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CROSS-COUNTRY ANALYSIS OF LABOR MARKETS DURING THE COVID-19
PANDEMIC

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Cross-Country Analysis of Labor Markets during the COVID-19 Pandemic
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ABSTRACT

The authors study employment outcomes during the early stages of the COVID-19 pandemic in eight countries with different case levels and policy responses: the United States, Australia, France, Denmark, Italy, South Korea, Spain, and Sweden. While the share of people not at work increased in all countries, safety net policies seem to influence whether people remained employed (but absent from work) versus unemployed or left the labor force. The authors find large employment decreases among middle-educated and young workers, increasing disparities in countries with the largest labor market declines. A variety of evidence suggests that labor demand was likely a larger driver of employment declines than labor supply and that stringent social distancing policies were sufficient to reduce employment even in the absence of high cases. Lastly, job characteristics - the importance of face-to-face interactions and the ability to work remotely - were closely related to labor market outcomes, with these relationships being stronger in countries with more cases.

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Introduction

The COVID-19 pandemic impacted countries around the globe, but most research has been conducted on individual countries, frequently the US. A disadvantage of within-country analysis is that it limits comparisons of the effects of the pandemic and policy responses to the pandemic because there is far less variation within most countries than across countries. This paper seeks to fill that gap by considering eight countries with markedly different pandemic experiences and policy responses in terms of both social distancing and social safety net policies. Our main goal is to compare changes in labor market outcomes during the first year of the pandemic across countries and draw conclusions on the determinants of international differences. We do this by improving the international comparability of country-level datasets, making across-country comparisons of COVID-19 cases and social distancing policies, and qualitatively relating changes in employment to the types of jobs people hold.

First, we break down changes in the share of people not-at-work into four distinct categories: long-term unemployed, recently unemployed, absent from work, and out of the labor force, and study changes between 2019 and 2020. Across countries, we find large increases in the share of people not-at-work during the second quarter of 2020, driven by greater shares in recent unemployment (especially in the United States), absence from work (especially in Europe and Australia), and out of the labor force (especially in South Korea). Below, we suggest that cross-country differences in adjustment are related to social safety net policy responses.

Second, we examine how the pandemic affected labor market disparities, especially by age, education, and sex. We find that countries that experienced the largest downturns in labor markets during the pandemic tended to experience large increases in disparities in labor market outcomes between highly educated and low to middle-educated workers. Labor market conditions for highly educated workers declined only modestly in all countries, with most of the variation across countries arising from differences in the outcomes of low and middle-educated workers. Interestingly, high school dropouts fared better than high school graduates in many countries.

We also consider disparities by other demographics. Our results indicate a substantial age

gradient, with greater reductions in employment among younger compared to older individuals. We suspect that workers' seniority plays an important role in shaping this age gradient. We find that differences by sex and marital status are fairly small and may reflect other disparities (e.g. age and education), although there are some differences by presence of children.

Third, we seek to understand the extent to which changes in labor market outcomes reflect changes in labor demand versus labor supply. Here we piece together a range of evidence. It seems logical that if changes in labor market outcomes are due to changes in labor supply, they will show up in the form of people withdrawing from the labor market, whereas if they reflect changes in labor demand, they will more likely take the form of changes in employment among those in the workforce. We further hypothesize that changes in labor supply will be particularly reflected among older individuals and women. The former because infection risk increases with age and the latter as women, particularly those with children, frequently took on additional caregiving responsibilities. Lastly, we use differences in the types of jobs that workers hold and show that those whose jobs could be performed remotely generally experienced smaller reductions in employment, which may reflect changes in labor demand based on the ability of firms to continue employing workers. In all cases, our estimates suggest that labor demand was likely the primary cause of changes in employment, at least in the early stages of the pandemic.

Fourth, our analysis may shed some light on the role that pandemic severity (number of cases) versus policy responses, such as social distancing and safety net responses, played in determining employment changes. We leverage the substantial differences in the level of cases across countries - with France, Italy, Spain, and the United States experiencing high cases and Australia, South Korea, Denmark, and Sweden having much lower cases - as well as differences in policy responses - with countries like Australia, Italy and Spain imposing rigid lockdowns, and others like South Korea and Sweden implementing much softer responses. Our estimates suggest that stringent social distancing policies reduce employment even in the absence of high cases.

Lastly, we study how job characteristics - the importance of face-to-face interactions and ability to work remotely - relate to labor market outcomes. Here, and in keeping with existing work, we find that both were strongly related to labor market outcomes. Moreover, we find

that the strength of these relationships varied considerably across countries and tended to be stronger in countries where cases were higher.

Our findings, based on country-level survey data that we made largely comparable across the countries, inform future decision-making on two main levels. First, because they suggest which groups were most vulnerable to job losses during this period and which policies were most harmful, they provide insights for policymakers striving to manage potential future health emergencies. Second, our evidence is informative on the costs of social distancing policies and their effects on labor market outcomes. Specifically, we found that the policy responses to the onset of the virus played a role in shaping the labor market effects, in addition to that played by infections and other indicators of COVID-19 spread.

Background

Related Literature

The COVID-19 pandemic had a significant impact on social and economic activity. Governments reacted with a range of policies that affected the supply and demand for labor. Many social distancing policies limited activity in large sectors of the economy, especially hospitality, retail trade, transportation, and tourism (Bartik et al. 2020, Chetty et al. 2020, Coibion et al. 2020, Gupta et al. 2020, Farboodi et al. 2021, Goolsbee and Syverson 2021).¹

While most studies focus on a single country, there are papers examining the trade-off between economic activity and public health in a small number of countries. For instance, Andersen et al. (2020) study Denmark and Sweden, Aum et al. (2021b) study South Korea and the United Kingdom, and Fajgelbaum et al. (2021) study South Korea and the US. They argue that full-scale lockdowns generated excessively large economic costs relative to the benefit of reducing health risks.²

¹These papers employ three main techniques to quantify social distancing: 1) measures of the mobility of the population, 2) proxies based on the observed spread of infection, and 3) indices of the implementation of social distancing policies (Brodeur et al. 2021).

²Fajgelbaum et al. (2021) suggest that optimal pandemic-fighting strategies should focus on a strict initial lockdown of locations with relatively high disease prevalence. This spatial targeting strategy creates substantially lower real-income losses. Aum et al. (2021b) show that vigorous testing and effective tracking of the virus reduced infections and caused less economic disruption than a blanket lockdown. Andersen et al. (2020) and Aum et al. (2021a) report that most economic contractions are caused by individuals' responses to the virus regardless of government-imposed lockdown policies.

Several papers have attempted to compare policy responses and their impact on labor markets across countries. Soares and Berg (2022) consider seven high and middle-income countries and conclude that wage subsidy policies helped to lessen negative labor market impacts. Wealthier, older, more highly educated and male workers fared better than others. Elgin et al. (2023) create a database of 165 countries and 39 labor market interventions. They find that policies that stimulated the economy and jobs and that supported enterprises, employment and incomes helped reduce the effect of the pandemic on economic growth.

A large body of literature provides evidence that previous economic and public health crises had disparate effects on the labor market and tended to accentuate pre-existing patterns of social stratification (Zissimopoulos and Karoly 2010, Dudel and Myrskylä 2017, Cheng et al. 2019, Killewald and Zhuo 2019, and Yasenov 2020). During the early stage of the pandemic, many researchers reported growing disparities in pre-existing labor market inequalities, considering outcomes such as wage and employment gaps by age, sex, ethnicity, education, and occupation. Adams-Prassl et al. (2020) find that workers in occupations that could not be performed at home were at greater risk of losing their jobs. In the US and UK, less educated workers and younger individuals were more likely to experience severe earnings declines compared to workers in Germany. Alstadsæter et al. (2020) show that the shock from COVID-19 in Norway had a strong socio-economic gradient, most adversely affecting financially vulnerable populations and parents with younger children. Bluedorn et al. (2021) document stronger initial negative impacts on women that quickly dissipate over time. Galasso and Foucault (2020) compare early pandemic labor market outcomes across twelve OECD countries. They found that college-educated and white-collar workers were more likely to work from home and that less educated and blue-collar workers were more likely to either continue working at their regular workplace or to stop working. Relative to the results from Galasso and Foucault (2020), we are able to consider a longer time frame in 2020, adding results from the entire year rather than just March and April, look at a more comprehensive set of labor market outcomes and their determinants, and consider Sweden, Spain, and South Korea in addition to other countries. Khamis et al. (2021) and Kugler et al. (2023) examine the early labor market impacts of COVID-19 in developing countries. Verick et al. (2022) compare the impacts of the COVID-19

pandemic on labor markets with those of the global financial crisis across a range of countries.

Some studies examine the impact of school closures on parental labor market outcomes. Even though there was a more heterogeneous effect on hours worked by mothers, both fathers and mothers of school-age children saw a reduction in hours worked and in the likelihood of working full-time (Heggeness 2020; Garcia and Cowan 2022). Garcia and Cowan (2022) also suggest that these effects are concentrated among parents without a college degree and those working in occupations less suitable for telework. Finally, Forsythe et al. (2020) show that most industries and occupations in the US experienced a contraction in job postings and a surge in unemployment insurance claims with leisure, hospitality services and non-essential retail experiencing the biggest declines.³

A related line of work has shown the significant role of job characteristics in explaining differences in labor market outcomes across demographic groups.⁴ Montenegro et al. (2022) study labor market outcomes during the early stage of the pandemic in March and April 2020. They find that, in the US, pre-pandemic sorting of workers into occupations along demographic lines can explain a sizeable portion of disparities in labor market outcomes. Using 2019 Occupational Information Network (O*Net) Work Context module data, they develop indices of the extent to which each occupation allows remote work and requires face-to-face interaction. Béland et al. (2020) show that occupations with a higher share of remote workers were less affected by COVID-19. They also find that occupations classified as “more exposed to disease” were less affected, possibly due to the number of essential workers in these occupations.

The Pandemic and Policy Responses

Our eight countries represent a broad range of COVID-19 pandemic experiences. In February 2020, Italy was the first Western country to deal with the virus. The Italian population

³Essential retail, the “front line” industry most in-demand during the COVID-19 crisis, experienced a much smaller decline.

⁴Dingel and Neiman (2020) construct a new index to measure the feasibility of working from home for all occupations and merge this classification with occupational employment counts. They find that lower-income economies have a lower share of jobs that can be done at home. Avdiu and Nayyar (2020) argue that the supply of labor is affected by the COVID-19 pandemic differently across jobs based on the potential for remote work (RW) and importance of face-to-face (F2F) interactions. Using guidance about “essential critical infrastructure sectors” from the US Department of Homeland Security (DHS), Blau et al. (2020) analyze the characteristics of essential workers and a subcategory of this group, frontline workers. Leibovici et al. (2020) take a similar approach to measure occupations with high interpersonal contact.

experienced a high death rate of 3,188 deaths per million people through the end of February 2023.⁵ Soon after, death rates in Spain passed those in Italy. The United States had the highest overall mortality rate (3,278 deaths per million through February 27, 2023) among the countries we examine. South Korea was hit hard early but largely managed to contain the virus and was consistently among the countries with the lowest death rates in most months between 2020 and February 2023, with a few exceptions in 2022. In February 2023, the cumulative death rate was 657 deaths per million in South Korea. Australia, which abandoned zero-COVID measures in late 2021 (a bit earlier than South Korea) was spared the early ravages of COVID but had a cumulative death rate of 750 deaths per million at the end of February 2023. Death rates in France, Spain, Sweden, and Denmark fell in the middle of our study countries: by February 27, 2023, the cumulative death rates were 2,557, 2,528, 2,247, and 1,403 deaths per million, respectively.

United States

On January 20, 2020, the first case of COVID-19 in the US was diagnosed in Washington State – the same day as the first reported case in South Korea. US COVID-19 cases and deaths initially peaked in late March and April of 2020. In reaction to the outbreak of COVID-19 in March 2020, the US government declared a nationwide emergency and issued overseas travel bans. States rapidly implemented shutdowns and a range of social distancing policies, such as stay-at-home orders, school closures, closures of non-essential business and services, and limits on large social gatherings, to slow the spread. In May and June, there was a brief reduction in the number of new cases, potentially due to the combination of lockdowns, social-distancing policies, and the dynamic nature of the pandemic. Considering the adverse impact of the initial outbreak on workers and businesses, and the public pressure from protests and demonstrations, some states began to implement a phased re-opening of economic activities. However, cases and deaths increased, reaching an even higher peak in July and August, leading to a pause in the re-opening activities.

The pandemic and the following shutdowns lead to a dramatic economic decline. To pro-

⁵Death rates obtained from <https://ourworldindata.org/coronavirus>.

vide economic assistance to American workers, families, small businesses, and industries, the US government implemented a large-scale stimulus program: the Coronavirus Aid, Relief, and Economic Security (CARES) Act (2020). The CARES Act was a \$2.2 trillion economic stimulus bill, which included \$300 billion on one-time cash payments to individuals, \$260 billion on increased unemployment benefits, \$350 billion in funding small businesses (the Paycheck Protection Program, PPP), \$500 billion in loans for corporations and \$339.8 billion to state and local governments.

For individual workers, the most directly relevant provisions were one-time cash payments, extended unemployment benefits, and the PPP. The CARES Act prescribed an additional 13 weeks of federally-funded benefits in addition to the standard state-administered UI programs, and an additional \$600 per week for up to four months to July 31st, 2020. Moreover, the CARES Act extended the eligibility for UI benefits to cover some workers who were ordinarily ineligible for unemployment benefits. To help businesses cover their payroll and keep employment and employee wages stable, the PPP allowed entities to apply for low-interest loans.

Australia

The first few cases in Australia were confirmed on January 25, 2020 in Victoria and New South Wales, the two most populous states. As case numbers grew, national borders were closed to arrivals from China in mid-February, from Italy on March 11th, and then to all non-residents on March 20th.⁶ The Australian policy response was fractured with each state setting up its own quarantine procedures and relying on the advice of its state-level medical authorities. Australia's geographic distance from the rest of the world, low population density, and late summer conditions in March 2020 all contributed to a very slow spread of the virus. This slow spread led policy-makers to believe that the virus could be eliminated, and policies from mid-2020 through November 2021 pursued this goal. This led to travel restrictions within Australia and extended lockdowns, most notably in the state of Victoria, which locked its citizens down for a total of 262 days between 2020 and 2021.⁷ As 2021 drew to a close, zero-COVID began

⁶See Australian Parliamentary Library 2020.

⁷See <https://theconversation.com/covid-in-victoria-262-days-in-lockdown-3-stunning-successes-and-4-avoidable-failures-172408>.

to appear unsustainable, leading to a quick dismantling of the restrictions. By late November 2021, Australia was mostly back to normal with schools and universities open and travel restrictions and social distancing rules removed.

Australia's fiscal stimulus policies during COVID-19 were substantial. Because Australia does not have unemployment insurance, income support policies were pivotal and stayed in place for a full year. During the early stages of the COVID-19 pandemic in 2020, the Australian federal government implemented large cash transfers targeted at firms and individuals: an AU\$88 billion wage subsidy (JobKeeper); early access to AU\$38 billion in withdrawals from private pension accounts; and AU\$52 billion in (supplementary) working-age benefit payments to the unemployed, students, and parents. In interpreting our results, we note that recipients of JobKeeper wage subsidies were counted as employed in our data irrespective of whether they were actually at work or not. These emergency cash transfers were in place for a full year.

Breunig and Sainsbury (2023) show that these programs reached 6.5 million working-age people (42 percent of the working-age population) and represented 20 percent of aggregate wages. The median recipient had 46 percent of his/her weekly pre-COVID-19 wages replaced by the transfers. The programs resulted in a strong, if short-lived shift in the income distribution. The share of the population with very low incomes fell: the number of individuals below the AU\$450 weekly poverty line fell by approximately 1.8 million during the most acute six-month phase of the pandemic.

South Korea

The first case of COVID-19 was confirmed in South Korea on January 20, 2020. Cases were mainly confined to specific clusters until mid-to-late February after which they spread rapidly, first in Daegu, and then nationally through March. From March to mid-April the spread slowed but clusters still emerged. The geographic dimension of transmission led the Korean authorities to focus on targeted efforts to control the spread of COVID-19 through broad-based, national policy responses. From mid-April, the number of new daily confirmed cases dropped substantially until mid-August. However, cases began to increase gradually in mid-August and then explosively through December.

From February to May 2020, the Korean government prioritized intensive and targeted testing and contact tracing.⁸ There were no limitations on private gatherings until the late December 2020 surge. Although some government and private facilities were temporarily closed in response to clusters, South Korea never mandated a blanket lockdown. In South Korea, schools are traditionally on break from late December to late January and then again for a few weeks in late February and early March. Rather than reopening, schools remained closed in March and partially reopened only at the beginning of May.

This targeted government response was widely regarded as successful in three ways. First, in contrast to many countries, it avoided a dichotomy between “essential” and “non-essential” economic activities (Aum et al. 2021a). Second, as of August 14, 2020, the containment strategy resulted in a very low cumulative infection rate (i.e. 0.28 per thousand individuals). Finally, it helped prevent social disruption from high levels of spread.

In 2020, the government implemented fiscal measures to combat the economic impact of COVID-19. Those measures, collectively worth KRW 310 trillion (equivalent to US\$258 billion), supported the self-employed; small business owners; small and medium-sized enterprises (SMEs); and the vulnerable, including households in crisis. They also provided emergency disaster relief funds in May in the form of direct subsidies to the entire population. The subsidy was one million KRW (730 US dollars) for a family of four (OECD 2020). Local governments, including the early hit Daegu, also implemented measures to respond to COVID-19. Among the 17 upper-level local governments (provincial, metropolitan, and special autonomous governments), 15 adopted fiscal measures (Park and Maher 2020).

European Countries: Italy, Denmark, Spain, France, and Sweden

Among the European countries in our sample, Italy and Spain had the highest cumulative death rates, followed by Sweden and France. Denmark consistently had the lowest death rate among the European countries we consider. France was the first to suspend events, followed by Italy, Spain, Denmark (all roughly a week later), and Sweden a week after that. However,

⁸Contact tracing interviews focused on basic information, such as the location history of confirmed cases. When this information was considered insufficient, additional data (mobile phone location, CCTV footage, card transaction records, etc.) were collected and cross-checked with information acquired from the initial interview (Shin et al. 2021).

probably as a response to the number of early COVID-19 cases and deaths, Italy quickly proceeded with other social distancing measures, including school closures on March 5th, 2020, and the suspension of non-essential activities on March 10th. Spain, France, and Denmark followed roughly 5 days later with non-essential industry closures and about 10 days later with school closures. Additionally, Spain closed its land borders on March 16th, and Spain and Italy interrupted non-essential production at the end of that month. By contrast, Sweden never implemented any measures beyond the suspension of public events on March 11th. Sweden is unique in our sample because, aside from the cancellation of mass events, it focused on recommendations and preferred behaviors, rather than imposing restrictions.

Prior work has focused on mobility to quantify the impact of the pandemic and social distancing responses (Caselli et al., 2022; Gupta et al., 2023; Li et al., 2023). Woskie et al. (2021) provide a comprehensive overview of cross-country relative changes in mobility during the pandemic. As a result of social distancing policies at the onset of the pandemic, Italy was the first to experience a 40% drop in mobility (defined as time spent away from own residence) by March 12th, compared to a drop of about 5% in other countries by that day. However, less than a week later, all countries except Sweden caught up, with drops in mobility of 50% to 60%.⁹ Mobility in Sweden never decreased more than 20%, except for a couple of days in April 2020 when it dropped by almost 50%. Still, this drop was small relative to Spain, Italy, and France where the decreases approached 80%. The tightest restrictions were largely lifted by the end of June 2020 across the European countries considered, with Denmark leading the gradual re-opening effort around mid-April 2020.

Despite wide variation in pandemic economic policies in the European countries, they largely fell into two categories. First, labor market support schemes provided income support and sought to retain jobs. These often took the form of “short-time work” (Eurofound, 2020), which subsidizes hours that are not worked anymore, or wage subsidies, which were similar to the Australian JobKeeper program. Second, household income was targeted directly, irrespective of employment status, by extending benefits and deferring taxes. The first set of measures was prioritized in Europe compared to the US, driving some differences in labor market trends

⁹While mobility data for Denmark are not available in our data source, social distancing policies were implemented around the same time in Denmark.

during this period. Furthermore, because job retention policies maintain the relationship between workers and employers, they may explain differences in labor market outcomes during the recovery, when economic activity recovered.

Of the European countries we consider, the budgetary fiscal support given to people and firms was lowest in Sweden, where additional spending in response to the pandemic was 2.2% of 2019 GDP, and highest in Italy, at 7.5%. For France, this number was 5.7%, for Spain, it was 5.3%, and for Denmark, it was 2.6% of the 2019 GDP.

France had about 155.4bn (Euros) in additional spending, which supported the short-time work scheme in the form of wage subsidies and support to firms, particularly the smallest ones, and the self-employed. Support was also provided to extend unemployment benefits and social programs. Italy spent an additional 150bn (Euros) which included income support to laid-off workers and the self-employed, vouchers for babysitter expenses, grants for small and medium enterprises, and education.

Spain's 74.14bn (Euros) additional spending was implemented via a set of measures which included much weaker requirements to access unemployment benefits, social contribution exemptions for firms that maintained employment, support to self-employed workers (with some exemptions), corporate solvency support, regional support for social services, education, households, and firms and expansion of pre-existing programs targeted at these sub-populations. Moreover, Spain introduced a new means-tested "minimum income scheme," a rental assistance program for vulnerable renters, and increased support to an existing program aimed at stimulating the housing and construction markets.

Sweden spent 12bn (Euros) on wage subsidies for short-term work, temporary paid sick leave, support for some sectors (media, culture, sports, education, and training), rent subsidies to certain sectors, and housing allowances to families with children, increases in the unemployment insurance generosity, and expansion of active labor market policies. Support was given to firms based on turnover reductions. Sweden also invested in infrastructure and public transport and provided general grants to local governments.

Finally, Denmark added about 9bn (Euros) in additional spending on grants to businesses, support to employment relationships and unemployment benefits, consumption support to house-

holds, training and education.

Data

We use data from local periodic labor force surveys collected in each country. For Australia, South Korea, and the United States we use monthly data from January 2019 to December 2020. For Italy, Denmark, Spain, France, and Sweden we use quarterly Eurostat data covering the same period. We begin by providing an overview of the definition and construction of our key labor market outcome variables. Then, we provide country-specific information about the data we use. Finally, we describe our method to harmonize occupation classifications across different countries and construct indices according to their suitability for remote work or face-to-face interactions.

The data contain information on demographic characteristics, current occupation for employed individuals in all eight countries, and previous occupation for the unemployed in the US.¹⁰ To analyze heterogeneity in the effects of the COVID-19 pandemic on labor market outcomes, we focus on five demographic characteristics: age, education, sex, marital status, and the presence of children in the household. We limit our attention to the working-age population aged between 18 and 65.

Variable construction

We divide employment status into five categories based on the categorization in U.S. Census Bureau (2019): 1) Employed and currently working; 2) employed but not currently working (absent from work); 3) recently unemployed (those who lost their jobs within the last six months);¹¹ 4) long-term unemployed (i.e., unemployed for more than six months); and 5) out of the labor force. Figure 1 outlines the structure of employment status in the US, which we use to construct the employment variables across all countries.

Employed but absent workers are “temporarily absent from their regular jobs because of illness, vacation, education or job training, labor dispute, or various personal reasons, whether

¹⁰These data are also available for South Korea and Australia, although we do not use them in our analysis.

¹¹Following U.S. Bureau of Labor Statistics (2020), the long-term unemployed are those who are currently unemployed and whose unemployment has lasted for 27 continuous weeks or more. Unemployment benefits (or insurance) last for 26 weeks in the US and 6 months in South Korea.

or not they were paid for the time off” (Australian Bureau of Statistics, 2021; Statistics Korea, 2021; U.S. Census Bureau, 2019). During the pandemic, employed-but-absent workers deserve particular attention. First, some employers paused their businesses and temporarily released their workers, intending to rehire them later (Bogage 2020, Borden et al. 2020). Moreover, in Australia and many European countries, retaining workers was subsidized. Second, some workers may have wanted to temporarily leave their workplace to protect their health or care for their families.¹² Third, because at the onset of the pandemic, surveys did not distinguish between pandemic-related changes in labor market participation, the lack of appropriate categories might have led surveyors to attribute this employment status to groups of workers who lost their jobs due to the pandemic. Hence, many workers directly affected by pandemic-related dismissals may have been recorded in the data as employed but absent.¹³ For these reasons, there is a massive increase in the share of workers coded as employed but absent from work during the pandemic. The key outcomes we focus on are (1) the share of people who are not at work (i.e., because they are employed but absent from work, unemployed (either recently or long-term), or out of the labor force) relative to the working age population; and (2) the share of people who are employed and at work divided by those who are employed (i.e., whether or not they are currently at work).¹⁴

Instead of using conventional unemployment rates, we construct rates by dividing the number of each employment status by the total working-age population in each country. We do this to avoid fluctuations driven by changes in “denominators,” which, at times, were quite dramatic during the pandemic. For instance, in the case of the unemployment rate, a reduction in the size of the labor force mechanically increases unemployment.

We analyze the direct effect of the pandemic on labor market outcomes during 2020 compared to the same period, that is, month or quarter (depending on data availability) in 2019. This controls for seasonality and allows us to compare labor market outcomes across countries. Although we do not emphasize long-term unemployment, we briefly examine changes in

¹²For example, school closures likely impact parents’ labor market participation (Heggeness 2020).

¹³The US Bureau of Labor Statistics instructed surveyors to code those out of work due to the pandemic as recently laid off or unemployed but indicated that surveyors appeared to code at least some of them in the employed-but-absent category (Montenovo et al. 2022).

¹⁴Although we have tried to align the definitions for each country with the US definitions, there are unavoidable differences between countries. Appendix Table A1 describes the construction of variables for each country.

long-term unemployment to better understand transitions between employment statuses. The pandemic may discourage long-term unemployed individuals from looking for a job. By considering the variation in long-term unemployment versus recently unemployed, we try to uncover the mechanisms behind changes in the out-of-labor force rate and isolate the short-term effect of the pandemic.

Data Description by Country

US Data

Our main source of data on the US labor market is the Current Population Survey (CPS), which is a monthly survey of about 60,000 households conducted jointly by the US Census Bureau and the US Bureau of Labor Statistics and is a primary source of labor force statistics for the United States. The CPS provides rich information on individual demographic characteristics and labor market activity, including both current and previous occupation of labor force participants. Occupations are recorded according to the 2018 Standard Occupational Classification (SOC) system.

Korean Data

We use two datasets for South Korean analysis. We use monthly data from the Economically Active Population Survey (EAPS) from January 2019 to December 2020 (Statistics Korea, 2020). Like the US CPS data, the EAPS provides demographic characteristics (age, sex, education, occupation and marital status) and employment status. The data cover all household members aged 15 or older from 35,000 households. While the employment status categories align closely to those in the US data, the Korean government treats people who are on layoff as employed (Statistics Korea, 2020). For consistency with data for other countries in our study, we treat people on layoff as unemployed. We manually build a crosswalk at the 3-digit level between the 7th Korean Standard Occupational Classification and the US Standard Occupational Classification.¹⁵

We supplement the EAPS using the semi-annual Local Area Labour Force Survey (LALFS),

¹⁵There are 153 occupation codes in South Korea.

which provides information about children in the household. The LALFS is conducted every April and October and has a similar structure to the EAPS.

Australia Data

Our analysis of the Australian labor market draws on monthly unit record data from the Australian Bureau of Statistics (ABS) Longitudinal Labour Force Survey (LLFS) data.¹⁶ We use individual demographic variables and labor market information. Each month, the LLFS includes over 37,000 respondents and is representative of the Australian population. Our variable construction is based on our best attempt to align definitions with the counterpart variables in Korea, the US, and Europe.

Occupation data in the LLFS is coded using the 2013 Australian and New Zealand Standard Classification of Occupations (ANZSCO). We match Australian occupations to US occupations using a concordance between the ANZSCO 1.2 occupations and the US O*NET-SOC 2010 Taxonomy.¹⁷ The concordance maps Australian occupations to the closest occupations in the O*NET-SOC taxonomy in terms of tasks, skills, and abilities. To produce this concordance, the Australian National Skills Commission (NSC) used a combination of manual judgement and machine learning applied to occupation titles, descriptions, and main tasks against O*NET-SOC occupations to identify the best matches.¹⁸ We use this mapping to characterize Australian occupations based on their ease of remote working and face-to-face working requirements.

European Data

To have a comprehensive assessment of the impact of COVID-19 on European countries, we selected Italy, Denmark, Spain, France, and Sweden.¹⁹ Eurostat provides quarterly and yearly data for each country. The quarterly data include information on labor market outcomes and demographics, and the yearly data contain information on children and partner presence at

¹⁶The data are publicly available, but can only be accessed through the ABS DataLab. Interested users can apply to the ABS for access at [urlhttps://www.abs.gov.au/statistics/microdata-tablebuilder/available-microdata-tablebuilder/longitudinal-labour-force-australia](https://www.abs.gov.au/statistics/microdata-tablebuilder/available-microdata-tablebuilder/longitudinal-labour-force-australia)

¹⁷The concordance can be requested from the National Skills Commission. <https://labourmarketinsights.gov.au>.

¹⁸They mapped 4-digit and 6-digit ANZSCO Occupations, which cover 354 four-digit ANZSCO occupations, including nearly all of the common occupations in Australia.

¹⁹We report the results for the United Kingdom in the Appendix. Due to Brexit, the yearly data and the fourth quarter data in 2020 for the United Kingdom are not covered in Eurostat.

home. We construct the sample by matching the quarterly and yearly data for each country and restricting to respondents aged 18 to 65. The quarterly sample includes about 80,000, 18,000, 100,000, 70,000, and 21,000 individuals representative of the Italian, Danish, Spanish, French, and Swedish populations.

We align the variable construction from Eurostat to that of the other countries, except for marital status. Eurostat only provide data on the partner's presence in the household as opposed to official marital status. Occupation type in Eurostat is coded using the three-digit 2008 International Standard Classification of Occupations (ISCO). We manually build a crosswalk between three-digit ISCO and the 2018 US Standard Occupational Classification (SOC).

Occupational indices

We investigate the differential impact of COVID-19 on workers based on their occupation using two indices developed by Montenovio et al. (2022) that measure the reliance on face-to-face interactions and the potential for remote work for each occupation. Montenovio et al. (2022) capture the extent to which an occupation involves tasks that may become riskier or more manageable during the pandemic using the 2019 Occupational Information Network (O*Net) Work Context module to obtain pre-pandemic, baseline measures.²⁰ When some occupational codes are matched to more than one standard occupational classification (SOC), we construct the mean of the matched US occupations for each index.²¹

Using the occupational face-to-face and remote work indices allows us to examine the role some job features played in shaping employment outcomes during the pandemic. For the US, which provides occupation information for all people in the labor force (including the unemployed), we explore how the occupation indices impact the transition from employment to unemployment.²² The Eurostat data only report occupation for employed individuals (includ-

²⁰The 2019 O*NET Work Context module reports summary measures of the tasks used in 968 (2010 SOC) occupations (O*NET, 2020). The data are gathered through surveys asking workers how often they perform particular tasks and about the importance of different activities in their jobs. Some of the questions relate to the need for face-to-face interaction with clients, customers, and coworkers. Other questions assess how easily work could be done remotely (Montenovio et al. 2022).

²¹For instance, there are 252 industry codes and 153 occupation codes in the Korean data. We match one occupation code of Korean data to at most three SOC codes of the US. We then calculate the mean of the occupational index from the matched SOC codes.

²²When doing so, we exclude people who are currently out of the labor force because of data limitations.

ing those who are absent from work), but not for the non-employed. For this reason, we look at the relationship between occupation characteristics and the share of people who are employed and at work (as opposed to employed but absent from work). This represents a limitation of our data.

Figure 2 provides insights into pre-pandemic sorting of workers across occupations using the mean of the face-to-face and remote work indices across sub-populations. We report outcomes for the month or quarter (for European countries) in 2019 when the change in labor market outcomes in 2020 is the largest.²³ Below, we use the same months or quarters for our other results. The figure reports the average across all countries and the country-level averages. Before the pandemic, the two occupational characteristics showed similar patterns across countries for the various demographic groups.

Compared to men, women tend to work in jobs that involve more face-to-face activity, but they are also more amenable to remote work. Younger workers are more likely to be in jobs with more face-to-face interaction and less remote work potential. The remote work index is particularly low for the youngest group (18-24). Older workers are less likely to be in jobs with intense face-to-face interactions.

Turning to education, notwithstanding minor differences across countries, the face-to-face index is hump-shaped in education: workers with the lowest and highest levels of education are in jobs that have low face-to-face interactions relative to middle-education workers. By contrast, the remote work index increases substantially and monotonically in education.

Among both women and men, variations across marital status and child presence in face-to-face and remote work are relatively small, but married men (with or without children) tend to be in jobs with less face-to-face interaction than single men. They are also in jobs with more remote work potential.

These systematic variations in the sorting of demographic groups into jobs with different reliance on face-to-face and remote-work tasks may explain some of the labor market disparities we consider below.

²³For the US and South Korea, we use data for April, those for Australia are from May, and, for the European countries, they are from the second quarter of 2019.

COVID-19 and Share of People Not-at-Work

The severity of the pandemic and the strictness of policy responses varied considerably across country. We begin by comparing aggregate changes in labor market outcomes by country. To measure the impact of the pandemic on the labor market, we calculate the percentage point change for each of the four groups of people not working (absent from work, recently unemployed, long-term unemployed, and out of the labor force) in each month or, in the case of Europe, each quarter in 2019 and 2020. Then we analyze the changes in labor market outcomes by demographic characteristics.

Aggregate Changes in Labor Market Outcomes

Figure 3 shows the change in the share of people not at work in each country overall and by employment status.²⁴ There are three primary dimensions on which countries differ. The first is timing. Although for all countries the largest increase in the share of people not working occurred in April or the second quarter, some start experiencing such increases earlier. For example, in South Korea, which had an early outbreak, the share of individuals not at work increases substantially in March. Similarly, Italy, and to a lesser extent France, Spain, and Denmark, also experienced substantial increases in the first quarter.²⁵

Second, the magnitude of the increase in people not at work varied across countries, ranging from about 3% in Sweden and South Korea to over 10% in Spain, Italy, France, and the US. Spain experienced the greatest increase in the not-at-work rate at over 15% in the second quarter of 2020. There appears to be a broad relationship between changes in not-at-work rates and the number of COVID-19 cases, although in Australia social distancing and social welfare policies led to a large increase in people not-at-work even in the absence of large case numbers.

Third, the nature of the change in employment varied considerably across countries. Figure 3 breaks down the change in the share of people who are not working into four components:

²⁴We also look at changes in the share of people who are employed divided by the working age population in Appendix Figure A1. However, since people absent from work are considered employed, Appendix Figure A1 may underestimate the negative impact of the pandemic on the labor market. For example, Figure 3 shows that France experienced a large increase in the share of people not working, but Appendix Figure A1 shows that France's employment rate only declined slightly.

²⁵In the US, the relatively small increase in people not at work in March was in part due to the reference week of the CPS survey being the first week that employment began to decline.

long-term unemployed, recently unemployed, absent from work, and out of the labor force. In the US, both recent unemployment and absence from work increased dramatically. South Korea, instead, is characterized by a large increase in recent unemployment and out-of-labor-force rates, with absence from work rising only slightly. In most other countries, much of the reduction in employment took the form of absence from work. Spain (with the largest changes in the share of people not-at-work across all countries), Italy, France, Australia, and Denmark (to a lesser extent) experienced large increases in absence from work, followed by increases in rates of people out-of-the-labor force. Finally, in Sweden, probably due to its weak social distancing policies, the changes in the not-at-work rate were limited.

It appears that these differences may be in part related to the labeling associated with some social welfare policies as well as to several job retention and short-term work schemes, especially in Europe and Australia. For instance, people who were not working but receiving unemployment benefits were considered “employed” in Australia under its JobKeeper program, which paid employers a wage subsidy to maintain staff on the payroll. The large increase in employed but absent may be attributed to the categorization of the participants in this program. Similarly, though with some variation, European countries implemented short-term employment schemes that facilitated the reduction of work hours while preserving employment relationships. This policy approach likely explains the large increases in employed-but-absent rates in Europe versus those in recently unemployed in the United States.

If our main hypotheses are that weak labor market outcomes may be a consequence of (1) high COVID-19 cases, including labor supply responses; (2) social distancing policy responses; or (3) some combination of the two, this figure points to the importance of policy responses. In fact, countries with high cases and strict social distancing policies (Italy, Spain, France, and the United States), including initial lockdowns, exhibit the largest changes in the population not at work. Neither Australia nor South Korea had high cases, but they differ dramatically in terms of policy responses. While, as discussed, the South Korean government limited some activities, unlike the other countries it did not implement lockdowns. Comparing the changes in the not-at-work rate in Australia, which implemented stronger social distancing policies, with those in South Korea, suggests that aggressive policy responses are sufficient to reduce work

activity even in the absence of high cases. However, we note that late in 2020, when cases rose in South Korea, the increase in the share of people not-at-work was much larger than that in Australia (Figure 3), especially for the out-of-labor force category. These differences between the two countries may reflect the benefits of keeping cases under control or the wage subsidy programs, which kept people attached to jobs even if they were not actually working.

In Sweden, relatively high cases were associated with a modest policy response. There was a small increase in people not at work in Sweden. Sweden provides a good opportunity to assess the employment effects of COVID-19 in the absence of strong policy responses and suggests that COVID-19 cases without strong policy responses may not have had large adverse employment effects. This suggests that policy responses may have been a primary driver of employment changes rather than COVID-19 cases.

There are two potential outcomes for people who lose their jobs: (1) stay in the labor market and look for a new job or (2) leave the labor market. Because exit from the labor market likely reflects a mix of discouragement and reduced labor supply (including concern over infection and caregiving responsibilities),²⁶ changes in the share of people out of the labor force are one way of gauging labor supply effects. Figure 3 shows that the out-of-labor force rate increased in almost all countries during the pandemic, but that this increase was only a small share of the total increase in people not at work. The exception is South Korea, where, though the total increase in the share of people not at work was modest, more than half of the increase in people not working came from an increase in people out of the labor force. Australia, Italy, Spain, and the US show the greatest declines in labor force participation, of around 3 percentage points. However, labor force participation losses in Australia, Italy, and Spain revert very quickly whereas, in the US, they persist throughout 2020. If the reductions in labor force participation are driven by concerns with infection, one might expect to see larger declines in participation among older workers, a hypothesis we investigate below. However, we conclude that the reductions in labor force participation do not appear to be large in the countries we considered.

²⁶Even though many jobs converted to remote work during the pandemic, early in the pandemic (i.e. beginning of April) a large portion of employees were laid off or furloughed (Brynjolfsson et al. 2020) making job search more difficult.

Differential Effects by Demographic Characteristics

Previous evidence indicates that the labor market effects of the COVID-19 pandemic vary across demographic groups. The impact on different demographic groups has implications for labor market disparities and can shed light on the extent of labor supply changes. To examine the heterogeneous effects of the pandemic on labor market outcomes, we focus on four characteristics: age, educational attainment, sex, and marital status interacted with child presence.

Age

Figure 4 focuses on the share of people not at work by age, which sheds light on a number of interesting facts. First, age is an important dimension along which workers differ and is therefore valuable for understanding disparities and differences in the impact of the pandemic. Second, younger workers tend to be closer to the margins of the labor market, which may make them particularly vulnerable to shocks. Indeed, there are wide differences in the structure of labor markets across countries, with Italy, Spain, and France being characterized by dual labor markets segmented into temporary and permanent workers. Third, the labor market responses of older workers can provide a window into how workers reduced their labor supply in response to the risk of COVID-19.

The US, Australia, and Scandinavian countries have similar age gradients with the effects of the pandemic decreasing roughly monotonically with age. At the beginning of the pandemic, in these countries, the spike in the share of people not at work among the youngest group is double or more than double that for older adults. The increase in the share not at work among this youngest group is likely due to the weaker connection between young workers and employers (e.g. because they were recently hired or were in temporary or fixed-term positions), making them more vulnerable to negative labor market shocks than other age groups.

Of the countries in our sample, Italy, Spain, and France have among the strongest divides between temporary and permanent jobs. In these countries, the share of the youngest people who are not at work was 60% or higher in 2019. As a consequence, the increase in the share of the youngest group who are not at work at the outset of the pandemic is smaller, and the spike in the share of people not at work at the outset of the pandemic is higher among the

second youngest group (i.e., those aged 25-34). Intuitively, given the exceptionally weak initial connection to the labor market among the youngest groups in France, Italy, and Spain, the spike hits the second youngest group of workers, who have higher employment but still have weak connections to employers.²⁷

Because the increases in the share of the youngest age groups that are not at work are so much larger than that for the older age groups, the recovery among the youngest age groups is quite large in absolute terms in most of the countries, even if it is not exceptionally large in percentage terms. Australia, the United States, and Denmark stand out for the strength of the recovery among the youngest age group.

South Korea shows different labor market outcomes by age compared to other countries. Unlike many of the European countries, South Korea does not have a formal dual labor market. At the same time, a large share of young people in South Korea were not at work prior to the pandemic, in part due to high rates of school enrollment. Most young workers in the labor market are less educated and more likely to have a job vulnerable to the COVID-19 crisis.²⁸ The second youngest group is more likely to be highly educated, and the share of people in this group who earned a college degree is the highest (more than 69%). As a consequence, the increase in the number of young people not at work is the largest, but the increase in the second youngest group is relatively modest and smaller than that among the middle-aged groups.

Turning to older workers, two primary forces are likely at play. First, older workers tend to have among the strongest connections to their employers and the highest termination costs, whether those connections are formal (e.g., as in France and Italy, via employment protection laws) or informal as in many of the other countries. This stronger connection to employers almost surely provides greater protection to older workers just as weaker connections generate vulnerability among younger workers. Older workers are also one of the best windows into labor supply effects. Because older individuals are at considerably greater risk from contracting COVID-19, we would expect a large reduction in the labor force participation rate among old

²⁷The share of young workers on temporary or fixed-term contracts is particularly high in France, Spain, and Italy. For the 18 to 24 age group, the shares are 56.49%, 71.81%, and 62.80% in France, Spain, and Italy. In Denmark and Sweden, they are 30.18% and 50.16%. For the 25 to 34 age group, these shares are 19.84%, 41.06%, and 30.24% in France, Spain, and Italy, 14.66% in Denmark, and 18.74% in Sweden.

²⁸Based on the high college enrollment rate in South Korea, it seems likely that labor force participation declined as many younger people left the labor market to return to school.

workers if they reduce labor supply to avoid infection.

The oldest age groups uniformly exhibit the smallest increase in the share of people not at work in all countries we consider. Appendix Figure A2 shows changes in out-of-labor-force rate by age group. While there are differences in timing and magnitude, labor force participation declines less among older workers than among younger workers in all countries. Among all age groups, the change in the share of workers out of the labor force aged 55 or older is often the lowest. By contrast, the increase in the share of young workers out of the labor force is the largest among all age groups in almost all the eight countries in at least some months. These findings suggest that reductions in labor supply among the elderly are almost surely smaller than worker discouragement among the young.

Educational attainment

Figure 5 shows changes in the share not at work by education. As is typical during downturns, the highly educated are more likely to stay employed and working during the early stage of the pandemic (i.e. in the 2nd quarter of 2020). However, there is a large increase in the share of middle-education workers who are not at work, which is greater than that among the other educational groups, including high school dropouts. During the COVID-19 pandemic, high school dropouts appear to be more protected than high school graduates in most countries, except for Sweden, and, in some periods, Denmark. Aside from the Scandinavian countries, the education differences in the share of people not at work echo those of the out-of-labor force outcome (Appendix Figure A3).

These interesting labor market dynamics may come from sorting into occupations based on education. As discussed in Figure 2, across all countries we consider, the probability of working in a job that can be performed remotely is increasing in education. We also show below that middle-educated workers are more likely to be in jobs that rely more heavily on face-to-face interactions, while high school dropouts and highly educated workers are less likely to be in such jobs. Combining these two findings, we hypothesize that the ability to work remotely and the importance of face-to-face interactions on the job (or lack thereof) likely play a role in the overall education gradient.

Our estimates also show that the disparities across education groups are far larger in the countries where employment declined the most, especially during 2020. For example, in the US, which experienced large downturns in the labor market, the loss of work among people with graduate education was small; almost all of the decrease in employment occurred among less educated workers. In Australia and Spain, more educated workers recovered more and faster. While we cannot speak to other dimensions of privilege and disadvantage, these estimates paint a disturbing picture as the incidence of the pandemic increased educational disparities far more in the countries it impacted heavily than in those where its impact was smaller.

Differences for Females and Males

Figure 6 reports changes in the share not at work by sex. From these figures, we conclude that the pandemic did not systematically disadvantage women relative to men. In the US, Spain, Italy, and France, if anything, the increase in people not at work was greater for men than women, although the opposite holds in South Korea and Australia. In terms of the share of people “out-of-the-labor-force” (Appendix Figure A4), there is a slight tendency in Australia, Italy and Spain for women to move out of the labor force initially more than men, but then the gap is closed and even reversed for Australia and Spain. Bluedorn et al. (2021), in their examination of 38 countries, similarly find that the initial negative impacts of the COVID-19 pandemic on women’s employment were typically short-lived.

In interpreting these results, it may be useful to think about changes in labor market outcomes as being driven by changes in labor demand, changes in the willingness to work (e.g. because of exposure to COVID-19), and changes in the ability to work (e.g. because of other commitments unrelated to labor). Figure 2 shows that women are more likely to be in occupations that can be done remotely, although women also tend to be in positions that require face-to-face interactions. In this sense, they might have experienced a smaller drop in labor demand if they were better able to start working remotely. An example of a job that pre-pandemic required face-to-face interactions but that had a high potential for remote work is teaching. Thus, the differential sorting of women into jobs that require more face-to-face interactions and jobs that can be performed remotely likely impacted labor force status in opposite directions, and

may account for the lack of large, systematic differences by sex.

Children and Marital Status

Parents with children were more likely to have increased responsibilities for childcare during the pandemic due to school and childcare closures (Heggeness 2020). We expect these family responsibilities to be highly concentrated among women with children and especially single women with children, making it harder for them to continue working during the pandemic. On the other hand, many countries, especially in Europe, instituted policies that facilitated parents' ability to work. For instance, Italy implemented a babysitting voucher program and Spain introduced income support policies that were more generous for single parents. In Australia, childcare centres were declared essential services and were required to remain open even while primary schools were closed. In the second quarter of 2020, the government required childcare centers to accept children of all workers and required centers to provide these services for free.

Determining marital status is non-trivial. The Eurostat data identify people who have partners present in the household rather than their marital status. For all the other countries, data provide information on formal marriage. Hence, we classify marital status into two groups: married (married with spouse present or partner present in the household) and single (others).²⁹ Moreover, we construct an indicator for having at least one child in a household.³⁰

Figures 7 and 8 report changes in the share of people not at work by the presence of children interacted with marital status, separately for women and men. In keeping with a labor supply or ability to work explanation, in many countries, the greatest declines in employment are among single individuals, especially women with children, particularly in the second quarter. Italy and Spain are the exceptions, likely due to the various policies implemented in these countries in support of parents. Otherwise, the differences by sex, marital status, and presence of children are relatively small and show no consistent pattern.

In fact, we find that the group facing the largest declines in work and labor force participation differs across countries. In the United States, Australia, South Korea, and France, single

²⁹We classify individuals who are divorced or married but separated as single. We do this because we expect that the effects of the pandemic depend mainly on the presence of a spouse rather than on marital status per se.

³⁰The reference age for children in all countries in our study is under age 18 except Australia which defines children as under age 15.

women, whether with children or not, appear to experience the largest increases in not-at-work rates, especially in the first months of the pandemic. In the United States, Australia, Italy, and France, married women with children experienced the smallest increases in the share not-at-work, and Spanish women do not exhibit large differences by family composition. Instead, women with children, either married or single, had the largest increase in the share not at work in Denmark, and the patterns for Sweden vary over time. Appendix figure A5 shows that changes in women's out-of-labor force rates vary by family composition. In the US and Australia, more single women with children left the labor market than their counterparts without children. In South Korea, single women without children were more likely to leave the labor market. The evidence is mixed in European countries, where no clear pattern emerges.

Figure 8 shows that, overall, the employment decline of men was mixed across countries during the second quarter of 2020. The US and Australia show that married men were less likely to exit work. In the US, single men with children experienced the largest increases in not-at-work rates throughout 2020. By contrast, in Australia, single men without children had the largest increase in not-at-work rates. Family composition is not an important or consistent factor in the share of men not at work in South Korea, Italy, Denmark, Spain, France, and Sweden. Turning to changes in labor force participation, Appendix Figure A6 shows that in some months, single men with children exited the labor force the most in the US, Australia, Italy, France, Spain, and Sweden. There are substantial transitory fluctuations in labor force participation for men by family composition, especially in Australia, Italy, Denmark, France, and Sweden, with declines eliminated or even reversing towards the end of 2020.

In general, family composition appears to be only a weak determinant of changes in labor force status during the pandemic. This might be surprising but caring practices changed a great deal during the pandemic. Many countries had policies to subsidize childcare, as discussed above. Many parents worked from home and combined care with work in novel ways. Grandparents and family members may have gotten involved differently than during the pre-pandemic period. We see greater differences in labor force participation rates than in the share of people not at work, implying that variation by family composition in other not-at-work categories

somewhat offset the changes in labor force participation.³¹

Occupation Indices and Labor Market Outcomes

We have shown that labor market outcomes varied considerably across groups during the COVID-19 pandemic and that the types of jobs that people hold may be a useful lens for thinking about these disparities. This section explores how differences in job characteristics and personal attributes relate to labor market outcomes in a regression framework, offering potential mechanisms behind the disparities in labor market outcomes during the pandemic. It proceeds in two steps. First, we consider the aggregate relationship between occupational characteristics and employment rates at the occupation level without controlling for demographics. Next, we estimate a regression with a full set of control variables using individual microdata. To capture the main, early impact of the pandemic on employment in each country, we focus on the second quarter of 2020.³²

To illustrate our approach, Figure 9 plots the employment rate in the United States in April 2020 corresponding to each of the SOC occupations against the face-to-face and remote work indices for that occupation.³³ The diameter of each bubble is proportional to the number of people employed in that occupation as of April 2019 to ensure that the weights are not affected by the pandemic. The upper left panel shows that the employment rate was lower in occupations characterized by higher face-to-face indices, suggesting that the more the occupation relies on face-to-face activities, the less likely its workers were to continue to be employed during the early period of the pandemic. The upper right panel shows that employment rates are higher in more remote-workable occupations. In other words, the ability to work remotely protected workers from job loss during the COVID-19 pandemic. The bottom panels focus on the share of people who are employed and at work. These are presented to assist with cross-country comparisons and are discussed below.

³¹Appendix Figure A8 confirms that we do not find significant differences for married men, married women, single men, and single women even after controlling for other potential confounding factors.

³²The reference period varies slightly across countries due to data availability. Specifically, we choose April for the US and South Korea, May for Australia, and the second quarter for European countries.

³³Similar bubble charts can be generated for all other countries but are omitted here for brevity.

The fitted line in Figure 9 is produced by the regression:

$$y_j = \alpha + \beta Occ_j + \varepsilon_j \quad (1)$$

where y_j is the employment for occupation j in the second quarter of 2020. Occ_j represents the occupational index, the face-to-face or remote work index). Like the markers in the figure, the regression is weighted by the size of the occupations, as measured by the number of workers in 2019. We estimate this regression for each country and retain the slope coefficients to make cross-country comparisons.

Due to limited occupational information for unemployed people in several countries, there are some differences in how we construct the outcome variables. Specifically, Eurostat does not record previous occupation for the unemployed, and this information is not tracked for most of the unemployed in Australia either. Therefore, for these countries the outcome variable is measured using the fraction of people who are employed and at work among all people with non-missing current or previous occupations. While the inability to study people who are no longer employed is concerning, it is worth noting that the largest increase in people not at work often comes from the employed-but-absent group, for which we have occupation information. Using US data, which contain occupation information for both the employed and the unemployed, we compare the estimates from these two different measures. Specifically, we re-generate the bubble charts in the bottom panel of Figure 9 but with the number of employed people at work divided by the number of employed workers on the y-axis. Employed workers comprise those who are and are not at work. The bottom panels show similar patterns to the upper panels, reassuring us about the similarity of these two measures.

To summarize these relationships for all of the countries in our sample, Figure 10 plots the estimates for each country in 2020 (red markers) and, for comparison, in 2019 (blue markers). The top panel of the figure shows that jobs with more face-to-face tasks experienced greater employment declines in *all* countries with the relationship being statistically significant for most. The estimates are strongest for the US, Spain, and the UK (which we report here rather than in the appendix for convenience), some of the hardest-hit countries. South Korea and Australia have among the lowest estimates in absolute value, which is consistent with lower case rates

in those countries. Although Italy was one of the hardest hit countries, it shows a negative but small and statistically insignificant relationship between face-to-face and employment perhaps because the Italian labor market rebounded during the summer. The bottom panel of the figure shows that, as expected, there is a strong positive and generally statistically significant relationship between the ability to work remotely and the employment rate. The patterns in remote work across countries are quite similar, but opposite, to those for face-to-face work, though they appear greater in magnitude and more commonly statistically significant. In Italy, for example, jobs that ranked high in their remote work capacity are also those for which employment was substantially higher in the second quarter of 2020.

To ensure that the 2020 estimates are driven by the pandemic and its labor market impacts, in Figure 10 we repeat the analysis using the same month/quarter in 2019 (blue markers). We expect the 2019 estimates to be small, and those in 2020 to be larger. Contrasting the estimates for 2020, in red, with those for 2019, in blue, we observe some pre-existing differences. However, many of the confidence intervals for 2019 overlap with zero, and the 2019 estimates are considerably smaller than those for 2020. Thus, it seems unlikely that the differences in employment outcomes during 2020 are driven by pre-existing relationships between job characteristics and employment outcomes. Instead, job characteristics became substantially more important as factors related to labor market outcomes during the pandemic, when those job characteristics were relevant for virus spread and impacted by social distancing policies.

These estimates suggest that occupation characteristics may be important determinants of the pandemic experiences of people in those occupations. Of course, occupations vary in terms of the observable characteristics of the workers in them, and Figure 2 and Section 4.2 show that worker demographics are systematically related to occupation characteristics. Hence, we investigate whether controlling for individual demographic characteristics alters the relationship between occupation characteristics and the employment rate, as would be the case if demographic differences in labor market outcomes during the pandemic drive part or all of the relationship between tasks and employment outcomes. We estimate the following regression using individual data in the second quarter of 2020 for each country:

$$y_{ij} = \alpha + \beta Occ_j + \theta X_i + \varepsilon_{ij} \quad (2)$$

where y_{ij} is an indicator for employed and at work for individual i with current or previous occupation j . Occ_j represents the occupational index (i.e. face-to-face or remote work index). X_i is a vector of covariates, including a quadratic variable in age, sex, education indicators, marital status, and indicators of whether there are children present in the household.

Figure 11 plots the estimates on the occupational indices with and without control variables X_i . Except for Denmark, and, when considering remote work, also Spain and France, controlling for demographic features has little or no impact on the coefficients of the occupational indices. In other words, job characteristics continue to be an important factor in determining employment outcomes even conditional on demographic features. This finding indicates that the impact of occupation characteristics on labor market outcomes operates separately from and in addition to pre-existing differences across demographic groups.

Conclusion

Although the COVID-19 pandemic prompted substantial research on the labor market effects on individual countries, cross-country analyses have been scarcer. Yet, given the wide range of experiences during the pandemic, the different social distancing policies, and social safety net responses, cross-country comparisons can help disentangle the effects of the pandemic and policy responses. We examine changes in labor market outcomes overall and by demographic group using monthly and quarterly data from eight countries with different COVID-19 experiences, and begin to fill this gap.

Our findings indicate that in most of the countries we study, there were substantial disparities in labor market outcomes across demographic groups and individuals with different education levels. Younger individuals were more likely to experience job losses than other age groups. Furthermore, individuals with college or higher degrees experienced more modest job losses than those in the middle of the education distribution. As a consequence, employment gaps between the most educated and middle-educated workers increased substantially. Notably, people who do not have college degrees appear to be protected. We did not observe significant differences in employment changes between men and women during the early stage of the pandemic, perhaps due to their differential pre-existing sorting into different types of

occupations. Finally, in most countries, single women were more susceptible to job loss than married women, although we did not find large differences between single women with and without children and age may be a confounder. Overall, a range of evidence suggests that labor demand played a larger role in employment changes than labor supply, with labor force participation falling considerably less than employment and smaller employment declines for older workers, who are at greater risk from COVID-19 infection on average.

To study the source of the disparities in the labor market changes among demographic groups at the beginning of the pandemic, we examine sorting of groups into different jobs. This perspective helps us explain many of the patterns we observe. We find that the pre-COVID-19 allocation of workers to occupations substantially accounts for disparities in labor market outcomes during COVID-19 along demographic lines. This result raises concerns regarding the distribution of the risks of COVID-19 exposure in the workplace across the population. In most countries, younger workers experienced reduced job security during the pandemic due to weaker relationships with their employers and the nature of the jobs they held. Younger workers were more likely to work in occupations with a large amount of face-to-face contact and limited potential for remote work.

We find that highly educated workers enjoyed greater job security during the pandemic as their work was often compatible with remote work. Interestingly, despite the least educated workers tending to hold jobs that involve more face-to-face interactions and have less remote work potential, their job losses were more modest, perhaps because they were more likely to be in essential industries. Numerous jobs within these industries may entail less face-to-face interaction but involve substantial and critical work that cannot be performed remotely. Finally, we study family composition by sex. Similar to the least educated group, we observe that married female workers with children, compared to other female workers, experienced less job loss. This can be attributed to the fact that these women are more likely to work in occupations that involve a significant amount of face-to-face work but also offer the possibility of remote work. For male workers, on the other hand, we find that married men with children hold jobs with fewer face-to-face responsibilities and a higher ability to work remotely. Single male workers with children, instead, faced greater job losses, as they are more likely to be

employed in jobs that entail more face-to-face tasks and are less amenable to being performed remotely.

The fact that the combination of sex and the presence of children played little role in explaining outcomes, once we control for other job characteristics, is interesting. We know that care patterns changed substantially during COVID-19 but our finding that women with children were not more likely to experience negative employment outcomes than women without children or men is novel and intriguing. It would be interesting to analyze this question further using richer data sources including time use data.

The empirical analysis suggests that job characteristics play an important role in the effect of COVID-19 on labor market outcomes. Estimates from regression models examining employment suggest that labor market disparities in labor market outcomes at the beginning of COVID-19 across demographic groups can be attributed to occupational characteristics.

This paper makes several contributions to understanding the socio-demographic divide in the early labor market responses to the global health crises. Most previous research analyzing the effect of the COVID-19 pandemic on labor market disparities using a range of social distancing mandates (Alstadsæter et al. 2020, Adams-Prassl et al. 2020, Montenovo et al. 2022) has been conducted on individual countries. We take advantage of the wide cross-country variation in the pandemic severity (measured by the number of cases) and policy responses, such as the enforcement of social distancing measures or safety net interventions. By leveraging such significant differences across countries, our estimates suggest that restrictive policies can reduce employment, even without high case numbers.

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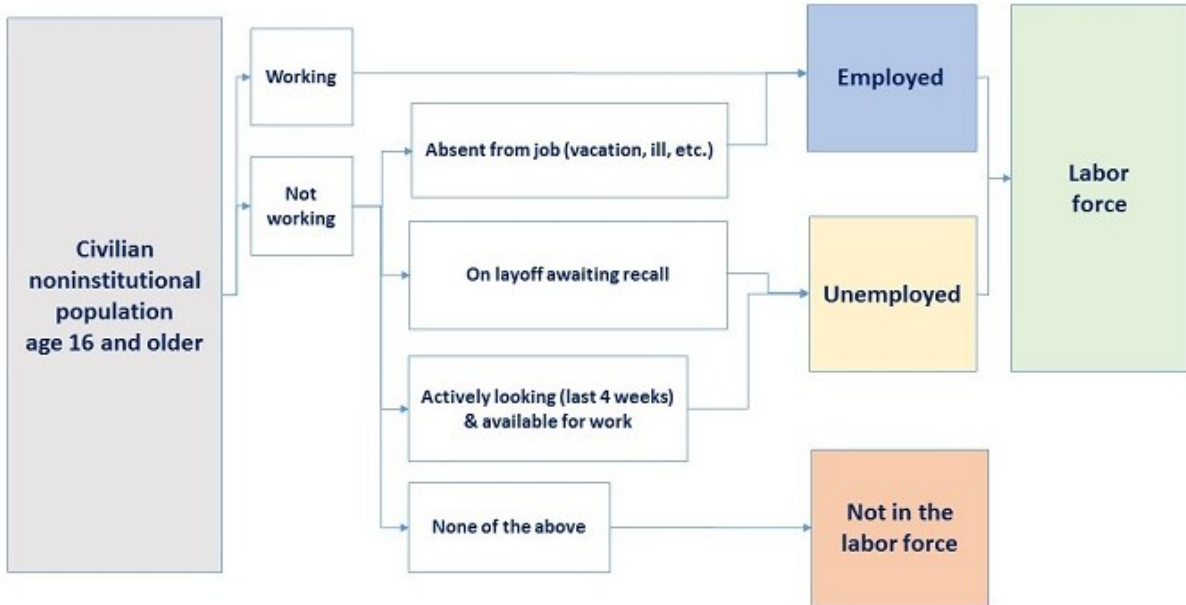
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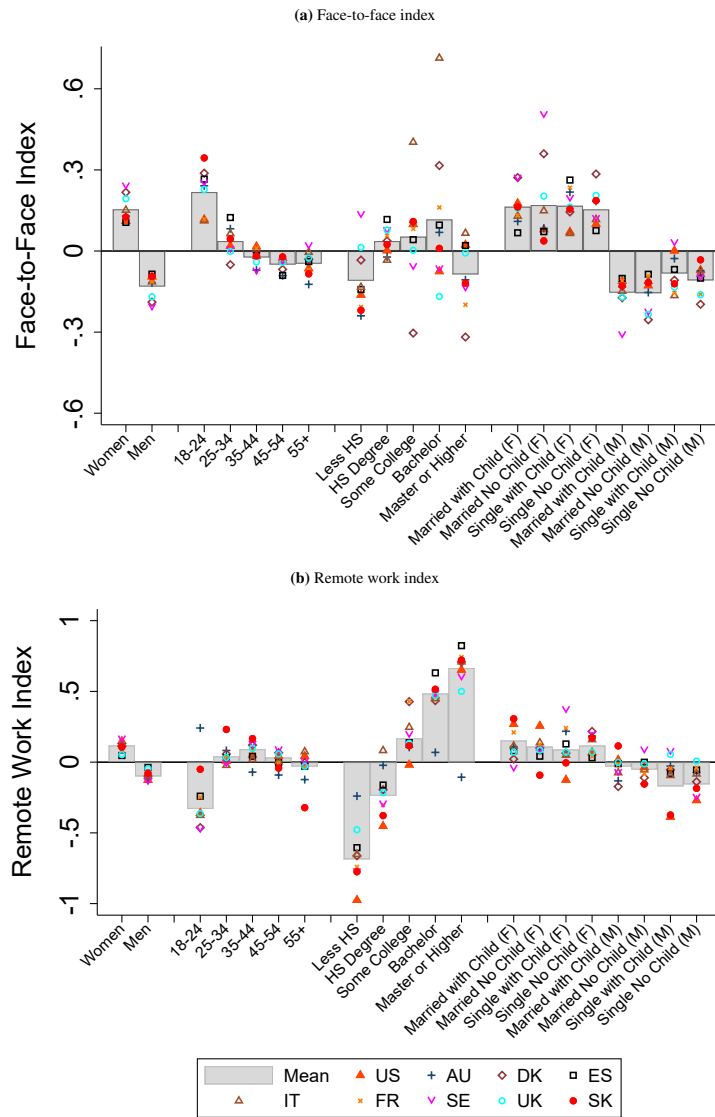
Figures and Tables

Figure 1: The Structure of Employment Status

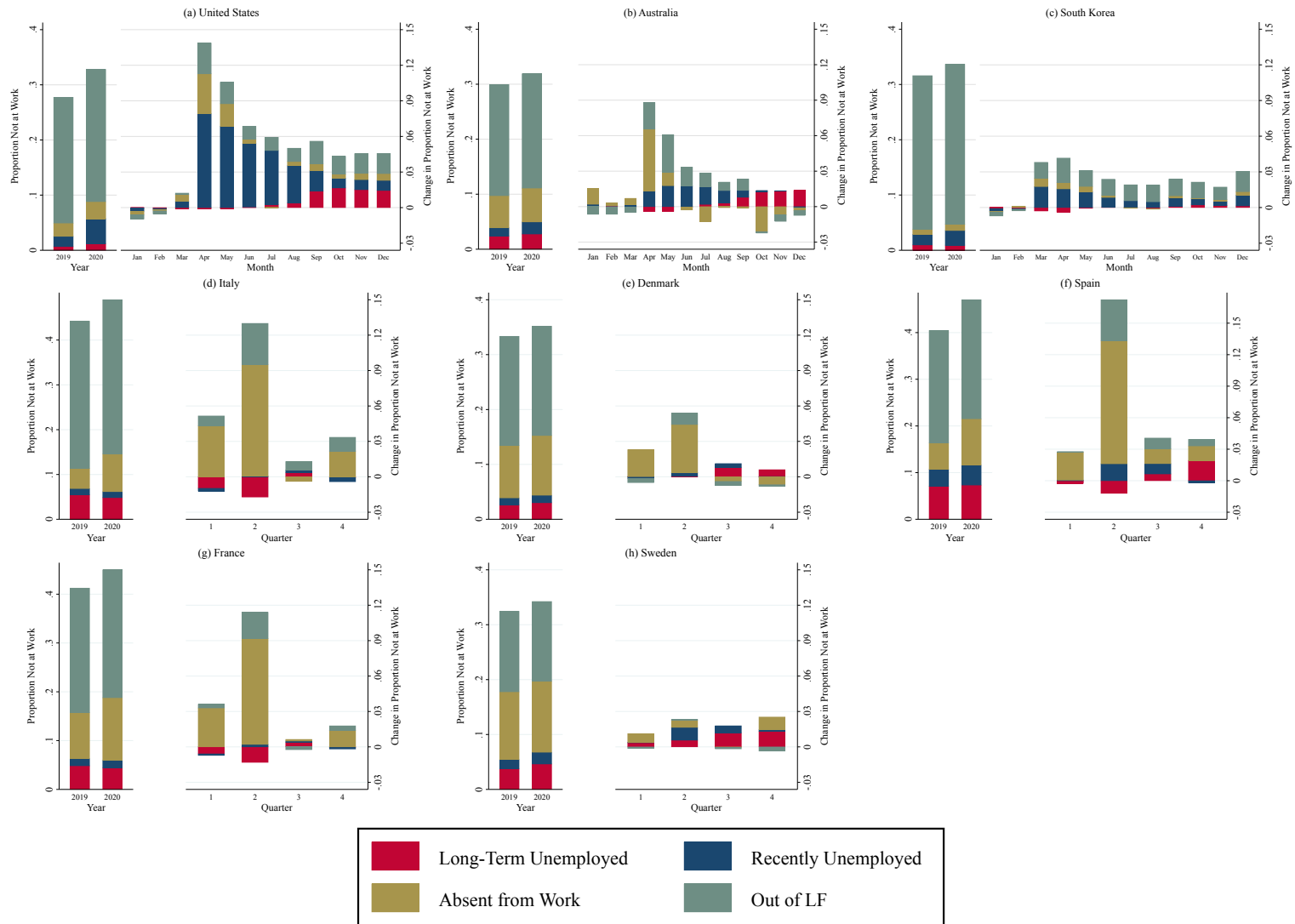


Source: US Bureau of Labor Statistics. <https://www.bls.gov/cps/definitions.htm>

Figure 2: Face-to-Face and Remote Work Indices by Demographic Group

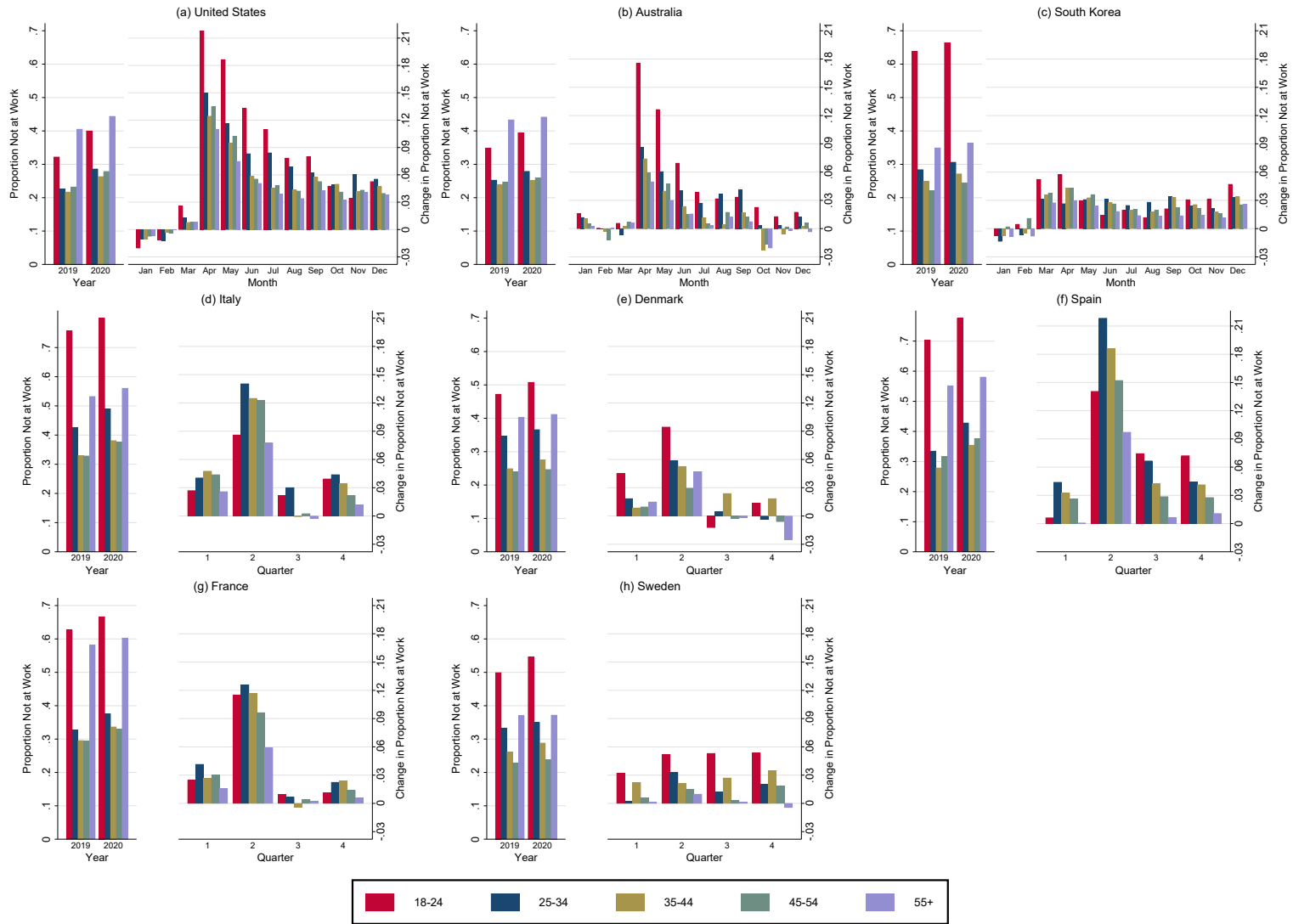


Note: This figure shows face-to-face and remote work indices by demographic group. The bars represent the average of the indices across the eight countries. The markers give means for each country. The sample consists of employed respondents aged 18 to 65. Both indices have been standardized to have a mean of 0 and a standard deviation of 1 in each country. The time window of data used to generate this figure is April for the US and South Korea, May for Australia, and the second quarter for Europe in 2019.

Figure 3: Change in the Share Not at Work

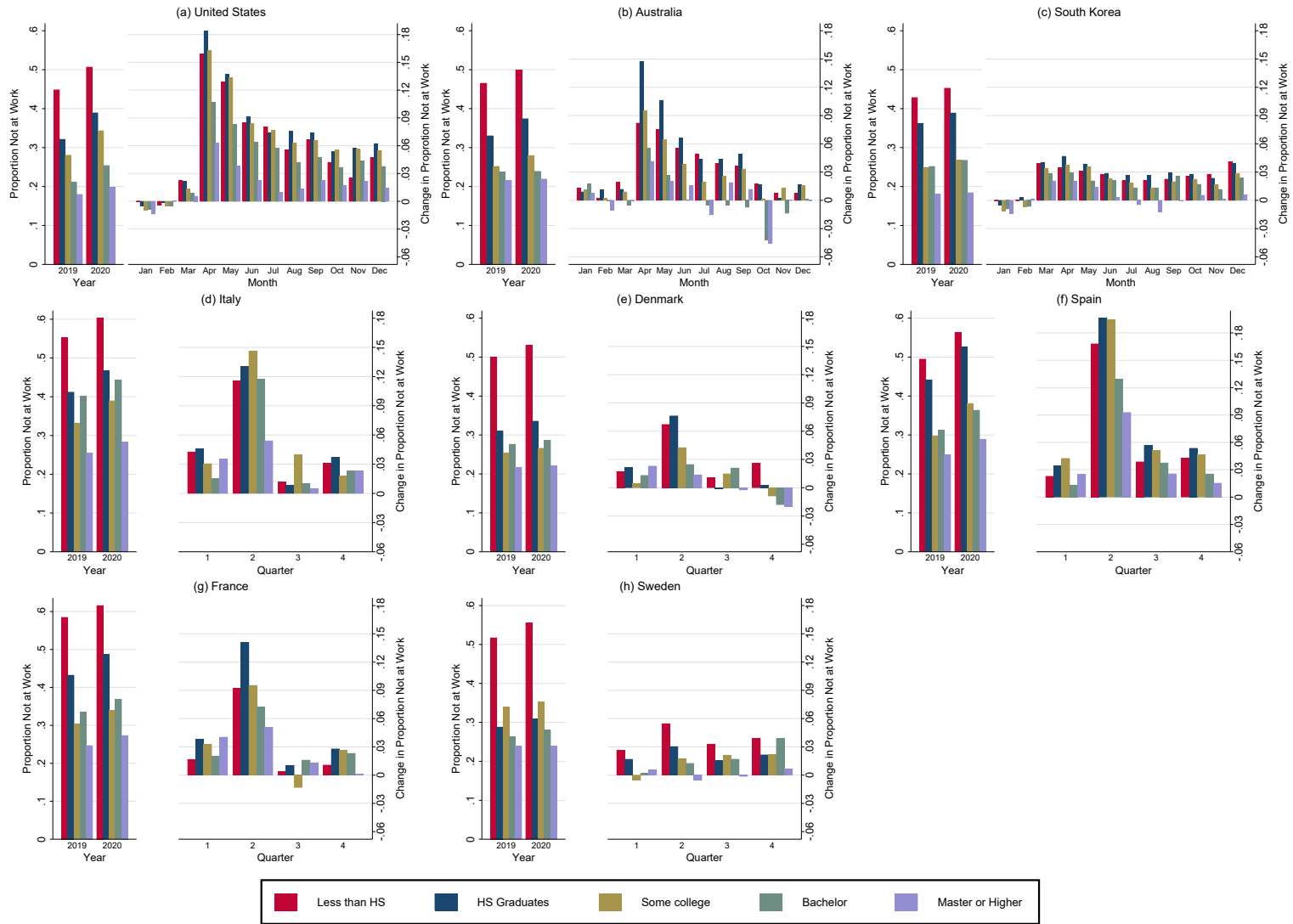
Note: We consider four categories of people not at work: 1) Long-term unemployed; 2) Recently unemployed; 3) Absent from work; and 4) Out-of-Labor force. Typical unemployment consists of long-term unemployment and recent unemployment. The left panel of each sub-figure shows the share of population between 18 and 65 not working in 2019 and 2020. The right panel of each sub-figure shows changes in the share of the population in each labor force status between 2019 and 2020 by month (for the US, Australia, and South Korea) or quarter (for the European countries).

Figure 4: Change in the Share Not at Work by Age



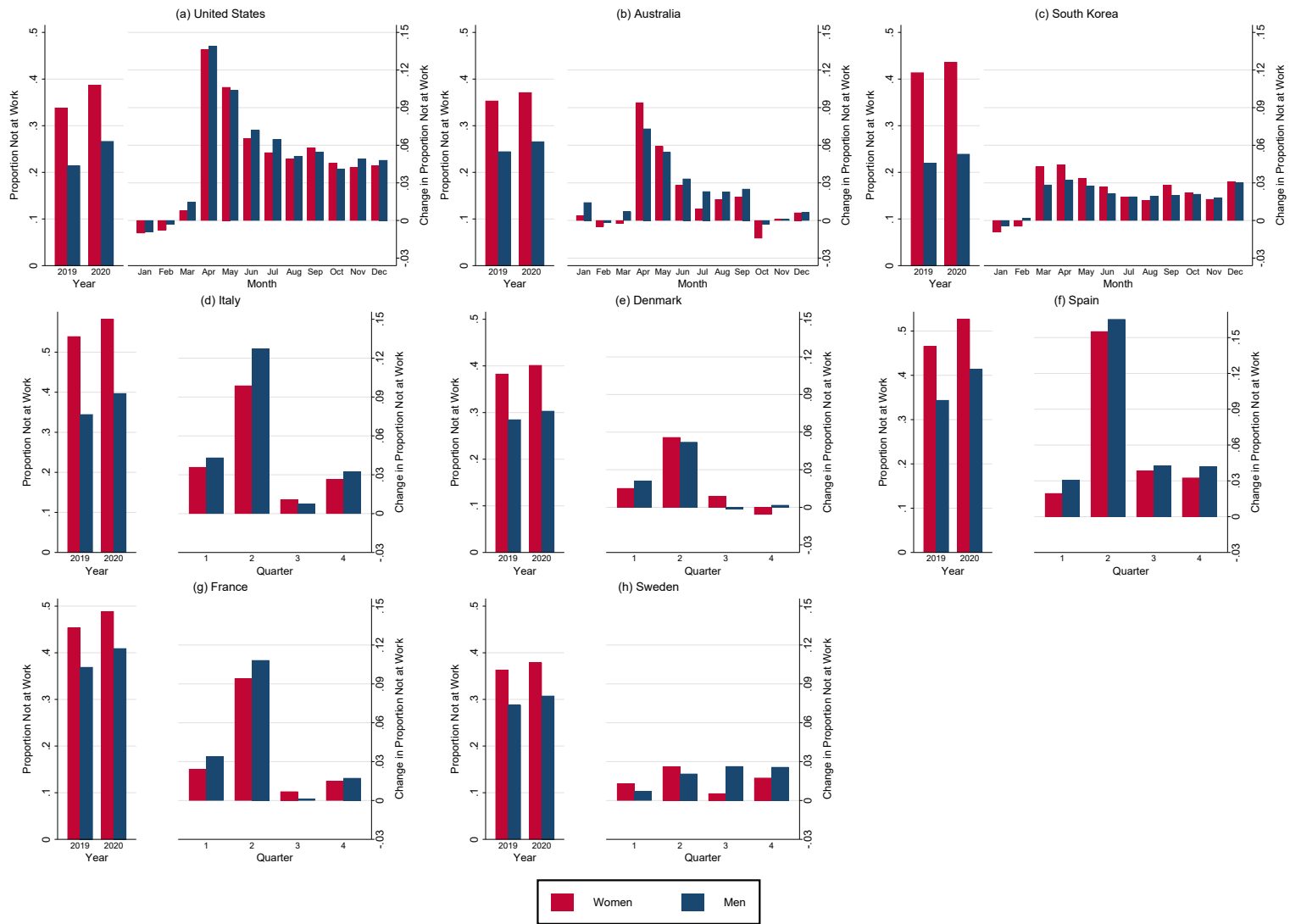
Note: We plot changes the share of the population not at work for five age groups: 18 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 to 65. The left panel of each sub-figure shows the share of population in each age group not working in 2019 and 2020. The right panel of each sub-figure shows the change in the share of the population not at work for each age group between 2019 and 2020 by month or quarter.

Figure 5: Change in the Share of Not-at-Work to Population Rate by Education



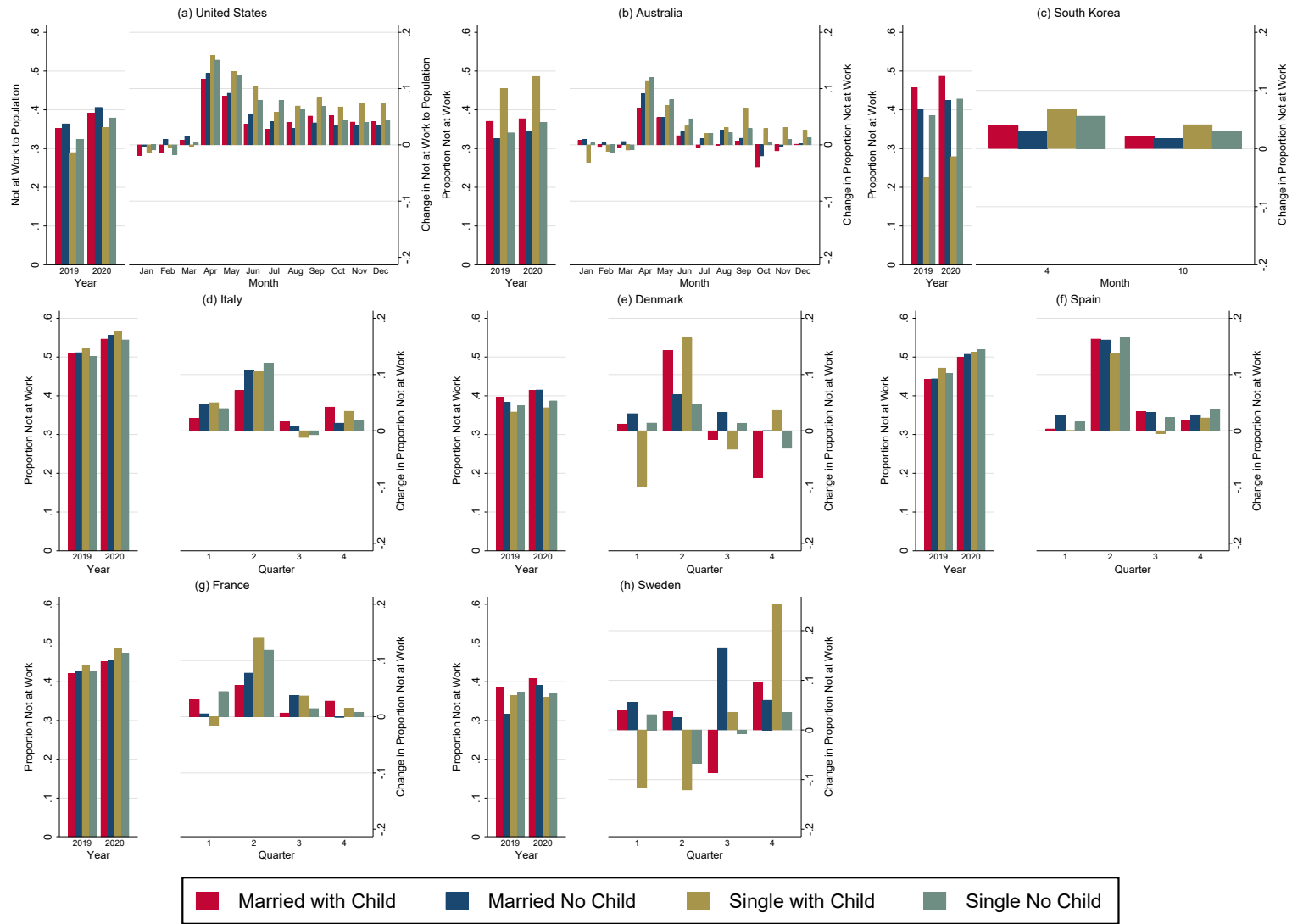
Note: We plot changes in the share of the population in five education groups who are not at work. The education groups are less than high school, high school graduates, some college, bachelor, and master or higher. The left panel of each sub-figure shows the share of population in each education group not working in 2019 and 2020. The right panel of each sub-figure shows the change in the share of the population not at work for each education group between 2019 and 2020 by month or quarter.

Figure 6: Change in the Share Not at Work by sex



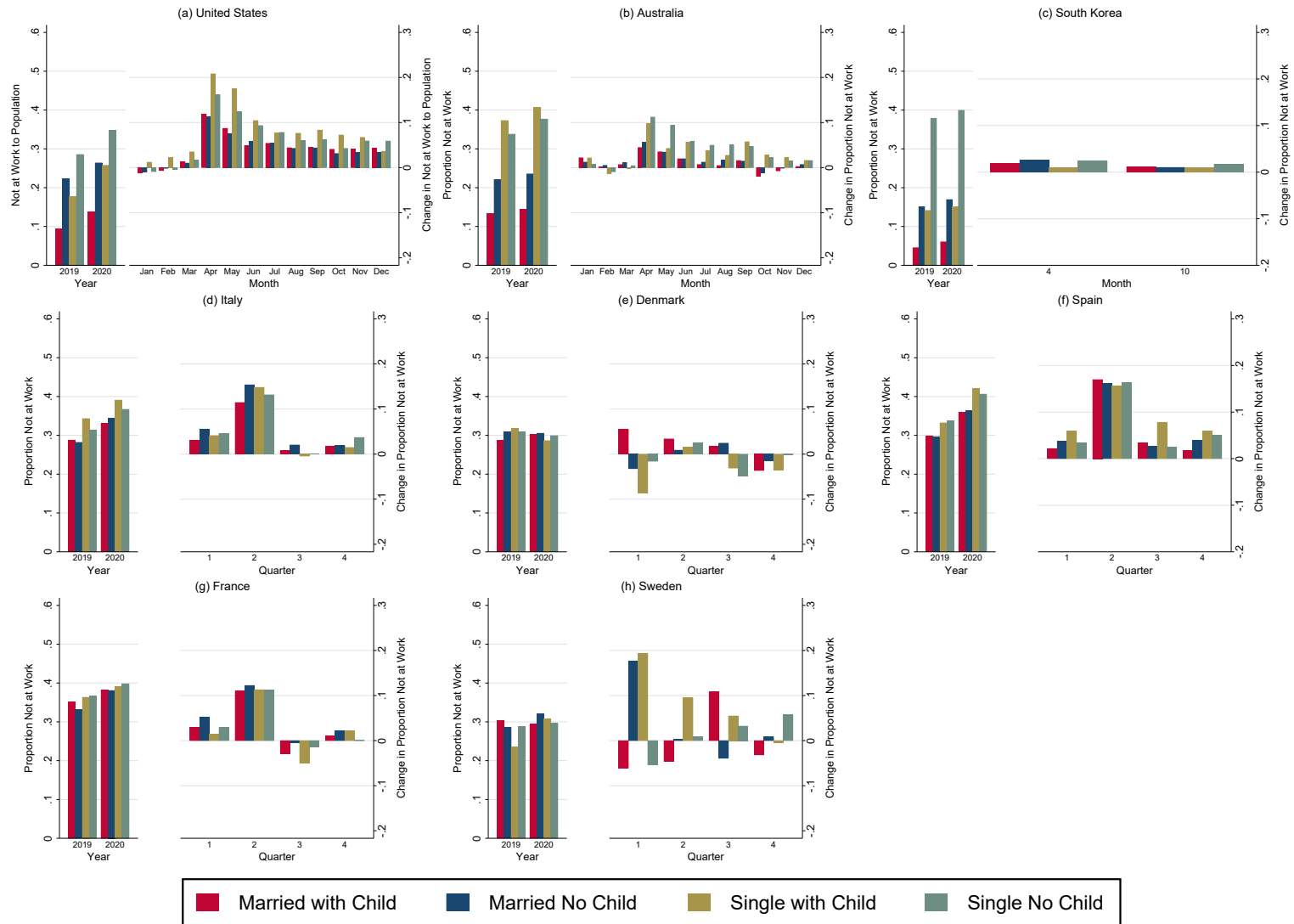
Note: We plot changes in the share of women and men not at work. The left panel of each sub-figure shows the share of women and men not working in 2019 and 2020. The right panel of each sub-figure shows the change in the share of women and men not at work between 2019 and 2020 by month or quarter.

Figure 7: Change in the Share Not at Work by Marital status and Presence of Children (Women)



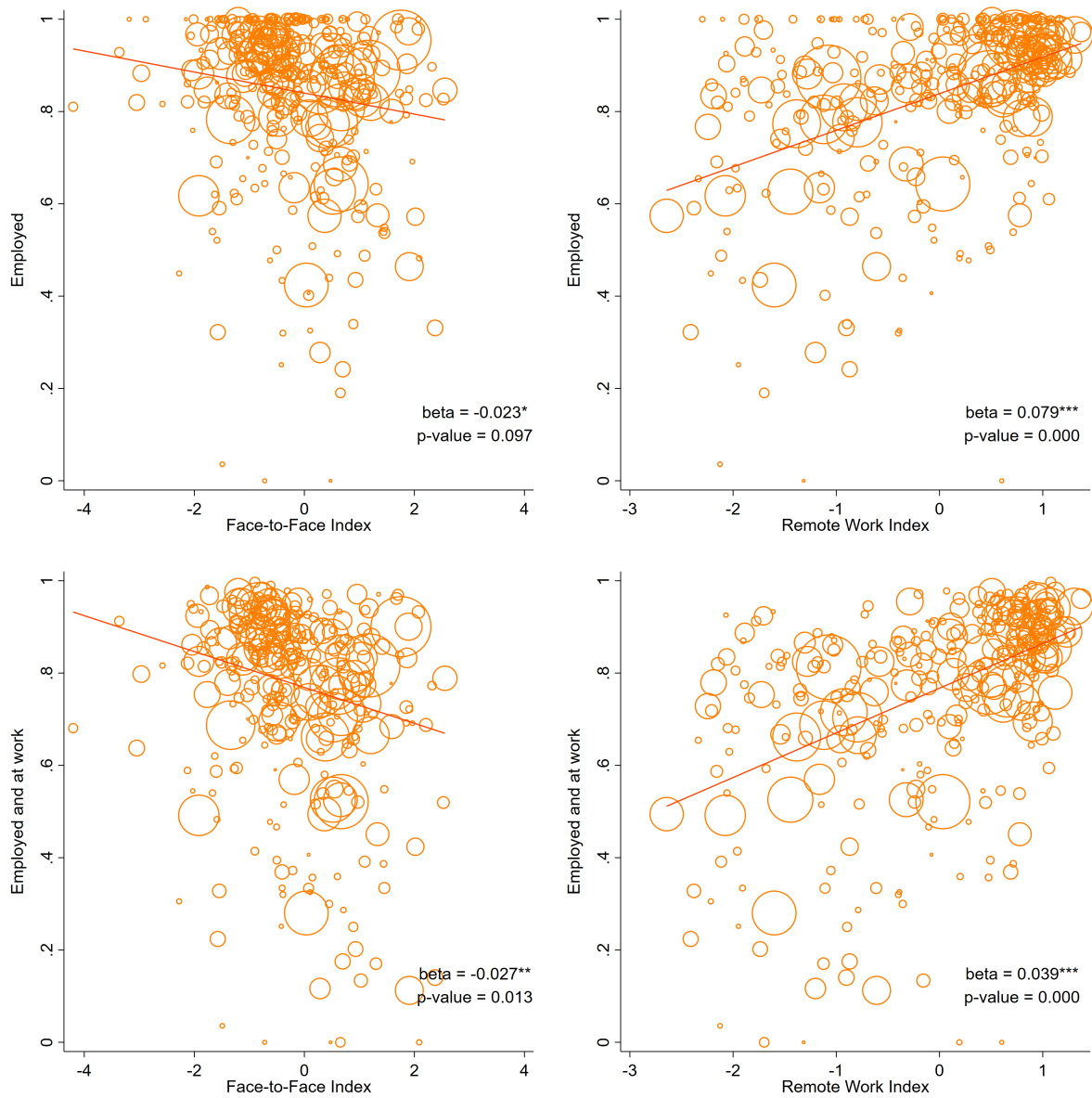
Note: We plot changes in the share of women aged 18 to 65 who are not at work by marital status interacted with presence of children. The left panel of each sub-figure shows the share of women who are not working in 2019 and 2020. The right panel of each sub-figure shows the change in the share of women not at work between 2019 and 2020 by month or quarter.

Figure 8: Change in the Share Not at Work by Marital status and Presence of Children (Men)



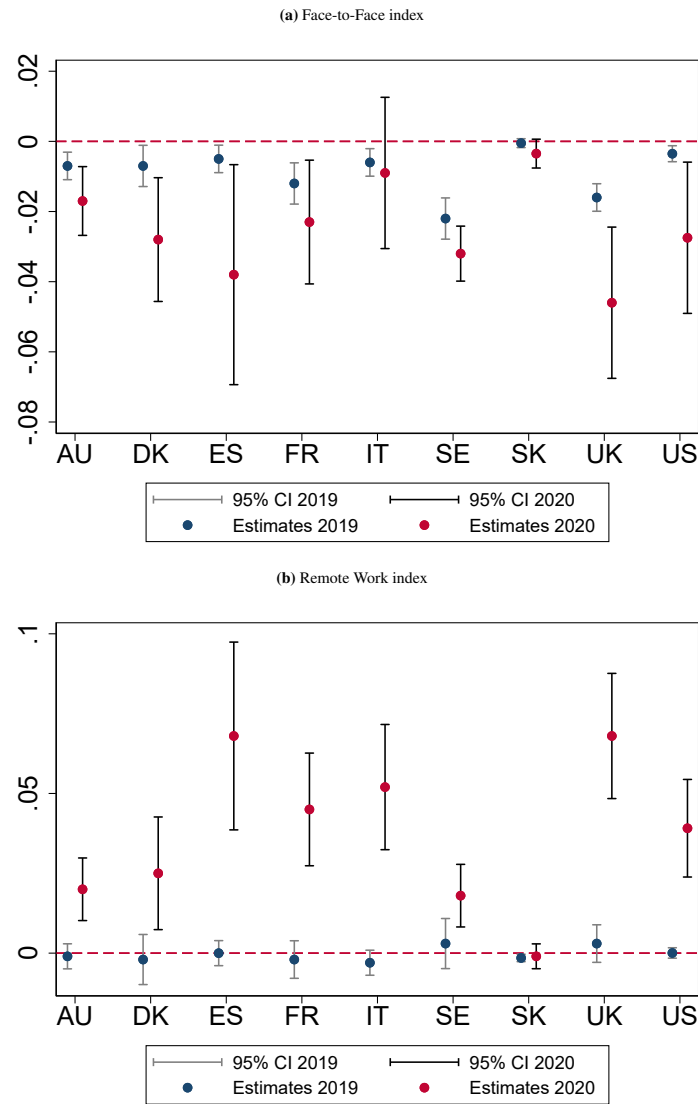
Note: We plot changes in the share of men aged 18 to 65 who are not at work by marital status interacted with presence of children. The left panel of each sub-figure shows the share of men who are not working in 2019 and 2020. The right panel of each sub-figure shows the change in the share of men not at work between 2019 and 2020 by month or quarter.

Figure 9: Relationship between Job Characteristics and Employment Status: the US



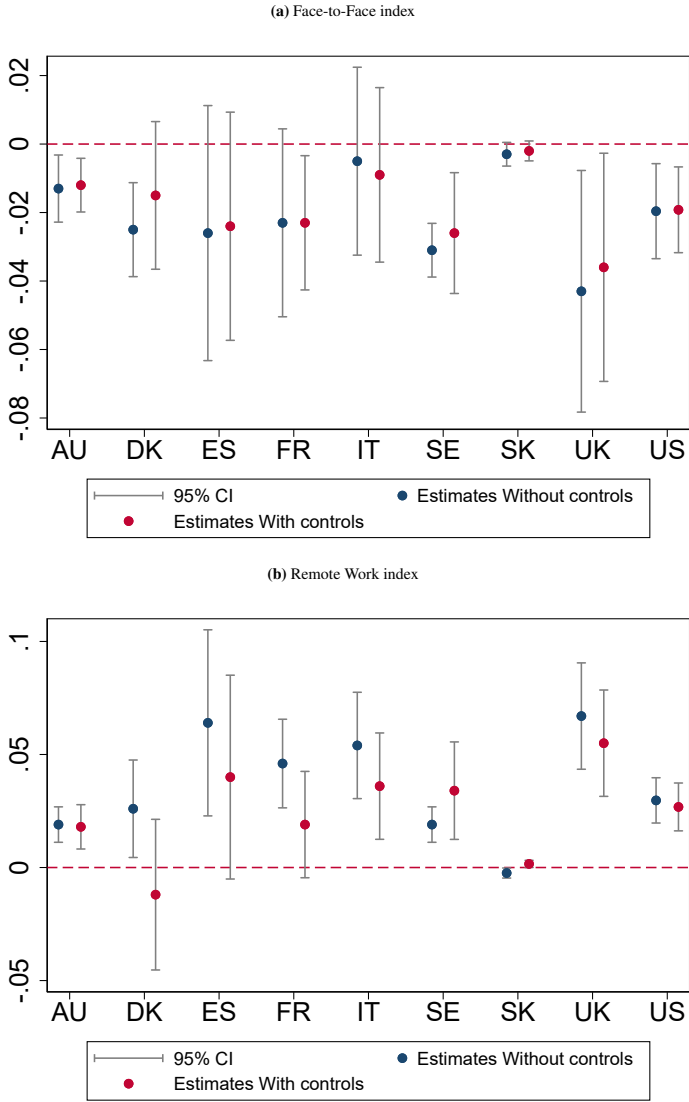
Note: These bubble charts relate employment status in April 2020 in the US to indices for the importance of face-to-face interactions (left panel) and the ability to work remotely (right panel) in an occupation. Occupations indices were generated using data from April 2019. Each bubble represents a SOC Occupation, and its size is proportional to the number of workers in that occupation in our sample. Occupational indices have been standardized to have a mean of 0 and a standard deviation of 1. The y-axis in the upper panel represents the employment rate in an occupation, while the y-axis in the bottom panel is the share of people employed and at work out of all employed people, including those not at work. The fitted lines show the relationship between employment status and occupation indices from regression equation (1.)

Figure 10: Relationship between Job Characteristics and Employment Status: All Countries



Note: This figure plots the slope coefficients from regression equation (1) like those in the bottom panel of 9 for each country and the corresponding 95% level confidence interval. Specifically, we regress the share of people employed and at work in an occupation out of all employed people in that occupation, including those not at work, on the importance of face-to-face interactions (top panel) and the ability to work remotely (bottom panel) in that occupation. Occupations indices were generated using data from April 2019. Red points are generated using 2020 data (April for the US and South Korea, May for Australia, and the second quarter for Europe), and blue points are generated using the same month or quarter data in 2019.

Figure 11: Relationship between Job Characteristics and Employment Status, with and without demographic controls



Note: This figure plots the regression estimates from regression equation (2) of employment on the importance of face-to-face interactions (top panel) and the ability to work remotely (bottom panel) in a person’s occupation with (red) and without (blue) control variables θX_i . The outcome is a binary indicator variable for whether an individual is at work. The regressions are estimated using individual data in the second quarter of 2020 (April for the US and South Korea, May for Australia, and the second quarter for Europe). The sample is restricted to the employed people since their occupation information is available in all eight countries.

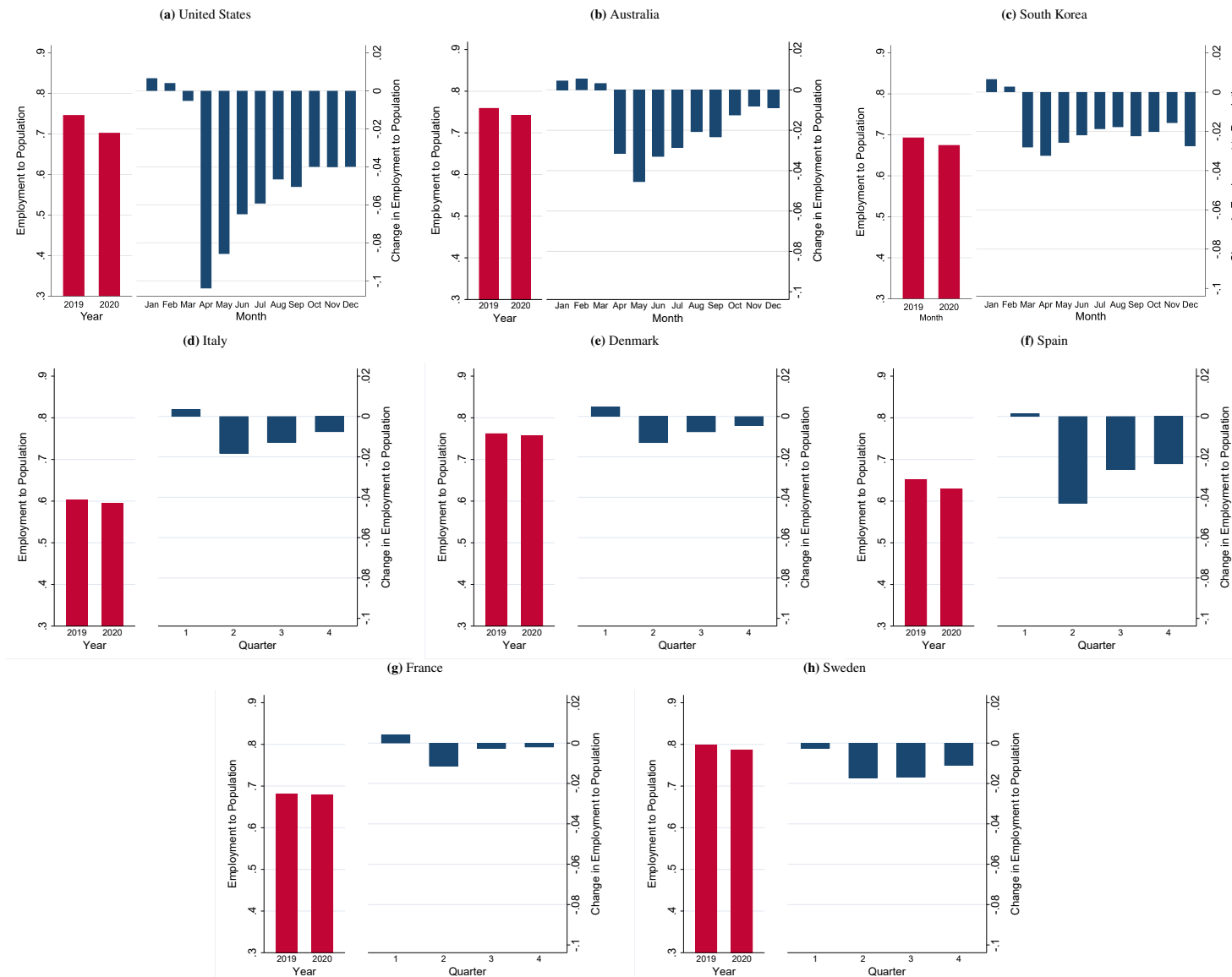
Appendix

Table A1: Employment status: Country-level definitions of the categories

Employment status	US	Australia	South Korea	EuroStat
<i>Employed and at work</i>	People who worked at least 1 hour as a paid employee or in their own business, or people who worked without pay for a minimum of 15 hours in a business owned by a family member.	People who worked at least 1 hour for pay, profit, commission or payment in kind, in a job or business or on a farm (comprising employees and owner-managers).	People who worked at least 1 hour as a paid employee, or in their own business, or people who worked without pay for a minimum of 18 hours in a business owned by a family member.	Persons who during the reference week worked for at least one hour for pay or profit.
<i>Employed and Absent from work</i>	Workers who were not working, but who had a job or business from which they were temporarily absent because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor-management dispute, job training, or other family or personal reasons whether or not they were paid for the time off or were seeking other jobs.	Workers who had a job but were not at work and were away from work for fewer than four weeks up to the end of the reference week, or away from work for more than four weeks up to the end of the reference week and received pay for some or all of the four-week period to the end of the reference week, or away from work as a standard work or shift arrangement, or on strike or locked out, or on workers' compensation and expected to be returning to their job, or were owner-managers who had a job, business or farm, but were not at work.	Workers who have a job or business but are unable to work due to temporary illness, accident, vacation, any type of leaves, job training, childcare problems, labor-management dispute, or other family or personal reasons, whether or not they were paid for the time off.	This category refers to persons with a job or business who were temporarily not at work during the reference week but had an attachment to their job. These persons include those who were not at work due to holidays, working time arrangements, sick leave, maternity or paternity leave, and job-related training; those who were on parental leave and receiving job-related income, the seasonal workers who continued to perform some tasks and duties of the job, and those who were temporarily not at work for other reasons for a total duration of 3 months or less.
<i>Unemployed</i>	People who are not employed but available for work and made at least one specific active effort to find a job, or who are temporarily laid off and expecting to be recalled to their job.	People who were not employed during the reference week, and had actively looked for full-time or part-time work at any time in the four weeks up to the end of the reference week and were available for work in the reference week, or were waiting to start a new job within four weeks from the end of the reference week, and could have started in the reference week if the job had been available then.	People who did not work during the survey week and who have actively searched for a job during the past 4 weeks, and who can get a job immediately if given a job.	This category refers to people who did not work in the reference week but have been actively searching for employment or have not been searching because they have already found a job that will start within a period of at most 3 months after the end of the reference week, or people who have not been searching because they have already found a job which started between the end of the reference week and the interview date. These people are also those indicating that they could start to work immediately.
<i>Not in the labor force</i>	People who are not employed and have not actively looked for work in the last 4 weeks. In other words, people who do not meet the criteria are classified as either employed or unemployed.	People who were neither employed nor unemployed, as defined. This may include persons who were performing home duties or caring for children, or retired or voluntarily inactive, or permanently unable to work, or persons in institutions (boarding schools, hospitals, prisons, sanatoriums, etc.), or members of contemplative religious orders, or persons whose only activity during the reference week was jury service or unpaid voluntary work, or persons who were contributing family worker and unpaid volunteer helpers.	Among the population aged 15 and over, people who are neither employed nor unemployed during the survey period, including Housewives who take full responsibility for housework or childcare and students in school.	People who are not categorized as employed or unemployed are classified as out of labor force.

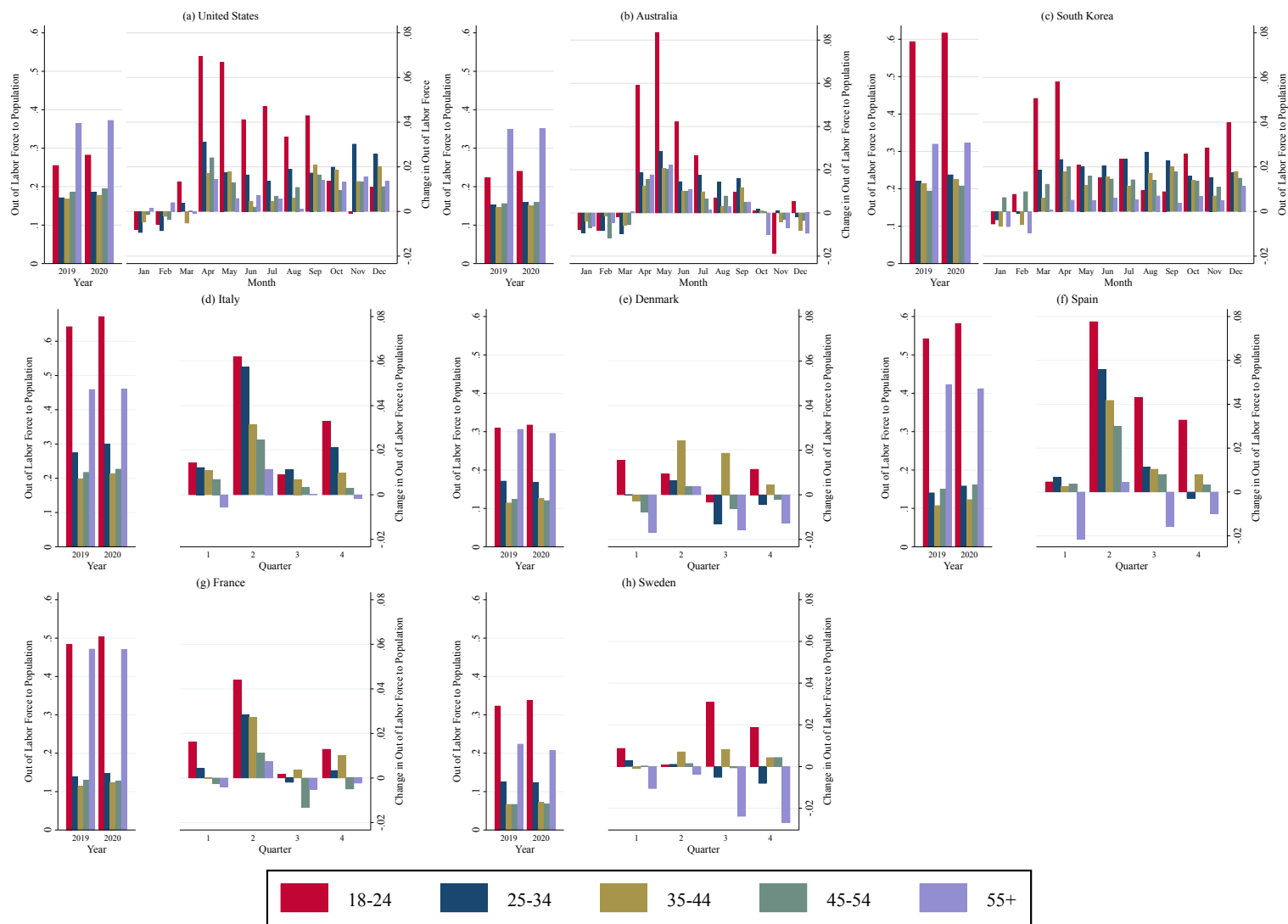
Source: <https://www.bls.gov/cps/definitions.htm> for US,
<https://www.abs.gov.au/statistics/standards/standards-labour-force-statistics/latest-release#labour-force-status> for Australia,
<https://www.k-stat.go.kr/metavc/msba100/statsdcda?statsConfmNo=101004&kosisYn=Y> for South Korea,
<https://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey> for the Eurostat data.

Figure A1: Change in the Employment to Population Ratio between 2019 and 2020



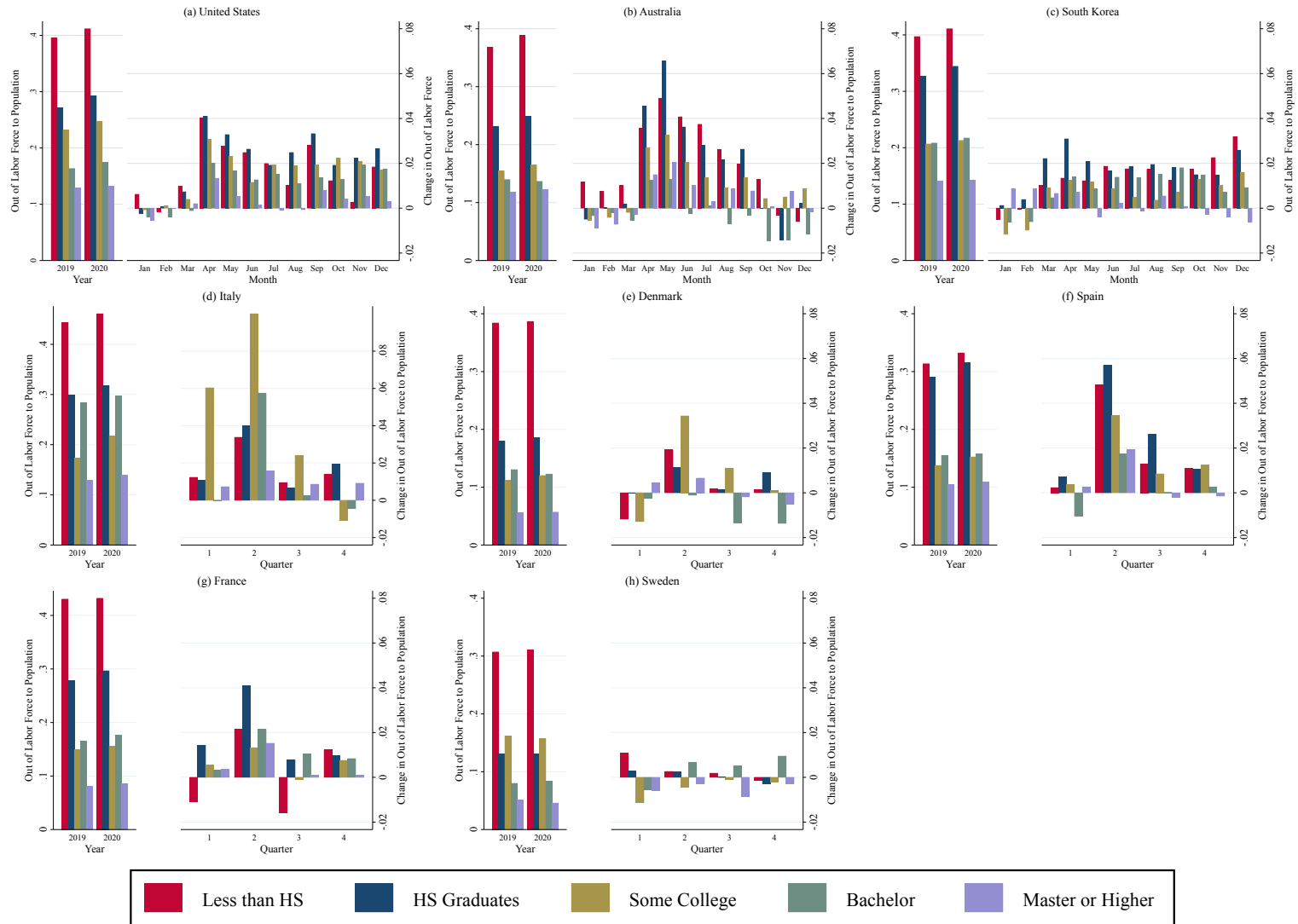
Note: We plot changes in the employment to population ratio of people aged 18 to 65. The left panel of each sub-figure shows the employment to population ratio in 2019 and 2020. The right panel of each sub-figure shows the change in the employment to population ratio between 2019 and 2020 by month or quarter. We construct the employment to population ratio by dividing the number of employed individuals by the population.

Figure A2: Change in the Share of the Population Out of the Labor Force by Age



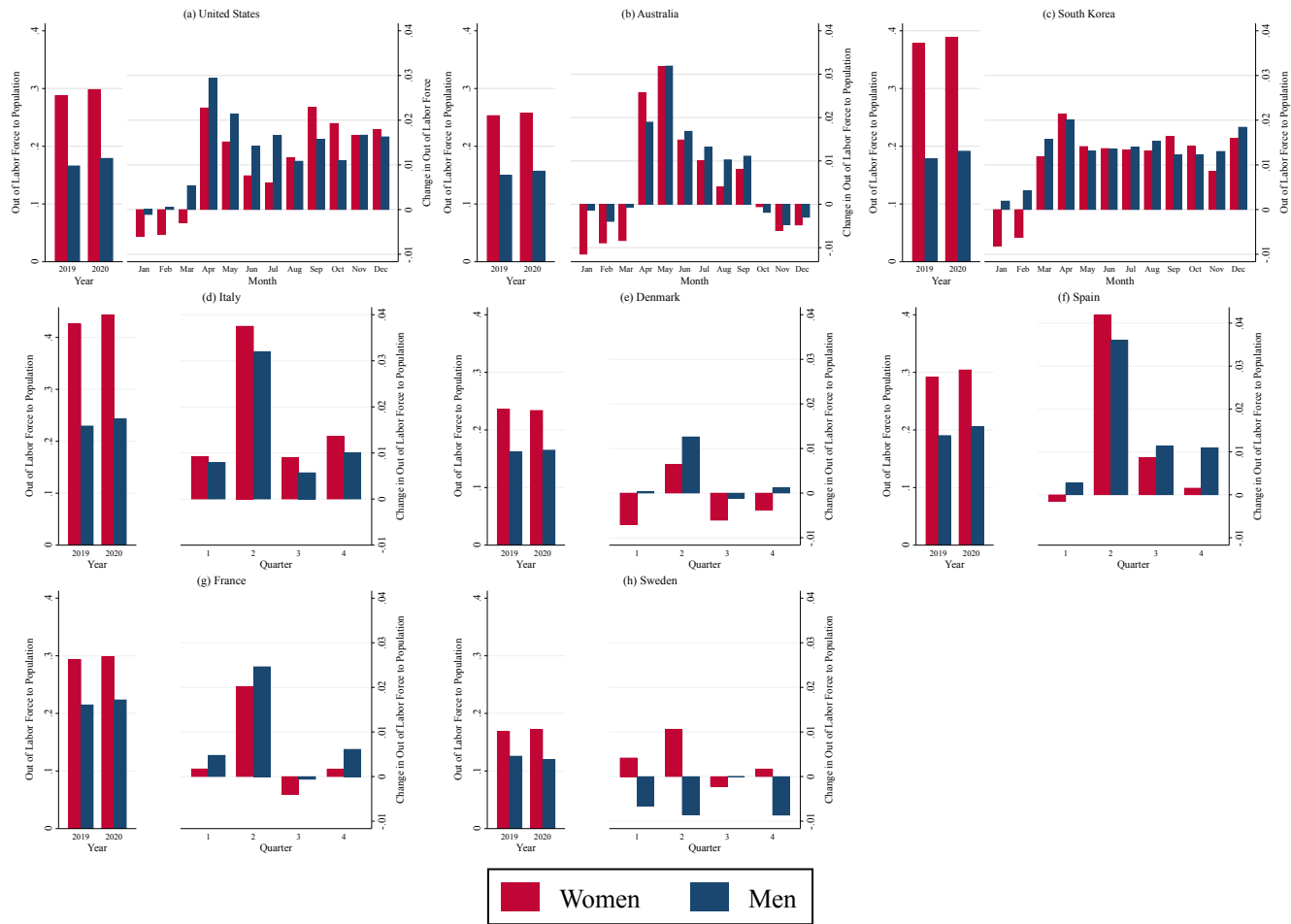
Note: We plot changes in the the share of the population out of the labor force for five age groups: 18 to 24, 25 to 34, 35 to 44, 45 to 54, and 55 to 65. The left panel of each sub-figure shows the share of each group out of the labor force in 2019 and 2020. The right panel of each sub-figure shows the change in the share of each group out of the labor force between 2019 and 2020 by month or quarter. We construct the out-of-labor force rate by dividing the number of individuals who are not in the labor force by the population within each group.

Figure A3: Change in the Share of the Population Out of the Labor Force by Education



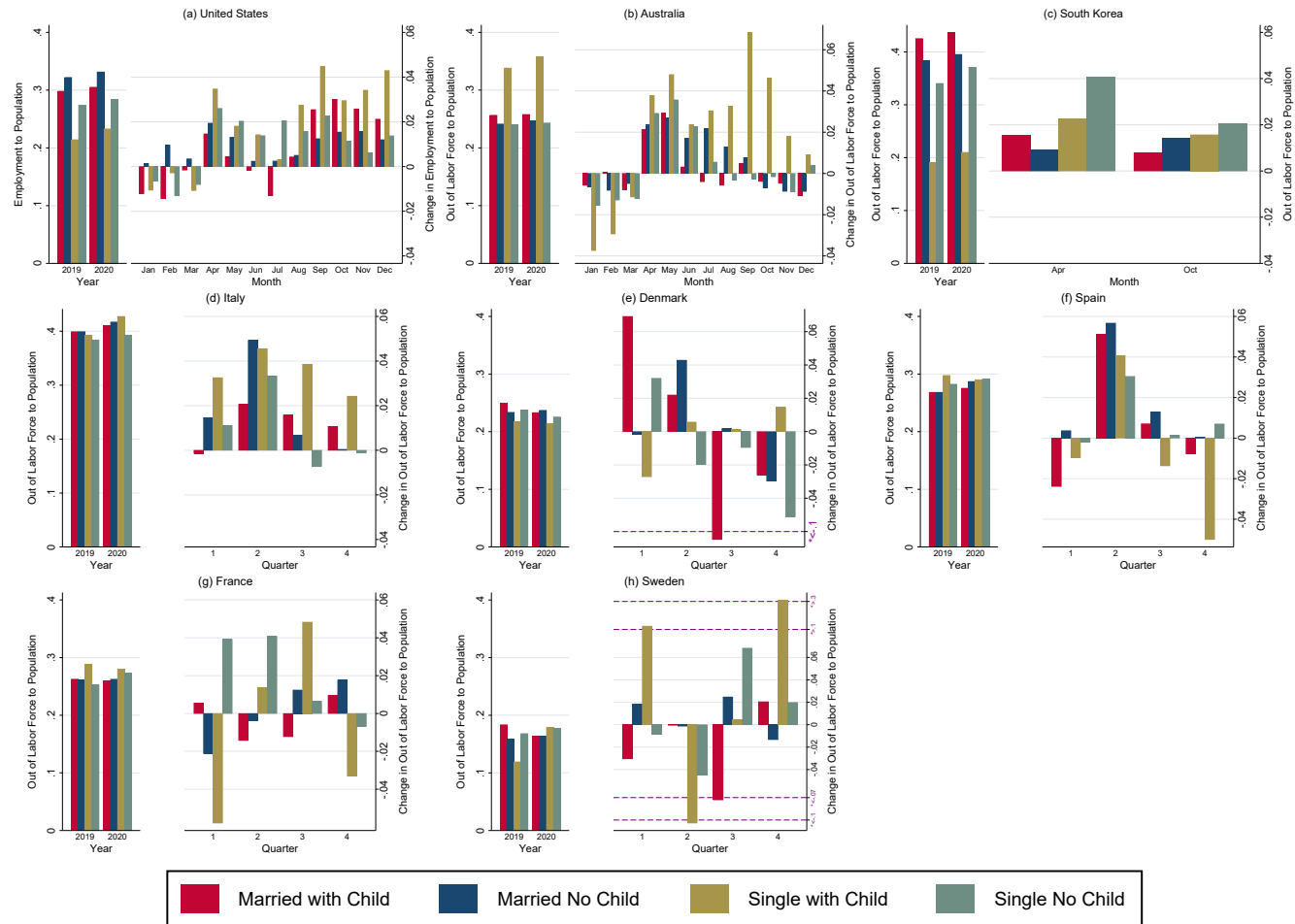
Note: We plot changes in the the share of the population aged 18 to 65 out of the labor force for five education groups: less than high school, high school graduates, some college, bachelor, and master or higher. The left panel of each sub-figure shows the share of each group out of the labor force in 2019 and 2020 by month. The right panel of each sub-figure shows the change in the share of each group out of the labor force between 2019 and 2020 by month or quarter. We construct the out-of-labor force rate by dividing the number of individuals who are not in the labor force by the population within each group.

Figure A4: Change in the Share of the Population Out of the Labor Force by sex



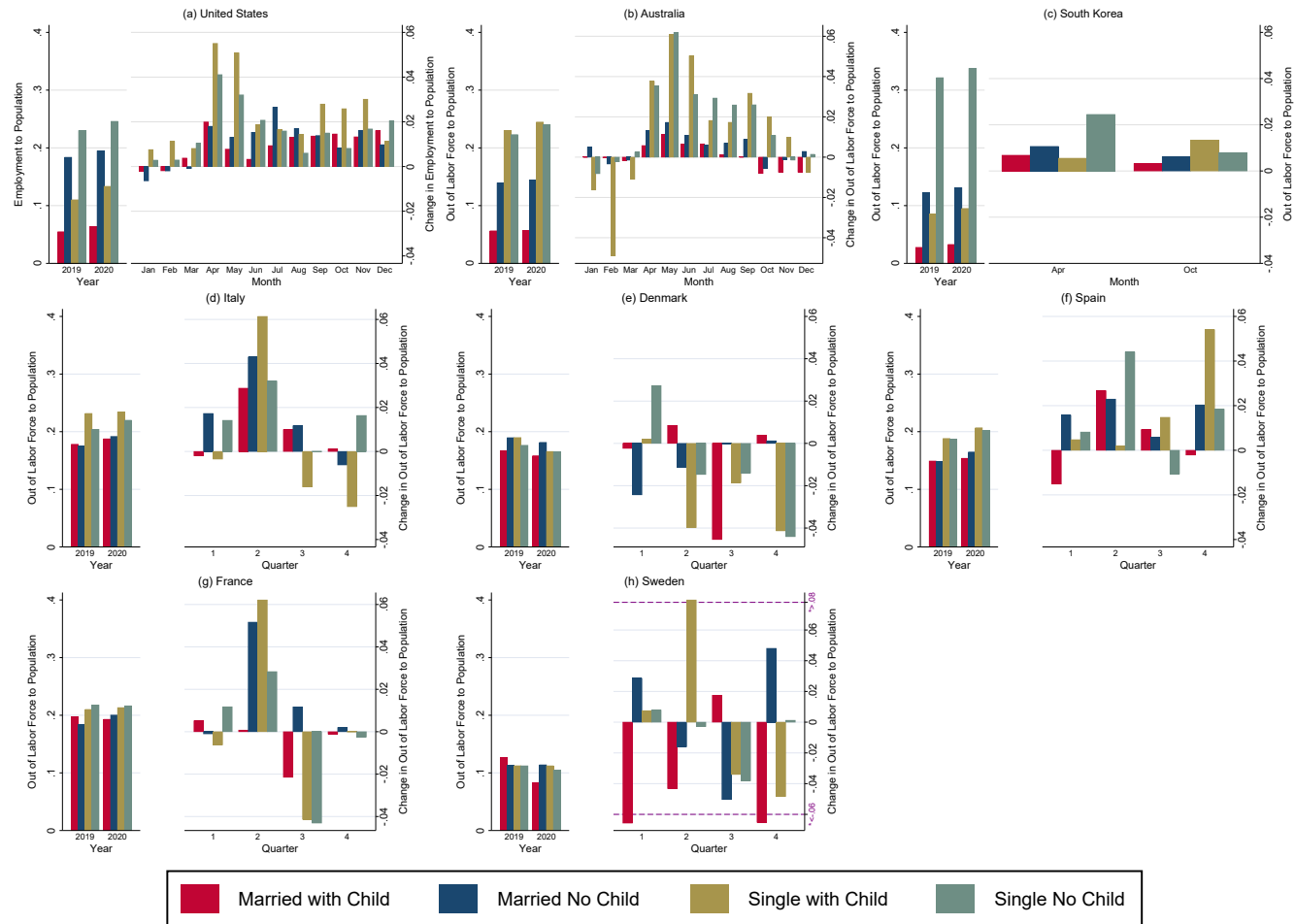
Note: We plot changes in the share of women and men aged 18 to 65 out of the labor force. The left panel of each sub-figure shows the share of each group out of the labor force in 2019 and 2020. The right panel of each sub-figure shows the change in the share of each group out of the labor force between 2019 and 2020 by month or quarter. We construct the out-of-labor force rate by dividing the number of individuals who are not in the labor force by the population within each group.

Figure A5: Change in the Share of the Population Out of the Labor Force by Marital Status Interacted with Child Presence (Women)



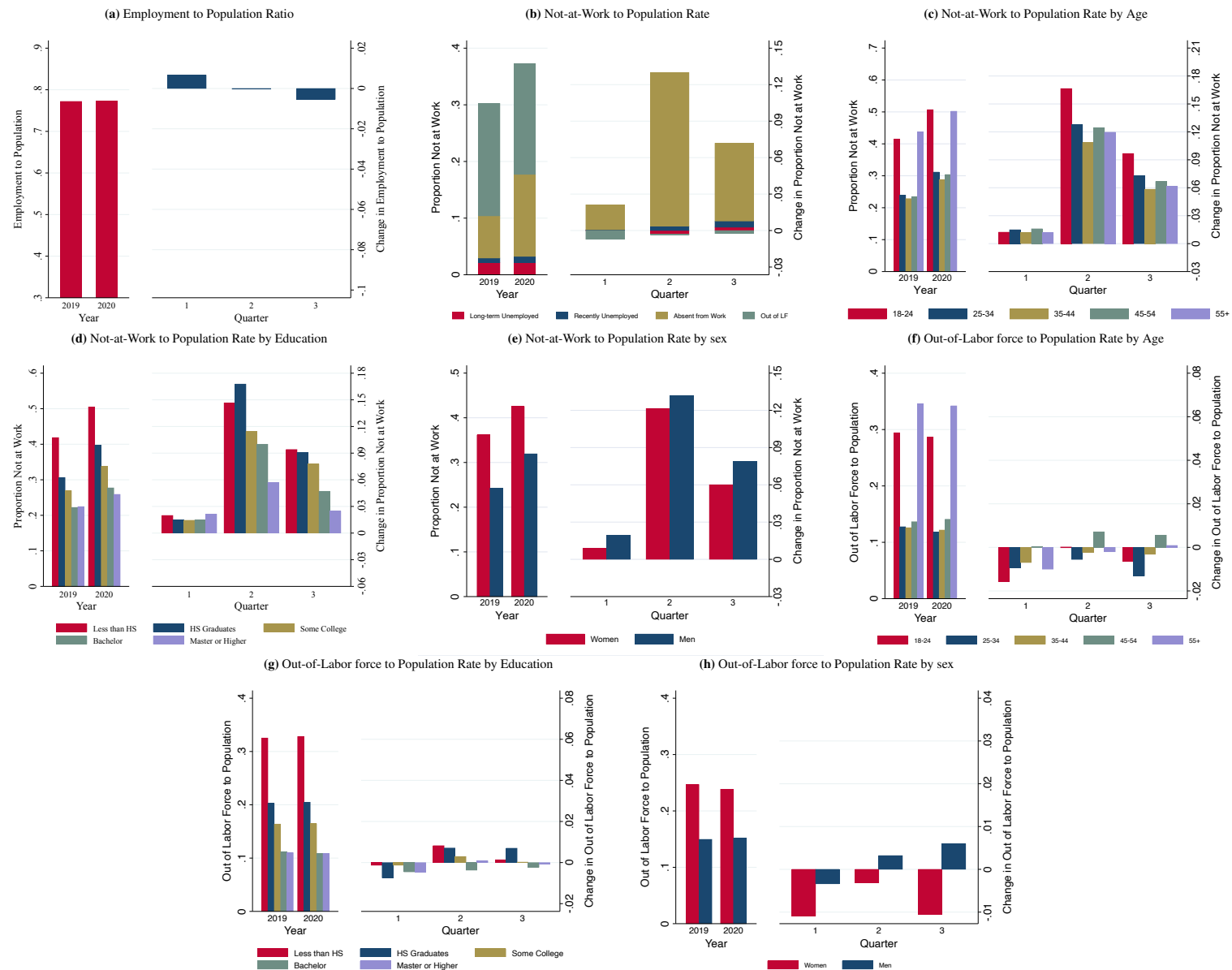
Note: We plot changes in the the share of women aged 18 to 65 out of the labor force for women who are married with at least one child, married with no children, single with at least one child, and single with no children. The left panel of each sub-figure shows the share of each group out of the labor force in 2019 and 2020. The right panel of each sub-figure shows the change in the share of each group out of the labor force between 2019 and 2020 by month or quarter. We construct the out-of-labor force rate by dividing the number of individuals who are not in the labor force by the population within each group.

Figure A6: Change in the Share of the Population Out of the Labor Force by Marital Status Interacted with Child Presence (Men)



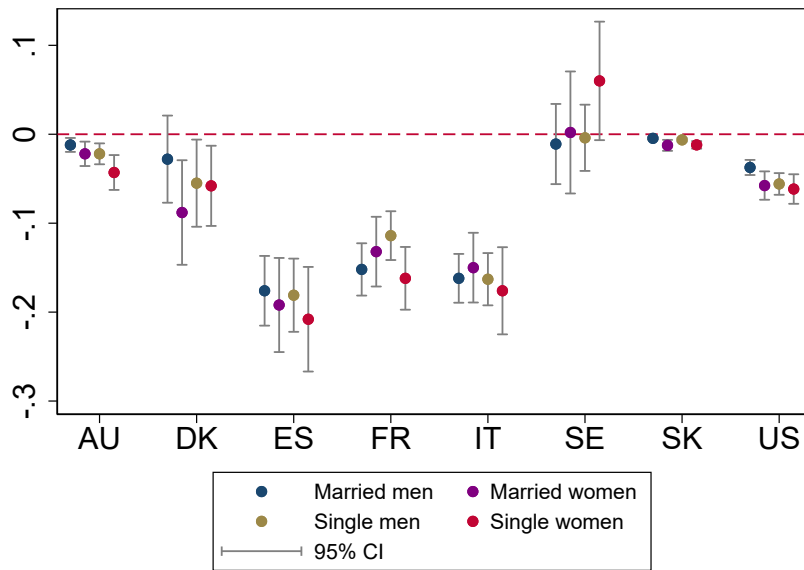
Note: We plot changes in the the share of men aged 18 to 65 out of the labor force for men who are married with at least one child, married with no children, single with at least one child, and single with no children. The left panel of each sub-figure shows the share of each group out of the labor force in 2019 and 2020. The right panel of each sub-figure shows the change in the share of each group out of the labor force between 2019 and 2020 by month or quarter. We construct the out-of-labor force rate by dividing the number of individuals who are not in the labor force by the population within each group.

Figure A7: The U.K.



Note: This figure compiles the various figures for the United Kingdom. The sample size is 52,000. The figures are reported here separately from the other countries because Eurostat does not have the fourth quarter data in 2020 for the United Kingdom.

Figure A8: Employment Outcome by Marital status and sex



Note: This figure plots the change in employment between 2019 and 2020 for four demographic groups: married men, married women, single men, and single women conditional on age, education, and occupational indices. The sample includes each country's 2019 and 2020 second-quarter data (April for the US and South Korea, May for Australia, and the second quarter for Europe).

Table A2: Regression Estimates used to build Figure 11: European Countries

	(1) DK	(2) DK	(3) ES	(4) ES	(5) FR	(6) FR	(7) IT	(8) IT	(9) SE	(10) SE	(11) UK	(12) UK
Face-to-Face	-0.015 (0.011)		-0.024 (0.017)		-0.023** (0.010)		-0.009 (0.013)		-0.026*** (0.009)		-0.036** (0.017)	
Remote Work		-0.012 (0.017)		0.040* (0.023)		0.019 (0.012)		0.036*** (0.012)		0.034*** (0.011)		0.055*** (0.012)
Age/100	1.935*** (0.536)	2.045*** (0.516)	2.119*** (0.402)	2.227*** (0.419)	1.482*** (0.392)	1.473*** (0.389)	0.653** (0.303)	0.625** (0.288)	-0.209 (0.444)	-0.176 (0.428)	2.053*** (0.267)	1.962*** (0.222)
(Age/100) ²	-2.060*** (0.614)	-2.173*** (0.591)	-2.269*** (0.425)	-2.392*** (0.442)	-1.499*** (0.437)	-1.493*** (0.436)	-0.505 (0.315)	-0.514* (0.305)	0.289 (0.554)	0.247 (0.543)	-2.429*** (0.289)	-2.334*** (0.249)
Married Women	-0.062** (0.028)	-0.069*** (0.026)	-0.047*** (0.016)	-0.051*** (0.018)	-0.031** (0.015)	-0.037** (0.016)	-0.023* (0.013)	-0.027* (0.014)	-0.032 (0.029)	-0.050 (0.031)		
Single Men	-0.038 (0.026)	-0.043 (0.027)	0.007 (0.008)	0.008 (0.008)	0.020 (0.013)	0.020 (0.013)	0.006 (0.009)	0.006 (0.009)	-0.000 (0.023)	0.001 (0.023)		
Single Women	-0.056** (0.027)	-0.063** (0.026)	-0.057*** (0.019)	-0.059*** (0.022)	-0.052*** (0.015)	-0.058*** (0.018)	-0.038** (0.016)	-0.043** (0.017)	-0.009 (0.026)	-0.028 (0.025)		
Women											-0.047*** (0.013)	-0.065*** (0.015)
With Children	-0.044** (0.022)	-0.045** (0.022)	0.010 (0.006)	0.010 (0.006)	-0.020** (0.009)	-0.020** (0.009)	0.012* (0.007)	0.012* (0.007)	-0.021 (0.023)	-0.018 (0.023)		
HS Graduates	0.091** (0.036)	0.094*** (0.034)	0.000 (0.017)	-0.028* (0.016)	0.040** (0.017)	0.025 (0.017)	0.063*** (0.016)	0.034** (0.014)	-0.021 (0.034)	-0.031 (0.031)	0.004 (0.009)	-0.013 (0.012)
Some College	0.126*** (0.046)	0.139*** (0.045)	0.039* (0.022)	0.002 (0.016)	0.113*** (0.019)	0.083*** (0.019)	0.073* (0.039)	0.034 (0.037)	-0.020 (0.034)	-0.048 (0.034)	0.059*** (0.012)	0.025** (0.012)
Bachelor	0.102** (0.041)	0.110*** (0.041)	0.114*** (0.033)	0.056** (0.027)	0.168*** (0.019)	0.136*** (0.021)	0.109*** (0.032)	0.060*** (0.023)	0.002 (0.042)	-0.029 (0.047)	0.082*** (0.014)	0.037*** (0.013)
Master or Higher	0.154*** (0.040)	0.174*** (0.041)	0.175*** (0.031)	0.109*** (0.027)	0.180*** (0.019)	0.151*** (0.019)	0.173*** (0.023)	0.121*** (0.021)	-0.002 (0.035)	-0.035 (0.039)	0.134*** (0.016)	0.083*** (0.016)
Observations	1,205	1,205	19,399	19,399	9,396	9,396	19,672	19,672	1,016	1,016	31,511	31,511
R-square	0.052	0.051	0.037	0.039	0.032	0.031	0.024	0.029	0.013	0.015	0.034	0.040

Notes: This table reports the regression estimates plotted in Figure 11 for the European countries. Specifically, it reports coefficients from regression equation (2) for each country where we regress employment on the importance of face-to-face interactions and the ability to work remotely in a person's occupation and control variables θX_i . The outcome is a binary indicator variable for whether an individual is at work. The regressions are estimated using individual data in the second quarter of 2020 (April for the US and South Korea, May for Australia, and the second quarter for Europe). The sample is restricted to the employed people since their occupation information is available in all eight countries. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Regression Estimates used to build Figure 11: Non-European Countries

	(1) US	(2) US	(3) AU	(4) AU	(5) SK	(6) SK
Face-to-Face	-0.019** (0.006)		-0.012*** (0.004)		-0.006 (0.005)	
Remote Working		0.027*** (0.005)		0.018*** (0.005)		0.002* (0.001)
Age/100	0.267* (0.126)	0.214 (0.128)	0.398*** (0.151)	0.358** (0.145)	0.174*** (0.053)	0.180*** (0.052)
(Age/100) ²	-0.343* (0.142)	-0.283* (0.144)	-0.501*** (0.173)	-0.457*** (0.168)	-0.174*** (0.056)	-0.181*** (0.055)
Single Men	-0.011** (0.004)	-0.008 (0.004)	-0.017*** (0.006)	-0.014** (0.006)	-0.004** (0.001)	-0.003** (0.001)
Married Women	-0.034*** (0.007)	-0.044*** (0.007)	-0.033*** (0.006)	-0.041*** (0.007)	-0.019*** (0.004)	-0.020*** (0.004)
Single Women	-0.025*** (0.007)	-0.033*** (0.007)	-0.028*** (0.008)	-0.036*** (0.008)	-0.008*** (0.003)	-0.008*** (0.003)
With Children	-0.008* (0.004)	-0.009* (0.004)	-0.024*** (0.004)	-0.024*** (0.005)	-0.013*** (0.002)	-0.013*** (0.002)
HS Graduates	0.012 (0.009)	-0.005 (0.010)	0.001 (0.007)	-0.008 (0.008)	-0.001 (0.002)	-0.002 (0.002)
Some College	0.032*** (0.010)	0.004 (0.011)	0.007 (0.007)	0.004 (0.007)	-0.004* (0.002)	-0.006** (0.002)
Bachelor	0.064*** (0.010)	0.027* (0.011)	0.043*** (0.007)	0.023*** (0.007)	-0.010*** (0.003)	-0.012*** (0.003)
Master or Higher	0.083*** (0.011)	0.039*** (0.011)	0.055*** (0.007)	0.037*** (0.008)	-0.013*** (0.004)	-0.015*** (0.004)
Observations	28,577	28,577	20,735	20,735	173,529	173,529
R-square	0.025	0.026	0.012	0.013	0.009	0.009

Notes: This table reports the regression estimates plotted in Figure 11 for the Non-European countries. Specifically, it reports coefficients from regression equation (2) for each country where we regress employment on the importance of face-to-face interactions and the ability to work remotely in a person's occupation and control variables θX_i . The outcome is a binary indicator variable for whether an individual is at work. The regressions are estimated using individual data in the second quarter of 2020 (April for the US and South Korea, May for Australia, and the second quarter for Europe). The sample is restricted to the employed people since their occupation information is available in all eight countries. * p<0.1, ** p<0.05, *** p<0.01.