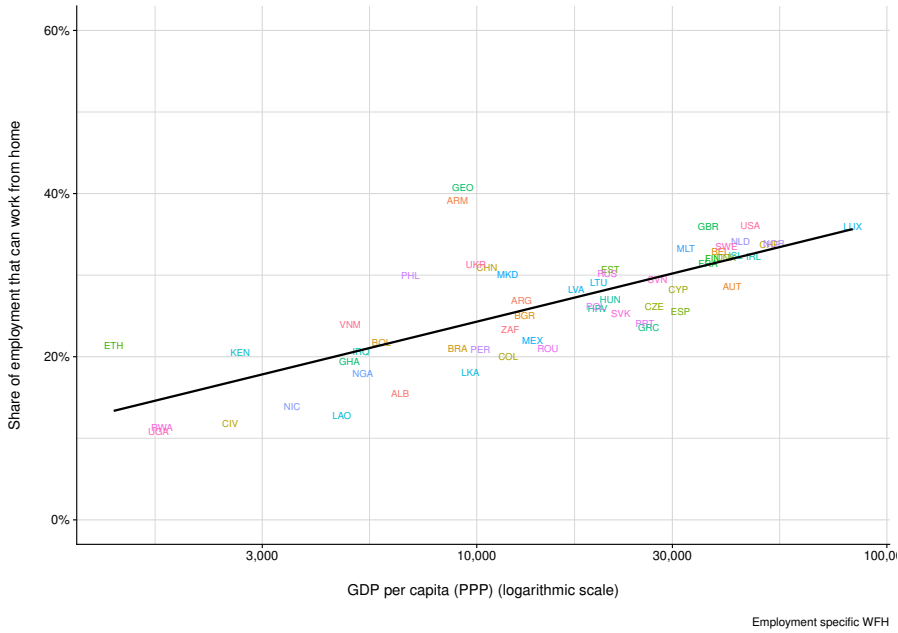
Ability to work from home. We next compute the share of urban employment that can WFH using the measure of WFH ability for household enterprises shown in Table 3 (intermediate criterion). We continue to use the measure by DN for wage employees. Results are shown in Figure 4 and summarized in line 4 of Table 2.

In line with the lower ability to WFH of the measure for household enterprises, this Figure shows a generally somewhat smaller share of employment that can be done from home. It drops from around 37% to 33% for the richest countries. The drop is similar for the poorest countries,

from 22% to 19.5%.

To summarize, the high levels of self-employment in poor countries, combined with its concentration in occupations where it is difficult to work from home, contributes significantly to the lower ability to WFH in poorer countries.

Figure 4: Percent of urban workers who can work from home by income per capita, with employment-type specific WFH score



Note: Figure 4 shows the share of WFH employed population when WFH wage employment and self employment specific by income per capita. Data sources as in Figure 2. the share of WFH jobs for wage workers is based on table 1, and the share of WFH jobs for self-employed workers is taken from WFH in table 3 (intermediate WFH criterion).

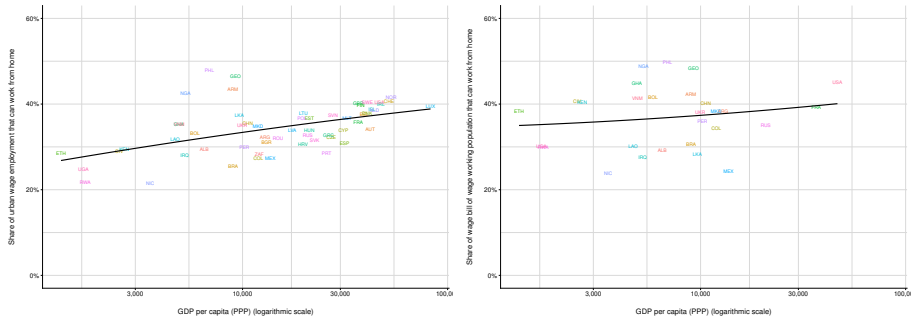
3.2 Wage employees

Figure 5 shows the ability to work from home across countries for wage employees only, again using data for urban areas. Panel (a) shows the share of wage employees in each country that can work from home. For rich countries, the differences between this figure and Figure 2 are small, reflecting the dominance of wage employment in aggregate employment in these countries. Yet for poor countries, differences are notable: the share of wage employees who can work from home in the poorest countries reaches almost 30%, significantly exceeding the aggregate share of urban employment that can be done from home. This can also be seen by comparing the first two lines of Table 2. The reason for this is that the occupation distribution of wage employment differs much less across

countries than that of all employment. In particular, employees in poor countries are not as concentrated in elementary and services and sales occupations as the self-employed are. (See Figure 3 and Table 6.)

Panel (b) of Figure 5 depicts the share of the wage bill accounted for by urban employees able to work from home. It varies less systematically by income per capita. Compared to panel (a), there is an additional composition effect at work: occupations with high WFH scores, which already are high-wage occupations in the US (DN), tend to pay even higher wages in poor countries. As such occupations are skill-intensive (managers, professional), this is likely a reflection of the scarcity of skill supply in these occupations in developing countries. To the extent that wages are informative of efficiency units of labor, we conclude that the fraction of efficiency units of wage employment that can be provided from home is weakly correlated with the level of development.

Figure 5: Ability to work from home for wage employees



(a) Percent of urban wage employees who can work from home by income per capita

(b) Wage bill share of employees who can WFH by income per capita.

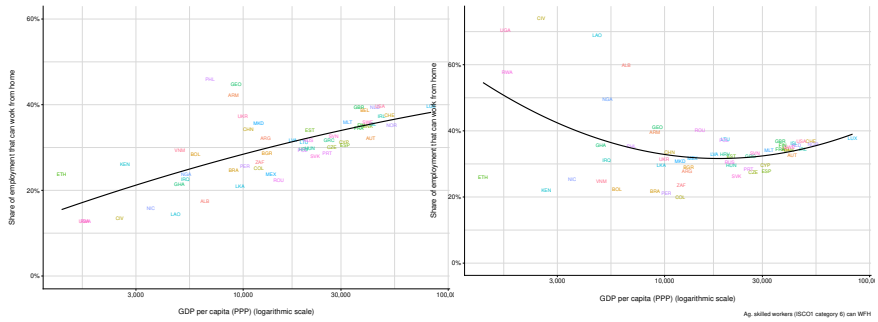
Note: Figure 5a shows the share of the urban wage-working population with an occupation that can be executed remotely by country year. Figure 5b displays the share of the wage bill that is spent on wage jobs. The country year coverage is smaller since wage information is only available for a subset of the surveys. Data sources as in Figure 2.

4 The role of farmers' ability to work from home

A second specificity of poor countries is the much larger share of agricultural employment. This did not affect results in the main analysis, since that focussed on urban employment. However, results for rural areas or at the national level will crucially depend on the ability of farmers to work from home.

The Dingel and Neiman (2020*a*) classification finds that farmers can barely work from home. It is not clear to what extent this is applicable in farming in poor countries, which occurs in very different technological

Figure 6: Percent of a country's workers who can work from home by income per capita



(a) Baseline WFH scores (b) WFH score of 1 for agricul. workers

Note: Data sources as in Figure 2. Panel (a) is analogous to that figure, using data for the entire country. Panel (b) is similar, except for the assumption that the ability to WFH is 1 for the occupation "Skilled Agricultural, Forestry and Fishery Workers".

and geographical settings. In rural areas, a very large fraction of households engage in some farming. If plots are close to home, or adjacent to home, farming may be possible from home, at least for some time. Similarly, in such a setting, a large fraction of output is consumed within the household, and not sold to market. This could also be sustained while working from home.

We therefore next show the ability to WFH for the country as a whole, under two alternative assumptions on the share of farmers able to do WFH: 0.083, as in Table 1, or one, almost the polar opposite.[11] Our findings will give an indication of how much restrictions on farmers' ability to work affect overall labor supply.

Results are shown in Figure 6. These figures show that for the aggregate ability to WFH in poor countries, farmers' ability to WFH is crucial. If farmers cannot work from home, the share of workers who can work from home in the poorest countries is extremely low, at less than 20%. If, in contrast, farmers are assumed to be able to WFH, this rises to 30 to 70%, somewhat higher than the average for rich countries.[12] The bottom half of Table 2 summarizes these results clearly. In the baseline scenario, the WFH gap between low (14.7%) and high-income countries (34.7%) is particularly pronounced. In the second scenario, on the other hand,

[11] A score of 1 probably exceeds the true ability to work from home even for subsistence farmers. Yet, it illustrates the importance of this number very powerfully. Note that while occupation 9 also contains agricultural workers, they are mostly wage workers, and therefore could typically not work from home.

[12] Note that the low productivity of agriculture in poor countries implies that, in such a scenario, the negative effect of only being able to WFH on aggregate output may still be larger in poor than in rich countries.

the gap reverses, with WFH averaging 64.3% in low and 37.5% in high-income countries. The rigidity of social distancing rules for farmers will thus affect the ability to WFH for a significant share of the population.

5 Concluding remarks

The ability to work from home is an important instrument to soften the economic fallout resulting from social-distancing measures to stem the COVID-19 pandemic. We document that the occupational composition in urban areas provides less scope for WFH in developing than in developed countries. This result is particularly driven by self-employed workers: they represent the bulk of employment in developing countries, working in occupations that can hardly be accomplished away from the production site or the customer base. The country-level ability to work from home depends crucially on the WFH ability of farmers.

Appendix

A Data sources

Figure 2 uses our individual level dataset that consolidates labor force surveys and the labor force section of household surveys from many countries. This dataset harmonizes information on individual characteristics and labor supply. It contains information on employment status, job type, occupation and sector of activity. Table 4 lists all data sources used to construct the dataset.

Table 4: Individual level dataset. Information on data sources, sample size and country years covered.

Name	Years	Sample size (in thds)	GDP per capita (PPP)	Source
Albania	2002–2012	23	4'845–9'918	LSMS
Argentina	2004–2006	127	12'074–13'770	LFS
Armenia	2013–2013	1	8'979–8'979	STEP
Austria	1999–2017	1'034	34'938–51'524	LFS
Belgium	1999–2017	474	32'357–46'522	LFS
Bolivia	2012–2012	2	5'860–5'860	STEP
Brazil	2002–2006	723	8'358–9'515	LFS
Bulgaria	1995–2017	177	6'390–20'027	LSMS, LFS
China	2012–2012	1	10'596–10'596	STEP
Colombia	2012–2012	2	11'934–11'934	STEP
Cote d'Ivoire	1985–1988	13	2'429–2'734	LSMS
Croatia	2002–2017	155	13'750–24'368	LFS
Cyprus	1999–2017	207	25'255–36'137	LFS
Czech Republic	2002–2017	663	21'374–36'061	LFS
Denmark	1999–2017	511	33'525–49'607	LFS
Estonia	1999–2017	118	10'772–31'013	LFS
Ethiopia	2013–2014	46	1'248–1'357	LFS, UES
Finland	1999–2017	207	31'433–42'902	LFS
France	2003–2017	812	31'567–40'975	LFS
Georgia	2013–2013	1	9'254–9'254	STEP
Ghana	2013–2015	6	4'875–4'910	STEP, LFS
Greece	1999–2017	1'143	22'683–31'340	LFS
Hungary	2001–2017	1'179	16'448–27'531	LFS
Iceland	1999–2017	54	37'732–51'316	LFS
Iraq	2006–2006	27	5'223–5'223	LSMS
Ireland	1999–2017	1'071	33'680–73'297	LFS
Kenya	2013–2013	2	2'652–2'652	STEP
Laos	2012–2012	2	4'693–4'693	STEP
Latvia	2001–2017	154	10'921–26'643	LFS
Lithuania	1999–2017	277	10'373–30'936	LFS
Luxembourg	1999–2017	168	64'436–99'477	LFS
Macedonia	2013–2013	2	11'910–11'910	STEP
Malta	2009–2017	76	26'792–41'847	LFS
Mexico	2005–2005	163	13'691–13'691	LFS
Netherlands	1999–2017	834	37'786–50'024	LFS
Nicaragua	2005–2005	12	3'548–3'548	LSMS
Nigeria	2010–2018	18	4'971–5'641	LSMS
Norway	2005–2017	111	49'908–63'768	LFS
Peru	2009–2014	115	8'515–11'086	LFS
Philippines	2015–2015	1	6'896–6'896	STEP
Poland	2006–2017	1'155	16'416–28'420	LFS
Portugal	1999–2017	771	22'413–28'567	LFS
Romania	2009–2017	694	16'752–25'262	LFS
Russian Federation	2004–2015	77	12'554–25'777	RLMS-HSE
Rwanda	2013–2016	49	1'551–1'872	LFS
Slovakia	2007–2017	354	22'724–30'433	LFS
Slovenia	2005–2017	297	26'506–33'947	LFS
South Africa	2012–2019	243	11'965–12'201	QLFS
Spain	1999–2017	920	25'102–37'233	LFS
Sri Lanka	2012–2012	1	9'653–9'653	STEP
Sweden	1999–2017	1'441	34'468–47'892	LFS
Switzerland	2010–2017	232	54'028–62'927	LFS
Uganda	2009–2013	21	1'571–1'759	LSMS
Ukraine	2012–2012	1	9'956–9'956	STEP
United Kingdom	1999–2017	702	31'110–42'138	LFS
United States	1998–2004	220	43'625–49'138	CEPR
Viet Nam	2012–2012	2	4'917–4'917	STEP
		17'892	1'248–99'477	

B Working from home by more detailed ISCO occupations

Table 5: Working from home by occupation category ISCO-2.

Occupation, ISCO 2 digit	Share of WFH occupations
Chief Executives, Senior Officials and Legislators	87.7
Administrative and Commercial Managers	89.9
Production and Specialized Services Managers	69.1
Hospitality, Retail and Other Services Managers	46.3
Science and Engineering Professionals	66.0
Health Professionals	11.0
Teaching Professionals	96.6
Business and Administration Professionals	95.1
Information and Communications Technology Professionals	100.0
Legal, Social and Cultural Professionals	68.5
Science and Engineering Associate Professionals	19.7
Health Associate Professionals	6.0
Business and Administration Associate Professionals	70.8
Legal, Social, Cultural and Related Associate Professionals	58.0
Information and Communications Technicians	81.8
General and Keyboard Clerks	100.0
Customer Services Clerks	28.3
Numerical and Material Recording Clerks	51.9
Other Clerical Support Workers	63.3
Personal Services Workers	23.8
Sales Workers	21.1
Personal Care Workers	21.9
Protective Services Workers	11.8
Market-oriented Skilled Agricultural Workers	10.0
Market-oriented Skilled Forestry, Fishery and Hunting Workers	9.6
Subsistence Farmers, Fishers, Hunters and Gatherers	0.0
Building and Related Trades Workers (excluding electricians)	1.5
Metal, Machinery and Related Trades Workers	0.0
Handicraft and Printing Workers	15.9
Electrical and Electronics Trades Workers	0.0
Food Processing, Woodworking, Garment and Other	7.9
Stationary Plant and Machine Operators	0.0
Assemblers	0.0
Drivers and Mobile Plant Operators	23.7
Cleaners and Helpers	0.0
Agricultural, Forestry and Fishery Labourers	0.0
Labourers in Mining, Construction, Manufacturing and Transport	8.3
Food Preparation Assistants	0.0
Street and Related Sales and Services Workers	0.0
Refuse Workers and Other Elementary Workers	25.0

Note: We follow the classification provided by Dingel and Neiman (2020*a*) who use two ONET surveys with information on work context and generalized work activities for many jobs. They consider a job to not be teleworkeable requires amongst others the handling of equipment or contact with the public or if the job has a work context that requires the handling of objects and tools (that are not computers). We use a cross-walk to map DN's measures to the ISCO-2 classification.

C Additional tables

Table 6: Average occupation share by country income level

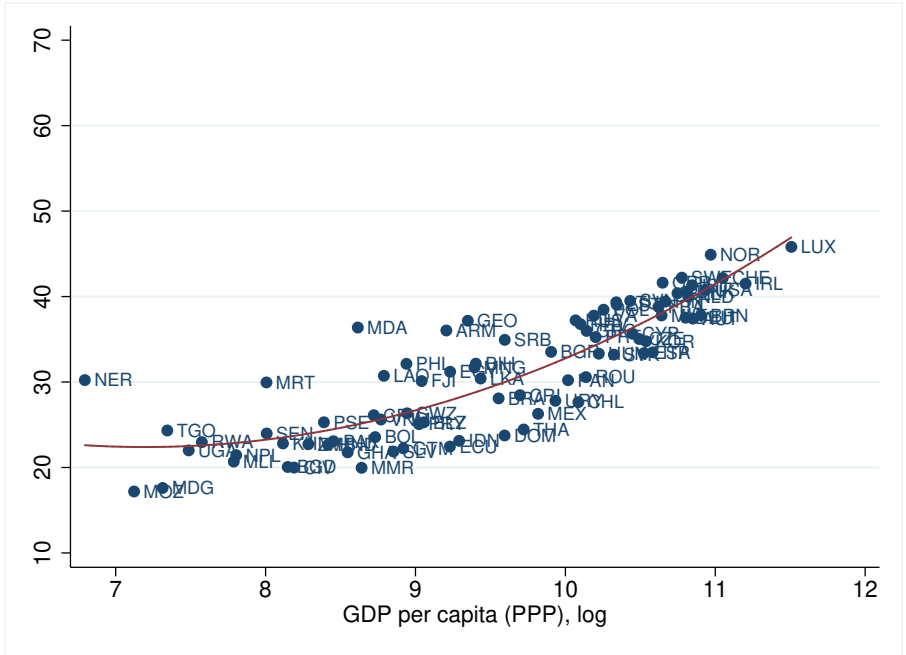
Urban, all	Low	Lower-middle	Upper-middle	High
Managers and Professionals	0.216	0.359	0.424	0.546
Services and Sales Workers	0.301	0.264	0.189	0.165
Elementary Occupations incl. Agr. Workers	0.299	0.121	0.125	0.101
Operators, Assemblers & Trades Workers	0.184	0.256	0.261	0.189
Urban self-employed				
Managers and Professionals	0.044	0.206	0.310	0.541
Services and Sales Workers	0.443	0.416	0.269	0.148
Elementary Occupations incl. Agr. Workers	0.371	0.144	0.188	0.100
Operators, Assemblers & Trades Workers	0.143	0.235	0.234	0.210
Urban employee				
Managers and Professionals	0.368	0.446	0.448	0.547
Services and Sales Workers	0.174	0.178	0.173	0.167
Elementary Occupations incl. Agr. Workers	0.236	0.108	0.111	0.101
Operators, Assemblers & Trades Workers	0.222	0.268	0.267	0.186

Note: The numbers represent averages across countries' occupation shares, conditional on employment status, within each income group as defined by the World Bank classification in 2018. The first occupation group (ISCO 1-4) consists of *Managers*, *Professionals*, *Technicians and associate professionals*, and *Clerical support workers*; the second (ISCO 5) of *Services and sales workers*; the third (ISCO 6 & 9) of *Skilled agricultural, forestry and fishery workers* and *Elementary occupations*; and the fourth (ISCO 7 & 8) of *Craft and related trades workers* and *Plant and machine operators*.

D Robustness: ILO data on occupation employment shares

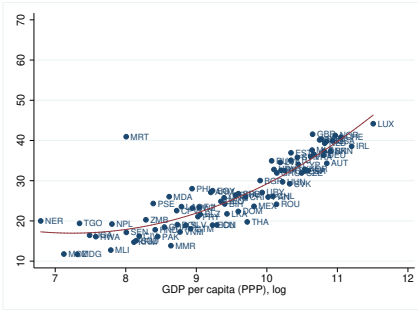
The main results are based on the occupational composition in our assembled dataset. Here, we re-compute some of the results using occupational employment provided by ILO data. Figure 7 focuses on urban employment and is analogous to Figure 2. We confirm a positive correlation between the share of WFH employment and GDP per capita. Figures 8a depicts the share of WFH for the aggregate economy (both urban and rural) using the baseline WFH scores, while Figure 8b does the same while attaching a WFH score of 1 to agricultural workers. They confirm the trends portrayed in Figure 6. Table 7 summarizes the findings by country income groups. Most importantly, the main specification in the first line suggests that 22.1% of workers can execute their work from home in low-income countries, as opposed to 37.4% in high-income countries.

Figure 7: Percent of urban worker that can work from home, ILO data

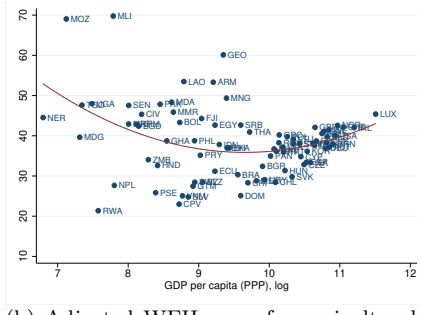


Note: The employment share of WFH combines WFH scores from Table 1 and ISCO-1 employment by occupation in urban areas from ILO. GDP data is from Feenstra et al. (2015); Zeileis (2019). Each country is the most recent annual observation over the period 2015-2019 for which occupational and GDP data are available. The regression line is a quadratic fit.

Figure 8: Percent of all workers (both urban and rural) that can work from home, ILO data



(a) Baseline WFH scores



(b) Adjusted WFH score for agricultural workers

Note: In panel (a), the employment share of WFH combines WFH scores from Table 1 and ISCO-1 employment by occupation in both urban and rural areas from ILO. In panel (b), the WFH score of skilled agricultural workers (ISCO code: 6) is set to 1. GDP data is from Feenstra et al. (2015); Zeileis (2019). Each country is the most recent annual observation over the period 2015-2019 for which occupational and GDP data are available. The regression line is a quadratic fit.

Table 7: Percent of workers who can work from home by country income level, ILO occupation data

	Low	Lower-middle	Upper-middle	High
Urban	22.1	24.5	29.2	37.4
Urban, wage employed	–	–	–	–
Urban, self-employed	–	–	–	–
Urban, WFH for self-empl. from ILFS	–	–	–	–
Urban & rural	15.4	20.6	24.0	35.0
Urban & rural, WFH for farmers =1	48.6	38.8	36.7	37.5

Note: The numbers represent averages across countries' WFH employment shares within each income group as defined by the World Bank classification in 2018.

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