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Special Issue

The Economic Impact of COVID-19 in Greece

Edited by Vassilis Monastiriotis and Philipp Katsinas

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Editorial

The COVID-19 pandemic represented yet another, in a series of many, shock to the global economy. Catching governments and policy officials by surprise, the pandemic very quickly exposed the weaknesses in national health and emergency response systems as well as in international political coordination. Countries and regions renowned for their healthcare provision, their quality of government and their level of development (including Lombardy, where the first European epicentre of the pandemic stroke) where soon engulfed into a healthcare crisis not seen in Europe at least since the end of WWII. The emergency measures that were put in place – in some places very swiftly, in others with significant, and often inexplicable, delays - naturally prioritised on the containment of the spread of the virus and the management of the capacity of the healthcare systems. Inevitably, the lockdowns that followed put a halt to most aspects of economic activity thus quickly translating a health crisis into an economic one. Almost invariably, governments across the globe put swiftly aside their 'free-market economics' and implemented measures seeking to stabilise and support the ailing economies – mainly in the form of wage subsidies (furloughing and short-working time schemes) but also through other means (income support, tax breaks and holidays, etc).

Despite the global nature of the pandemic, responses in the first instance where astonishingly 'national', with little coordination across countries, even in cases where mechanisms and institutions of international coordination (such as the European Union) where in place. As a result, the pervasiveness and effectiveness of the various measures, both with regard to the pandemic itself and in relation to the economy, were very varied. Somewhat unusually, this variation did not square easily with obvious characteristics of the national political economies. Responses are difficult to group along the old fault-lines of "advanced" versus "less advanced" countries; they do not follow too well the Liberal versus Coordinated Market Economy of the Varieties of Capitalism literature or Esping-Andersen's "worlds of welfare capitalism" or other traditional "north-south" distinctions; and – with the exception of small-sample tentative conclusions about the effectiveness of measures in countries with female-led governments – they do not seem to link to well also to distinctions regarding personal traits of national leaders. For example[1], Peru tops the global rankings in terms of number of COVID-related deaths per million inhabitants, followed immediately by Belgium; Brazil is neck-and-neck with the UK for the 8th place in the global ranking; Kosovo has done almost twice as well as France but it is very comparable to Canada; while Austria

[1] All information extracted from LSE's Statista database on 25/9/2020 (https://www.statista.com/statistics/1104709/coronavirus-deaths-worldwide-per-million-inhabitants/)

and Turkey are very comparably 7 times less affected, on this count, than Sweden and Mexico.

In all this context of crisis and instability, Greece has emerged as a surprisingly good case – giving a new meaning to the old political scientist's term "Greek exceptionalism". With 313 confirmed deaths and a total of approximately 3,600 cases, Greece stands in the 86th position in the global deaths-per-capita rankings, with less than 30 COVID-related deaths per million of population. The containment of the virus by the Greek authorities and the health-related and economic policy responses of the country have been hailed in international media (e.g., The Guardian, New York Times, and others) as a great success. Battered by its very own and extremely prolongated financial, fiscal, political and economic crisis and the three adjustment programmes of 2010-2018, and given its openness (tourism) and known weaknesses with regard to surveillance, compliance and enforcement, the country could have been a very easy target for the deadly virus. Instead, and despite the recent upward trend, the spread of the virus has been largely contained; the support measures taken in the economy have been received by many – including many international commentators – as robust and effective; and the impact on the economic has been much less severe than one could initially anticipate.

How did this happen? And is Greece, then, a success story? And are the policies that have been put in place, for the labour market and the economy at large, sufficient, or sufficiently effective to deal with the implications of the pandemic in the medium- to long-run? What are the lessons that we can learn from the Greek response to the crisis? And how the crisis – and the support measures – affected patterns of work and work-life balance in the country?

There are hundreds – perhaps thousands – of relevant and intriguing question one could ask within this context. Questions about the economics of the crisis, the politics of the crisis, the politics of international coordination with regard to the crisis, the geopolitics of Greece, the functioning of the party system and the effectiveness of public administration, the societal responses to the crisis and the cultural and other traits that these reflect, the distributional implications of the crisis and the political economy and economic geography of the spread of the virus, the robustness of the health service in Greece, and many-many more. Engaging in analytical ways with these questions will take time – time and a lot of effort – as the pandemic is, unfortunately, a bit too fast-moving and thus difficult to 'test' or examine systematically in a short period of time. Still, a small literature has emerged – quite fast, given the circumstances – that has started this enquiry.

This special edition of GreeSE Papers is a small effort to contribute in this direction. It hosts three papers on the economic impact of COVID-19 in Greece and the policy responses and adjustments in the Greek labour market. The first, by G.

Economides and A. Philippopoulos, utilises a computable general equilibrium macroeconomic model of the Greek economy, partly developed as part of a project funded by the Hellenic Observatory, to examine the possible impact of the COVID-19 pandemic on the Greek economy under different policy scenarios. With this, it highlights the costs and wider economic implications of various policy options for the management of the pandemic in the country, thus contributing directly to informing policy on the steps that are to be followed as the crisis evolves. The second, by Betcherman et al – including former HO Research Officer Ioannis Laliotis – offers an in-depth study of the the short-term impacts of the COVID-19 lockdown on the Greek labour market. The paper has already attracted significant attention in policy circles and the public domain and has also been hosted in prestigious discussion papers series, including the Institute of Labor in Bonn (IZA) and the World Bank. The paper presents robust evidence showing that the emergency job-protection measures that were put in place were effective in maintaining employee retention and reducing job separations; but where not sufficient to counter the dramatic slowdown in hiring that, as it happened, took place at a time "when job creation typically peaks in normal years, mostly in tourism". The third paper, by K. Pouliakias, turns its attention to aspects of work organisation, examining how the COVID-19 pandemic and the social distancing and work-from-home measures that were put in place may have contributed to the "unexplored potential" of teleworking – an area where the country has been a notable laggard in the European Union context.

As noted already, this small collection of papers cannot possibly cover in any shape or form the breadth of issues that emerge in relation to the COVID-19 pandemic, its economic impacts and the policy challenges – and social costs – that these raise. This notwithstanding, they represent in many ways the state of the art of Greek research on the issue, by some of the most promising scholars in the country in their respective fields and the contribute – each to its limited extent – to the debate that needs to take place about the management of the COVID-19 crisis and the future steps that policy – as well as society and its economic agents – should take in dealing with the multifaceted consequences of the crisis, as the crisis unfolds and evolves. We hope that you will find the material presented in this special edition useful and we invite you to continue monitoring the pages of GreeSE Papers for future publications on the topic.

Vassilis Monastiriotis,

Editor-in-Chief, GreeSE Papers

The macroeconomic impact of covid-19 on the Greek economy and policies from now on

George Economides[2] and Apostolis Philippopoulos[3]

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ABSTRACT

In this short paper, departing from 2019, we quantify the possible impact of the COVID-19 pandemic on the Greek economy under various policy scenario assumed. A loss of around 8.5% of GDP and a sharp jump of public debt seem to be unavoidable during 2020 but, like in the case of the sovereign debt crisis in the previous decade, the duration of the new crisis will depend crucially on the choices made.

Keywords: Covid-19, growth, macroeconomic policy.

JEL classification: O4, H6, E02.

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1. Introduction and main findings

In the beginning of 2020, the world was stricken by the covid-19 pandemic which, at the time of this writing, is expected to cause a severe economic downturn worldwide. A public financing crisis is also expected to follow as most governments have stepped in and new "unprecedented" fiscal and monetary policies have been adopted or promised to be adopted. Greece is not an exception. Actually, the pandemic struck the Greek economy just when it embarked on a moderate growth path after years of economic depression associated with its sovereign debt crisis. To make matters worse, the pandemic has found Greece with limited fiscal space (its public debt was already around 175% of GDP in the end of 2019).

This raises two interrelated questions: First, what will be the size and the duration of the new economic downturn? Second, what are the right policy reactions to this downturn? As is widely recognized (see e.g. European Commission (2020a)), although the shock is symmetric hurting most countries, its effects will be uneven depending, except from the severity of the pandemic and the stringency of the containment measures in each country, on how the shock propagates to each economy, the initial conditions and the way each country responds to the economic downturn.

In this short paper, using the macroeconomic model for Greece constructed by Economides et al. (2020), and the lessons learnt from the sovereign debt crisis in 2008-2016, we will try to give quantitative answers to the above questions. In particular, in Economides et al. (2020), we have constructed a medium-scale macroeconomic model that embeds the main features of the Greek economy in the euro period. To this model, we add a temporary adverse labour supply shock so as to get the drop in economic activity caused by the pandemic; this is as in Eichenbaum et al. (2020) and can mimic the effects of the necessitated containment measures on labour supply.

Our quantitative results are as follows. Departing from the year 2019, and assuming a rather moderate value for the adverse labour supply shock that lasts during 2020 only, our simulations show that in 2020, and in the fictional case of no policy reaction, the Greek economy could suffer an output loss of around 12% relative to 2019 and public debt to GDP could jump to more than 220%. This shows the big vulnerability of the Greek economy to supply shocks even of relatively small magnitude. Policy responses, on the other hand, can mitigate the economic damage. For example, responding with higher public spending and lower taxes, as the Greek government has already done or has announced to do, can make the recession milder (the output loss can be around 8.5% in 2020) and the rise in the public debt to GDP smaller (it could be around 214%). The same simulations show that the expected financial assistance from the EU, via the balance sheet policies of the ECB and the official fiscal aid from the newly established Recovery Fund (the latter is around 32 billion euros for Greece), can seriously help the Greek economy

but this depends crucially on the way it is used. If it is used, for example, to finance public investment, it will limit the output loss to around 6.5% in 2020 and will also put the country on a sustainable path with public debt falling to around 168.5% in the coming years thanks to economic growth. If, on the other hand, this financial assistance becomes a common pool for rent seeking[4], it will be completely wasted (the GDP will be as if the country has received zero aid from the EU) and the country will be trapped in a bad equilibrium in the coming years. Product market liberalization and improvements in institutional quality will also be crucial, as they have been during the sovereign debt crisis in the 2010s.

Therefore, similarly to the sovereign debt crisis in the previous decade, a different spending-tax policy mix, product market liberalization, an improvement in institutional quality, and a socially productive use of the redistributive resources made available from the EU, can help the Greek economy, not only to overcome the pandemic with the minimum possible output losses in 2020, but also to achieve higher medium-term economic growth and a lower public debt-to-GDP ratio over time. Reversing the argument, if we repeat the same mistakes made during the sovereign debt crisis (anti-growth policy mix combined with a sharp deterioration in institutional quality), Greece will enter a new phase of deep economic depression.

The rest of this note is as follows. Section 2 explains how we work and introduces the alternative policy scenaria assumed. Quantitative results, borrowed from our main work in Economides et al. (2020), are presented in section 3. Section 4 closes the note.

2. How we work and policy scenario

We work as follows. First, employing the model constructed by Economides et al. (2020), we get a stationary solution using data of the year 2019. This solution serves as a departure point for our new numerical simulations. Second, departing

[4]A prerequisite of rent seeking is an institutional failure in the form of poorly defined and protected property rights (see e.g. Drazen (2000, chapter 10)). It is this failure that allows private and/or public assets and income to become common pools or contestable prizes, which, in turn, incentivise self-interested agents (with the right connections) to participate in rent seeking competition. All this implies a misallocation of resources so that the society incurs productivity and welfare losses. For modelling details, see Economides et al. (2020). For the key importance of property rights among other measures of institutional quality, see e.g. Hall and Jones (1999), Acemoglu (2009, chapters 4 and 22), Besley and Persson (2009), Besley and Ghatak (2010) and many others. For quantitative macro models with such problems, see e.g. Angelopoulos et al. (2009), Economides et al. (2020) and Christou et al. (2020). For data on institutional quality in Greece relative to other countries, see e.g. Masuch et al. (2018) and Christou et al. (2020); Greece scores very poorly in almost all indices.

from this solution, we add a labor supply shock, denoted as Φ_t, as in Eichenbaum et al. (2020), keeping all other driving forces (exogenous and policy variables) at their 2019 values. We start by setting Φ_t at 0.8 during 2020 and at 1 from 2021 onwards (meaning that in 2021 we go back to the Greek normality). We label this to be our baseline bad scenario regarding the impact of covid-19 without any government policy reaction. Third, we study various policy reactions to this situation. In doing so, we distinguish policy reactions without, and with, financial aid from the EU.

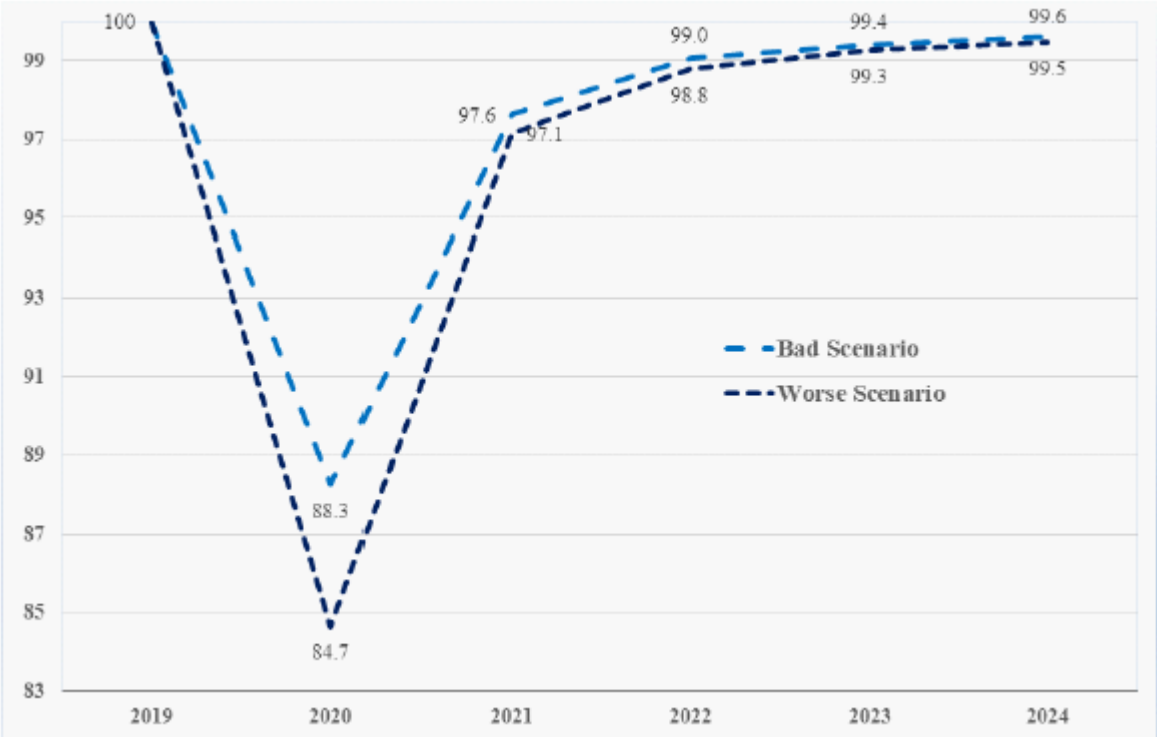
Fictional scenaria without help from the EU We focus on the following cases: (I) The government, during 2020, makes a transfer to all households, and not only to public employees (the labour income of public employees is assumed to remain unaffected by the shock even in the baseline bad scenario, as it has been the case in practice). This transfer covers the reduction in all labour incomes caused by the pandemic shock. (II) On top of (I), during 2020 and 2021, the government also increases temporarily by 1 percentage point all other public spending items as shares to GDP. (III) On top of (I)-(II), from 2020 onwards, the government also reduces permanently the effective income and consumption tax rates, each by one percentage point, and this extra loss in public revenue is somehow balanced by cuts in government transfers by the same percentage point from 2021 onwards. We believe that, among the above mentioned scenaria, the possible quantitative impact of COVID-19 on the Greek economy can be better captured by scenario (III), since the Greek government has already adopted, or has promised to adopt, a set of policy measures which include, among others, transfers to households and firms, increases in public spending in general and tax reductions or discounts. Scenaria (I) and (II) however help us to understand the effect of one policy measure at a time. Scenaria with help from the EU In addition to the above responses, we study the impact of the establishment of the new fund, the so-called European Recovery Fund, whose aim will be to raise money from private markets and then allocate it to member-countries depending on how much they have been hurt by the covid-19 pandemic (see European Commission (2020b)). According to the information available so far, Greece could benefit up to a net amount of 32 billion euros mainly in the form of grants. This amount translates into around 17% of the Greek GDP in 2019, and should be used by the end of 2024. Therefore, in an attempt to quantify the effects of this new financial assistance from the EU, in addition to scenaria (I)-(III), which had to do with policy reactions at national level, we will also investigate the following three scenaria all of which incorporate this EU assistance to our model[5]: In scenario (IV), on top of the policy measures included in scenario (III), which can serve as the policy benchmark, we assume that the Greek government uses the 32 extra billion euros from the EU to

[5] In terms of modelling, we just have to add the assumed amount of financial assistance, or foreign aid, to the budget constraint of the government and of course to the balance of payments.

finance public investment over the years 2021-2014 (we assume that one fourth of the total amount is used for this purpose each year). This can give us an idea of the potential benefits from the EU support when the country makes a "good" use of the money received. In scenario (V), on top of (IV), we assume that the country also implements stronger - and at a faster pace - reforms in the product market so as the degree of competition in the Greek product market approaches the one in the core eurozone countries within three years. This attempts to capture the contribution of structural reforms to economic recovery. Finally, in scenario (VI), we go to the other extreme from (IV) and (V). Now, instead of assuming that Greece uses the amount of 32 billion euros to finance public investment, we assume that this amount is misused in the sense that it becomes a contestable prize and that atomistic economic agents compete with each other for a share of this contestable prize. We do so because there is a lot of anecdotal, as well as econometric, evidence that, in countries with weak institutions, like Greece, foreign aid transfers increase the size of the prize that interest groups fight over and hence induce rent seeking activities (see e.g. Economides et al. (2008)). In turn, rent seeking in the recipient country, and the distortion of incentives triggered by this type of anti-social competition, mitigate the beneficial effects that foreign aid may have in the first place. Our model of Tullock-type rent seeking competition (see Economides et al. (2020) for details) can easily accommodate this possibility; we just add the amount of 32 billion euros (one fourth of it in each year from 2021 to 2024) to the existing contestable prize.

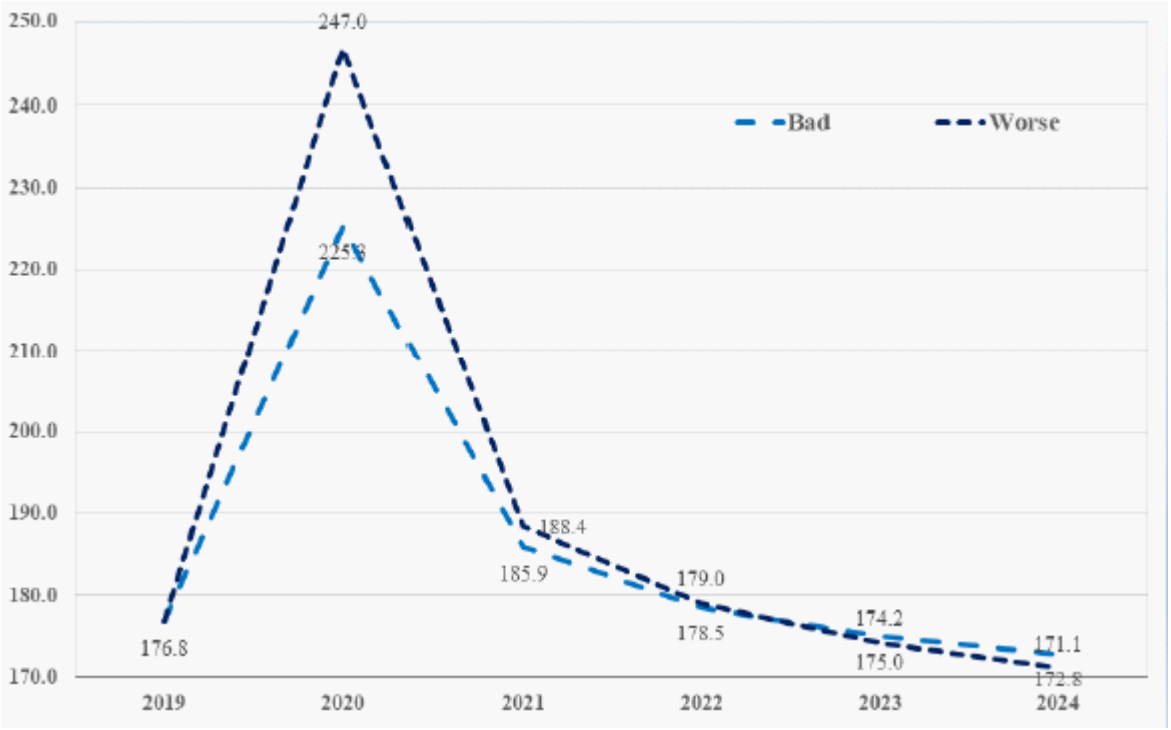
3. Results

Departing from 2019, Graph 1 illustrates the simulated path of GDP when the economy is hit by the covid-19 shock in 2020 as defined above and if there is no policy reaction at all. In the so-called bad scenario, as said above, Φ_t takes the value of 0.8 in 2020 and then returns to 1 for ever. In this graph, we also study a worse scenario in which Φ_t takes the value of 0.75 in 2020, which can be thought of as the case in which there is a second wave of the pandemic which might require a new lockdown of households/firms (however, even in this worse scenario, Φ_t is assumed to return to 1 in 2021 and to remain there for ever). As can be seen in Graph 1, in the bad scenario, the economy loses almost 12% of its output relatively to 2019, whereas, in the worse scenario, this loss exceeds 15%. To make it worse, the economy does not manage to rebound in the years after in the sense that GDP remains below its 2019 level. These results show the big vulnerability of the Greek economy to supply shocks even of relatively small magnitude. They also imply that government intervention has been more than necessary.



Graph 1: The economic impact of covid-19 without any response

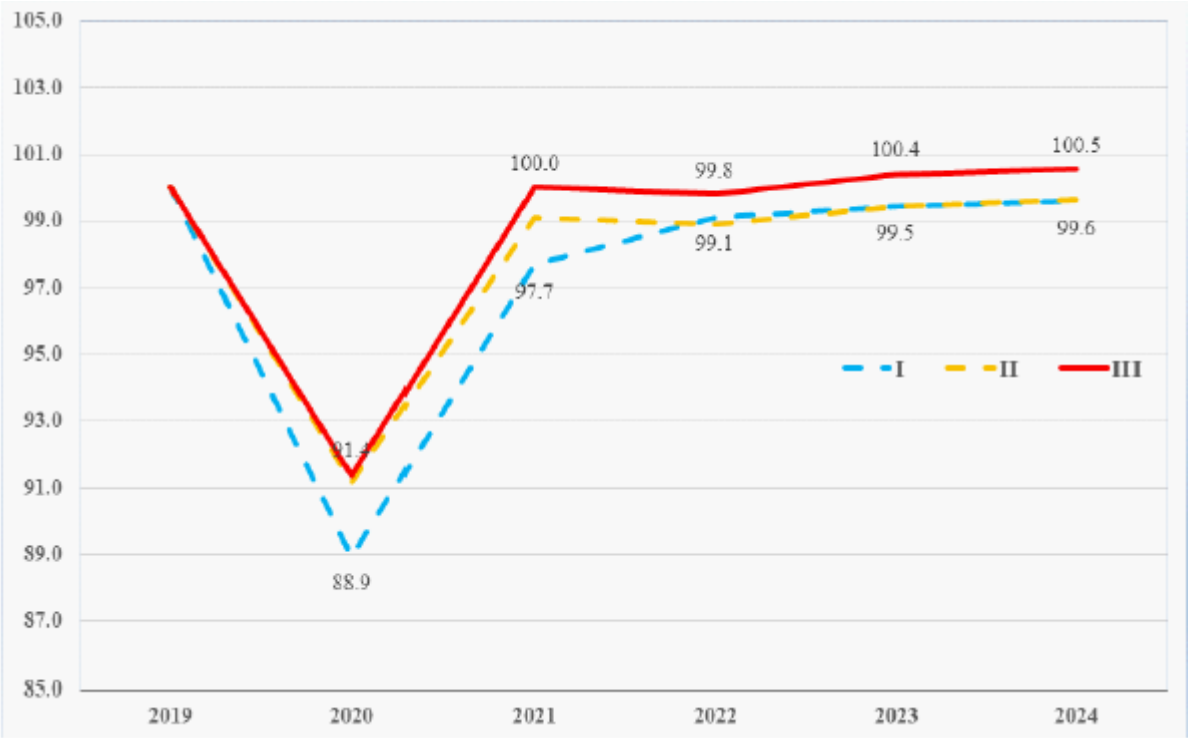
Graph 2 presents the simulated paths of public debt to GDP under the bad and the worse scenaria. In the bad scenario, the public debt to GDP ratio in 2020 exceeds 225%, whereas, in the worse scenario, it jumps to 247%, both due to the snowball effect. However, as said, all this is without policy reaction, which once implemented, is expected to limit the economic downturn and the rise in public debt. We now turn to policy reactions.



Graph 2: The public debt to GDP ratio without any response

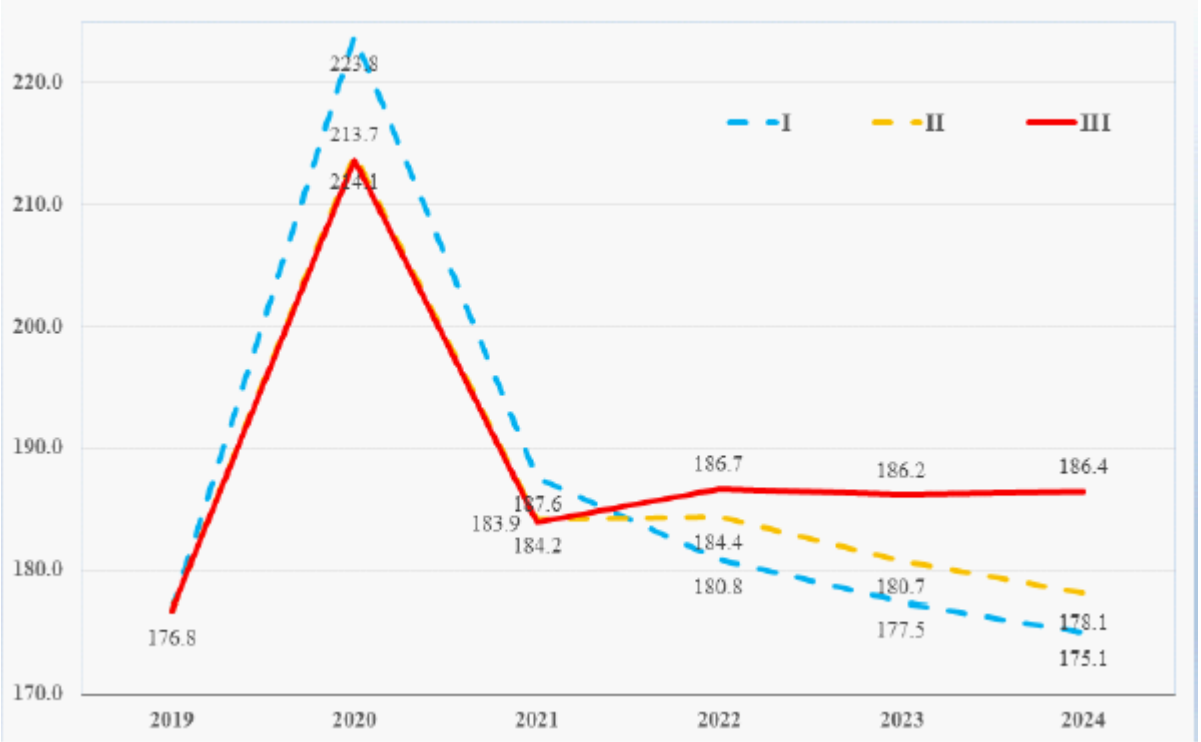
In Graph 3, we investigate whether the various policy measures and/or reforms, defined as scenaria (I), (II) and (III) above, can mitigate the economic damage from COVID-19. In particular, compensating all income groups for the labour income losses they have suffered (this is scenario I) results in an output loss of about 11% in 2020, whereas, in 2021, the output is expected to grow at a rate of about 9.9%. However, the economy cannot make up for its output losses in the years after. If, on top of compensating all income groups for their labour income losses, the government also increases temporarily (for the years 2020 and 2021) all other government spending items by 1 percentage point (this is scenario II), the recession in 2020 gets milder amounting to a drop of about 8.8% instead of 11% which was the case under scenario I. On the other hand, again, although the economy is expected to grow at a rate of about 8.7% in 2021, its GDP cannot return to its 2019 level in the coming years. Putting these results together, reacting with public spending instruments only can produce an incomplete and gradual (U-shaped) recovery only. If, however, increases in government spending are accompanied by permanent decreases of 1 percentage point in effective income and consumption tax rates, which are financed by equal cuts in government transfers from 2021 onwards (this is scenario III), then aggregate things get relatively better. In this case, the GDP loss in 2020 is limited to 8.6% and the economy is expected to grow at a rate of about 9.4% in 2021 restoring fully,

even in absolute terms, its output capacity. Thus, the tax-spending mix will be crucial to the recovery, as it was the case during the previous, debt crisis.



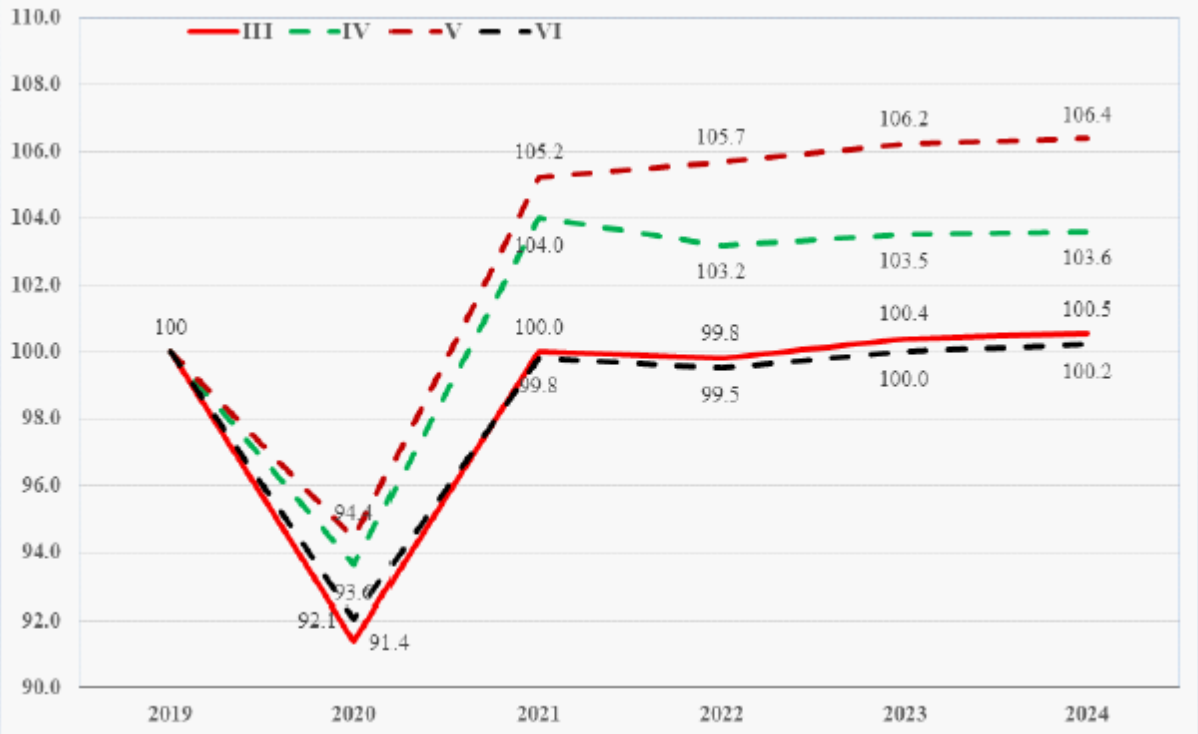
Graph 3: The economic impact of covid-19 under scenaria (I), (II) and (III)

Graph 4 presents the simulated paths of public debt to GDP under scenaria (I), (II) and (III). For example, the adoption of policy measures, such as the ones described in scenario (III), can limit the increase of public debt to GDP ratio to about 213.7%, relative to about 225% in the bad scenario discussed above, despite the increased fiscal cost associated with the expansionary government measures; this is thanks to the lower output loss that this scenario implies. In all cases, however, the public debt to output ratio de-escalates after the impact year as the economy rebounds, although at different paces depending on the scenario assumed.



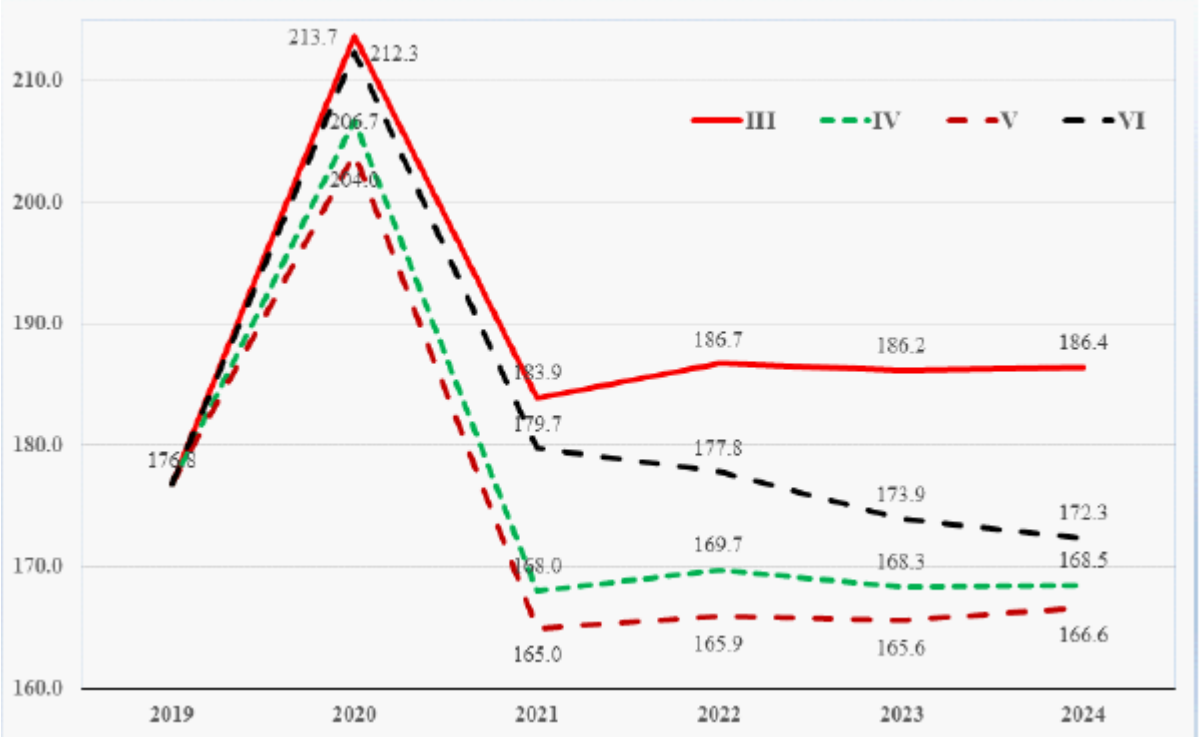
Graph 4: The public debt to GDP ratio under scenaria (I), (II) and (III)

Next, Graph 5 presents the simulated paths of output under scenario (IV), (V) and (VI) as defined above. In particular, under scenario (IV), the output loss in 2020 is limited to about 6.5%; recall that, according to this scenario, the Greek government has at its disposal extra 32 billion euros from the EU all of which are assumed to be used to finance public investment plans allocated equally over the years 2021-2024. Moreover, in this scenario, in all years after 2020, the GDP is well above its pre-crisis 2019 level. In turn, if the spending and tax policy measures, included in scenario (IV), are complemented by the implementation of stronger product market reforms so as the associated degree of competition approaches that in the core eurozone countries (this is scenario V), the output loss is limited to 5.6% in 2020. and the economy enjoys even stronger growth in the years after. Finally, the black line in Graph 5, illustrates the path of GDP under scenario (VI) which is the "misuse" scenario. Now, as defined above, the 32 billion package plays the role of a common pool attacked by rent seekers. This scenario, in addition to a huge waste of resources, condemns the country to economic stagnation and, in terms of GDP, it is as if the country has received no international aid (the time path of GDP under VI coincides with that under III).



Graph 5: The economic impact of covid-19 under scenaria (IV), (V) and (VI)

Finally, Graph 6 presents the simulated paths of public debt to GDP under scenaria (IV), (V) and (VI). In scenario (IV), the public debt to GDP ratio in 2020 approaches 207%, whereas, in scenario (V), the same ratio reaches 204%. In 2024, the public debt to output ratio falls to 168.5% under (IV) and 166.6% under (V) respectively. In other words, economic growth helps the country to grow out its public debt. By contrast, under the misuse scenario (VI), public debt jumps to 212.3% and remains high in the coming years.



Graph 6: The public debt to GDP ration under scenaria (IV), (V) and (VI)

4. Concluding remarks

In this short paper, we tried to identify the quantitative impact of the covid-19 pandemic crisis on the Greek macroeconomy under different policy scenaria. Our analysis was not limited only to the possible effects on growth for 2020, but also tried to capture the growth perspectives for the period after the pandemic.

Our main message is that for the Greek economy to enter an era of sustainable economic growth capable of not only mitigating but also overcoming the adverse consequences of the covid-19 crisis in the near future, a mix of coherent and consistent policies is needed that combines: (i) a growth-enhancing tax-spending fiscal policy mix (ii) further product market liberalization (iii) a substantial improvement in institutional quality and (iv) a socially productive use of the redistributive resources that have been made available by the EU. Otherwise, with high probability, the Greek economy is in danger of being trapped in new long-lasting depression similar to that experienced during the sovereign debt crisis of the previous decade.

References

Acemoglu D. (2009): Modern Economic Growth, Princeton University Press.

Angelopoulos K., A. Philippopoulos and V. Vassilatos (2009): The social cost of rent seeking in Europe, European Journal of Political Economy, 25, 280-299.

Besley T. and T. Persson (2009): The origins of state capacity: Property rights, taxation and politics, American Economic Review, 99, 1218-1244.

Besley T. and M. Ghatak (2010): Property rights and economic development, in Handbook of Development Economics, vol. 5, edited by D. Rodrik and M. Rosenzweig, North-Holland.

Christou T., A. Philippopoulos and V. Vassilatos (2020): Institutions and macroeconomic performance: Core vs periphery countries in the Eurozone, mimeo, Working Paper no. 9-2020, Department of Economics, Athens University of Economics and Business.

Drazen A. (2000): Political Economy in Macroeconomics, Princeton University Press, Princeton.

Economides G., S. Kalyvitis and A. Philippopoulos (2008): Does foreign aid distort incentives and hurt growth? Theory and evidence from 75 aid-recipient countries, Public Choice, 134, 463-488.

Economides G., D. Papageorgiou and A. Philippopoulos (2020): Macroeconomic policy lessons for Greece, Working Paper no. 10-2020, Department of Economics, Athens University of Economics and Business.

Eichenbaum M., S. Rebelo and M. Trabandt (2020): The macroeconomics of epidemics, mimeo.

European Commission (2020a): European Economic Forecast, Brussels.

European Commission (2020b): Europe's moment: Repair and prepare for the next generation, Brussels.

Hall R. E. and C. Jones (1999): Why do some countries produce so much more output per worker than others?, Quarterly Journal of Economics, 114, 83-116.

Masuch K., R. Anderton, R. Setzer and N. Benalal (2018): Structural policies in the euro area, Occasional Paper Series, no. 210, European Central Bank.

Reacting Quickly and Protecting Jobs: the short-term impacts of the COVID-19 lockdown on the Greek labor market

Gordon Betcherman[6], Nicholas Giannakopoulos[7], Ioannis Laliotis[8], Ioanna Pantelaiou[9], Mauro Testaverde[10], Giannis Tzimas[11]

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ABSTRACT

We use administrative, survey, and online vacancy data to analyze the short-term labor market impacts of the COVID-19 lockdown in Greece. We find that flows into unemployment have not increased; in fact, separations were lower than would have been expected given trends in recent years. At the same time, employment was about 12 percent lower at the end of June than it would have been without the pandemic. Our interrupted time series and difference-in-differences estimates indicate that this was due to a dramatic slowdown in hiring during months when job creation typically peaks in normal years, mostly in tourism. While we do not formally test the reasons for these patterns, our analysis suggests that the measures introduced to mitigate the effects of the crisis in Greece have played an important role. These measures prohibited layoffs in industries affected by the crisis and tied the major form of income support to the maintenance of employment relationships.

Keywords: Greece, COVID-19 pandemic, labor market impacts

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JEL codes: J21, J60, J68

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1. Introduction

The COVID-19 pandemic has had dramatic consequences for economies and labor markets around the world. The pandemic has been unique in triggering both supply and demand shocks. To contain the spread of the virus, governments introduced various confinement and lockdown measures that shut down businesses and removed workers from their jobs. At the same time, there have been substantial declines in demand despite large government transfers to firms, workers, and households in many countries. According to the World Bank's June forecast, global GDP is expected to fall by 5% in 2020, with the decrease projected at 7% in the advanced economies (World Bank, 2020). The ILO estimates that the decrease in labor demand in the second quarter of 2020 compared to the last quarter of 2019 will be equivalent to the loss of about 400 million jobs worldwide (ILO, 2020c). The OECD expects that overall unemployment in member countries will be in double digits for the remainder of 2020, more than twice the 5.3% unemployment rate in the first quarter of the year (OECD, 2020).

While a dramatic reduction in labor demand has been a consequence of the pandemic everywhere, there has been considerable variation in how different labor markets have adjusted to the shock. Take the examples of two G-7 countries that have been hard-hit by the virus. In the United States, the unemployment rate more than tripled between February and May, with 14 million workers added to the unemployment rolls in this period. Italy, on the other hand, experienced a decline in unemployment, with almost 400,000 fewer unemployed workers in May compared to February. There, the adjustment to declining labor demand has occurred through labor force withdrawal. There are also important differences emerging between countries in terms of the types of jobs and workers most affected by the crisis.

In this paper, we analyze how the labor market in Greece has been affected during the early months of the pandemic and lockdown. Greece is a particularly interesting case, both because of its situation prior to the arrival of COVID-19 and because of how the pandemic has been handled. Greece entered the current crisis just as it seemed to be finally emerging from the protracted and deep recession the country had endured since the financial crisis began more than a decade earlier. After declining every year from 2008 to 2013, Greece's real GDP has experienced modest growth since 2014, with an annual increase of about 2% in 2018 and 2019. At the same time, labor market conditions, while still difficult, were improving. After peaking at over 27% in 2013, the unemployment rate had

slowly but consistently declined to 14.3% in March of this year, the lowest monthly rate in a decade.

To this point, Greece has been quite successful in holding the pandemic in check. While many neighboring countries suffered rapid escalations in cases and deaths, and severe burdens on health care systems, for the most part Greece has been able to avoid difficulties of such magnitude. As of mid-July, Greece had fewer than 4,000 confirmed cases which, on a per capita basis, is roughly one-twentieth of the rate in Spain and one-tenth of Italy's rate. Less than 200 deaths have been attributed to the virus, about one-thirtieth of the rate in Italy and Spain. These numbers reflect a swift response of the Government after the first case was confirmed on February 26. After that, and within a relatively narrow time window, closures shut down public events, schools, workplaces, travel, and public gatherings, and finally a general stay-at-home order was implemented on March 23 (eventually lifted on May 4). The Government was also very active in introducing a series of measures to help employers and workers weather the economic consequences of the lockdown. These included various forms of tax and rent relief for businesses, unemployment benefit extensions, financial support and social insurance coverage for employees whose contracts have been suspended, financial support for the self-employed, and prohibitions on dismissals for businesses shut down by state order.

Nonetheless, as elsewhere, the pandemic and lockdown are having major economic impacts in Greece. The Hellenic Statistical Authority (ELSTAT) reports that on a seasonally adjusted basis, GDP declined by 1.6% in the first quarter compared to the fourth quarter of 2019.[12] In its Summer Forecast, the European Commission predicts that economic activity will decrease by 9% in 2020.[13] In this situation, a significant deterioration in labor market conditions would be expected.

The main empirical contribution we make in this paper is to describe in some detail how the Greek labor market has evolved in the first few months of the pandemic. Relying on a range of sources including administrative data, survey data, and data from online job posting sites, we document the drop in employment following the imposition of the lockdown and the subsequent flat employment trend through the first months that followed. Two things are particularly noteworthy about the patterns we have observed. First, while Greece did not experience the major

[12] The relevant ELSTAT press release can be found here.
[13] The Summer 2020 Interim forecast is here.

declines in employment that some other OECD countries did in March, April, and May, these are normally months when employment growth is substantial in the heavily seasonal Greek economy. Second, employment in these months in 2020 differed from the story in previous years not because the lockdown fueled large numbers of separations but rather it choked off new hiring in what should have been expansionary months. In fact, compared to recent years, separations were comparable or even lower. We attribute this largely to the regulations and wage subsidies introduced by the Government that were designed to minimize job loss.

Indeed, one of the messages from our analysis is that policy choices help to explain how the labor market has responded differently to the pandemic shock in different OECD countries. A particularly relevant distinction is between countries, like Greece, that have primarily linked their support to the maintenance of the employment relationship through dismissal restrictions, wage subsidies, and short-term compensation and those countries that have largely let layoffs occur and supported workers through unemployment benefits and cash transfers. Highlighting this link between policy choices and labor market outcomes is a second contribution of this paper.

The remainder of this paper is organized into the following sections. In section 2, we review the early evidence on how the COVID-19 pandemic has affected labor markets in OECD countries. We note how a roughly similar shock has translated into different outcomes across countries and highlight the role of government mitigation policies in shaping those outcomes. Section 3 turns to the pandemic in Greece. It describes the measures introduced by the Government to control the spread and to compensate firms and workers, and it uses mobility data to document the evolution of the lockdown. In section 4, we describe the different data sources and methods used for our labor market analysis. That analysis is presented in section 5. It tracks employment and unemployment trends during the lockdown, with an emphasis on how the overall picture has been shaped by the dynamics of hirings and separations. Finally, in section 6, conclusions are presented as well as some key research questions moving forward to understand the impact of the pandemic on the Greek labor market.

2. Literature Review

2.1 Challenges related to data and measurement

The COVID-19 pandemic has affected entire economies and labor markets at a very fast pace, requiring policy makers to have access to up-to-date information

to design suitable and timely policy responses. However, the disruptions caused by the pandemic and the speed with which the crisis has unfolded have shown that the methods and sources normally used to track labor market outcomes may have significant shortcomings in this context. For example, even gold standard surveys designed to provide up-to-date information, such as the Current Population Survey (CPS) in the United States, may not be sufficient to keep up with the fast spread of the virus and its disruptive impacts. Administrative data released with shorter time lags, as in the case of UI claims in the United States[14], have also shown to have shortcomings that limit their effectiveness in timely and comprehensively informing policy responses during the pandemic (Cajner et al, 2020).

Furthermore, social distancing and other transmission prevention measures have affected several data-related activities around the world with potential impacts on data quality and reliability. ILO (2020b) shows that data collection, supervision, cleaning and analysis have been affected in several countries. Adjustments in survey instruments, data collection methods and weighting schemes have become necessary to address issues related to low response rates and non-random patterns in non-responses. Even with these adjustments, response rates have dropped in several cases. The United States Bureau of Labor Statistics documents that the response rate for the 2020 May Establishment Survey was 69%, compared to a 75% average between March 2019 and February 2020. The corresponding figure for the household survey in May 2020 was 67%, compared to the 82% average over the twelve months ending in February 2020 (BLS, 2020). Furthermore, focusing on the nature on non-responses in the March and April 2020 rounds of the CPS, Montenovo et al. (2020) show that the drops in responses in these two months were not random.

The specific disruptions emerging from the crisis have also implied that standard labor market definitions may not be sufficient to fully capture labor market dynamics under the pandemic. For example, given the different forms of mobility restrictions and social distancing measures currently in place, variations in unemployment may be misleading. In fact, in the COVID-19 era, slow increases in unemployment may co-exist with significant job losses. This is because non-employed people, despite being interested in working, might not be actively looking for a job as a result of restrictions on economic activities or the perceived risk of contracting the disease at work. As such, going beyond the analysis of employment, unemployment and labor force participation trends, becomes

[14] Official estimates on UI claims are released 12 days after the end of the week they refer to.

important to fully understand labor market dynamics during the crisis (ILO, 2020b; Abraham, 2020; Hamermesh, 2020).

Several efforts have been made over the last months to address these challenges. Some researchers have complemented administrative and survey data with online vacancy data that record information in real-time and are available with short time lags (Kahn et al, 2020; Campello et al., 2020; Hensvick et al.; 2020). Kong and Prinz (2020) and Goldsmith-Pinkham and Sojourner (2020) use google search data to predict UI claims in the US with the objective to reduce the time lag with which this information becomes available. Other authors have leveraged on private sector data, specifically payroll data (Cajner et al., 2020), data from a time and scheduling software (Kurman et al., 2020) or data from daily purchases (Coibion et al., 2020). By combining these data with information from traditional data sources or augmenting these data with newly collected COVID-related information, they have been able to provide timely and detailed insights on the labor market impacts of the crisis.

Several other researchers have used newly collected data based on surveys specifically implemented to better understand the impacts of the crisis. In the United States, Bick and Blandin (2020) fielded a survey that follows a similar structure to the CPS but that generates more timely estimates. Brynjolfsson et al. (2020) used Google Consumer Surveys to collect two waves of survey data in April and May 2020. Bartik et al. (2020) focused on firms and collected data from approximately 5,800 businesses using an online survey. Online surveys were also used in the UK (Gardiner and Slaughter, 2020) and in Belgium (Baert at al. 2020) to collect data from workers, and in Denmark (Bennedsen et al., 2020) to collect data from firms. Finally, some researchers implemented multi-country online surveys. Adams-Prassl et al. (2020) covered Germany, the United States and the UK, while Belot et al. focused on China, Japan, Korea, the United States, UK, and Italy.

2.2 Evidence on employment impacts and the role of policies

Combining data from surveys, administrative and real-time sources, the ILO estimates large drops in employment due to the pandemic. To address the data and methodological challenges emerging from the crisis, the ILO developed what they refer to as a “nowcasting” model, which provides real time statistical prediction based on a multiplicity of traditional and non-traditional data sources (ILOa, 2020). Based on this model, the ILO estimates that between April and June 2020, Europe alone experienced a decline in hours worked equivalent to 37 million full-time jobs compared to the last quarter of 2019. Projections for the second half

of 2020 show that even in the most optimistic scenario, hours worked would still be far from pre-COVID levels. The OECD projects unemployment in OECD countries to be at 11.5% in mid-2020, twice the level at the end of 2019. The projections for the rest of the year still show unemployment rates well above the pre-outbreak levels, with the most optimistic scenario suggesting levels comparable those recorded during the peak of the Global Financial Crisis (OECD, 2020).

These significant drops in hours worked are the result of different labor market adjustments in various countries. ILO (2020c) shows that working hour losses were not due to significant job losses in the UK and in Korea, as the vast majority of workers were still able to keep their jobs even if working fewer or no hours. As a result of this, unemployment was not greatly affected in these countries. The implications of reductions in hours worked were significantly different in Canada and the US. In Canada, almost half of the reduction in hours worked was due to people losing their jobs. In the United States, two-thirds of the decline in hours worked was due to people losing their jobs. Among those who lost their jobs, relatively more people became inactive in Canada, while the majority became unemployed in the United States. Furthermore, these disruptions did not equally affect all workers and segments of the economy. Estimates suggest that women, migrants, young people, informal workers, and specific vulnerable sectors and occupations were particularly hit by the crisis (ILOa, 2020; OECD, 2020).

The policies introduced to attenuate the disruptions caused by the pandemic have likely played a role in the way labor markets have responded in different countries. Gentilini et al. (2020) show that since the beginning of the outbreak, 200 countries implemented more than 1,000 social protection and employment measures to address the impacts of the crisis. While most of these interventions were cash transfer programs, several countries also introduced policies specifically focused on attenuating the labor market impacts of the crisis: 64 countries provided unemployment benefits, 53 social security subsidies, 69 wage subsidies, 24 labor market regulation adjustments and 10 shorter work time benefits.

Some clear patterns have emerged after these initial months of policies' implementation. A first group of countries has focused on policies and programs aimed at preserving existing employment relationships, often implemented through the provision of subsidies to reduce labor and other costs for employers and/or the introduction of measures to limit dismissals. New Zealand, Germany, Denmark, France, and Switzerland are all countries in which take-up rates in job retention schemes have been high. A second group of countries has focused on

mitigating the impacts of the crisis on workers by expanding unemployment insurance systems. In the United States, Israel, Norway, Canada and Ireland, the unemployment insurance system has played an important role in response to the crisis. While projections, administrative data and surveys suggest that increases in unemployment have been minimal for the first group of countries, unemployment has increased significantly for the second group (Rothwell, 2020; OECD, 2020).

A large body of research in the last months has focused on better understanding the impacts of COVID on labor markets in specific countries, with a particular attention to identifying groups severely affected by the crisis and jobs at risk. An increasing number of papers has also focused on the impacts of the pandemic on small firms, on the role of policies in shaping labor market dynamics, and on potential shock-induced changes in labor market behaviors such as job search.

Studies focused on the United States suggest that significant job losses were recorded in March and April, with some initial signs of recovery in May, which however seem to have slowed down by the end of June. Evidence from both standard surveys (Béland et al., 2020a; Cowan, 2020) and private sector data (Coibion et al., 2020; Cajner et al. 2020) point to unprecedented drops in employment, increases in unemployment and declines in labor force participation. Between February and April 2020, it was estimated that at least 20 million people lost their jobs (Coibion et al., 2020; Cajner et al. 2020). These patterns have been accompanied by significant declines in job vacancies posted by firms (Kahn et al., 2020; Campello et al., 2020). Estimates based on real-time population surveys document strong increases in employment and declines in unemployment during May and most of June. However, the current figures are still well below their pre-COVID levels (Bick and Blanding, 2020).

These findings are confirmed by studies focused on small businesses. Kurman et al. (2020) find that until mid-April employment in small businesses in the services sector dropped by 60%, equivalent to the loss of 18.2 million jobs. However, from mid-April to June more than half of the closed businesses reopened, resulting in 9.1 million additional jobs, mainly taken by previously furloughed workers. Bartik et. al (2020) find similar patterns and point to significant heterogeneity across sectors, with retail, arts and entertainment, personal services, food services, hospitality reporting the largest declines. Using CPS data, Fairlie (2020) confirms that economic activities by small business significantly declined in April and only partially recovered in May.

Overall, the research so far seems to unanimously show that the workers hit the hardest by the crisis are women, young, low-educated (Béland et al., 2020a; Bick and Blanding, 2020; Cho and Winters, 2020; Cowan, 2020; Montenovo et al., 2020) or with an ethnic minority or migration background (Béland et al., 2020a; Borjas and Cassidy, 2020; Cho and Winters, 2020; Cowan, 2020; Fairlie et al., 2020; Montenovo et al., 2020). Nevertheless, some evidence suggests that during the initial stages of the crisis men might have been disproportionately affected (Béland et al., 2020a) and that some older workers might have chosen to go on early retirement (Coibion et al., 2020; Cowan, 2020).

These studies also explore whether social distancing measures have disproportionally impacted specific categories of workers. Findings from this research show that jobs that cannot be performed from home are at higher risk, while, jobs in workplace classified as essential face lower risks (Béland et al., 2020a; Cajner et al., 2020; Montenovo et al., 2020). As an estimated 93% of workers around the world live in countries with some forms of workplace restrictions (ILOa, 2020), a large body of research across the world has focused on identifying vulnerable occupations, with a particular focus on jobs that cannot be performed from home and in sectors that have severely been affected by the shutdown (Diengel and Neiman, 2020; Garrote-Sanchez et al., 2020; Hatayama et al., 2020; Hicks et al., 2020; Mongey et al. 2020; Pouliakas and Branka, 2020; Saltiel, 2020). ILO (2020a) shows that while only 7.9% of workers around the world worked from home before the crisis, almost 18% are in jobs or have access to the infrastructure that could allow them to work from home in the future. This research also shows that working from home is more feasible in high-income countries (23%) than in low-income countries (13%). Focusing on Greece, Pouliakas (2020) shows that more than one third of jobs in the Greek labor market could be performed from home.

A number of studies have tried to identify the channels driving the observed employment impacts. Using data from the United States' Current Employment Statistics (CES), Brinca et al. (2020) try to disentangle the aggregate COVID shock in its demand and supply components. They observe that in April 2020 employment in the private sector was significantly lower than its historical average and estimated that more than 65% of this impact was due to labor supply shocks, i.e. inability of workers to perform their jobs. Kong and Prinz (2020) conclude that restaurant and bar limitations and non-essential business closures were the only transmission prevention measures that in the United States led to an increase in UI claims. Barrero et al. (2020) using forward-looking firm level data, find that the COVID-19 induced shocks lead to 3 new hires for every 10 layoffs.

They also project that the total number of entire working days performed from home will triple after the end of the pandemic and that between 32% and 42% of all layoffs will be permanent.

Findings of research focused on the Canadian labor market are in line with the results in the United States. Using the Canadian Labor Force Survey up to April 2020, Béland et al. (2020b) document substantial increases in unemployment (approximately 5 percentage points) and drops in labor force participation (3.7 percentage points), hours worked (1.5 percentage points) and wages (0.4 percentage points). These impacts were less severe for essential workers or workers who can work remotely, while they were more pronounced for younger and less educated workers. Differently from the results for the United States, they do not find evidence of differential effects by gender or of disproportionate impacts of the crisis on labor market outcomes for migrants.

Adams-Prassl et al. (2020) compare the impacts of COVID=19 on jobs, earnings and hour worked in three countries that have introduced different policies in response to the pandemic, i.e. the UK, United States and Germany. They find substantial differences across and within countries. Job losses in the United States and the UK were substantially higher (18% and 15%) than in Germany (5%), a country with a well-established short-time work scheme. They point out that the UK also introduced a similar scheme, which however does not allow furloughed workers to do any work for their employers, thereby potentially discouraging firms from applying. Not surprisingly, the study also finds that furloughing was more prevalent in the UK (43%) than in the US (31%), a country that strongly relied on the expansion of unemployment benefits to respond to the crisis. The study also finds that in all countries, people who can work from home are less likely to lose their jobs. This is also the case for people with permanent contracts, fixed hours and in salaried jobs. In the US and the UK, less educated workers and women were found to be more likely to lose their jobs during the pandemic. This is not the case in Germany. Based on a survey covering China, Japan, Korea, US, UK, and Italy, Belot et al (2020) also find that young people are severely affected by the crisis in these countries.

Focusing on Denmark, another country that introduced significant measures to encourage job retention, Bennedsen et al. (2020) provide additional evidence on the strong impact of these policies in helping firms keep their workers. Estimates presented in this study suggest that the policies introduced by the Danish Government contributed to a reduction in layoffs by 81,000 jobs and increase in furloughs by 285,000. Employment subsidies seem to have a stronger correlation

with job retention, while the correlation is weaker for cost subsidies and the evidence for tax subsidies is mixed. The authors conclude that labor subsidies meet their objective of preserving employer-employee relationships, while the impact of the other policies is less clear.

Sweden is another example of a country that has leveraged on strong job retention interventions to respond to the crisis. Hensvick et al. (2020) study the impact of the COVID=19 crisis on job search using real-time data from the job board of the Swedish Public Employment Service. They find that between March and May employers posted 40% less vacancies. The drops were significant in sectors such as hotels and restaurants, and entertainment, as well as in occupations that are more difficult to perform from home. They also find that users reduced job-search intensity and seemed to have re-directed their searches to occupations that are more likely to be performed from home and more resilient to the crisis.

Alstadsæter et al. (2020) study the impacts of COVID-19 on layoffs in Norway, a country that has strongly relied on unemployment insurance benefits to mitigate the impacts of the crisis. Their analysis based on UI claims data shows that almost all layoffs up to April 19 were temporary. Even if accounting for only 10% of the total number of layoffs, permanent layoffs generated a 1.5 percentage point increase in unemployment, a significant month-to-month variation for Norway. They also show that layoffs affect populations that are already financially vulnerable (low-income, low-educated, immigrants) and are more common in jobs that require physical proximity, especially in the initial phases of the crisis. Similarly, they find that in the early stages of the crisis, the impacts were mostly felt by women and young workers, but as time passed men and older workers were also significantly impacted.

The Korean experience also provides interesting insights as the Government mainly relied on testing and tracing and less on lockdowns to contain the spread of the virus. Aum et al. (2020) find that a one per thousand increase in infections leads to an almost 3% decrease in local employment. They compare these effects to those in the UK and US, where lockdowns were introduced, and note that employment losses were almost double in these countries. Shedding light on the channels driving these results, the authors find that employment losses were mainly due to a slowdown in hiring by firms and to transition of workers out of the labor market rather than to unemployment. The authors note that at the time of publication, the Korean Government had not implemented any public furlough scheme. The paper also shows that employment losses were mainly experienced in small businesses (less than 30 employees), and that the workers with the

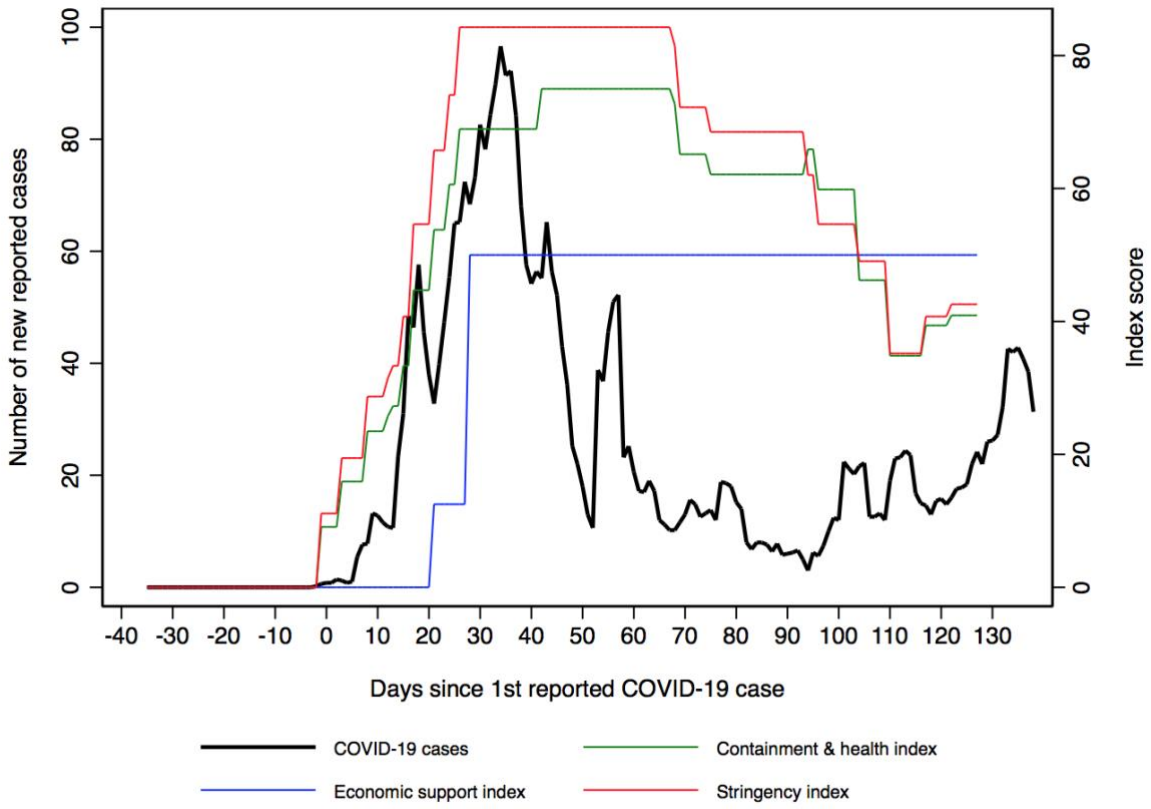
highest probability to lose their jobs were less educated, young, employed in low-wage occupations, with temporary contracts, or self-employed. Men were also more affected than women. With the exception of the gender results, these results are similar to those found by other studies for the US and the UK.

3. COVID-19 in Greece: Evolution and measures taken

3.1 The spread of the virus and the lockdown measures

The first case of COVID-19 in Greece was confirmed on February 26. Figure 1 shows the trend in new cases from that date. Compared to many other countries in Europe, where cases and fatalities exploded quickly, the pandemic progressed slowly in Greece.

Figure 1. COVID-19 cases and public policy mitigation measures



Source: Johns Hopkins University; University of Oxford, Blavatnik School of Government.
Notes: Indices range from 0 to 100. The Containment & health index combines lockdown restrictions and closures with measures such as testing policy, contact tracing, short-term healthcare investment in healthcare, and investments in vaccine. The Economic support index

records measures such income support and debt relief. The Stringency index records the strictness of lockdown-style policies that primarily restrict behavior and activities. The first confirmed COVID-19 case in Greece was reported on February 26, 2020.

The Government has been credited with reacting quickly to the pandemic, introducing various restrictions even when cases and fatalities were quite low. For example, on March 10, before most of Europe, schools and universities nationwide were ordered closed, when there were just 89 confirmed cases and no deaths. The first virus-related death in Greece was recorded on March 12. The outbreak peaked in early April when new cases were approaching 100 per day. By April 21, there were 2,401 confirmed cases; 150 new cases, all asymptomatic, were related to one refugee facility located in Northern Greece. As of early July, Greece had around 3,500 confirmed cases and slightly less than 200 deaths from the virus.

Even though the actual spread of the virus has been much lower than in most European countries, the impact on society and the economy has been substantial because of the strict lockdown measures. Figure 1 shows the rapid imposition of the lockdown, as shown by the steep rise in the Oxford/Blavatnik Stringency and Containment and Health Indices within the first three weeks after the initial recorded case.

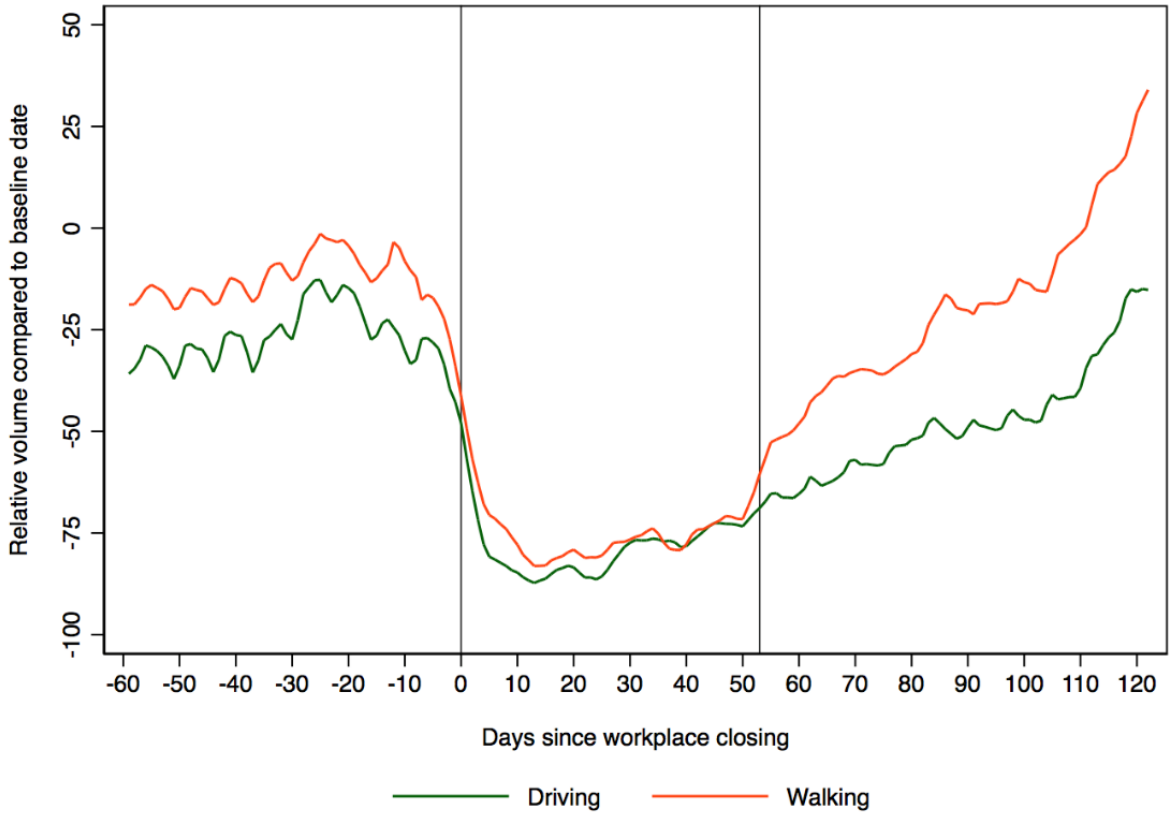
Some of the key measures put in place to slow the spread of the pandemic included cancellation of all carnival events (February 27), school closings (February 27 at a regional level and closed down nationally on March 10), closing of all non-essential workplaces (March 12-18), suspension of all public religious services (March 16), ban on gatherings of more than 10 people (March 19), internal and external travel restrictions (March 18-22), and finally, a general stay-at-home order (March 23), intensified by permanent roadblocks and checks of vehicles (April 8). The Government lifted the stay-at-home order on May 4, followed by the opening of schools, commercial activities, and workplaces (progressively from May 11, essentially completed by June 1).

These measures affected all aspects of everyday life. This effect can be visualized through mobility data provided by Apple and Google, which is sent from users' devices to these companies' maps services.[15] Using February 15 as the pre-pandemic baseline, Figure 2 presents Apple Maps data to illustrate how driving

[15] Apple data: www.apple.com/COVID19/mobility; Google data: www.google.com/COVID19/mobility/.

and walking in Greece started to decline after the first cases but then fell sharply as soon as the lockdown and workplace closing measures were implemented. For much of the period between March 12 (workplace closings initiated) and May 4 (end of the lockdown), driving and walking activity was well below 70% of February 15 levels. Towards the end of the lockdown period, mobility started to slowly pick up and this continued through May and June and approached pre-pandemic levels, at least in the case of walking.

Figure 2. Daily driving and walking activity

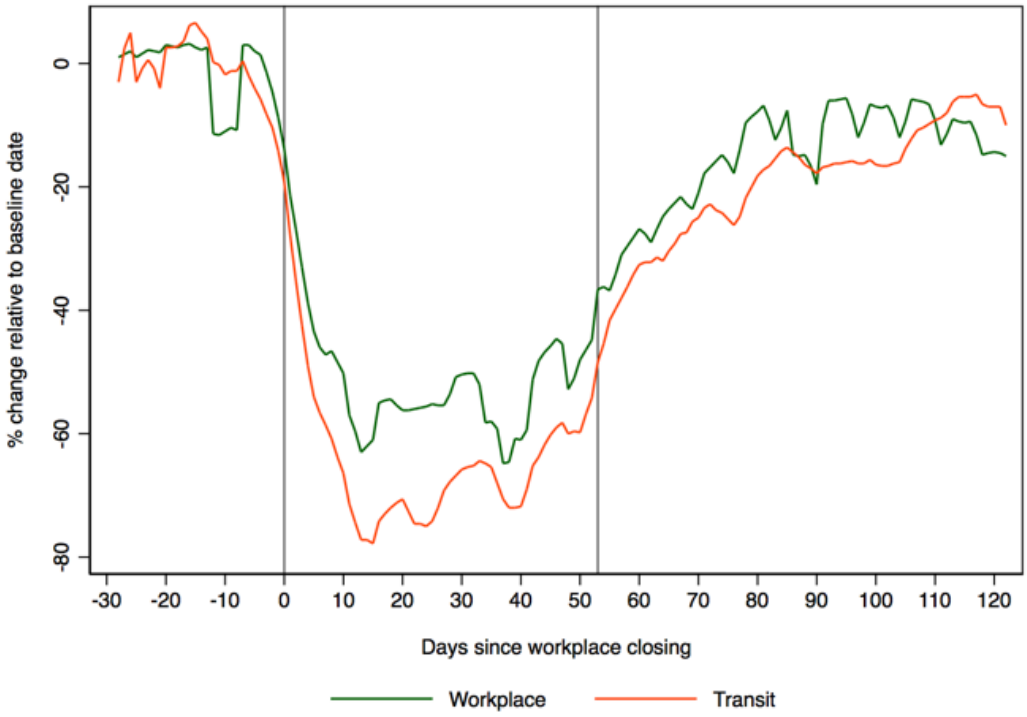


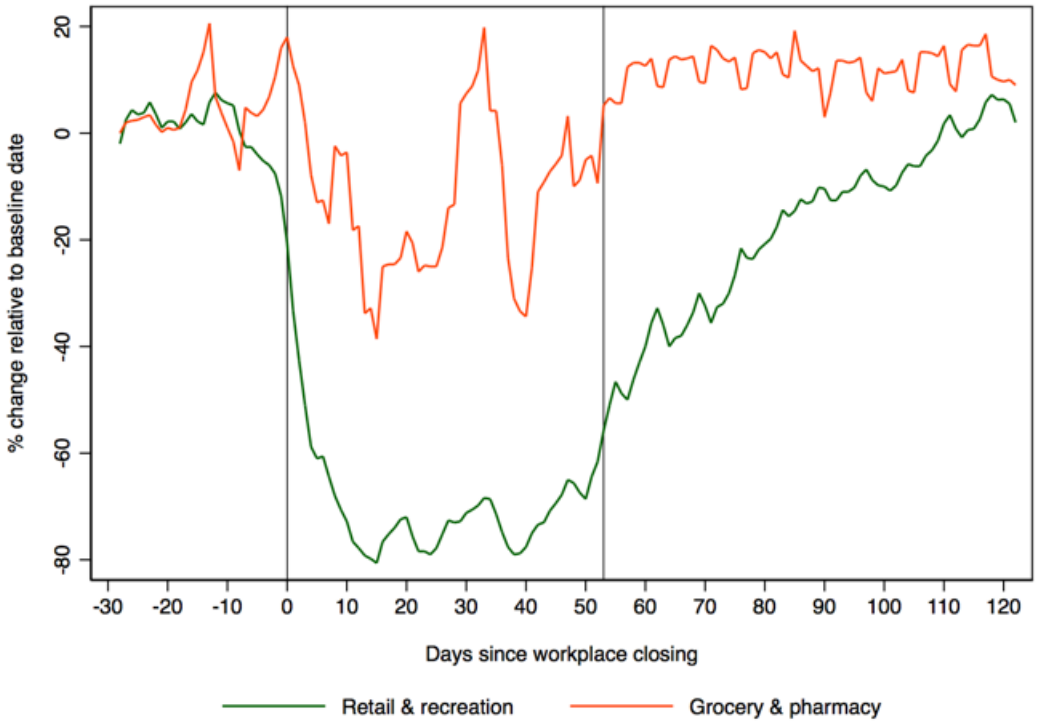
Source: Apple.
Notes: Vertical lines are set at workplace closing (March 12) and at the end of the lockdown (May 4). The baseline date is February 15.

The lockdown effects are also reflected in market-related activities. Google mobility reports provide data on trends in visits to various types of places, which can be compared to the pre-pandemic baseline (February 15). Figure 3 (top panel) shows that visits to workplaces and use of public transit declined by 50%-80% during the lockdown compared to pre-pre-pandemic levels. The data again show the return (albeit partial) towards the pre-pandemic baseline after the lockdown was lifted. A similar pattern is observed for non-essential shops (using retail and

recreation as an example), while essential retail (grocery stores and pharmacies) were not nearly affected to the same extent (Figure 3, bottom panel).

Figure 3. Daily activity for selected indicators





Source: Google Community Mobility Reports.
Notes: Charts begin on 15 February 2020 (baseline date) after which Google data became available. Vertical lines are set at workplace closing (March 12) and at the end of the lockdown (May 4).

3.2 Economic impact and mitigation measures

As expected, restrictions imposed by the Government as well as the demand shock that affected most sectors resulted in a major economic slowdown with significant consequences for businesses and workers. GDP for the 1st quarter of 2020 decreased by 1.6% in comparison with the 4th quarter of 2019, while in comparison with the 1st quarter of 2019, the decline was 0.9%.[16] Various projections from national and international agencies estimate that GDP will shrink between 5.7% and 10% in 2020. A key factor will be declining exports, and especially tourism and shipping.[17]

To keep the economy afloat during the pandemic, the Greek government introduced a range of measures to support affected businesses and their employees. The government mobilized an immediate aid package amounting to 6.8 billion euros (or 3.5% of GDP) for March and April and legislated an additional package of 24 billion euros in May in order to stimulate the restart of the economy in the aftermath of the crisis.

The first legislative act to support businesses (March 11) was intended to provide firms with liquidity through the extension of tax and social contribution compliance deadlines, discounts on certified tax liabilities in case they were paid in due time, and suspension of debt payments. About 800,000 firms that had been financially affected in terms of a decline in their turnover or had ceased operation by state order were eligible for these and other benefits described below, on the condition of no layoffs.[18]

On March 18, the Ministries of Finance and Labor announced and then legislated a new package of measures. The key component was the provision of an 800-euro stipend (covering the period from March 15 to April 30, eventually extended through May) to workers whose contracts had been suspended because of the suspension of operations of their enterprise. In addition, for these workers, the Government covered all social insurance contributions and all tax payments were suspended for a period of four months. The same measure was applied to freelancers, self-employed, and individual business owners with up to 20 employees.[10] Enterprises whose operations had been mandatorily suspended and affected employees were asked to pay just 60% of their rents for March to May.

[16] See Table 2 here.

[17] See the relevant Centre of Planning and Economic Research report here.

[18] The list of eligible businesses was defined by virtue of Ministerial Decision by the Ministry of Finance (MoF), included business activities (sectors) per Code of Business Activity and was updated regularly during the health crisis. The most recent version of the list is provided on the MoF website.

Overall, by early May, approximately 1.2 million employees and 550,000 self-employed and freelancers had benefited from this scheme. A one-off stipend of 600 euros in the form of a special training program was provided to specific professionals (economists/accountants, engineers, lawyers, doctors, teachers, and researchers) in April.[19] These occupations became eligible for the €800 financial support as of May. The budget allocation for the stipends for employees, freelancers/self-employed/individual businesses, and professionals is €2.36 billion, with an additional €1.36 billion for the social insurance payments.[20]

Additional funds were allocated to benefits for unemployed workers. On March 20, a measure was introduced to extend payments of the regular unemployment benefit, the long-term unemployment benefit, and the unemployment allowance for the self-employed by 2 months for those whose entitlement ended on March 31. The measure was then extended to cover those whose entitlement ended at the end of April and at the end of May. In addition, a lump sum stipend of €400 was introduced for 155,000 long-term unemployed individuals, registered with the public employment agency (Hellenic Manpower Employment Organization (OAED)) from April 1, 2019 who were maintaining their status until April 16, 2020 and were not receiving any other benefit from the State. The budget allocation for these measures related to unemployment benefits is about €300 million.

In terms of numbers affected and financial commitment, the Government's mitigation measures have emphasized the preservation of employment in enterprises where operations were suspended. A key condition of the benefits provided to affected businesses was that they were obliged to maintain the same headcount. In fact, layoffs in designated industries were temporarily prohibited from March 18 until the restriction was lifted on June 16.

4. Data and methods

This section briefly presents the data sources, relevant indicators, and the methods that are used to assess labor market adjustments in Greece due to the COVID-19 pandemic and the relevant mitigation policies.

[19] The eligibility criteria for the freelancers, self-employed and individual business owners who were entitled to such financial support were explained in Ministerial Decision 39162 ΕΞ 2020/ GG B' 1457/16.04.2020.

[20] Information regarding fiscal responses to the economic fallout from the coronavirus are provided by the Bruegel datasets; see here.

4.1. Labor market indicators

We report monthly estimates from the Labor Force Survey (from ELSTAT) on the labor force participation rate, employment to population ratio, and unemployment rate for the periods January-April 2019 and January-April 2020 to see differences in trends before and during the lockdown.[21]

We also use the LFS data to identify how other aspects of the Greek labor market have been affected by the COVID-19 crisis. In addition, to assess the degree of labor market slackness, we calculate the extended labor force indicator which is simply the active labor force plus the "potential additional labor force" (PALF), which takes into account persons seeking work but not immediately available and persons available for work but not seeking work.

4.2. Unemployment claims

As an indicator of the evolution of unemployment, we present data from OAED, the public employment agency, on the number of unemployment benefit recipients and the new claims for benefits covering the period from January 2017 to May 2020.

4.3. Labor market flows

Administered by the Ministry of Labor and Social Affairs (MoLSA), ERGANI is the national employment registry in Greece and covers all registered employers who contribute to the Social Security System. The ERGANI monthly reports provide daily information on labor market flows in the private sector, and we use the reports from January 2018 through June 2020. More specifically, the data we analyze covers new hires, overall and by type (full-time, part-time and shift work), and separations (lay-offs, quits and contract terminations). On a monthly frequency, labor market flows are disaggregated by gender, age and region. In addition, we disaggregate these flows by occupation (2-digit) and sector of economic activity (2-digit) for the periods January-April 2019, and January-April 2020.[22]

[21] It should be noted that the pandemic and mitigation measures affected the LFS data collection process, to some extent. From mid-March 2020 onwards, the LFS data collection switched from a blended style of personal and telephone interviews to solely telephone interviews. This decreased the response rate compared to previous months, especially in urban areas. The relevant ELSTAT press release is here.

[22] Due to data limitations in the ERGANI monthly reports, we extracted information on monthly labor market flows (January-April 2019 and January-April 2020) disaggregated by occupation (2-digit) and sector of economic activity (2-digit) from the National Institute of Labor and Human Resources (NILHR) website.

Using ERGANI daily data, the change in daily flows since the onset of the pandemic and the government restriction on layoffs can be analyzed through a simple regression framework. More specifically, we adopt a single group interrupted time series analysis, in order to compare how outcomes change between the pre-pandemic period and two post-pandemic sub-periods, i.e., one since the onset of the pandemic and one since the government intervention to protect jobs:

$$y_t = a + b_1(c_t \times S_t) + b_2(c_t \times R_t) + W_t^d + c_t + u_t \quad (1)$$

where y is the daily number of hires (or separations), S is dummy for the period after the onset of the pandemic (26 February 2020), R is a dummy switched on after the implementation of layoff restrictions (18 March 2020), c a linear daily time trend, and W is a vector of day-of-week fixed effects (i.e. d=1,…,7); u is an error term. Model (1) is estimated with negative binomial regressions and for two different sample sizes: (a) one for 2020 only, and (b) one covering the total period (2018-2020) for which ERGANI daily data is available. In the latter case, models additionally control for month and year fixed effects. Under the assumption that pre-pandemic labor market flows would have prevailed in the absence of the pandemic and the government responses to it, this method offer an approach for identifying COVID-19-related impacts on daily labor market activity.

However, changing trends before and after the pandemic onset and the related government interventions could be driven by unobserved factors. To account for such unobservables, we follow Powdthavee et al. (2019) and Metcalfe et al. (2011) in constructing a "control group" of observations based on trends from earlier years unaffected by COVID-19. More specifically, we compare the size of weekly labor market flows during weeks after Greece was exposed to the virus ("treated" group) with weekly flows for previous years ("control") group.[23] The exposure period for hires begins after week 9 in 2020, corresponding to the first COVID-19 case, while, for separations, the exposure period is after week 12 when layoffs were restricted by the Government.

We use a difference-in-differences (DiD) approach, with the identifying assumption being that control and treated weeks move on parallel trends before the exposure period. This is tested visually as well as by including leads of the treatment for a sufficient number of weeks before (Autor, 2003; Cookson and Laliotis, 2017). The model is the following:

[23] Averaging over weeks for years before 2020 also smooths out any seasonal effects.

$$m_{it} = \alpha_0 + \alpha_1 Treat_i + \alpha_2 Post_t + \alpha_3 Treat_i \times Post_t + e_{it} \quad (2)$$

where m is the number of hires (or separations) in week t (t=1,…,21) for group i (i=0,1), Treat is a binary indicator equal to 1 if the week is observed in 2020 and 0 if observed before (average of weeks 2018-2019), Post is a dummy switched on during the exposure period for both groups (week 9 or 12) and e is an error term. In this quasi-experimental setup, the coefficient of interest is the one associated with the interaction of treatment and exposure period indicators, i.e., α_3. As the lockdown was lifted on May 4, we restrict this analysis for weeks 1-21 so our DiD estimates are not affected by increased labor market activity due to relaxing restrictions. Under the pre-exposure parallel trends assumption, the estimated DiD coefficients will indicate the short-term labor market impacts of COVID-19. As in (1), the model is estimated using negative binomial regressions.

4.4. Online vacancies

Daily data on the number of vacancies posted online are extracted from the two most popular job search portals in Greece. In order to achieve a wide coverage of the market, we use Alexa's ranking, which is web traffic data-based metric.[24] An automated data acquisition mechanism was set up to scrape and store daily information on job postings from all selected portals. Extracted data were pre-processed (e.g., string cleaning, language detection, avoid multiple entries per job ad and harmonization of company name and sectoral affiliation) before being used for the analysis. Advanced machine learning techniques were employed for deduplication. After deduplication, a total of 17,812 job vacancies were collected. Most job vacancies cover occupations such as sales and purchasing agents and brokers, administrative and specialized secretaries, administration professionals, transport and storage laborers, and information and communications technology professionals. A combination of Natural Language Processing and Name Entity Extraction/Recognition methods was adopted to extract the core information from the job postings. Examples of job posting fields extracted through this process include: job title, job description, job category, location, job type, contract type, experience, qualification, employer, employer type, firm location, firm size. The extracted data cover the period from January 2020 through June 2020.

[24] The the two highest-ranked job portals according to Alexa (www.alexa.com) are kariera.gr and jobfind.gr. Alexa's traffic data take into account websites' unique visitors and page views. A recent assessment conducted by Cedefop also lists kariera.gr and jobfind.gr among the top private job portals in Greece based on different sources, including a study conducted by ELSTAT in 2017 and based on number of advertisements, number of monthly visitors and Alexa ranking (Cedefop, 2018).

4.5. Job search and finding employment

One additional question we investigate is whether the lockdown and economic slowdown may have reduced job search activity. To answer this question, we use individual-level data from the quarterly LFS to estimate the probability that those not working in a specific quarter were actively searching for a job during that quarter. The estimation sample consists of jobless individuals observed in the first quarters of 2017-2020 who lost their jobs over the previous two years. We estimate the following:

$$Prob(U_i=1) = a + Y^{2020}\times[b^qQ^q_i + \gamma X_i]+ \varepsilon_i \quad (3)$$

where U indicates the i-th non-employed jobseeker, Y^{2020} is a dummy indicator which takes the value of 1 for the first quarter of 2020 and 0 for first quarters of earlier years, Q is a vector of quarter dummies (q=1,…,8) and X is a vector of observable individual characteristics, i.e. gender, age, country of birth, education, region and sector of economic activity in the individual's last job, as well as indicators for the reason they stopped working (i.e. laid-off, contract termination, and other reasons).

In addition, we estimate the probability of finding employment during the first quarter in each of 2017, 2018, 2019, and 2020 for those were out of employment prior to that quarter.

$$Prob(E_i=1) = \alpha + Y^{2020}\times[\beta^tT^t_i + \delta Z_i]+ \eta_i \quad (4)$$

where E indicates the i-th individual entered into employment, Y^{2020} is a dummy indicator which takes the value of 1 for the first quarter of 2020 and 0 for first quarters of earlier years, T is a vector of year dummies (t=2018, 2019, 2020) and X is a vector of individual characteristics, i.e. gender, age, country of birth, education, and region. Both models in (3) and (4) use a probit link function.

5. Analysis of impacts on the labor market

5.1. Labor market indicators

Table 1 shows non-seasonally-adjusted monthly estimates of the main labor market indicators from the LFS since the onset of the pandemic. The February figures show the improvement in the Greek labor market during the period prior

to the pandemic.[25] Most notably, the number of workers unemployed in February 2020 was 16.9% lower than in 2019, corresponding to a nearly three percentage point drop in the unemployment rate (from 19.8% to 17%). On the eve of the pandemic, unemployment had been falling compared to the previous year and there had been a modest increase in employment.

The data for March and April present the evolution of labor market conditions while the lockdown was in place. Normally these are months when seasonal factors lead to job creation and an improvement in labor indicators in Greece. In 2020, employment numbers rose very slightly in March and April, less than they had in 2019. The unemployment figures are interesting. Between February and March 2020, the number of unemployed actually decreased by 13.8%, larger than the decrease in 2019. However, as the lockdown continued in April, unemployment numbers rose by 9.8%. Yet unemployment in April 2020 was still 14.3% lower than it had been a year earlier.

Table 1. Main labor market indicators, February, March, and April, 2019 and 2020

	February	March	April	% change (monthly)	
	[1]	[2]	[3]	[2] vs [1]	[3] vs [2]
		2019			
[4] Employed	3758.9	3846.3	3884.3	2.3	1.0
[5] Unemployed	928.0	844.0	852.6	-9.1	1.0
[6] Inactive	3261.8	3254.4	3203.9	-0.2	-1.6
		2020			
[7] Employed	3779.2	3813.0	3839.3	0.9	0.7
[8] Unemployed	771.6	665.4	730.3	-13.8	9.8
[9] Inactive	3353.1	3423.1	3329.4	2.1	-2.7
		% change (annual)			
[7] vs [4]	0.5	-0.9	-1.2		
[8] vs [5]	-16.9	-21.2	-14.3		
[9] vs [6]	2.8	5.2	3.9		

Source: Labor Force Survey (EL.STAT.)
Notes: Seasonally unadjusted estimates for persons 15-74 years old.

In part, the falling unemployment rates reflect higher inactivity, as jobless workers were less likely to search for work. Table 1 confirms that more workers were inactive in February 2020 than one year earlier. The pandemic accentuated this trend: in March inactivity increased by 2.1%. However, labor force participation statistics need to be carefully interpreted while the lockdown is in place since

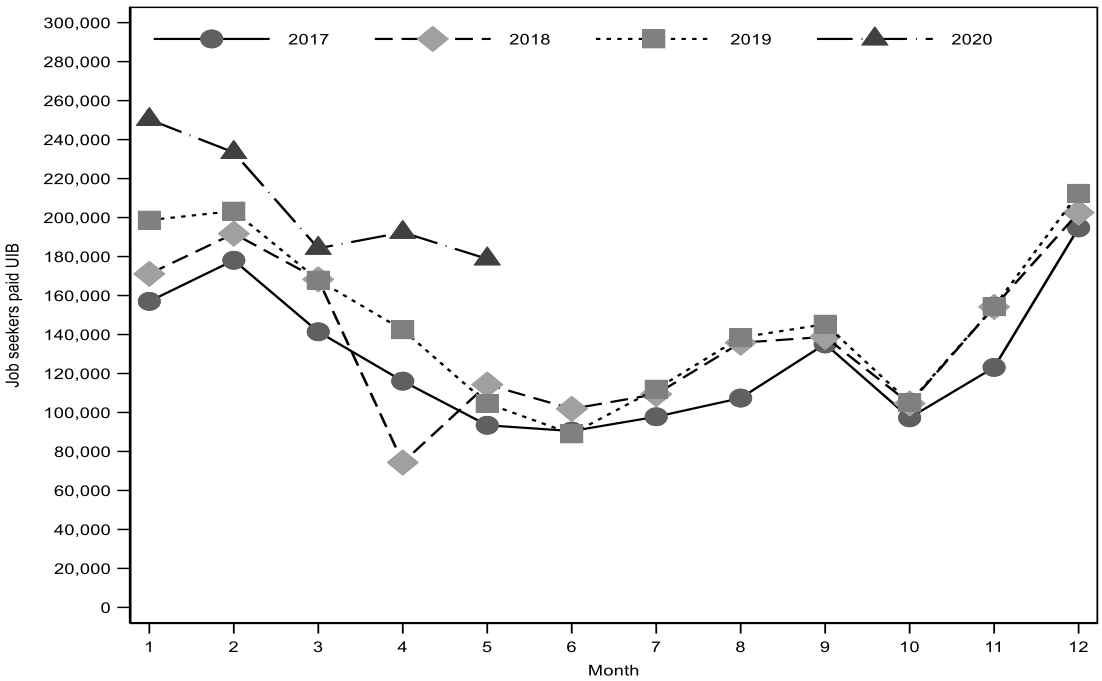
[25] Disaggregated trends in the main labor market indicators for 2018Q1, 2019Q1, and 2020Q1 are in Appendix Table A.1.

some people who are counted as inactive might still have some attachment to the labor force. This is evident when we consider the "potential additional labor force" (PALF), which includes those "seeking work but who are not immediately available" and those "available for work and wanting to work but not currently seeking work" (Hornstein et al., 2014). According to LFS data, the size of the PALF increased by 40% in 2020Q1 compared to 2019Q1, and by 72% compared to 2019Q4.[26] This suggests that lockdown measures increased the underutilization of labor, with growing numbers awaiting recall, unable to look for jobs because of the lockdown, or discouraged by the lack of new job openings. As economic activity resumes, these marginally attached workers may be more likely to (re)join the labor force.

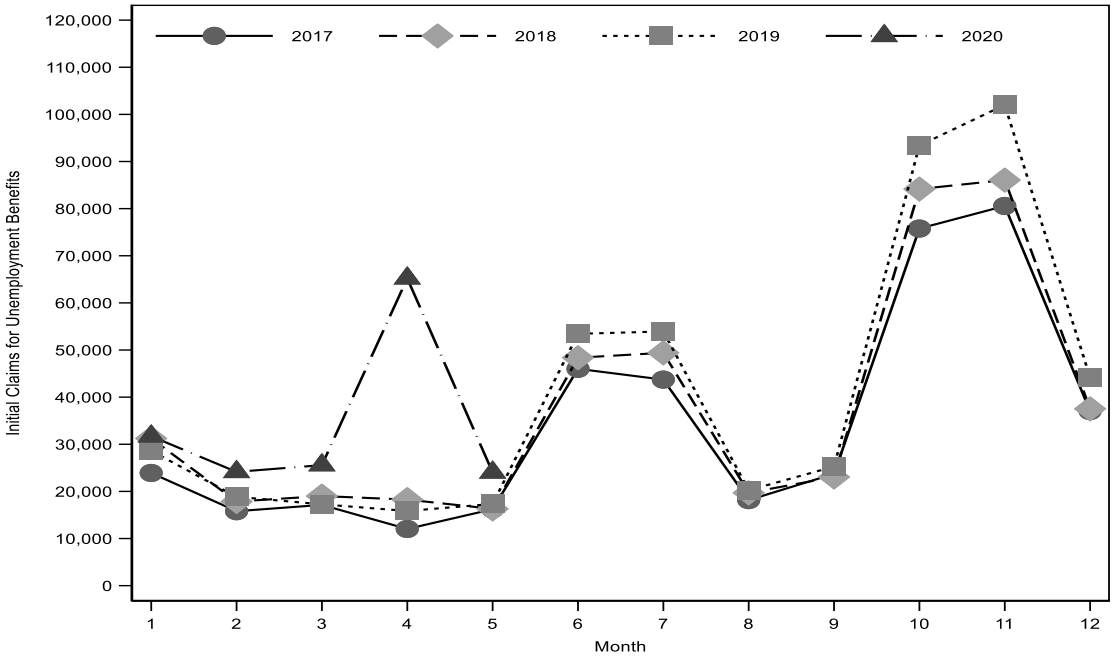
5.2 Unemployment claims

Figure 4 shows the monthly number of recipients of unemployment insurance benefits. The top panel shows overall beneficiaries, demonstrating a pattern which reflects the seasonal character of the Greek economy. The bottom panel shows that new claims for unemployment insurance benefits increased slightly in February and March 2020, and then tripled in April 2020. However, in May, initial claims moved back to a level and trend similar to that of earlier years.

Figure 4. Unemployment insurance benefit recipients and new monthly claimants



[26] See ELSTAT Table 10 here.



Source: OAED Monthly Reports. Authors' calculations.

5.3 Labor market flows

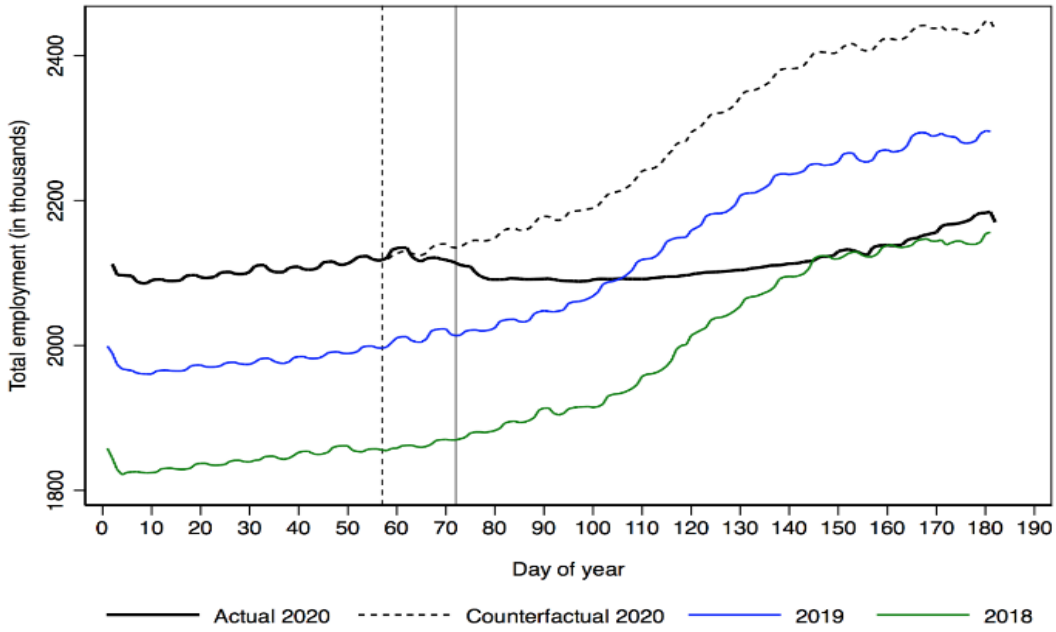
The employment registry, ERGANI, provides a unique data source since employment levels and flows in and out of employment can be tracked on a daily basis. Figure 5 presents the day-by-day employment for 2020, from the start of the year to the end of June. The first COVID case and the introduction of the workplace restrictions are marked with vertical lines on the chart so that the employment trend can be observed with reference to these key dates. In order to provide perspective on the 2020 numbers, a counterfactual trend line is included which estimates what the 2020 employment levels would have been if the daily 2018 and 2019 patterns had prevailed in 2020. The chart also shows the actual numbers for 2018 and 2019.

Figure 5 shows that employment started decreasing after COVID-19 appeared in Greece and this continued for a few days (about ten) during the lockdown period. At that point, employment levelled off and then gradually started increasing in May, when restrictions started to be relaxed. However, the employment impact is more striking when actual trends are compared with our best estimate of what the employment trajectory would have been in the absence of the pandemic and lockdown (i.e., based on 2018 and 2019 trends in daily changes).[27] This modest increase in employment corresponds to a period when job growth tends to be strong in Greece, because of seasonal factors primarily associated with the gearing

[27] This is our identifying assumption of our interrupted time series analysis, i.e. Equation (1).

up of the tourism industry. Comparing the actual employment to the counterfactual employment level results to a job deficit of 265,000 by end of June. This corresponds to a loss of 11.9% in total employment relative to a no-pandemic scenario.

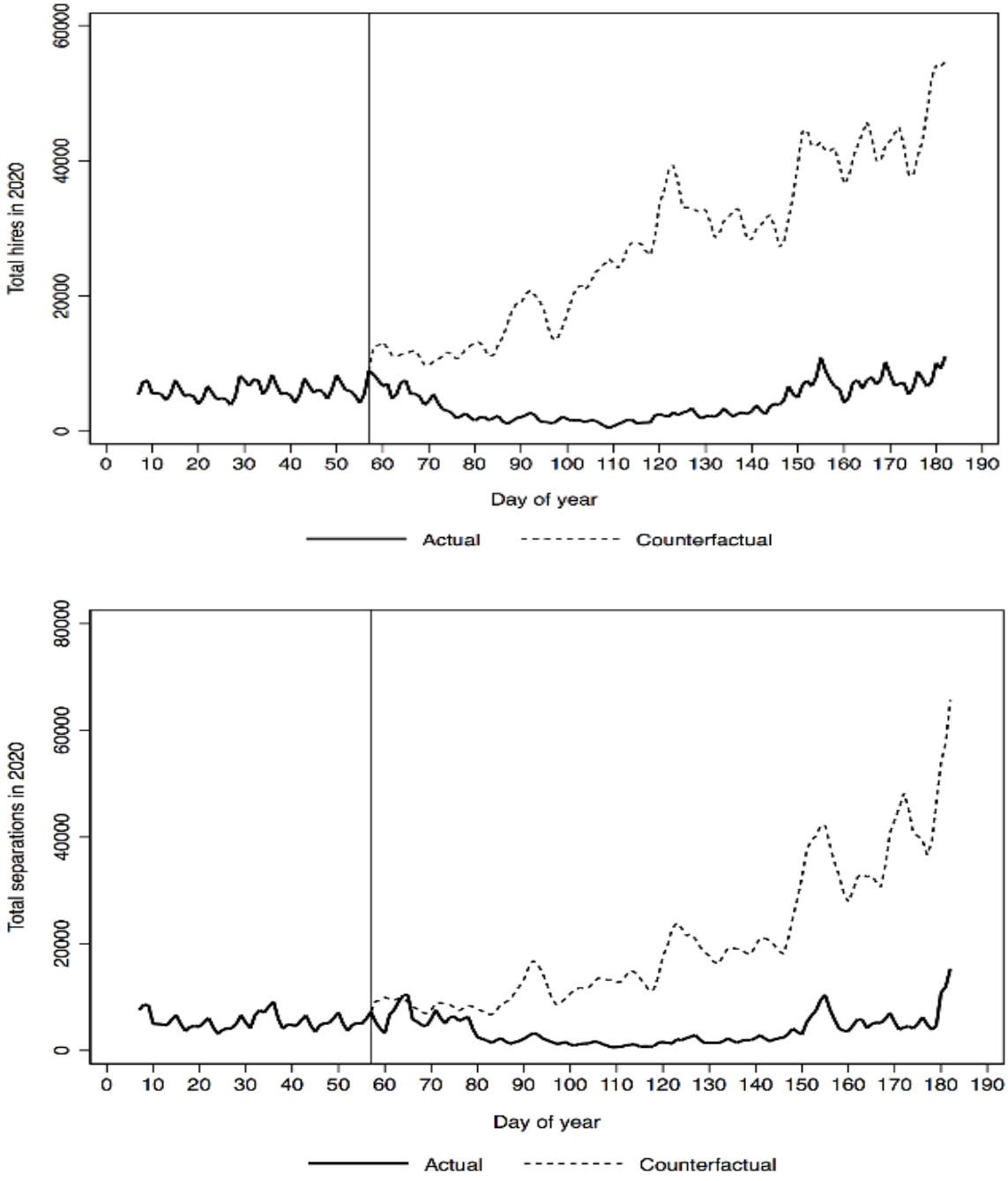
Figure 5. Observed and counterfactual daily employment levels for 2020 and employment levels for 2018 and 2019



Source: ERGANI.
Notes: Vertical lines are set in the days when the first COVID-19 case was identified (26 February 2020) and when workplace restrictions were implemented (12 March 2020).

Changes in employment levels are explained by trends in hires and separations. The impact on jobs we have observed in Greece is completely due to the effect of the pandemic on new hires. Figure 6 shows the daily progression in total new hires (top panel) and separations (bottom panel) and compares the actual to the counterfactual trends, calculated as before. The decline in new hires, compared to the counterfactual scenario, is apparent. This occurs for all types of hires, i.e., full-time, part-time and shift work (see Appendix Figure A.2).

Figure 6. Total daily hires and separations before and after the pandemic onset, with comparison to counterfactual scenario



Source: ERGANI. Authors' calculations.
Notes: Vertical line is set at the pandemic onset (February 26, 2020).

On the other hand, as the bottom panel of Figure 6 shows, there is no evidence that separations have increased because of the pandemic and lockdown. In fact, the actual number of separations is below what would have been expected if the 2018-19 trends had continued in 2020. This is true for layoffs, quits, and contract terminations (Appendix Figure A.1). Certainly, in the case of layoffs, this can be

explained by the Government measures to protect jobs by prohibiting layoffs in affected industries and by tying income support to the maintenance of employment relationships. The reduction in quits is not surprising since one would expect fewer workers to leave their jobs in a deteriorating labor market. It should be noticed that there is initial evidence of a small uptick in the number of separations at the end of the period, which may reflect the easing of the layoff restrictions.

Using monthly data on net labor market flows, we observe that the crisis has affected sectors and occupations differently. Table 2 presents the difference between 2020 and 2019 in the size of net flows (new hires minus separations) for January, February, March, and April by sector of economic activity. The results suggest that the accommodation and food sector was particularly affected by the crisis. The negative impacts were especially severe in March and April, the months in which tourism would normally be gearing up for the summer season. In March, accommodation and food services accounted for 52% of the 2020 net job decreases, relative to 2019, while by April, this share was 84%.

Table 2. Comparison of net job flows between 2019 and 2020 by sector

	Difference: Month 2020 – Month 2019			
NACE Rev. 2 sector of economic activity:	January	February	March	April
Agriculture, forestry etc.	402	8	-413	-127
Mining and quarrying	22	-75	-164	-58
Manufacturing	1151	83	-5014	-482
Electricity, gas, steam etc.	-419	829	-42	-248
Water supply; sewerage etc.	-187	-188	-53	-18
Construction	548	-383	-1472	292
Wholesale and retail trade	1009	592	-7310	-8119
Transportation and storage	500	371	-6556	-3572
Accommodation and food service	3865	3415	-43120	-84491
Information and communication	-80	-665	-1965	447
Financial and insurance activities	-485	-188	-415	126
Real estate activities	-17	-34	-405	-769
Professional, scientific and technical	-634	-1303	-3000	-389
Administrative and support service	-688	-515	-4896	-3435
Public administration, defense etc.	-941	-2612	235	-260
Education	299	-350	-1798	214
Human health and social work	179	-846	-943	2038
Arts, entertainment and recreation	573	-728	-4684	309
Other service, households and extra	-119	-295	-1623	-2114
Total additional jobs	4978	-2884	-83638	-100656

Source: ERGANI and National Institute of Labor and Human Resources (NILHR). Authors' calculations.

Table 3 presents a similar analysis by occupation. During March and April, the most affected group was workers employed in services and shop and market sales workers. This group accounted for a two-thirds of the total drop in net job flows in April. A large number of workers in this occupation in Greece are employed in the tourism sector.

Table 3. Comparison of net job flows between 2019 and 2020 by occupation

	Difference: Month 2020 – Month 2019			
NACE Rev. 2 sector of economic activity:	January	February	March	April
Legislators, senior officials and managers	-10	43	-641	-498
Professionals	418	-2890	-3951	990
Technicians and associate professionals	1970	-2018	-8894	-1362
Clerks	-951	-2508	-11418	-14781
Service workers and shop and market sales workers	1333	3456	-35567	-66066
Skilled agricultural and fishery workers	43	-89	-417	-388
Craft and related trades workers	-156	491	-3285	-1452
Plant and machine operators and assemblers	511	-11	-7577	-3452
Elementary occupations	1860	552	-13527	-16683
Total additional jobs	5018	-2974	-85277	-103692

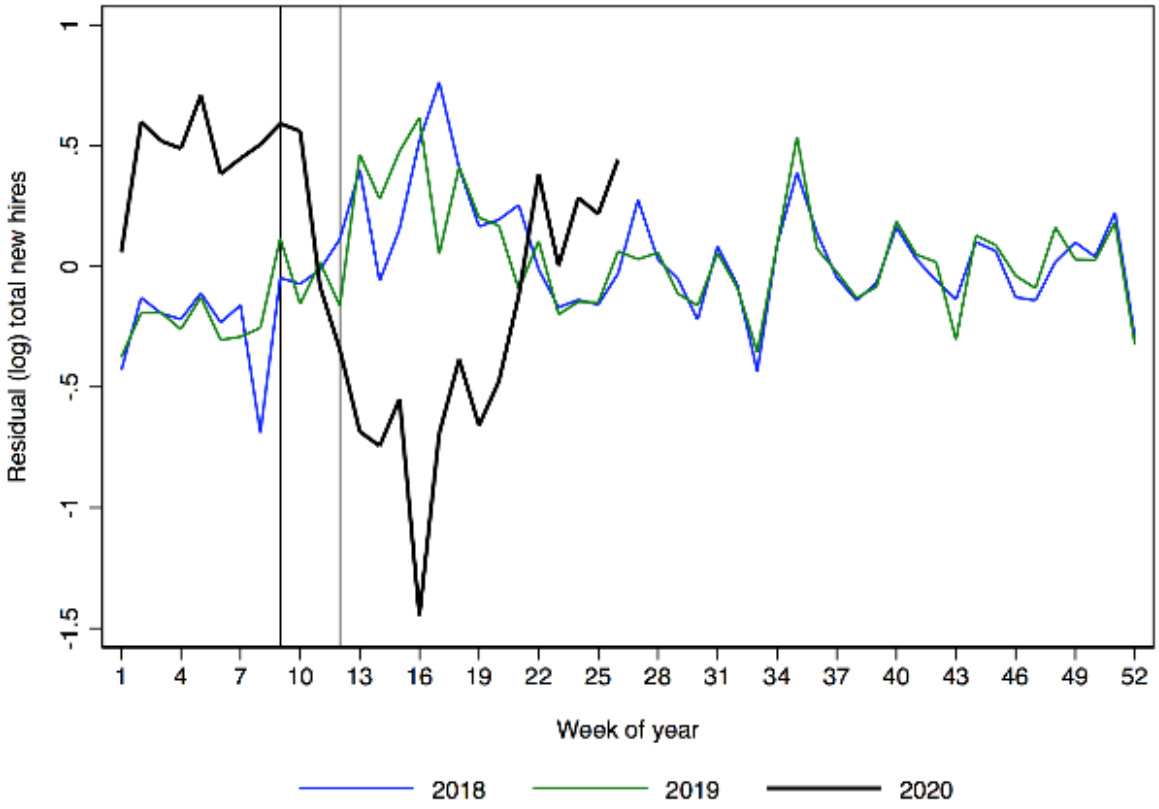
Source: ERGANI and National Institute of Labor and Human Resources (NILHR). Authors' calculations.

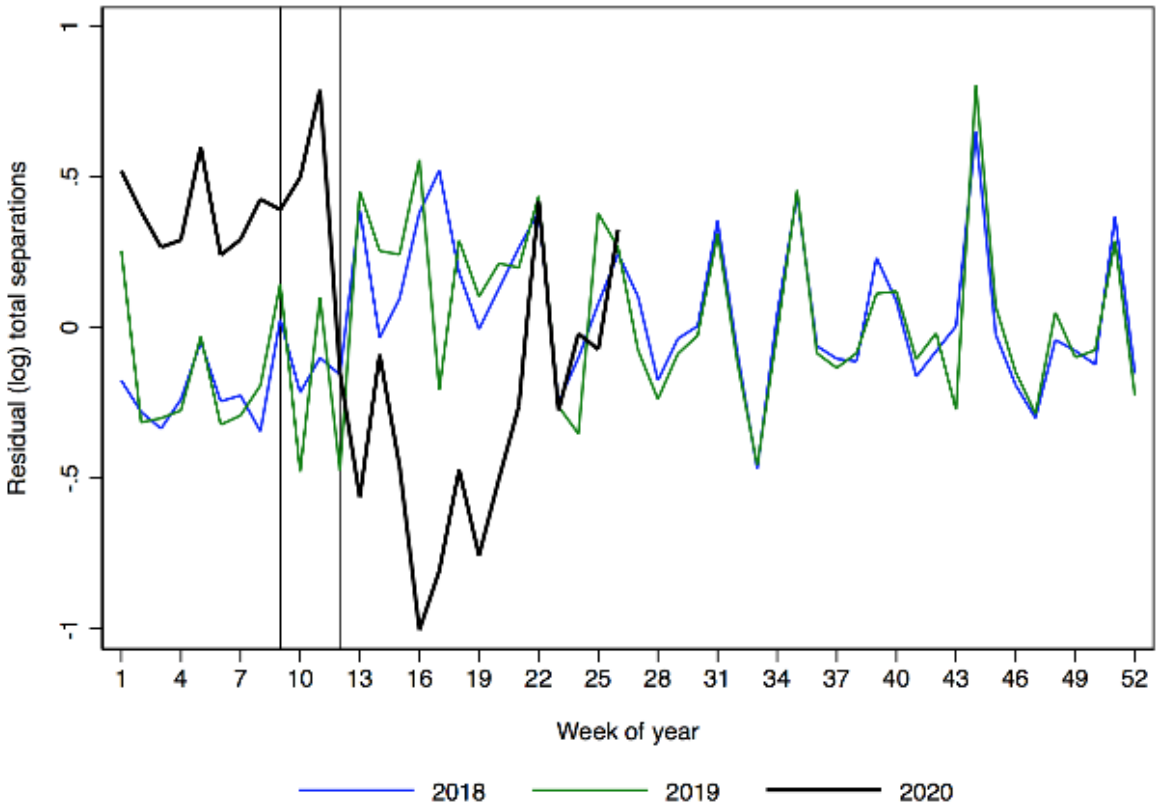
We now turn to our more formal analysis of the impact of the pandemic on labor market flows, first using interrupted time series and then difference-in-difference estimates. Regarding the former, we regress the log of total new hires (or separations) on a day-of-week, month, year fixed effects and a linear time trend, and then plot the mean residual by week and year. The results are shown in Figure 7; vertical lines are set at the weeks when the pandemic started and when restrictions on layoffs were implemented. The results confirm what we observed through the descriptive data analysis. There is a pronounced decline in new hires after the pandemic appeared and this decline started in those weeks during which new hires peaked in the pre-pandemic years. At the same time, separations were lower compared to the respective weeks of pre-pandemic "normal" years.

As the data show signs of over-dispersion, Equation (1) is also estimated using negative binomial regression. Under this specification, b_1 indicates the mean daily

change on each outcome after the onset of the pandemic and b_2 denotes the effect of layoff restrictions. Estimation results are summarized in Table 4. The interrupted time series regression estimates confirm the graphical evidence. In 2020, new hires decrease by a significant 1.12%, on average, each day during the pandemic crisis. The effect is more sizeable for part-timers (1.38%) and those in shift work (2.09%), although full-timers are the biggest group in the labor market. Moreover, it seems that the labor market responded with a slight delay, in terms of full-time hires, after the onset of the pandemic, although coefficient estimates are everywhere negative. On the other hand, separations are significantly decreased relative to pre-pandemic days. This is true especially for firings which, as already noted, were restricted during the crisis.

Figure 7. Residual hires and separations by week and year





Source: ERGANI. Authors' calculations.

Table 4. Pandemic onset and layoff restriction effects on hires and separations: Interrupted time series estimates.

	Days since pandemic	Days since layoff restrictions	Days since pandemic	Days since layoff restrictions
Dependent variable:	[1]	[2]	[3]	[4]
Total new hires	-.0112***	-.0058**	.0002	-.0047**
	(.0029)	(.0023)	(.0020)	(.0019)
Full-time new hires	-.0071***	-.0055***	.0011	-.0049***
	(.0027)	(.0020)	(.0019)	(.0019)
Part-time new hires	-.0138***	-.0056**	-.0007	-.0044**
	(.0031)	(.0025)	(.0021)	(.0021)
Shift-work new hires	-.0209***	-.0079***	-.0011	-.0049*
	(.0038)	(.0031)	(.0028)	(.0028)
Total separations	-.0001	-.0070***	.0050***	-.0099***
	(.0030)	(.0022)	(.0017)	(.0016)
Quits	.0020	-.0087***	.0060***	-.0103***
	(.0028)	(.0020)	(.0016)	(.0015)
Firings	.0041	-.0120***	.0075***	-.0137***
	(.0031)	(.0020)	(.0016)	(.0014)
Contract terminations	-.0031	-.0028	.0024	-.0077***
	(.0037)	(.0031)	(.0028)	(.0025)
Day of week fixed effects	Yes	Yes	Yes	Yes

Month fixed effects	No	No	Yes	Yes
Year fixed effects	No	No	Yes	Yes
Daily time trend	Yes	Yes	Yes	Yes
Period covered	01 Jan 2020 – 30 Jun 2020	01 Jan 2020 – 30 Jun 2020	01 Jan 2018 – 30 Jun 2020	01 Jan 2018 – 30 Jun 2020
Observations	182	182	912	912

Source: ERGANI. Authors' calculations.
Notes: Negative binomial regression estimates. Robust standard errors in parentheses.
*** at 1%, ** at 5% and * at 1%.

Turning to the DiD estimates, this approach requires an identifying assumption that control and treated weeks move on parallel trends before the exposure period. To assess this, we have graphed weekly trends for total employment, hires, and separations for both time periods (see Appendix Figure A.2). In each case, the figures show that the trends move in parallel before the outbreak.

Table 5 presents the DiD results for cumulative employment, total new hires and total separations. Results for the last two variables are also presented by type of hire and separation. In all cases, the estimated DiD parameters are sizeable and highly significant confirming that the labor market impact of the pandemic has been quite severe, at least in the short-run. Cumulative employment and new hires (overall and by job type) in 2020 fell substantially after week 9, relative to the control group. For separations, the exposure period is set at week 12 when the government intervened to restrict layoffs. The associated DiD coefficients, overall and by separation type, are also sizeable and significant.

In addition to the graphical evidence confirming that employment, hires, and separations trended similarly before the pandemic onset and the layoff restrictions (Appendix Figure A.2), we also report results of an additional test. In this test outcomes are regressed on the set of controls already controlled for in Table 5, plus leads of the interaction term (Equation (2)) that range from one to five weeks before the actual treatment takes place. The size and significance of those estimates will indicate how the series trended before the treatment period (Table 6).

Table 5. Pandemic and layoff restriction effects on labor market: Difference-in-differences results.

	DiD coefficient	Treatment group coefficient	Treatment period coefficient[1]
Dependent variable:	[1]	[2]	[3]
Cumulative employment	-.0602*** (.0092)	.0964*** (.0034)	.0127 (.0128)
Total new hires	-1.196*** (.1718)	.1138* (.0624)	.5483** (.2312)
Full-time hires	-1.097*** (.1594)	.1171 (.0724)	.6174*** (.2218)

Part-time hires	-1.264*** (.2009)	.1326** (.0651)	.4919* (.2524)
Shift work hires	-1.558*** (.2978)	.0432 (.1037)	.5835 (.3558)
Total separations	-1.330*** (.1650)	.1539 (.1113)	.1702 (.1590)
Firings	-1.407*** (.2076)	.1711 (.1101)	.1748 (.2052)
Quits	-1.236*** (.1576)	.1507* (.0812)	.1066 (.1462)
Contract terminations	-1.423*** (.2167)	.1481 (.1702)	.2550 (.2176)

Source: ERGANI. Authors' calculations.

Notes: Negative binomial regression estimates. Robust standard errors in parentheses. All models include a constant and a weekly linear trend. Sample size covers weeks 1-21 (lockdown lifting) and the effective observations are 42 in all models (21 weeks; 2 groups). [1] Treatment period for cumulative employment and hires is week 9 onwards (pandemic onset). Treatment period for separations runs from week 12 onwards (layoff restrictions).

*** at 1%, ** at 5% and * at 1%.

Table 6. Testing for parallel trends before the treatment period.

	-5 weeks lead	-4 weeks lead	-3 weeks lead	-2 weeks lead	-1 weeks lead	0 weeks lead
Dependent variable:	[1]	[2]	[3]	[4]	[5]	[6]
Cumulative employment	-.008*	-.002	-.005***	-.002	-.001	-.051***
	(.004)	(.001)	(.001)	(.001)	(.001)	(.008)
Total new hires	-.050	.372***	-.222***	.076***	-.001	-1.28***
	(.076)	(.021)	(.021)	(.021)	(.021)	(.157)
Full-time hires	-.120**	.486***	-.345***	.065***	-.086***	-1.05***
	(.052)	(.018)	(.018)	(.018)	(.018)	(.149)
Part-time hires	-.039	.289***	-.128***	.075***	.060**	-1.421***
	(.106)	(.023)	(.023)	(.023)	(.024)	(.192)
Shift work hires	.199*	.232***	-.048	.131***	.082**	-1.878***
	(.110)	(.034)	(.033)	(.034)	(.033)	(.288)
Total separations	-.148	.020	.197***	.025	.015	-1.437***
	(.126)	(.017)	(.017)	(.017)	(.017)	(.149)
Firings	-.141	-.010	.324***	.162***	.411***	-2.050***
	(.108)	(.020)	(.020)	(.020)	(.020)	(.179)
Quits	-.244***	-.032**	.215***	.190***	.094***	-1.472***
	(.090)	(.015)	(.015)	(.015)	(.015)	(.154)
Contract terminations	-.050	.075***	.143***	-.209***	-.422***	-.983***
	(.196)	(.023)	(.023)	(.023)	(.023)	(.174)

Source: ERGANI. Authors' calculations.

Notes: Negative binomial regression estimates. Robust standard errors in parentheses. All models include a constant and a weekly linear trend. Sample size covers weeks 1-21 (lockdown lifting) and the effective observations are 42 in all models (21 weeks; 2 groups). [1] Treatment period for cumulative employment and hires is week 9 onwards (pandemic onset). Treatment period for separations runs from week 12 onwards (layoff restrictions).

*** at 1%, ** at 5% and * at 1%.

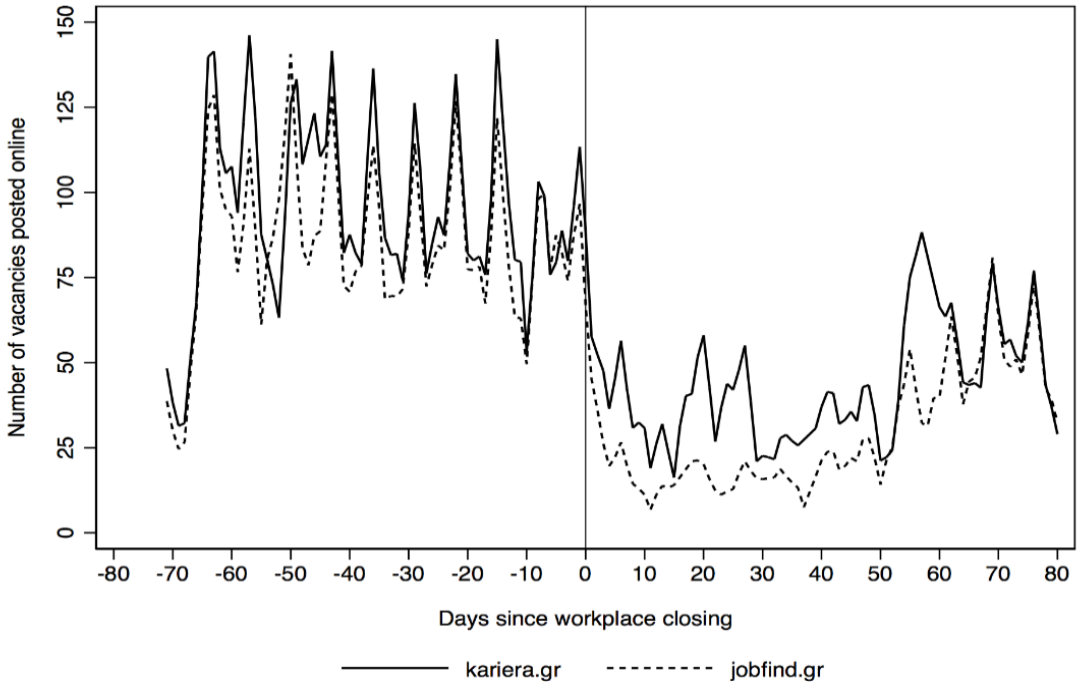
For cumulative employment, the results confirm the parallel trend hypothesis for treated and control groups before the pandemic. The estimated coefficients are not significant and remarkably low; the effect comes when specifying a zero weeks lead and it is comparable to the respective DiD estimate from Table 5. No clear

patterns emerge when considering hires-related outcomes, the effects on the zero weeks lead coefficient are in line with the reported DiD estimates. When considering separations, there are some sizeable and positive effects taking place even three weeks before the actual treatment takes place. This is also in line with the graphical evidence (Figure 8), indicating that there might have been some anticipation of the pandemic in terms of labor market activity that induced the government to step in and restrict layoffs. Hence despite an upward tendency in separations, these were drastically reduced from week 12 onwards. Again, the coefficients when specifying a zero-week lead are comparable with the DiD estimates shown before.

5.4 Online vacancies

To further understand hiring dynamics during the crisis, we use daily data from two popular online job portals in Greece (www.kariera.gr and www.jobfind.gr). Following Hensvik et al. (2020), we measure the changes in labor demand by the average daily inflows of new vacancies. Although we do not have evidence to assess the representativeness or coverage of these data, the number of vacancies posted on them is consistent with the sharp decline in new hires reported in ERGANI. The results, summarized in Figure 8, show a steep decrease in new vacancies posted on both sites corresponding to the implementation of the workplace restrictions in March. There seems to be a slight but fluctuating increase in job postings in May as the restrictions were lifted but the number of new postings was still far below pre-pandemic levels.

Figure 8. Job vacancy postings, kariera.gr and jobfind.gr, January-May 2020



Source: kariera.gr and jobfind.gr

5.5 Job search and finding employment

We also look at the impact of the pandemic on job search behaviors and on the likelihood of finding employment. First, we use the LFS micro dataset to estimate Equation (2) and to assess the probability that those not employed are actively seeking work. The associated marginal effects are shown in Table 7.

Table 7. Job seeking during the COVID-19 pandemic

	2019-2020		2017-2020	
	[1]	[2]	[3]	[4]
Reasons for stop working				
Laid-off	-.128***	-.112***	-.156***	-.139***
	(.034)	(.035)	(.031)	(.031)
Contract termination	-.143***	-.144***	-.163***	-.158***
	(.023)	(.023)	(.022)	(.022)
Other	-.047	-.046	.018	.022
	(.045)	(.045)	(.043)	(.043)
Quarters since stop working				
0 (current quarter)	-	-.383***	-	-.467***
		(.079)		(.069)
1	-	-.135***	-	-.130***
		(.031)		(.031)
2	-	-.022	-	-.065*
		(.043)		(.039)
3	-	-.222***	-	-.210***
		(.062)		(.060)

4	-	-.070	-	-.134**
		(.065)		(.056)
5	-	-.148***	-	-.164***
		(.056)		(.054)
6	-	-.049	-	-.027
		(.057)		(.056)
7	-	-.054	-	.028
		(.056)		(.055)
Observations		3416		7637

Source: EL.STAT, Quarterly Labor Force Survey-LFS (2017 – 2020, 1st quarter).
Notes: Reported estimates are average marginal effects drawn from a probit model (interaction effects model) and correspond to the post 2020Q1 period (additive effect). Based on the ILO definition of unemployment, the dependent variable takes the value of 1 if the individual is considered to be unemployed and 0 otherwise. Sample includes all individuals (aged 25-54) who have stopped working during the last 8 quarters (2 years). All models include controls for gender, age, country of birth, education, region and sector of economic activity of the last job. In parentheses, white heteroskedasticity corrected standard errors are reported. All estimates are weighted using the sampling weights provided by the EL.STAT.
*** at 1%, ** at 5% and * at 1%.

We observe (column 2) that, for those who had been laid-off, the probability of searching for work during the first quarter of 2020 was 11.2 percentage points lower than in the first quarter of 2019. For those who were not working because their last employment contract had been terminated, the drop in the probability of searching employment was even stronger, i.e. 14.4 percentage points lower. The largest drop was experienced by those who had lost their job within the current quarter (38.3 percentage points). This suggests that the slackness of the labor market in the first quarter of 2020 mostly affected the newly jobless individuals. These results are confirmed even when additional years of first quarters are added in the model (column 4).

We now turn to the estimation results of the probability of finding employment during the 1st quarter of 2020. Table 8 presents the estimated marginal effects of the probit model described in equation (3). We observe (column 2) that the probability of finding employment in the first quarter of 2020 was 4.6 percentage points lower than during the first quarter of 2019. When additional years are added (columns 3 and 4), we observe that the estimated marginal effect for the first quarter of 2020 compared to the corresponding quarter of 2017 is negative although only marginally significant. These results suggest that the slackness of the labor market in the first quarter of 2020 may well have contributed to slowing down the employment prospects of jobless individuals.

Table 8. Employment entry during the onset of COVID pandemic

		2019-2020		2017-2020	
Year start work		[1]	[2]	[3]	[4]
	2020	-.045***	-.046***	-.017*	-.016

		(.010)	(.010)	(.009)	(.009)
	2019	-	-	.028***	.029***
				(.010)	(.010)
	2018	-	-	.001	.001
				(.009)	(.009)
Fixed effects		-	Yes	-	Yes
Observations		3802		7942	

Source: Hellenic Statistical Authority (EL.STAT.), Quarterly Labor Force Survey-LFS (2017 – 2020, 1st quarter).

Notes: Reported estimates are average marginal effects drawn from a probit model (the first year serves as the reference category, i.e., 2019 and 2017 in columns 1-2 and 3-4, respectively). Based on the ILO definition of employment, the dependent variable takes the value of 1 if the individual has start working in the current employer during the last 3 months and 0 otherwise. Sample includes all individuals (aged 15-54) who have start working any month during the last 8 quarters (2 years). In all models fixed effects include controls for gender, age, country of birth, education, region. In parentheses, white heteroskedasticity corrected standard errors are reported. All estimates are weighted using the sampling weights provided by the EL.STAT. *** at 1%, ** at 5% and * at 1%.

6. Conclusions

In many respects, Greece has been an interesting case for studying the COVID-19 pandemic and its impacts on employment. The virus itself has been controlled well when compared to other countries in Europe and elsewhere in the OECD. To a significant degree, this was due to a stringent lockdown quickly imposed by the Government after the first cases were confirmed in late February. Even without widespread contagion, though, the pandemic has had an important economic impact, with GDP expected to decrease as much as 10% in 2020.

The timing of the pandemic and lockdown is also an important part of the Greek story, in two ways. First, COVID-19 arrived at a point when the economy seemed to be finally on a sustainable growth path after the economic crisis that had persisted for the past decade. Second, the lockdown covered a period when the heavily seasonal Greek economy, quite reliant on tourism, would normally be gearing up and creating large numbers of jobs – something that could not happen in the spring of 2020. This is important to keep in mind in order to fully understand how the labor market has been affected by COVID-19 crisis. A final characteristic of the Greek experience was the Government decision to mitigate the economic consequences of the crisis by introducing regulatory and income support measures to maintain employment relationships. This has had an important effect on how the lockdown and the reduced labor demand have played out in the labor market.

We use administrative, survey, and online vacancy data to analyze how employment in Greece was affected during the first few months of the COVID-19 pandemic and lockdown. Our main findings are the following: First, in the early months of the lockdown, labor force participation and unemployment fell, while there was very little change in employment levels. Second, job search activity declined, both because of continued attachment to employers who had suspended operations and because of almost no hiring activity. Third, by the end of June, we estimate that (registered) employment was 11.9% less than it should have been, based on trends from the previous two years. Fourth, this lost employment was entirely due to the sharp decline in hiring activity in the first few months of the crisis. This is evident from both the administrative and online vacancy data. As noted above, the early months spanned a period when seasonal activities, especially related to tourism, would normally be expanding and this needs to be taken into consideration in assessing the impact of the crisis. Most of the "missing" jobs thus far in 2020 have been in accommodation and food, which reflects the pandemic's effect on the tourism. Fifth, and somewhat unexpectedly, separations to the end of May were *lower* than would be predicted based on the trends from recent years. This almost certainly was due to the Government measures to protect existing employment relationships. This was done through a prohibition of layoffs in industries affected by the crisis and by tying the major form of income support to the maintenance of jobs.

To sum up, the analysis points to the important role that policy has played in determining how the Greek labor market has adjusted to the pandemic and lockdown. The measures put in place by the Government to mitigate the effects of the crisis on employers and workers emphasized job protection. The decreased labor demand, then, translated into a downturn in hiring rather than increases in separations that would lead to higher unemployment. In this respect, Greece has been similar to some other European countries that have adopted measures to avoid layoffs. This stands in contrast to some other countries, like the US and Canada, where unemployment rose quickly as policies emphasized income support more than job protection. Of course, it is still far too early to assess the efficacy of the different approaches. However, at least in the short run, the policy stance adopted by Greece and others to maintain employment relationships where possible seems to have had positive attributes.

We are still, of course, in the early days when it comes to understanding how COVID-19 is affecting labor markets in Greece and elsewhere. The analysis in this paper largely covers just the lockdown period and does not include analysis of

what is happening to employment as Greece emerges from the lockdown and implements a “new normal” which may or may not include further lockdowns. So, there is an important research agenda going forward.

In the next stage of our research, we plan to assess three topics. First, an in-depth examination of how the impacts of the pandemic and lockdown were distributed across different types of workers, different occupations and industries, and different parts of the country. Second, an updated analysis of the labor market and employment relations adjustments as Greece emerges from the lockdown and as the mitigation measures are phased out. Third, the medium-term impacts of the mitigation strategies based on maintaining employment relationships rather than income support for workers who have lost their jobs. This last issue is particularly relevant for the ongoing debate in labor market policy about protecting jobs vs. protecting workers.

References

Abraham, K. (2020),"What is happening to unemployment in the post-Covid-19 labor market?", IZA World of Labor, available at: https://wol.iza.org/opinions/what-is-happening-to-unemployment-in-the-post-covid-19-labor-market

Adams-Prassl, A. Boneva, T., Golin, M., and Rauh, C. (2020), "Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys," IZA Discussion Papers 13183, Institute of Labor Economics (IZA).

Alstadsæter, A., Bratsberg, B., Eielsen, G., Kopczuk, W., Markussen, S., Raaum, O., and Røed, K (2020), "The First Weeks of the Coronavirus Crisis: Who Got Hit, When and Why? Evidence from Norway", NBER Working Paper No. 27131, DOI: 10.3386/w27131.

Aum, S., Lee, S. Y. (Tim), and Shin, Y. (2020a), "COVID-19 Doesn't Need Lockdowns to Destroy Jobs: The Effect of Local Outbreaks in Korea", NBER Working Paper No. 27264, DOI: 10.3386/w27264.

Autor, D.H. (2003), Outsourcing at will: The contribution of unjust dismissal doctrine to the growth of employment outsourcing, Journal of Labor Economics, 21(1): pp. 1-42.

Baert, S., Lippens, L., Moens, E., Sterkens, P. and Weytjens, J., (2020), "How Do We Think the COVID-19 Crisis Will Affect Our Careers (If Any Remain)?", IZA Discussion Paper No 13164.

Barrero, J. M., Bloom, N., and Davis, S. J. (2020), "COVID-19 Is Also a Reallocation Shock"
NBER Working Paper No. 27137, DOI: 10.3386/w27137.

Bartik, A. W., Bertrand, M., Cullen, Z. B., Glaeser, E. L., Luca, M., and Stanton, C. T. (2020), "How Are Small Businesses Adjusting to COVID-19? Early Evidence from a Survey" NBER Working Paper No. 26989, DOI: 10.3386/w26989.

Béland, L. P., Brodeur, A., and Wright, T. (2020), "The Short-Term Economic Consequences of Covid-19: Exposure to Disease, Remote Work and Government Response", IZA discussion paper No 13159.

Béland, L. P., Brodeur, A., Mikola, D., and Wright, T. (2020), "The Short-Term Economic Consequences of Covid-19: Occupation Tasks and Mental Health in Canada", IZA Discussion Paper No 13254.

Belot, M., Choi, S.Tripodi, E. van den Broek-Altenburg, E.; Jamison, J.C. and Papageorge, N. W. (2020), "Unequal Consequences of COVID-19 across Age and Income: Representative Evidence from Six Countries", IZA Discussion Paper No 13366.

Bennedsen, M, Larsen, B.,Schmutte, I.and Scur, D. (2020), "Preserving job matches during the COVID-19 pandemic: Firm-level evidence on the role of government aid", Covid Economics: Vetted and real-time papers No. 27.

Bick, A. and Blandin, A. (2020), "Real Time Labor Market Estimates During the 2020 Coronavirus Outbreak", Working Paper, available at: https://drive.google.com/file/d/1uQrlBJ_w4b2Fps6Zp9qgc-9pMnbC-mjq/view.

Bureau of Labor Statistics, U.S. Department of Labor (2020), "Frequently asked questions: The impact of the coronavirus (COVID-19) pandemic on The Employment Situation for May 2020", available at: https://www.bls.gov/cps/employment-situation-covid19-faq-may-2020.pdf

Borjas, G. J., and Cassidy, H. (2020), "The Adverse Effect of the COVID-19 Labor Market Shock on Immigrant Employment", NBER Working Paper No. 27243, DOI: 10.3386/w27243.

Brinca, P., Duarte J., Faria-e-Castro, M. (2020) "Measuring Sectoral Supply and Demand Shocks during COVID-19," Federal Reserve Bank of St. Louis Working Papers 2020-011 D, DOI: 10.20955/wp.2020.011.

Brynjolfsson, E. and Horton, J., Ozimek, A., Rock D., Sharma, G., and TuYe, H.Y., (2020), "COVID-19 and Remote Work: An Early Look at US Data" NBER Working Papers No 27344.

Cajner, T., Dod Crane, L., Decker, R., Hamins-Puertolas, A., and Kurz, C. J. (2020), "Tracking Labor Market Developments during the COVID-19 Pandemic: A Preliminary Assessment", FEDS Working Paper No. 2020-030, DOI: 10.17016/FEDS.2020.030.

Campello, M., Kankanhalli, G., and Muthukrishnan, P. (2020), "Tracking labor market developments during the covid-19 pandemic: A preliminary assessment", Technical report, NBER Working Paper No 27208.

Cedefop (2018), “Mapping the landscape of online job vacancies. Background country report: Greece”, available at: https://www.cedefop.europa.eu/files/rlmi_-_mapping_online_vacancies_greece.pdf.

Cho, S.J., Winters, J. V. (2020), “The Distributional Impacts of Early Employment Losses from COVID-19”, IZA Discussion Paper No 13266.

Coibion, O., and Gorodnichenko, Y. and Weber, M. (2020), "Labor Markets During the COVID-19 Crisis: A Preliminary View" NBER Working Papers No 27017.

Cookson G. and Laliotis I. (2017), Promoting normal birth and reducing caesarean section rates: An evaluation of the Rapid Improvement Programme, Health Economics, 27(4): 675-679.

Cowan, B. W. (2020), “Short-run effects of COVID-19 on U.S. worker transitions” NBER Working Paper No 27315.
Dingel, J. I., and Neiman, B. (2020), “How Many Jobs Can be Done at Home?”, NBER Working Paper No. 26948, DOI: 10.3386/w26948.

Fairlie, R. W., Couch, K., and Xu, H. (2020), “The Impacts of COVID-19 on Minority Unemployment: First Evidence from April 2020 CPS Microdata”, NBER Working Paper No. 27246, DOI: 10.3386/w27246.

Fairlie, R.W. (2020), “The Impact of COVID-19 on Small Business Owners: Continued Losses and the Partial Rebound in May 2020”, NBER Working Paper No 27462.

Gardiner, L., Slaughter, H. (2020), “The effects of the coronavirus crisis on workers: Flash findings from the Resolution Foundation’s coronavirus survey”, Resolution Foundation, available at: https://www.resolutionfoundation.org/app/uploads/2020/05/The-effect-of-the-coronavirus-crisis-on-workers.pdf.

Garrote Sanchez, D., Gomez Parra, N., Ozden, C., Rijkers, B. (2020), “Which Jobs Are Most Vulnerable to COVID-19? What an Analysis of the European Union Reveals”, Research and Policy Brief No. 34, World Bank, Washington, DC, available at: https://openknowledge.worldbank.org/handle/10986/33737.

Gentilini,U., Almenfi, M., Dale, P., Lopez, A. V., Mujica, I.V., Quintana. R., and Zafar, U. (2020), “Social Protection and Jobs Responses to COVID-19: A Real-Time Review

of Country Measures (July 10, 2020)", COVID-19 Living Paper Washington, D.C. : World Bank Group, available at: http://documents1.worldbank.org/curated/en/454671594649637530/pdf/Social-Protection-and-Jobs-Responses-to-COID-19-A-Real-Time-Review-of-Country-Measures.pdf

Goldsmith-Pinkham, P., Sojourner, A. (2020), "Predicting Initial Unemployment Insurance Claims Using Google Trends", available at: https://paulgp.github.io/GoogleTrendsUINowcast/google_trends_UI.html.

Hamermesh, D. (2020), "Measuring employment and unemployment – Primer and predictions", IZA World of Labor, available at: https://wol.iza.org/opinions/measuring-employment-and-unemployment-primer-and-predictions

Hatayama, M., Viollaz, M. and Winkler, H. (2020a), "Work from home: which jobs?", Covid Economics: Vetted and Real-Time Papers, No. 19.

Hensvik L., Le Barbanchon T. and Rathelot, R. (2020) "Job Search During the COVID-19 Crisis", IZA Discussion Paper No. 13237.

Hicks, M.J., Faulk, D., and Devaraj, S. (2020), "Occupational Exposure to Social Distancing: A Preliminary Analysis using O*NET Data", Center for Business and Economic Research, Ball University, Working Paper, available at: https://projects.cberdata.org/reports/SocialDistanceEffects-20200313.pdf.

Hornstein A., Kudlyak M. and Lange F. (2014), Measuring resource utilization in the labor market, Economic Quarterly, 100(1): pp. 1-21

ILO (2020a), "Working from home: estimating the worldwide potential", ILO Policy Brief, available at: https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---travail/documents/briefingnote/wcms_743447.pdf.

ILO (2020b), "COVID-19 impact on the collection of labour market statistics", ILOSTAT, available at: https://ilostat.ilo.org/topics/covid-19/covid-19-impact-on-labour-market-statistics/.

ILO (2020c), "ILO monitor: Covid-19 and the world of work",5th edition, available at: https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/briefingnote/wcms_749399.pdf

Kahn, L., Lange, F., and Wiczer, D. (2020), "Labor Demand in the Time of COVID-19: Evidence from Vacancy Postings and UI Claims", NBER Working Paper No. 27061.

Kong, D., Prinz, D. (2020), "The impact of shutdown policies on unemployment during a pandemic", Covid Economics: Vetted and Real-Time Papers, No. 17.

Kurman, A.; Lale, E.; Ta, L. (2020). The Impact of COVID-19 on Small Business Employment and Hours: Real-Time Estimates With Homebase Data. Working Paper. http://www.andrekurmann.com/hb_covid

Metcalfe R., Powdthavee N. and Dolan P. (2011), Destruction and distress: Using a quasi-experiment to show the effects of September 11 attacks on mental well-being in the United Kingdom, Economic Journal, 121(550): pp. F81-F103.

Mongey, S., Pilossoph, L., and Weingberg, A. (2020), "Which workers bear the burden of social distancing measures?" NBER Working Paper No 27085.

Montenovo, L, Jiang, X., Rojas, F. L., Schmutte, I. M., Simon, K. I., Weinberg B. A. and Wing, C. (2020), "Determinants of disparities in covid-19 job losses", NBER Working Paper No 27132.

OECD (2020), "OECD Economic Outlook", Volume 2020 Issue 1, OECD Publishing, Paris, available at: https://doi.org/10.1787/0d1d1e2e-en.

Pouliakas, K. (2020), "Working at Home in Greece: Unexplored Potential at Times of Social Distancing?", IZA Discussion Paper No 13408.

Pouliakas, K., Branka, J. (2020), "EU jobs at highest risk of Covid-19 social distancing: Is the pandemic exacerbating the labour market divide?", Luxembourg: Publications Office of the European Union, Cedefop Working Paper No 1.

Powdthavee N., Plangol A., Frijters A.C. and Clark A.E. (2019), Who got the Brexit blues? The effect of Brexit on subjective wellbeing in the UK, Economica, 86(343): pp. 471-494.

Rothwell, J. (2020), "The effects of COVID-19 on international labor markets: An update", Brookings, available at: https://www.brookings.edu/research/the-effects-of-covid-19-on-international-labor-markets-an-update/.

Saltiel, F. (2020), "Home working in developing countries", Covid Economics: Vetted and Real-Time Papers, No. 6.

World Bank (2020), "Global economic prospects", World Bank Group Flagship Report, June 2020.

Appendix

Table A.1: Labor market indicators, Greece, Q1 for 2018-2020

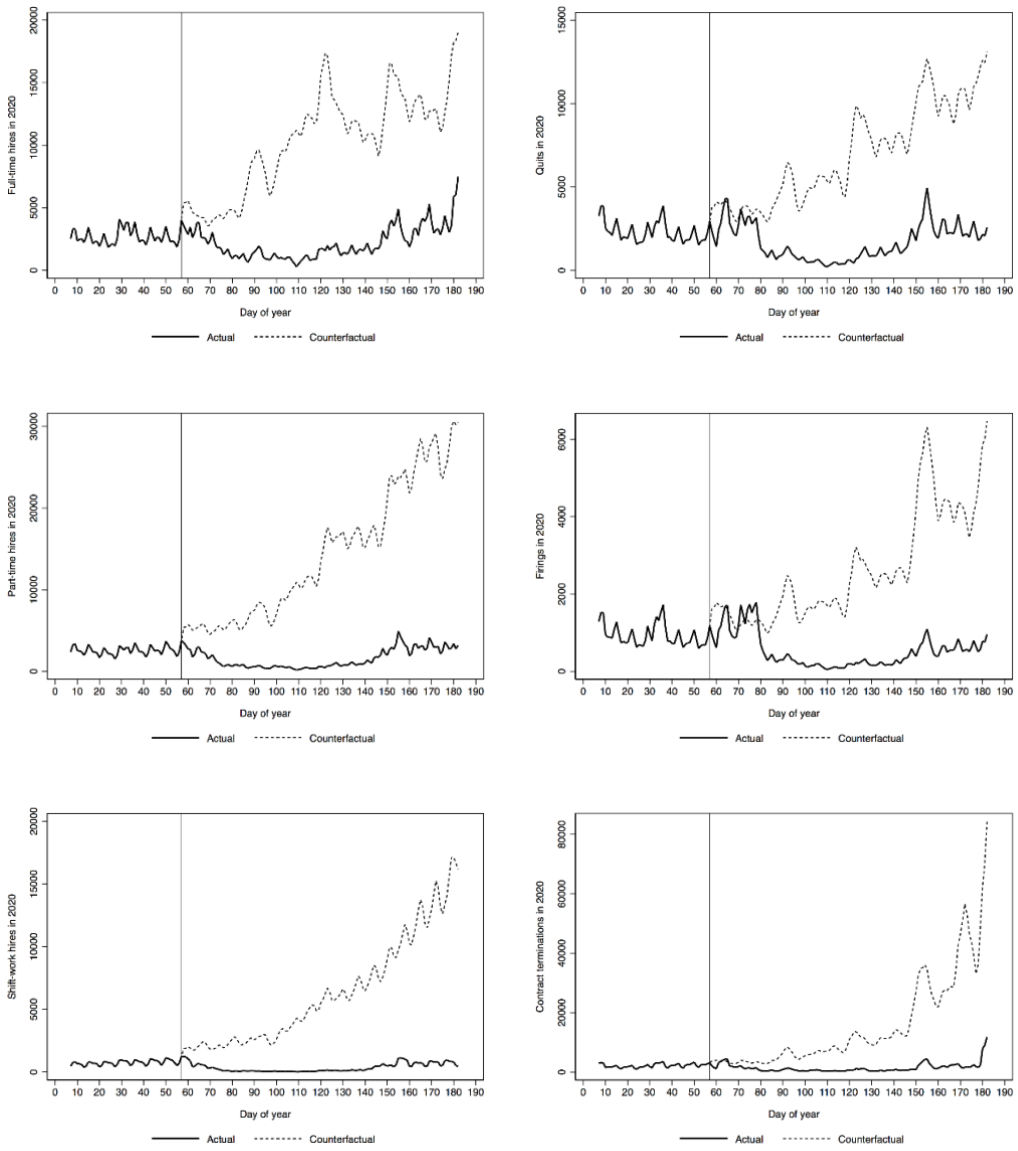
	Labor force participation (%)			Employment to population (%)			Unemployment (%)		
	2018Q1	2019Q1	2020Q1	2018Q1	2019Q1	2020Q1	2018Q1	2019Q1	2020Q1
Age 15 and over									
Total	51.62	51.78	50.61	40.68	41.83	42.21	21.19	19.21	16.21
Men	59.79	59.70	58.80	49.48	50.52	50.72	17.24	15.37	13.73
Women	44.01	44.42	43.01	32.48	33.75	34.69	26.18	24.02	19.35
Age group									
15-19	5.15	4.87	3.83	2.31	2.42	2.52	55.22	50.21	34.22
20-24	43.76	41.80	39.46	24.95	25.21	25.86	42.97	39.69	34.47
25-29	81.66	84.15	80.44	56.23	60.36	59.49	31.13	28.27	26.05
30-34	86.89	86.97	85.87	67.49	66.68	70.55	22.32	23.33	17.84
35-39	88.03	87.67	85.57	69.69	71.21	72.18	20.84	18.77	15.65
40-44	88.21	87.84	85.90	71.87	73.91	74.20	18.53	15.85	13.62
45-49	84.39	85.86	85.57	68.50	71.06	73.82	18.83	17.24	13.74
50-54	77.17	78.72	78.47	65.03	67.87	68.24	15.72	13.78	13.03
55-59	60.97	62.40	61.48	50.65	53.22	53.86	16.93	14.70	12.39
60-64	33.69	36.67	37.40	28.31	31.60	32.78	15.98	13.82	12.37
65-74	6.82	7.38	7.93	6.08	6.50	7.25	10.88	11.89	8.66
Country of birth (15 and over)									
Greece	50.50	50.51	49.53	40.31	41.51	42.08	20.18	17.82	15.03
Foreign	67.52	68.77	66.01	45.98	46.13	47.05	31.90	32.93	28.72
Region									
Eastern Macedonia & Thrace	49.21	50.62	48.95	41.13	42.12	40.79	16.43	16.79	16.66
Central Macedonia	50.70	50.68	49.25	39.58	40.40	39.76	21.94	20.28	19.25
Western Macedonia	50.24	50.24	45.87	36.14	36.63	36.98	28.06	27.08	19.39
Epirus	47.58	46.35	45.85	36.72	38.63	37.82	22.82	16.64	17.53
Thessaly	50.41	50.46	48.82	41.29	41.10	40.90	18.09	18.55	16.22
Ionian Islands	51.37	48.54	45.56	38.07	38.78	39.37	25.89	20.09	13.59
Western Greece	50.74	50.89	48.55	37.81	37.86	38.64	25.47	25.61	20.41
Central Greece	50.06	48.77	49.38	40.10	39.78	39.83	19.89	18.43	19.34
Attica	52.60	53.33	53.14	41.43	43.54	45.57	21.24	18.35	14.25
Peloponnese	52.80	51.38	51.84	44.39	44.48	46.26	15.92	13.44	10.76
Northern Aegean	54.24	54.99	53.66	40.96	43.86	44.93	24.48	20.24	16.27
Southern Aegean	55.51	55.93	46.10	42.14	40.91	39.63	24.08	26.85	14.02
Crete	53.40	53.82	52.97	42.76	44.92	43.94	19.92	16.54	17.05

Source: LFS, ELSTAT

Figure A.1. Daily observed and counterfactual hires and separations by type before and after the pandemic onset

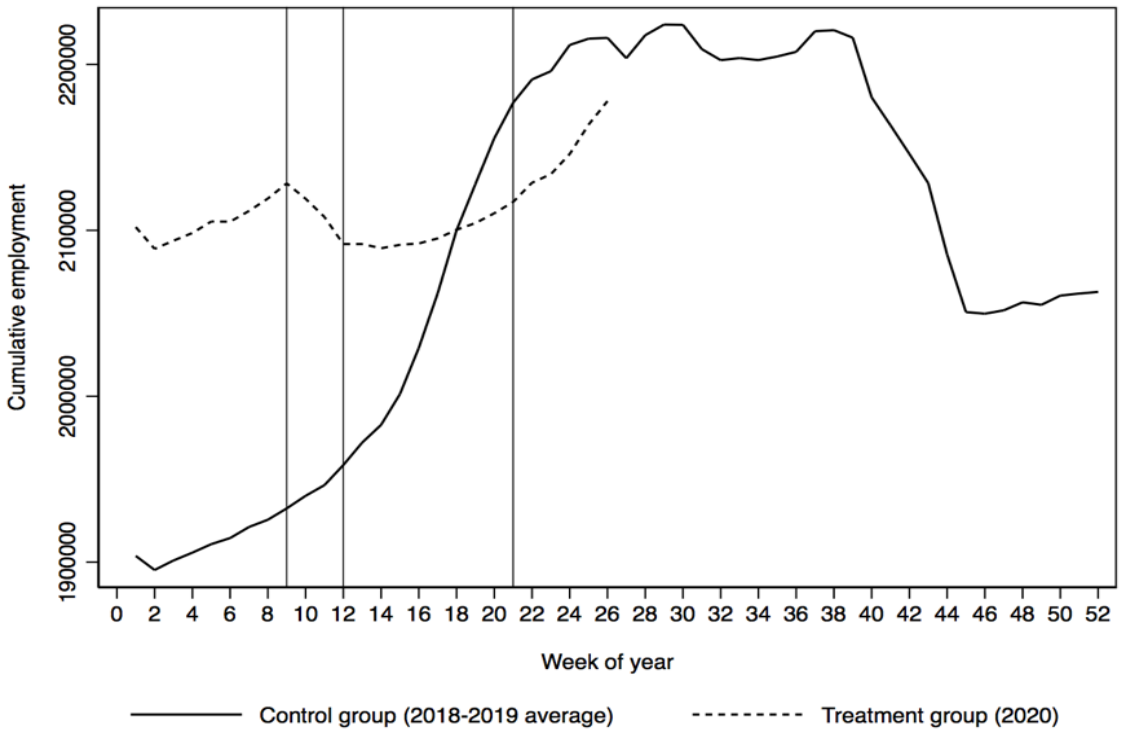
Number of new hires by type

Number of separations by type

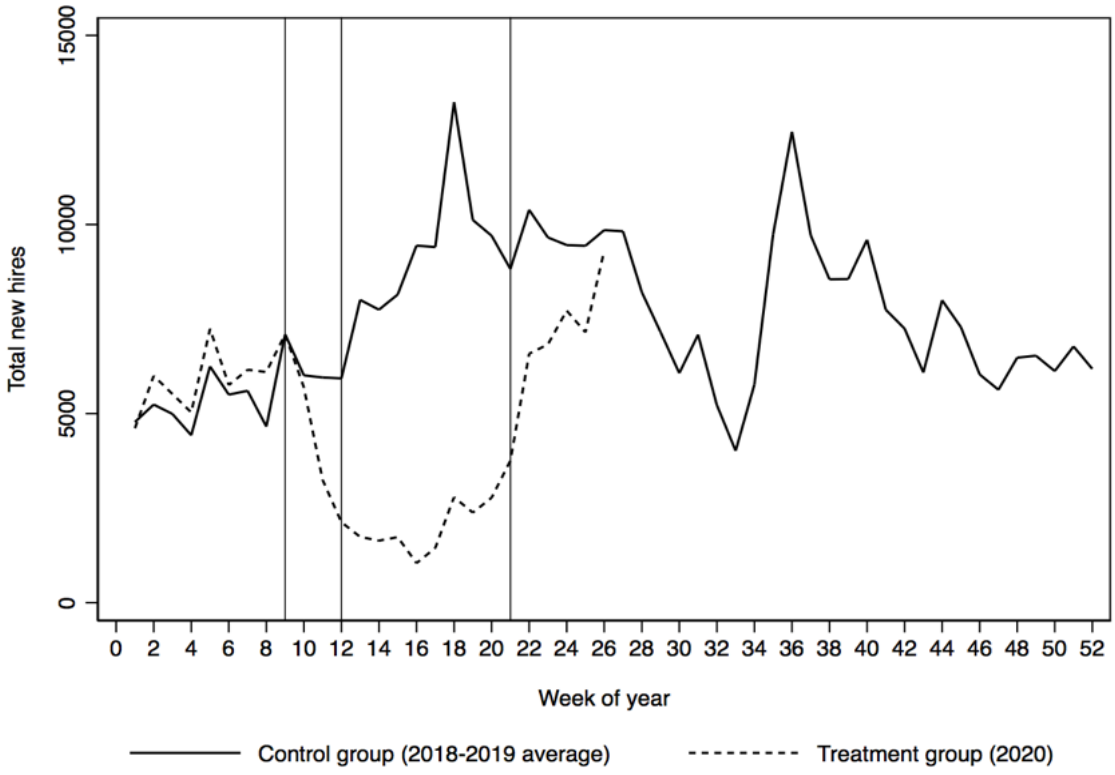


Source: ERGANI.
Notes: Vertical line is set at the pandemic onset (February 26, 2020).

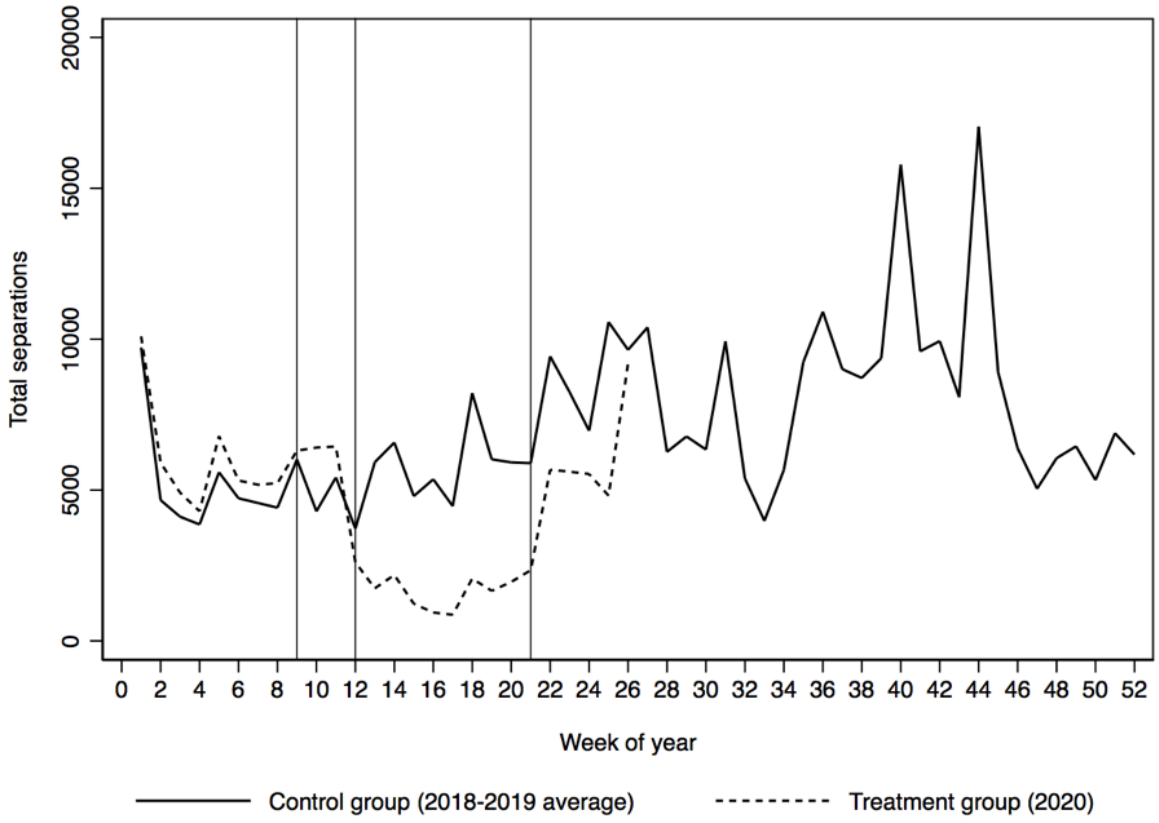
Figure A.2. Trends in labor market flows for treatment and control groups.



Panel A. Cumulative employment by week



Panel B. Total new hires



Panel C. Total separations

Source: ERGANI. Authors' calculations.
Notes: Vertical lines are set in weeks 9, 12 and 21 to indicate the pandemic onset, the layoffs restrictions and the end of our estimation sample (lockdown lifting), respectively.

For employment and new hires, there is a common trend up to week 9, and then there is a visible break in the trend for the treatment group (2020). For total separations, the trend for both groups is common up to week 11. Total weekly separations in 2020 are on a slightly higher level, compared to the control group, in weeks 9-11; however there is a sharp reduction after week 12 when the government restricted layoffs to protect the number of jobs. These observations hold even when looking within total new hires and total separations.

Working at Home in Greece: unexplored potential at times of social distancing?

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ABSTRACT

This paper investigates the incidence, trends and determinants of remote work in Greece. A crisis-stricken country in the years preceding the Covid-19 crisis, Greece entered the first wave of the public health shock as a laggard in digitalisation and remote work arrangements among European countries. While Covid-19 induced a spike in the use of remote work arrangements in many countries, this paper presents evidence that working from home (WfH) in Greece was subdued in the past decade. By analysing the profile of the job tasks and skill needs of Greek homeworkers, the paper also shows marked deviations in homeworking patterns and determinants in Greece, relative to other EU countries. This includes a higher prevalence of WfH among Greek females and non-nationals, limited use by young workers and families with children and a stronger relation with atypical work hours. While remote workers in Greece receive a 7% monthly wage premium, their jobs are found to involve standardised and moderate ICT tasks and to rely more on social serving tasks. The paper highlights that there is significant scope to enhance remote work in Greece, which can amount to up to 37% of all salaried jobs, subject to changing work organisation, norms and policies. In the coronavirus era, overcoming barriers to remote work will be key for the Greek labour market to adapt to social distances practices and digitalisation.

Keywords: Work at home, remote work, teleworking, tasks, skills, Covid-19, Greece
JEL Codes: C25, J01, J23, J24, J31
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1. Introduction

One stark impact of the Covid-19 pandemic and its associated confinement measures has been the growing numbers of individuals forced to work from home (WfH). At a time of choosing between exposing one's health by working in close physical proximity to other people in a workplace and remote work, the latter option presented itself with major benefits. These did not only include the possibility of stemming job and economic losses (Adams Prassl et al., 2020), but also an ability to alleviate extraordinary child care demands caused by school and crèche closures and safeguarding personal and family health. Home-based work could have also contributed towards the flattening of the Covid-19 curve and be a measure of control for further spikes in SARS-Cov-2 cases, in addition to ensuring continued economic performance (Redmond and McGuinness, 2020).

With more than 80% of the world population in lockdown at a given point (ILO, 2020a), what had been a limited work arrangement before the pandemic, affecting about 15-17% of EU workers on average (Eurofound-ILO, 2017; Eurofound, 2020), became widely used to safeguard against the possibility of complete job loss, furlough or business closure. While reliable statistics on how many individuals actually worked remotely from home during the Covid-19 crisis are yet to be developed[29], several economists have hinted to the fact that over a third of all jobs in advanced economies could potentially be performed from home (Dingel and Neiman, 2020; Boeri et al., 2020) and that the Covid-19-induced shift to homework is likely to have a long-term impact on future work organisation (Baert et al., 2020).

The cost of the Covid-19 lockdown and confinement measures, and subsequent economic disruption, is likely to have been lower for those countries that already benefitted from higher shares of employed persons utilising some form of remote work.[30] Similarly, countries that enjoyed a relatively advanced level of technological or digital maturity in terms of infrastructure and skills, organisational preparedness, as well as managerial competence and attitudes, would have also managed to adapt faster and with greater ease to the forced demand for remote work due to the

[29] Some polls have reported that the percentage of people who say they have worked "remotely" has roughly doubled, up to 62%, from the beginning of the virus-related changes in March until April. 59% of those who WfH said they would like to keep working this way https://news.gallup.com/poll/306695/workers-discovering-affinity-remote-work.aspx

[30] The term 'remote work' is used in this paper as it is an overarching description of the phenomenon whereby workers perform their work activities outside of their employers' premises, either from home or elsewhere. The focus of the analysis is on 'working from home (WfH)', which is a key facet of remote work. Homeworking includes teleworking/ICT-mobile work, which typically refers to work carried out from home, making use of remote information and communication technologies, but also integrates bringing work home after office hours (Song and Gao, 2018). Teleworking can be generally distinguished according to the place of work (home, office, elsewhere) and intensity/frequency of use of ICT (Eurofound-ILO, 2017). As the LFS data does not have information about workers' use of ICT when WfH, the use of the term 'teleworking' is generally avoided in the paper.

coronavirus crisis. As WfH is not feasible for all groups of workers, most notably for those employees considered 'essential' or at the frontline of tackling the pandemic consequences, countries with an industrial and occupational structure conducive towards remote work should also have managed to adapt better.

Entering what has been the most serious public health crisis of recent times, Greece was a country carrying already the heavy toll of its preceding economic and financial debt crisis. Enforced austerity policies during the previous decade as part of the country's economic restructuring or Memoranda programmes, heightened concerns about the potentially crippling effects such policy measures had on the country's strained public health care system (Economou et al., 2014; Kotsakis, 2018; Kyriopoulos et al., 2019).

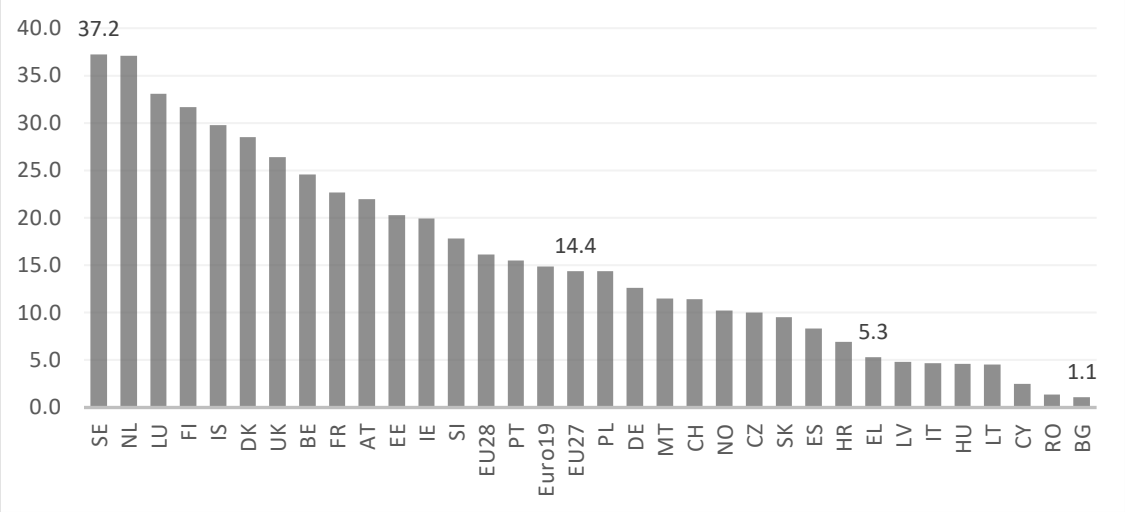
Greece was also ranked at the bottom of European Union (EU) countries in terms of its overall digital preparedness (European Commission 2019), including in indicators such as connectivity and internet access, use of digital services in the public sector, use of ICT technologies at home or work, integration of digital technologies within businesses and, most importantly, insufficiency of its digital skills base (Cedefop, 2018). The country's heavy reliance on a small-and-medium-sized firm base is also believed to be a contributory factor to its lower exposure and use of digital technologies (IOBE, 2018), evidenced by the low concentration of workers in digitally intensive occupations (SEV, 2020a). Overall, the country suffers from a marked 'digital divide', with significant socioeconomic differences in access to and use of digital technologies and information tools (Demousis and Giannakopoulos, 2004; Cedefop, 2016; Paidousi, 2020; Lintzeris, 2020). The above deficiencies explain why the country was ranked 53rd of 63 countries in the IMD World Digital Competitiveness ranking[31], which measures the capacity and readiness of economies to adapt and explore digital technologies as a key driver for economic transformation in business, government and wider society.

Furthermore, the Greek economy has traditionally been more heavily reliant than other EU countries on the provision of economic activities that entail interactive service provision, most notably via its significant tourism industry as well as its relatively larger wholesale and retail trade and public administration service sectors. This is another factor which weighed heavily on the country's ability to mitigate the adverse economic and social consequences of the Covid-19 shock[32].

[31] https://www.imd.org/wcc/world-competitiveness-center-rankings/world-digital-competitiveness-rankings-2019/

[32] See Greece's Mechanism for Labour Market Diagnosis for an analysis of the impact of Covid-19 on the Greek labour market https://lmd.eiead.gr/covid19/

Figure 1. **% of employed persons WfH, EU-27 and UK, NO, IS, CH, 2019**



NB: Summation of employed persons WfH sometimes or usually.
Source : European Labour Force Survey, Eurostat [lfsa_ehomp]

Because of the above reasons, but also cultural and social traits, Greece was also one of the EU countries with the lowest incidence of employed individuals WfH in the pre-coronavirus era (Eurostat, 2020). As shown in Figure 1, Greece was ranked 24th out of 31 countries in terms of the share of employed persons working either sometimes or usually from home in 2019. Only 5.3% of all employed persons worked remotely in Greece, higher than in neighbouring Italy, Bulgaria and Cyprus, but considerably lower than the EU-27 average of 14% and the very high shares of homeworking (over 37%) observed in the leading countries of Sweden and Netherlands.

Despite the many challenges that the crisis-stricken country was faced with, it experienced a very low Covid-19 toll during the first wave of the 2020 coronavirus infection[33]. But το ensure good public health outcomes in the medium-term and assist the implementation of necessary social distancing practices, WfH will have to be used by a larger part of the Greek workforce. Organisational and public policies to promote the further entrenchment of home- and online working in Greece will also be necessary so that it does not fall behind the bandwagon of other EU and advanced economies, given that distance work arrangements are expected to become more widespread in the aftermath of the pandemic.

The aim of this paper is to examine the evolution and determinants of WfH in Greece in the decade preceding the Covid-19 public health episode. Using Labour Force Survey data for the period 2008-2018, the study examines how the share of stay-

[33] At the time of writing, Greece had about 3287 confirmed SARS-Cov-2 cases and 190 deaths.

home workers changed over time in relation to the changing socioeconomic, industrial and occupational structure of the economy.

A value added of the study is the investigation of the type of tasks and skill needs characterising the jobs of Greek remote workers, which provides additional insight into the nature of their work. The paper also engages in a comparison of the divergence between the typical tasks profile of the jobs of average EU and Greek homeworkers. Moreover, it provides an assessment of the deviation between the historical and 'technically feasibility' of remote working in the country, which highlights the degree of investment required so that Greek workers and organisations can exploit its full potential. Finally, it also examines how the earnings of Greek workers is related to remote work arrangements, after accounting for the content and task profile of their jobs.

Section 2 engages in a review of the literature on the determinants and impact of WfH, with specific coverage of recent analyses spurred by the Covid-19 episode. Section 3 outlines the data and provides summary statistics. Section 4 describes the empirical methodology used to analyse the evolution, determinants and potential of homeworking in Greece. Section 5 describes main empirical findings. Section 6 concludes.

2. Literature review

As a response to the Covid-19 crisis a significant volume of new research has taken place investigating the extent to which home-based work can be further deployed as a means of safeguarding jobs and ensuring continued business operations. This research supplements a first generation of studies that preceded the Covid-19 wave, which had produced relatively inconclusive evidence on the balance of the positive (work flexibility and autonomy, work-family balance, reduced commuting time, job satisfaction) and negative (family confrontation, stress, longer work hours, social isolation, diminished teamwork, endangered career prospects) attributes of remote working (Eurofound-ILO, 2017).

Felstead and Henseke (2017), for instance, show that remote working is associated with higher organisational commitment, job satisfaction and job-related well-being, but these benefits also come at the cost of work intensification and a greater inability to switch off. They find that the detachment of work from workplaces is a growing trend that cannot only be explained by compositional factors and organisational responses. Song and Gao (2018) show that WfH is generally associated with a lower level of net affect and unpleasant feelings, compared to those working in a workplace. However, this may vary depending on the type of remote work, with teleworking specifically increasing individuals' stress.

In an experimental study controlling for learning and selection effects, Bloom et al. (2015) identified significant performance-enhancing effects of WfH. Little evidence was found of shirking by stay-home workers, instead they were observed to work more, have fewer breaks and sick days and work better (due to a quieter and more convenient work environment). They also reported improved job satisfaction, although one side effect was that promotion opportunities conditional on performance worsened.

Monteiro et al. (2019) argue however that whether remote work increases firm productivity is theoretically ambiguous. They show using a rich and representative sample of Portuguese firms over the period 2011-2016 that remote work had a negative average productivity effect within firms. Such negative outcomes are accentuated for smaller-sized and non-innovative firms, as well as those that employ a higher share of a low-skilled workforce.

Following the Covid-19 outbreak, a series of papers have recently tackled the issue of how many jobs can be feasibly done at home. Based on relevant job descriptors from the O*NET surveys, such as if an occupation requires performing physical activities, Dingel and Neiman (2020) apply a classification method to determine the plausibility that some occupations can be performed remotely. They find that about 34% of US jobs, accounting for 44% of overall wages, can plausibly be performed at home, although this is an upper bound estimate and the share varies considerably across cities and industries. They also show that while most jobs in finance, corporate management and professional and scientific services could plausibly be performed at home, this is not the case in agriculture, hotels and restaurants or retail sectors.

Using a similar adapted methodology, Boeri, Caiumi, and Paccagnella (2020) estimate the home-based work potential as 24% for Italy, 28% for France, 29% for Germany, 25% for Spain, and 31% for Sweden and the United Kingdom. Analysing a range of task indicators of jobs, available from the Italian occupational survey ICP-O*NET and the European Survey of Working Conditions, Sostero et al. (2020) also construct indices of the type and extent of physical teleworkability and social interaction at a detailed occupational level. The research highlights that about 40% of the EU workforce could feasibly work from home, with some variations across countries driven by the occupational composition of the workforce, work organisation and institutional arrangements. The authors note that occupations that have mostly benefitted from teleworking in the past are only a subset of the totality of occupations for which it is technically feasible to work remotely, most notably technicians and associated professionals and clerical work.

A range of other country-specific studies have also revealed similar figures regarding the teleworkability of occupations. Martins (2020) finds that about 30% of all jobs can be potentially performed at home in Portugal. Dingel and Neiman (2020), Saltiel

(2020)[34] and Gottlieb et al. (2020) all show that poor and lower-income countries generally have a lower share of jobs that can be performed at home, while Hatayama et al. (2020) find that jobs' amenability to homeworking increases with the level of economic development in countries. This conclusion is echoed by ILO (2020b) analysis showing that close to 18% of workers work in occupations and live in countries with an infrastructure that allows them to effectively perform their work from home, although with significant differences between the regions of the world. Specifically, Northern American and Western European workers have the largest capability for carrying out remote work.

Delaporte and Rena (2020) similarly estimate the teleworkability of jobs in 23 Latin American and Caribbean countries and document considerable variation, in the range of 6-17%, across countries but also occupations, industries, regions and workers' socioeconomic characteristics. It is shown that the feasibility of homeworking is positively correlated with highly skilled and high-paying occupations, as well as with individuals' education level, urban status and level of job formality. Women are also found to be more likely than men to work from home in developing countries, reflecting pre-established gender roles.

Focusing on the historical incidence of WfH in Ireland, Redmond and McGuinness (2020) show that 14% of employees in Ireland usually or sometimes work from home, mostly in the education, ICT and finance sectors, while this figure falls to 6% for 'essential' employees and 2% for those in the accommodation and food service sectors. Results from their econometric model indicate that homeworking is less likely among women, essential employees, non-Irish nationals and young workers, and far more likely in higher-paid occupations compared to elementary occupations. Couples with children are more likely to work from home, compared to single parents.

Survey-based evidence has been collected to detect some early shifts in the economy, including in the share of people WfH. Brynjolfsson et al. (2020) report the results of a nationally-representative sample of the US population with focus on their adaptability to the Covid-19 pandemic. Based on Google Consumer Surveys carried out between 1-5 April, the authors show that 34.1% of those who were commuting four weeks earlier were WfH at the time of the survey. They also argue that there is significant scope for converting (mostly younger-aged) workers who are currently commuting to remote workers.

Baert et al. (2020) conducted a state-of-the-art web survey among Flemish employees to examine their perceptions of telework on various life and career aspects during such a time of sudden, obligatory and high-intensity telework. The

[34] Saltiel (2020) constructs his measure of teleworkability by classifying workers as unable to work from home if they either do not use a computer at work, lift heavy objects, repair electronic equipment, operate heavy machinery or report that customer interaction is very important.

survey data shows that most respondents attribute positive characteristics to teleworking, such as increased efficiency and lower risk of burnout. However, some fear that it diminishes their promotion opportunities and weakens ties with colleagues and employer. Individuals with resident children also feel a greater strain due to the need to strike a balance between work and family obligations. It is noted that teleworking could constitute a means of overcoming ethnic labour market discrimination due to the lessened exposure of migrants with customers and co-workers.

Several papers have also focused on the impact that remote work has on economic outcomes. Adams Prassl et al. (2020) demonstrate that workers in alternative work arrangements and in occupations in which only a small share of tasks can be done from home are more likely to have reduced their hours, lost their jobs and suffered falls in earnings due to the coronavirus pandemic. Fadinger and Shymik (2020) detect a negative relationship between WfH and Covid-19 cases and infections in Germany, while they also show that under confinement the regions that experienced larger output loss were those where the share of homeworkers was lower. They also compute that a maximum of 42% of jobs in Germany could potentially be done from home, mainly in the finance, ICT and teaching industries. This is lower than the upper bound estimate of Alipur et al. (2020) also for Germany, who calculate that WfH is feasible for roughly 56% of the overall working population. The latter is based on survey data capturing workers for whom remote performance is not possible, even if granted the option by their employers. They show that less than half of this potential was exploited in the pre-pandemic German economy.

Despite some variation in estimates of the feasibility of homeworking across different countries, most studies agree that teleworking potential – "teleworkability" - is significantly underexploited. There is also broad consensus that the crisis may accentuate inequities in labour markets, given that those with lower levels of education and wages, younger adults, ethnic minorities and migrants and informal or precariously employed workers are typically less concentrated in occupations amendable to remote work (Yasenov, 2020).

Such relatively vulnerable population groups are also found to be overrepresented in jobs with higher social distancing risk, as shown by Pouliakas, and Branka (2020). Although the latter authors do not explicitly focus on measuring the incidence of remote work, their skills-based analysis identifies determinants of jobs with higher social distancing risk in Europe. These are defined as jobs demanding intense interpersonal skills (customer-service, teamworking and communication skills) and a low level of digital skills. Such skills attributes are also underlying traits of non-teleworkable jobs and hence there should be an inverse correlation among the two phenomena, as confirmed in section 5 below.

3. Data and descriptive statistics

To analyse the prevalence, evolution and determinants of homeworking in Greece, the Greek sample of the European Labour Force Survey (EU-LFS) is drawn covering the period 2008-2018[35]. The EULFS is the largest European household survey classifying the population of working age (aged 15 and over) in each of 31 European countries (EU27 plus UK, Norway, Switzerland and Iceland) according to their main employment status. Participating countries are responsible for collecting data on over 100 variables collected quarterly and annually. The EU-LFS data collection is carried out mainly via computerised questionnaires collected though personal visits, telephone and web interviews as well as self-administered questionnaires. The survey is of very high quality and ensures comparability across countries, given that it is based on probability (random) sampling and it uses the same concepts and variable definitions. It follows International Labour Organisation (ILO) guidelines and classifications (main labour force status, occupation, economic activity, education attainment, region etc.), it is used to derive key EU labour market statistics and indicators and has withheld the test of time.

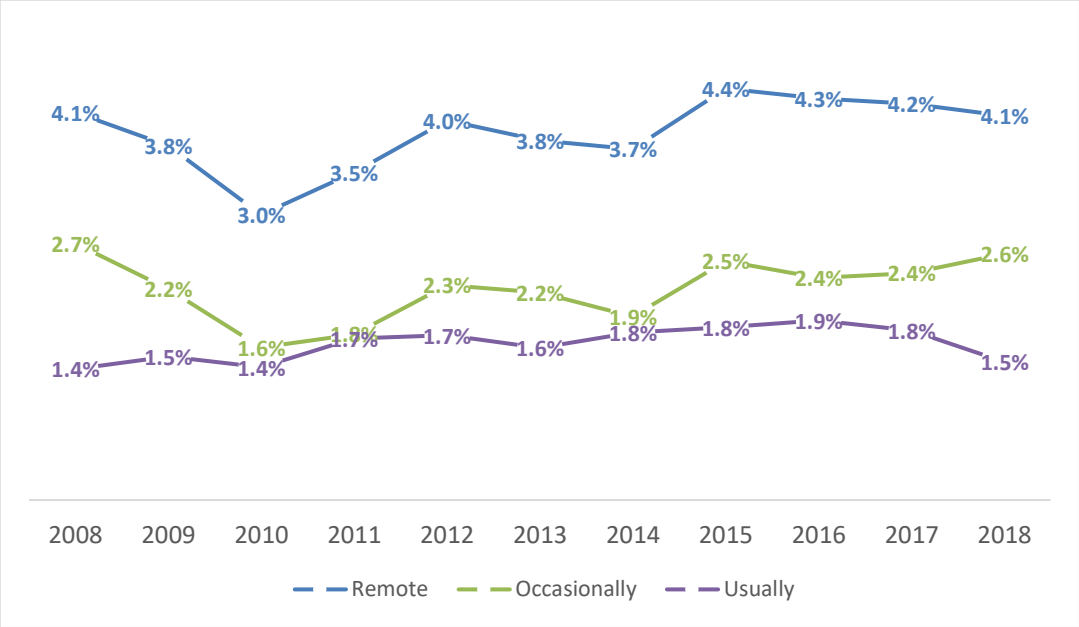
In carrying out the survey in Greece, the Hellenic Statistical Authority (ELSTAT), following the guidance of Eurostat, samples about 27,000 households and 43,600 persons aged 15-74 in an average quarter. The survey collects rich information about the demographic, geographical and educational characteristics of individuals, labour market status, employment characteristics of main and second jobs, characteristics of the unemployment experience for those actively searching for work as well as the job searching methods used by the inactive population.

For the purposes of measuring the percentage of employees that worked from home in Greece and their job determinants, a sample of paid employed individuals aged 15-64 has been retained[36]. A specific variable included in the EU-LFS, *HOMEWK*, is used to quantify the incidence of Greek employees WfH. This variable, intended to assess the reconciliation of work with family life as well as flexible work arrangements, measures whether individuals 'usually', 'sometimes' or 'never' do any productive activities as part of their current job from home in the year of the survey. 'Usually' is defined as WfH at least half of the days worked in the four weeks preceding the end of the reference week, while 'sometimes' refers to cases where individuals work at home less than half of the days but at least one hour in the reference period. Those captured under 'never' have on no occasion worked at home in the four weeks preceding the end of the reference week of the survey.

Figure 2 **Share of Greek employees WfH (occasionally or usually), 2008-2018**

[35] The year 2018 is the latest year made available by Eurostat at the time of writing this article.

[36] While self-employed individuals have a higher incidence of homeworking (about 5%) relative to employees (about 4%), the former have been dropped from the sample because many of the factors examined in the empirical analysis are only valid for employees.



Source: Greek Labour Force Survey

The variable excludes cases where the place of work is offered via a separate entrance to one's home (e.g. a medical practice). It also necessitates that the specific working arrangement is part of a formal arrangement between the employee and his/her employer, either as part of the contractual agreement or involving other formal procedures of notice. The teleworking arrangement is also confirmed via the provision of a personal computer to the employee so that he/she can carry out the job tasks.

Table 1 shows that over the period 2008-2018 about 3.9% of Greek adult employees engaged in some work from home. In 2018, the closest date before the onset of the Covid-19 episode, this share was 4.4%, accounting for about 110k employees. WfH was therefore considerably lower in Greece relative to other EU countries. While the percentage of home workers declined between 2008-2010, there was an upward trend between 2010-2016, mostly driven by occasional stay-at-home employees, that subsequently levelled off (Figure 2).

Table 1 **Share of Greek employees WfH (occasionally or usually), 2008-2018**

	Never	Occasionally	Usually	WfH
Total	96.14%	2.23%	1.63%	3.86%
Gender				
Male	97.01%	1.81%	1.18%	2.99%
Female	95.04%	2.77%	2.19%	4.96%
Age group				
15-24	98.36%	0.98%	0.67%	1.64%
25-34	97.20%	1.77%	1.03%	2.80%

35-44	96.35%	2.25%	1.40%	3.65%
45-54	95.04%	2.69%	2.27%	4.96%
55-64	94.65%	2.77%	2.58%	5.35%
Highest education attainment				
Low	98.84%	0.53%	0.63%	1.16%
Medium	98.54%	0.86%	0.60%	1.46%
High	91.36%	5.08%	3.56%	8.64%
Household status				
One adult without children	95.37%	2.69%	1.94%	4.63%
One adult with children less than 15	94.84%	2.48%	2.67%	5.16%
One adult with children 15-24	93.78%	3.60%	2.62%	6.22%
Couple without children	95.52%	2.87%	1.62%	4.48%
Couple with children less than 15	95.71%	2.55%	1.74%	4.29%
Couple with children 15-24	95.26%	2.69%	2.05%	4.74%
Two adults (not couple) without children	97.01%	1.55%	1.45%	2.99%
Two adults (not couple) with children less than 15	98.04%	1.15%	0.81%	1.96%
Two adults (not couple) with children 15-24	97.35%	1.48%	1.17%	2.65%
Continuing learning activities				
Yes	92.50%	3.55%	3.94%	7.50%
No	96.30%	2.18%	1.53%	3.70%
Multiple jobs				
Yes	92.95%	4.19%	2.86%	7.05%
No	96.20%	2.20%	1.61%	3.80%
Size of local unit				
1-10	97.29%	1.53%	1.19%	2.71%
11-19	94.47%	3.26%	2.28%	5.53%
20-49	93.47%	3.43%	3.10%	6.53%
50+	96.04%	2.26%	1.69%	3.96%
Occupation				
Managers	92.86%	3.97%	3.17%	7.14%
Professionals	86.08%	8.17%	5.75%	13.93%
Technicians and associate professionals	97.62%	1.58%	0.81%	2.38%
Clerical support	98.78%	0.78%	0.44%	1.22%
Services and sales	98.59%	0.78%	0.63%	1.41%
Skilled agriculture, forestry and fishing	99.26%	0.55%	0.19%	0.74%
Craft and related trades	99.18%	0.48%	0.33%	0.82%

Plant and machine operators and assemblers	98.98%	0.64%	0.38%	1.02%
Elementary occupations	98.49%	0.36%	1.15%	1.51%
Region				
East Macedonia, Thrace	96.20%	2.42%	1.37%	3.80%
Central Macedonia	95.21%	2.60%	2.19%	4.79%
West Macedonia	96.32%	2.58%	1.10%	3.68%
Thessaly	98.25%	1.00%	0.74%	1.75%
Epirus	95.97%	3.02%	1.00%	4.03%
Ionian islands	97.75%	1.49%	0.76%	2.25%
Western Greece	95.64%	2.99%	1.37%	4.36%
Peloponnese	96.47%	1.76%	1.77%	3.53%
North Aegean	96.98%	2.00%	1.02%	3.02%
South Aegean	96.25%	2.50%	1.25%	3.75%
Mainland Greece	96.88%	1.85%	1.27%	3.12%
Attica	95.78%	2.23%	1.99%	4.22%
Crete	96.93%	1.78%	1.29%	3.07%

Source: Greek Labour Force Survey.

Table 1[37] also reveals that the incidence of WfH is larger for females, older-aged workers and those with higher levels of education. It is prevalent among natives and single parent households with children. People who work at home are more likely to have been employed before joining their current employer, have a permanent or full-time contract or longer tenure and engage in multiple jobs. They are significantly more likely to undertake supervisory duties as part of their job in mostly medium-sized firms, work fewer average hours, engage in more continuing learning and are more highly paid than non-homeworkers.

In terms of sectoral distribution, it is notable that the share of Greek workers doing some work from their own premises is largely driven by those employed in the education sector (18%). However, it is also high in the ICT sector (6%) and in professional services (6%) and other service activities (5%). The highest percentages of employees WfH are also evident for professionals (14%; specifically, teaching professionals and legal, social and cultural professionals), managers (7%; notably, administrative and commercial managers), ICT technicians and sales workers. Finally, the incidence of remote work is highest for workers residing in Central Macedonia, Western Greece and Attika and lowest for those living in Thessaly and the Ionian islands.

4. Estimation methodology

[37] Also see Annex 1 and 5 for full sample descriptive statistics and breakdowns.

4.1 Determinants of remote work

To investigate the determinants of homeworking in Greece, the following probit multivariate regression equation is estimated on a dependent binary variable, *H*, that aggregates all Greek employees who have worked at least one hour from home in the reference period, namely those who usually or sometimes worked from home[38]:

$$H_i = \beta_0 + \beta_1 d_i + \beta_2 j_i + \beta_3 r_i + \beta_4 T_f + u_i \qquad [1]$$

where d_i captures a set of demographic factors (gender, age group, nationality, highest education attainment, marital status, number of children below 15 years old) of individual *i*, j_i is a set of job-related characteristics (years of tenure, part time job, temporary contract, supervisory responsibilities, firm size, usual work hours, working atypical hours (such as shifts, nights, evenings or weekends), economic sector and occupational group) and r_i captures the household region. Time dummies, *Tf*, are also included in the specification to capture any individual-invariant factors (e.g. macroeconomic conditions) that varied during the period under investigation and u_i is the error term. Hubert-White robust standard errors are estimated throughout.

4.2 Job tasks and skill needs of remote work

A second step in the analysis aims to explore the profile of the tasks and skills needed by the jobs of Greek homeworkers, relative to those who work from a more typical office setting. For this purpose, the Greek LFS data are merged at the level of a "job"[39] with the Eurofound European jobs monitor (EJM) task database as well as Cedefop's European skills and jobs survey (ESJS).

As explained in Eurofound (2016), a data set containing descriptions of the task intensity of jobs i.e. all two-digit occupation-by-sector combinations in Europe, has been constructed from various international sources, including Eurofound's European working conditions survey (ESWC), OECD's Survey of adult skills (PIAAC), the American O*NET database and the EU labour force survey (LFS)[40]. This is based on a task framework that classifies and measures tasks along two main dimensions, the content of the tasks themselves and the methods and tools used to perform them (Fernandez-Macias and Bisello, 2016; 2020). The content part of the task framework

[38] Table 2 also provides the empirical output of separate probit regressions for those who work occasionally and usually from home.

[39] Following Eurofound (2016), a 'job' is defined as the combination of an individual's industry (40 NACE Rev.2 activities) and detailed occupation group (2-digit ISCO08). The task dataset contains information on a total of 1520 sector-occupation combinations. After harmonising the dataset with the list of 19 broader groups of economic activities available in the LFS dataset, the merging of the two datasets is made for 741 'jobs'.

[40] The dataset is available from Eurofound (2016) *What do Europeans do at work: a task-based analysis* https://www.eurofound.europa.eu/publications/report/2016/labour-market/what-do-europeans-do-at-work-a-task-based-analysis-european-jobs-monitor-2016

identifies three main classifications of task content: physical, intellectual and social, each with various sub-indicators. The methods and tools of work capture the extent to which workers use machine or ICT tools. For this paper, the 2015 task indices extracted for Greece are used.

Similarly, the analysis merges the Greek LFS data with unique information on the skill needs of jobs in Greece as collected by the European skills and jobs survey (ESJS)[41], an EU-wide survey developed and financed by the European Centre for the Development of Vocational Training (Cedefop). The first ESJS, carried out in 2014, collected data on skill requirements and skill mismatch from a representative sample of about 49 000 adult workers (aged 24 to 65) from the (then) 28 Member States of the EU. For Greece, specifically, it surveyed about 2 000 adult employees.

In addition to standard demographic and job characteristics, the survey collected extensive information on the skill requirements of EU jobs. Respondents were asked to assess '*On a scale from 0 to 10, where 0 means not at all important, 5 means moderately important and 10 means essential, how important are the following skills for doing your job?*', where the skills set included literacy, numeracy, information and communication technology (ICT) skills, communication skills, teamworking skills, customer handling skills, foreign language skills, problem-solving skills, planning/organisation skills and technical/job-specific skills.

Once the data are merged, the probit estimation in equation (1) is replicated with the inclusion of the tasks (t) or skill needs (s) variables in the specification:

$$H_i = \beta_0 + \beta_1 d_i + \beta_2 t, s_i + \beta_3 j_i + \beta_4 r_i + u_i \qquad [2]$$

To provide a benchmark to the Greek estimates, equations (1) and (2) are also estimated on the full sample of adult employees in other EU Member States available in the EULFS dataset.

4.3 Assessing the feasibility of homework in Greece

As discussed in section 2, a key question of policy importance following the Covid-19 crisis has been how many jobs can be "potentially" performed at home in terms of physical and technical feasibility i.e. their "teleworkability". For instance, using a classification scheme that distinguishes occupations according to whether they involve "working outdoors" or "operating vehicles, mechanised devices, or equipment", Dingel and Neiman (2020) estimate that slightly above one third of jobs in Greece can be potentially done remotely, while Hatayama et al. (2020), who

[41] For full details of the *European skills and jobs survey* see: https://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jo bs-esj-survey; and Cedefop (2015) and Cedefop (2018). The full dataset is available for download at: https://www.cedefop.europa.eu/en/events-and-projects/projects/european-skills-and-jobs-esj-survey/access-to-data

construct a WfH amenability index for 53 countries, demonstrate that Greece is bundled with the group of labour markets that have very low amenability to remote work.

This study therefore also aims to measure the extent of deviation between the current incidence of homework in Greece and its potential feasibility threshold. In the absence of a specific Greek occupational survey with detailed information on job tasks, the methodology superimposes on the Greek LFS data (at 3-digit occupational level) the external classifications of the "teleworkability" of occupations as derived by Sostero et. al (2020). These authors build their classification based on analysis of a detailed set of job tasks of workers, as collected in a sample survey of occupations in Italy[42] and the ESWC[43]. It focuses on those tasks that are predictive of the extent to which different work activities can be carried out from a remote site.

Specifically, the classification of 5-digit occupations according to their physical teleworking feasibility is based on a series of relevant indicators that distinguish work that cannot be done remotely, including their manual or finger dexterity, performing of general physical activity, handling and moving objects, inspecting equipment, structures or materials, operating vehicles, devices or equipment. A 5-digit occupation is classified as not physically teleworkable if any of these activities is sufficiently important (namely, it has a score of over 40% on the importance scale). Using an official mapping, the 5-digit occupational classification is subsequently aggregated to the 3-digit ISCO08 taxonomy. This classification is further refined based on ESWC data that identifies jobs involving lifting or moving people.

The authors also construct a supplementary index of social interaction task content, using relevant indicators such as if a job involves selling or influencing others, training or teaching, assisting or caring, performing or working directly for the public and tasks involving the coordination of others. Any occupation that is totally or partially teleworkable from a technical perspective can be additionally assessed in terms of how efficient the provision of labour services will be if they were to be performed remotely, as a function of the degree of social interaction involved (see Sostero et al. 2020 for the full classification table and methodological details).

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42 The Italian ICP (Indagine Campionaria delle Professioni), conducted in 2007 and 2012 by the National Institute for Public Policy Analysis (INAPP) in collaboration with the Italian National Statistical Institute (ISTAT), is structured according to the information content of the US Occupational Information Network (O*NET) survey. It describes how about 16,000 employed people carry out the 800 professional units that make up the elementary structure of the Italian Classification of Occupations (CP2011).

43 The European survey of working conditions is a survey carried out by the European Foundation for the Improvement of Living and Working Conditions (Eurofound) in 35 countries (including Greece) interviewing nearly 44,000 workers. It provides detailed information on a broad range of issues, including exposure to physical and psychosocial risks, work organisation, work–life balance, and health and well-being. The analysis described in the text uses data from the 6th ESWC carried out in 2015.

This classification of occupations is subsequently matched to the jobs of Greek workers at the 3-digit occupational level using the LFS dataset. It is acknowledged that the structure of the Greek labour market and the nature of jobs tasks of Greek employees may differ relative to Italian and other European counterparts, so further tests of the plausibility of this matching process have been undertaken. Specifically, the externally-derived classification of the teleworkability of occupations has been firstly validated using specific information on the job tasks of Greek employees and after replicating the methodology of Hatayama et al. (2020) on the Greek PIAAC sample[44].

Secondly, the extent to which the average characteristics of Greek homeworkers differ relative to those of other European counterparts has been examined. To do so, a standard decomposition analysis as outlined by Oaxaca (1973) and Blinder (1973) has been carried out using the EULFS data (see Annex 2 for a description of the approach). This deconstructs the gap in the incidence of remote working between Greek workers and others into a part that is attributable to differences in their mean productive characteristics (the explained part) and a part that is due to different returns to such characteristics (the unexplained part). In this manner it becomes possible to detect the extent to which observable characteristics contribute to differences in remote working between Greek and non-Greek workers and how much of the wedge can be attributed to other unobserved influences.

4.4 Estimating the wage return to remote work

A final step of the study is to estimate the implications that WfH has on workers' wages. Using information on the deciles of monthly take-home pay[45] available in the Greek LFS data, a Mincer-type earnings regression is performed, as follows:

$$W_i = \vartheta_0 + \theta_1 WfH_i + \theta_2 age_{di} + \theta_3 ten_i + \vartheta_4 ten^2{}_i + \theta_5 sex_i + \theta_6 Ed_i + \theta_7 L_i + \theta_8 T_f + \varepsilon_i \qquad [3]$$

where the monthly net earnings, *W*, of individual *i* is regressed on the *WfH* indicator variable and on variables capturing gender, age band, years of tenure and its quadratic term (to capture the concavity of job-specific acquired human capital), as well as the highest level of education attainment level (*Ed*) and an indicator variable

[44] Due to limited sample sizes in the Greek PIAAC data at the 3-digit occupational level, and since the job task information available in PIAAC is more limited relative to the O*NET approaches, it has been preferred to utilise the teleworkability classification of Sostero et al. (2020) for the main analysis of the paper. The Greek-specific PIAAC analysis is used for robustness purposes.

[45] This includes the last monthly pay after deduction of income tax and National Insurance Contributions. It includes regular overtime, extra compensation for shift work, seniority bonuses, regular travel allowances and per diem allowances, tips and commission, compensation for meals. It excludes income from investments – assets, savings, stocks and shares.

capturing a person's investment in continuing learning activities (L). Time dummies, T_f, are also included to control for time-varying effects that are fixed across individuals and ϵ is the error term.

Given that the wage information in the LFS dataset is only available in the form of ten deciles, equation (3) is estimated using an ordered probit estimator and corresponding marginal effects are reported for each interval of the wage distribution (see Annex 5). Standard Mincer wage equations are also estimated on continuous (monthly/hourly) wage variables. The latter is derived by keeping the median values of each of the monthly income bands included as options in the Greek LFS survey. Information on employees' usual weekly hours in their main job is also used to derive a measure of (log) net hourly wages.

5. Empirical findings

5.1 Determinants of homeworking in Greece

Table 2 displays the association between a number of demographic, socioeconomic and job characteristics of adult employees in Greece and their incidence of WfH. In the decade preceding the 2020 coronavirus crisis, which is expected to have caused a structural change in the share and composition of remote working in most countries, it is interesting to observe that homeworking in Greece was characterised by several idiosyncratic features relative to other countries.

WfH, especially on a usual basis, is found to be more prevalent among females and non-nationals. Younger Greek workers up to middle age are less likely to engage in remote work, despite being more digitally literate compared to older cohorts (OECD, 2016). WfH is more widespread among tertiary educated individuals, while it is striking that there is little difference in the estimated probability of homeworking among those qualified at below upper secondary and medium-education level. Having a first child or more than 3 young children in the household is also positively associated with a propensity to regularly work at home.

Other things equal, adult employees who work from home are more likely to have been in inactivity before starting their current job, which hints to the fact that such workers, who may have already become accustomed to carrying out activities at home, are more inclined to retain this working mode in their new employment. By contrast, individuals making a school to work transition have lower chances of agreeing with their employer to work from their own premises. As mostly occasional homeworkers have greater chances of engaging in moonlighting, this alludes to the fact that the ability to work from home can be combined with engagement in additional work activities for some people (e.g. freelancing or working in the online platform economy).

Table 2 **Determinants of WFH, Probit estimates, Greece, 2008-2018**

	(1) *WfH*	(2) *WfH occasionally*	(3) *WfH usuall*	(4) *WfH males*	(5) *WfH females*
Male	-0.13***	-0.09***	-0.12***	…	…
	(0.008)	(0.010)	(0.011)		
Non-native	0.20***	-0.04	0.30***	0.02	0.23***
	(0.015)	(0.024)	(0.019)	(0.026)	(0.021)
Married	-0.01	0.05***	-0.06***	0.00	0.02
	(0.010)	(0.012)	(0.013)	(0.016)	(0.013)
Age: 25-34	-0.02	-0.06**	0.03	-0.00	-0.02
	(0.023)	(0.027)	(0.033)	(0.034)	(0.031)
Age: 35-44	0.07***	0.01	0.11***	0.02	0.09***
	(0.023)	(0.027)	(0.034)	(0.035)	(0.032)
Age: 45-54	0.17***	0.02	0.30***	0.07*	0.22***
	(0.024)	(0.029)	(0.034)	(0.036)	(0.033)
Age: 55-64	0.23***	0.05	0.35***	0.12***	0.29***
(ref: 15-24)	(0.026)	(0.032)	(0.037)	(0.039)	(0.036)
Education: Medium	-0.00	0.01	-0.02	0.05**	-0.06***
	(0.014)	(0.018)	(0.019)	(0.020)	(0.021)
Education: High	0.18***	0.17***	0.13***	0.16***	0.15***
(ref: Low)	(0.016)	(0.021)	(0.021)	(0.023)	(0.024)
Child15: 1	0.03***	0.01	0.05***	0.08***	0.01
	(0.010)	(0.012)	(0.014)	(0.016)	(0.014)
Child15: 2	0.01	-0.03*	0.05***	0.09***	-0.05***
	(0.012)	(0.015)	(0.016)	(0.018)	(0.017)
Child15: 3	0.05**	-0.01	0.11***	0.19***	-0.07**
(ref: 0)	(0.022)	(0.026)	(0.030)	(0.030)	(0.031)
Moonlight	0.22***	0.21***	0.14***	0.18***	0.29***
	(0.023)	(0.026)	(0.030)	(0.029)	(0.038)
Continuous learning	0.22***	0.07***	0.32***	0.19***	0.24***
	(0.015)	(0.018)	(0.018)	(0.022)	(0.020)
Last stat: unemployed	-0.01	-0.01	-0.02	-0.00	-0.02
	(0.023)	(0.028)	(0.032)	(0.036)	(0.030)
Last stat: student	-0.09**	-0.23***	0.09	-0.24***	-0.01
	(0.045)	(0.057)	(0.059)	(0.084)	(0.056)
Last stat: inactive	0.13**	0.01	0.23***	0.10	0.12

(ref: employed)	(0.055)	(0.074)	(0.067)	(0.073)	(0.084)
Years of tenure	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Part-time	0.05***	-0.16***	0.25***	0.06**	0.04
	(0.018)	(0.022)	(0.024)	(0.031)	(0.024)
Temporary	-0.04***	-0.04**	-0.02	-0.06***	-0.01
	(0.013)	(0.016)	(0.018)	(0.022)	(0.018)
Supervisor	0.23***	0.22***	0.18***	0.26***	0.21***
	(0.011)	(0.013)	(0.015)	(0.014)	(0.017)
Firm size: 11-49	0.08***	0.04***	0.12***	0.06***	0.08***
	(0.011)	(0.013)	(0.015)	(0.017)	(0.015)
Firm size: 20-49	0.19***	0.08***	0.27***	0.12***	0.24***
	(0.012)	(0.014)	(0.015)	(0.018)	(0.016)
Firm size: 50+	0.14***	0.09***	0.19***	0.16***	0.10***
	(0.012)	(0.015)	(0.017)	(0.017)	(0.018)
Firm size: DK<11	0.00	0.06***	-0.08***	0.01	0.01
	(0.017)	(0.019)	(0.025)	(0.025)	(0.024)
Firm size: DK>10	-0.02	0.01	-0.04**	-0.07***	0.02
(ref: 1-10)	(0.013)	(0.015)	(0.019)	(0.020)	(0.018)
Weekly hours	0.01***	-0.00***	0.02***	0.00***	0.01***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Atypical hours	0.31***	0.32***	0.20***	0.29***	0.37***
	(0.007)	(0.008)	(0.009)	(0.009)	(0.011)
Urban: Towns/suburbs	0.02*	0.07***	-0.05***	0.02	0.02
	(0.009)	(0.011)	(0.013)	(0.014)	(0.013)
Urban: Rural area	0.03***	0.07***	-0.03**	0.06***	0.02*
(ref: Cities)	(0.010)	(0.012)	(0.013)	(0.014)	(0.014)
Industry dummies	x	x	x	x	x
Occupation dummies	x	x	x	x	x
Region dummies	x	x	x	x	x
Time dummies	x	x	x	x	x
Constant	-2.33***	-1.79***	-3.35***	-2.06***	-2.67***
	(0.063)	(0.076)	(0.093)	(0.084)	(0.124)
Observations	565,898	565,898	565,898	312,094	253,804

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
Source: Greek Labour Force Survey.

In addition to doing more than one jobs, the empirical estimates also draw attention to the potential disruption in work-life balance that WfH may entail for some individuals. *Ceteris paribus*, homeworkers in Greece are found to work longer and atypical work hours. Households comprised of couples with children (especially those with separated parents) have a lower estimated probability of WfH, compared to childless households. This is concerning as it may pose a strain on parents trying to combine work with child-care responsibilities[46].

Working remotely is found to be more prominent for individuals in part-time jobs and with a permanent contract, after controlling for work hours and other individual and job characteristics, as well as for those with supervisory responsibilities in their main job. Part-timers are more inclined to work on a frequent basis from home, while temporary workers are particularly less likely to do occasional remote work. Workers in micro-sized firms are the least likely to have the ability to do remote work, in contrast to those in medium-sized establishments.

A finding of interest is the positive partial correlation between (mostly usual) remote work and workers' further participation in formal or non-formal education and training activities. During the coronavirus confinement period, specific policy measures and programmes, in Greece and other European countries, have been implemented to promote the use of distance- and other forms of remote learning. The positive partial relationship between remote work and continuing education and training implies that there may be a reinforcing link between homeworking and continuing learning.

Examining this association in more depth reveals that it is underpinned by persons being in regular education (especially by people undertaking advanced research studies i.e. ISCED 7-8) but more so by those following non-formal taught learning activities (courses, seminars, conferences, private lessons). It is observed that remote workers are more likely to engage in non-formal education and training that is job-related and takes place mostly or solely outside working hours. It is also confirmed that the relation is not distorted by the inclusion of employees aged below 24 years, or those still in regular education as main status and that it holds when dropping from the sample all individuals whose main subjective labour market status is not employment[47].

With respect to the sectoral and occupational distribution of homeworking, the empirical estimates confirm that employees in the education, ICT and professional services have higher probability of doing remote work. Similarly, professional occupations have the highest probability of WfH, whereas technicians and associate professionals and clerks, whose jobs in general share similar characteristics in terms

[46] The results on household status are not reported in Table 2, as they are correlated with the number of children, but are available from the author upon request.

[47] All results are available from the author upon request.

of social interaction and use of digital technologies with professionals, have significantly lower chances for WfH (Redmond and McGuinness, 2020).

Finally, the estimates reveal a statistically significant geographical variation in terms of the incidence of remote work in Greece, with workers in Attika and South Aegean engaging more in home-based work, in contrast to similar employees in West Macedonia, Thessaly and North Aegean. Working in non-urban areas is also positively associated with the offer to work from home, especially on an occasional basis.

5.2 Gender differences in homeworking

Given the importance of WfH for reconciliation of work-life balance and as a means of flexibility in work arrangements, Table 2 further examines any gender differences in its determinants in the Greek labour market. Some important differences include the fact that female homeworkers are more likely to be non-nationals, in contrast to males. With respect to age, men engage in remote forms of work only when they are of considerably older age, whereas women do so from their 30s (possibly reflecting strong gender roles in relation to the assumption of child care responsibilities). Medium-qualified female employees in Greece are particularly less inclined to work from home than the lower educated, as opposed to equivalently qualified men. It is also striking that females with younger children have a lower probability of WfH, compared to those with no offspring. Thus, the estimated positive total mean effect of child-bearing on homeworking is driven entirely by Greek men, especially those with more than 3 children.

Further interesting gender differences include the fact that female homeworkers in Greece are more likely to moonlight, signifying that they may be encountering hours or income constraints in their main job (Pouliakas, 2017) and use the opportunity of WfH to engage in other work activities. Women who work remotely also work longer and atypical work hours. However, they are more inclined to engage in further education and training than males, which may reflect that they try to utilise the added flexibility of WfH to further promote their skills and career opportunities. Male employees have greater chances of doing remote work than women in part-time and permanent jobs, larger-sized firms and in rural areas.

5.3 “Essential” workers and WfH

Redmond and McGuinness (2020) examine the specific relationship between WfH and jobs in which “essential” services were provided during the coronavirus lockdown. Such jobs include workers in the health care and public administration sectors (armed forces, police officers etc.) but also food and transportation services

and some retail workers, necessary for meeting basic population needs. They show that just 6% of essential employees WfH in Ireland, compared to an average of 16% for non-essential employees.

Using the Greek LFS data, a dummy variable has been created identifying the share of Greek workers employed in such 'essential' job posts. The characterisation of essential services utilised by Redmond and McGuinness (2020), who combine specific industry and occupational codes, is mimicked. However, a more detailed and augmented approach is employed that identifies essential occupations based on 3-digit occupational codes, combined with the industrial taxonomy in some cases to narrow down the selection of workers (see Annex 3). About 33.5% of Greek employees are found to belong to this group of essential occupations.[48]

Table 3: **WfH and essential jobs, Probit estimates, Greece, 2011-2018**

	(1) *WfH*	(2) *WfH occasionally*	(3) *WfH usually*	(4) *WfH males*	(5) *WfH females*
Essential	-0.21***	-0.20***	-0.22***	-0.19***	-0.26***
	(0.019)	(0.022)	(0.028)	(0.027)	(0.029)
Full set of control variables	x	x	x	x	x
Constant	-2.46***	-2.13***	-3.23***	-2.35***	-2.79***
	(0.081)	(0.097)	(0.118)	(0.106)	(0.156)
Observations	362,401	362,401	362,401	196,433	165,968

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Probit estimates; all regressions include a full set of control variables as in Table 2.
Source: Greek Labour Force Survey.

As noted by Redmond and McGuinness (2020) for Ireland, there is a higher concentration of females and part-time workers among essential occupations. Such jobs are also, on average, lower-paid and with a higher share of low-educated workers. However, in Greece, in contrast to Ireland, essential workers are more likely to be non-natives, middle-aged and live in households with children. They work more

[48] The share of essential jobs falls to 24% if the occupations related to sales categories are excluded from the indicator variable, as it is not entirely clear which sales jobs are essential given that some retail outlets were forcefully shut during the pandemic lockdown and others not. The analysis using this indicator variable can only be performed for the period 2011-2018 due to the ISCO classification revision in 2011.

and atypical hours per week and participate less in continuing education and training activities.

Despite such differences in characteristics, just 1.5-2% of essential employees are found to WfH in 2018 compared to 5-6% of non-essential workers. Estimation of equation (1) with the inclusion of an 'essential services' dummy variable in the specification further confirms that the prevalence of WfH is statistically significantly lower for workers at the frontline of service delivery and care during a pandemic (see Table 3). Other things equal, essential workers have a 1% lower marginal probability of WfH. This negative relationship is pronounced for female essential employees, who have a 2% lower predicted probability of WfH relative to males.

5.4 Trend of WfH in Greece

As revealed in Figure 2, the incidence of WfH has stayed relatively constant at around 4% over the past decade, with a significant fall in occasional remote work between 2008-2010 that was subsequently reversed. Table 4 first reveals the impact of various unobserved time-varying factors (time dummies) on the incidence of home working, when the dependent variable is regressed only on them. The estimated intercepts reveal a statistically significant negative trend between 2008-2014 that was subsequently reversed but flattened until 2018. However, when taking into account the changing composition of the working population and jobs in the Greek labour market during these years, which was marked given the significant impact of economic restructuring policies (Christopoulou and Monastiriotis, 2018), it becomes evident that homeworking has been in steady decline during the previous decade and it has not managed to bounce back to its 2008 level.

Table 4 **Evolution of WfH in Greece, 2008-2018**

	(1) *time dummies only*	(2) *& industrial composition*	(3) *& industrial & demographic composition*	(4) *full specification*
2009	-0.04***	-0.06***	-0.06***	-0.06***
	(0.012)	(0.014)	(0.014)	(0.015)
2010	-0.14***	-0.17***	-0.18***	-0.19***
	(0.013)	(0.015)	(0.015)	(0.016)
2011	-0.08***	-0.12***	-0.13***	-0.13***
	(0.013)	(0.015)	(0.015)	(0.016)
2012	-0.01	-0.07***	-0.08***	-0.08***
	(0.014)	(0.016)	(0.016)	(0.016)
2013	-0.03**	-0.11***	-0.13***	-0.14***
	(0.014)	(0.016)	(0.016)	(0.017)

2014	-0.05***	-0.11***	-0.13***	-0.14***
	(0.014)	(0.016)	(0.016)	(0.017)
2015	0.03**	-0.02	-0.03**	-0.06***
	(0.014)	(0.016)	(0.016)	(0.016)
2016	0.02	-0.04***	-0.06***	-0.10***
	(0.013)	(0.015)	(0.015)	(0.016)
2017	0.01	-0.05***	-0.07***	-0.10***
	(0.013)	(0.015)	(0.015)	(0.016)
2018	-0.00	-0.06***	-0.09***	-0.12***
	(0.013)	(0.015)	(0.015)	(0.016)
(ref: 2008)				
Industry controls		x	x	x
Occupation controls		x	x	x
Worker controls			x	x
Job controls				x
Constant	-1.74***	-1.70***	-1.98***	-2.33***
	(0.009)	(0.046)	(0.052)	(0.063)
Observations	582,591	568,947	568,947	565,898

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Probit regressions; Col. 1 only controls for time dummies; Col. 2 controls for industry/occupation dummies; Col. 3 also controls for gender, age, education and native status; Col. 4 controls for full set of set of controls as in Table 2.
Source: Greek Labour Force Survey.

While the incidence of WfH is anticipated to have risen in Greece following the coronavirus lock down period, it is hence clear that Greek businesses and workers were insufficiently gearing up to face the public health shock and ensuing spike in demand for remote working arrangements in preceding years.

5.5 Tasks and skills of remote jobs

While the above-mentioned findings paint a wide-ranging portrait of the type of jobs and workers engaged in remote working in Greece, it does not fully reveal the nature of tasks and skills demanded by homeworking jobs. Knowing the structure of the tasks and skill needs of jobs can yield additional insight for policymakers who wish to understand what exactly workers do as part of their jobs, in contrast to the broad characterisations provided by their sector of economic activity and occupation[49].

[49] As noted by Fernandez-Macias and Bisello (2020), the amount of individual variance in task content that can be explained by the occupation/sector combination ranges between 30% and 40%. Hatayama et al. (2020) further estimate that occupations capture only half or less of the types of tasks that workers do on-the-job. Occupation-industry dummies are hence an imperfect proxy of what

To detect the nature of the tasks and skills demanded by Greek homeworkers, the Greek LFS data have been merged at the level of 'jobs' to the Greek samples of the Eurofound European Job Monitor (EJM) task dataset and Cedefop's 1st European skills and jobs survey (ESJS). This has been done for the 2015 and 2014 LFS waves, respectively, as described in section 4.

Table 5 **Job tasks, skill needs and WfH, Probit estimates, Greece and other Europe**

	(1) *Job tasks EL (EJM)*	*(2)* *Skill needs EL (ESJS)*	*(3)* *Job tasks other Europe (EJM)*
CONTENT OF WORK			
Physical tasks			
Strength	-2.57***		0.65***
	(0.633)		(0.061)
Dexterity	-0.32		-2.02***
	(0.451)		(0.061)
Intellectual tasks			
Literacy: Business	-0.41		-0.25***
	(0.355)		(0.041)
Literacy: Technical	-1.37***		-0.06
	(0.320)		(0.037)
Literacy: Humanities	1.49***		0.69***
	(0.337)		(0.038)
Numeracy: Accounting	-0.08		0.18***
	(0.216)		(0.025)
Numeracy: Analytic	0.14		0.01
	(0.336)		(0.030)
Problem-solving: information retrieval	-0.39		0.01
	(0.405)		(0.049)
Problem-solving: creativity	1.13***		0.65***
	(0.373)		(0.057)
Social tasks			
Serving/attending	1.27***		-0.97***
	(0.391)		(0.044)
Selling/influencing	-0.13		-0.13***

individuals do in their work, as noted by the now significant literature on the 'task approach to labour economics' (Russo, 2017; Bisello and Fernandez-Macias, 2016, 2020; Eurofound, 2016; Handel, 2016; Pouliakas and Russo, 2015; Autor and Handel, 2013; Autor, 2013).

	(0.333)	(0.045)
Teaching/training/coaching	2.16***	0.94***
	(0.371)	(0.043)
Managing/coordinating	-2.23***	-1.12***
	(0.513)	(0.053)
METHODS & TOOLS OF WORK		
Methods		
Autonomy	-0.33	-0.11**
	(0.366)	(0.047)
Teamwork	-0.37***	-0.10***
	(0.138)	(0.013)
Routine: repetitiveness	0.12	-0.06***
	(0.181)	(0.019)
Routine: standardisation	0.48***	0.05***
	(0.169)	(0.016)
Tools		
Using machinery	-0.11	-0.53***
	(0.407)	(0.047)
Basic ICT	-0.28	0.36***
	(0.234)	(0.030)
Advanced ICT	0.30	0.10***
	0.11	(0.034)
SKILL NEEDS		
Basic literacy	-0.11	
	(0.074)	
Advanced literacy	-0.19**	
(ref: No literacy skills needed)	(0.084)	
Basic numeracy	-0.09	
	(0.089)	
Advanced numeracy	-0.22**	
(ref: no numeracy skills needed)	(0.092)	
Moderate ICT	0.29***	
	(0.060)	
Advanced ICT	0.05	
(ref: Elementary ICT skills needed)	(0.070)	
Job-specific	0.01	
	(0.009)	
Communication	0.056**	
	(0.012)	
Teamworking	-0.10***	
	(0.009)	
Foreign language	-0.03***	
	(0.009)	

Customer service		0.00	
		(0.008)	
Problem-solving		-0.02	
		(0.014)	
Learning		0.090***	
		(0.012)	
Planning		0.01	
		(0.011)	
COVID-19 SOCIAL DISTANCING RISK (high social & low digital skill needs)		-0.33***	
		(0.060)	
Constant	-2.94***	-2.46***	-0.90***
	(0.585)	(0.350)	(0.083)
Observations	40,279	36,544	737,566

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Probit regression includes full set of controls as in Table 2. Col. 1&3 matches the respective samples of the European Jobs Monitor task dataset with the Greek LFS (2015) and EU LFS data at the "jobs (sector-2-digit occupation)" level. Col. 2 matches the Greek sample of the European skills and jobs survey data with the Greek LFS (2014) data at "jobs (sector-2-digit occupation)" level. The Covid-19 social distancing risk index is derived as in Pouliakas and Branka (2020).
Source: Greek Labour Force Survey; European Jobs Monitor task dataset; European skills and jobs survey.

Table 5 displays the estimated coefficients of the specific tasks and skill needs variables obtained from the estimation of equation (2) on the respective samples. The estimates reveal interesting insights about the nature of the work done and skills required by Greek employees who WfH. Specifically, they are found to be less likely to engage in physical activities requiring strength, highlighting that most manual work cannot be moved to remote work spaces. Those carrying out relatively basic information processing tasks of a codifiable nature, such as technical-related intellectual tasks (writing letters, memos, invoices, manuals, instructions, reports etc.), are also found to have lower chances of WfH.

What is clear is that working away from office premises tends to be more prevalent among Greek workers who engage in social serving tasks (responding directly to demands from the public or customers) and teaching tasks (imparting knowledge or instructing others). The same holds for employees carrying out more advanced intellectual tasks (reading or writing articles or books, creativity and planning). By contrast, the need to coordinate or supervise the behaviour of colleagues or sell/influence others constitute an impediment to homeworking.

An interesting observation is that the jobs of Greek homeworkers tend to be characterised by work methods that involve a marked degree of standardisation. This implies that mostly jobs in which work procedures and outputs are predefined and encoded in a formalised system lend themselves to remote work.

Similar conclusions are drawn when examining the importance of different skills needed by the jobs of Greek homeworkers. The analysis reveals that distance work is relatively less likely to require advanced literacy and numerical skills. By contrast, the nature of the work carried out by Greek stay-home employees is mostly characterised by a higher importance of communication skills (which includes teaching and instruction) and basic digital skills. Such findings concur with the description of the task content of their jobs, as described before, specifically the high reliance on routine standardised tasks.

Because of the greater need to engage in social interaction and physical proximity with people, there is also a negative correlation between the importance of teamworking and foreign language skills with homeworking. Moreover, the evidence further supports the positive association between remote working and continuous learning for one's job, such as learning and applying new methods and techniques, adapting to new technology or equipment or materials and engaging in own learning.

5.6 Remote work as safeguard to social distancing?

With the onset of the Covid-19 confinement and associated social distancing measures, a large part of the labour force was either made redundant, put on furlough or some form of short-time working arrangement or forced to work remotely from home. Greece, a country that acted relatively swiftly in the implementation of preventive measures to counteract the exponential spread of the virus, experienced a spike in joblessness at first instance, which was slowed down by the implementation of government policies to encourage employee retention (e.g. short-time work arrangements) by firms (SEV, 2020b). The pressure for ensuring work continuity from a distance was therefore accentuated during the lock-down. As the country moves steadily towards the gradual lifting of strict confinement measures and towards a new norm of social distancing in workplaces, it is interesting to examine if the jobs of workers most exposed to social distancing risk are conducive to the take up of remote working, which would lower adjustment costs.

To investigate this issue, the Covid-19 social distancing risk index (COV19R) has been derived as described in Pouliakas and Branka (2020). COV19R is a weighted index combining information on the importance of skills involving physical proximity or contact with other people (communication, team-working and customer handling skills) as well as jobs' digital skill intensity. Larger values of COV19R indicate a larger

potential loss in employee productivity and possible job destruction due to social distancing measures.

As shown in Table 5, there is a statistically significant negative correlation between higher COV19R values and the probability of remote working in Greece. This draws attention to the fact that workers who may be most affected by social distancing measures in the post-peak-coronavirus period are the ones least likely to be using the WfH option.

5.7 Comparison with other European employees

In order to explore whether the determinants of homeworking deviate between Greek and other EU employees, Table 6 provides as a comparison the estimated coefficients for a sample of other European employees (excluding Greeks). The results are extracted by running separate probit regressions of equation (1) for 2018, the last year publicly available in the EULFS.

To compare any deviation in the patterns of WfH between Greek and other European homeworkers, considering that the residual variance of the two subgroups may differ in binary dependent variable models (Allison, 1999), a seemingly unrelated estimation is performed using both sample estimates. The hypothesis of equality of coefficients between the estimated Greek and other European WfH models is subsequently tested and rejected ($\chi^2(44) = 3569.75 \ ***$).

Table 6 **Determinants of WfH, Probit estimates, other Europe, 2018**

	(1) *All employees*	(2) *Males*	(3) *Females*	(4) *Wald test of coefficient equality EL-other Europe*
Male	0.01*** (0.004)	…	…	13.59***
Non-native	-0.14*** (0.008)	-0.15*** (0.011)	-0.12*** (0.011)	30.71***
Married	0.09*** (0.004)	0.10*** (0.006)	0.09*** (0.005)	6.41**
Age: 25-34	0.28*** (0.010)	0.24*** (0.014)	0.32*** (0.013)	26.26***

Age: 35-44	0.46***	0.42***	0.51***	38.07***
	(0.010)	(0.014)	(0.014)	
Age: 45-54	0.48***	0.43***	0.53***	14.11***
	(0.010)	(0.014)	(0.014)	
Age: 55-64	0.44***	0.39***	0.49***	13.51***
(ref: 15-24)	(0.010)	(0.015)	(0.015)	
Education: Medium	0.12***	0.17***	0.07***	16.65***
	(0.008)	(0.011)	(0.011)	
Education: High	0.38***	0.42***	0.36***	49.37***
(ref: Low)	(0.008)	(0.011)	(0.012)	
Moonlight	0.25***	0.22***	0.27***	0.42
	(0.007)	(0.011)	(0.010)	
Continuing learning	0.22***	0.22***	0.24***	12.23***
	(0.004)	(0.007)	(0.006)	
Years of tenure	-0.00***	-0.00***	-0.00***	6.47**
	(0.000)	(0.000)	(0.000)	
Part-time	0.10***	0.21***	0.03***	38.11***
	(0.007)	(0.012)	(0.009)	
Temporary	-0.10***	-0.14***	-0.07***	2.34
	(0.007)	(0.010)	(0.009)	
Supervisor	0.18***	0.19***	0.17***	7.35***
	(0.004)	(0.006)	(0.006)	
Firm size: 11-49	-0.26***	-0.20***	-0.30***	96.57***
	(0.006)	(0.009)	(0.008)	
Firm size: 50+	-0.18***	-0.13***	-0.23***	56.50***
	(0.006)	(0.008)	(0.008)	
Firm size: DK<11	-0.28***	-0.22***	-0.33***	35.24***
	(0.014)	(0.021)	(0.019)	
Firm size: DK>10	-0.28***	-0.22***	-0.32***	152.16***
(ref: 1-10)	(0.011)	(0.016)	(0.015)	
Usual weekly hours	0.01***	0.01***	0.01***	47.47***
	(0.000)	(0.000)	(0.000)	
Atypical hours	0.25***	0.25***	0.26***	7.64***
	(0.003)	(0.004)	(0.004)	
Urban: towns/suburbs	-0.06***	-0.06***	-0.05***	17.47***
	(0.004)	(0.006)	(0.006)	
Urban: rural areas	-0.07***	-0.06***	-0.06***	7.08***
	(0.005)	(0.007)	(0.006)	
Industry dummies	x	x	x	
Occupation dummies	x	x	x	
Country dummies	x	x	x	

Constant	-1.21***	-1.46***	-0.98***
	(0.028)	(0.038)	(0.042)
Observations	1,331,893	676,837	655,056

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; other European countries include all EU27 countries (excluding Greece) plus NO, IS, CH, UK; Col. (4) shows the output of Wald tests following a SURE estimation of WfH for both the Greek and other Europe samples. *Source*: EU Labour Force Survey.

The extent of the difference in the marginal effects between the two samples is also assessed by comparing relatively homogenous samples of Greek and other European workers, in terms of the composition of their measurable characteristics. In particular, marginal effects of the explanatory factors have been estimated for the other European sample after constraining their values to the respective mean values of the Greek sample. Comparing the marginal effects of the two samples based on a fixed profile of observable characteristics does not affect the main conclusions.[50]

Specifically, the comparison highlights that, in contrast to the Greek job market[51], there are higher chances of males, natives and those in non-supervisory posts working remotely in other European countries. While younger Greek workers at early stages of their career, as well as those with medium-level qualifications and children, also have a lower likelihood of home-based work. This stands in contrast to the flexibility enjoyed by their European counterparts. Greek remote workers also work significantly more atypical hours than other Europeans.

WfH is a flexible work arrangement used more frequently by Europeans in micro-sized firms and mostly applies to managerial occupations, whereas in Greece it affects mostly professional occupational groups and those in medium-sized firms. WfH also applies to Greeks living in towns and rural areas, as opposed to other Europeans for whom remote work is predominantly a phenomenon in densely populated areas.

5.8 How many jobs can be done remotely in Greece?

As discussed in section 4.3, a key question of policy importance following the Covid-19 crisis is how many jobs can be potentially performed at home. Following the methodology described above that classifies occupations according to their

[50] For instance, the estimated marginal probability of WfH at the means of the sample characteristics for the other European sample is 0.44. It is equal to 0.5 when constrained at the average value of the factors of the Greek sample.

[51] These comparisons have been corroborated by estimating equation (1) on the 2018 wave of the Greek LFS data. The effect of the variables indicating the number of children and last employment status (not shown in the table) have also been estimated in a separate regression that contains a subset of EULFS countries, for which these optional variables were collected.

teleworkability, we measure the extent of deviation between the current incidence of homeworking in Greece and its technical feasibility threshold.

Specifically, the teleworkability classification of 3-digit occupations as obtained from external sources is matched to the respective jobs of Greek workers using the LFS sample. As mentioned in section 4 and described in Annex 2, the differences in remote working between Greek and other European workers is not driven by discrepancies in the nature of their job tasks and other labour market endowments. Furthermore, the teleworkability classification derived using non-Greek sources has been corroborated using Greek-specific PIAAC data, after applying the methodology of Hatayama et al. (2020) (Fig A4.1, Annex 4). Both robustness tests provide support to the approach of using the teleworkability indices derived from non-Greek samples for the purposes of making inferences about the WfH amenability of jobs in Greece.

This analysis hence reveals that between 35-37% of all Greek employee jobs (affecting about 869-922k workers) can potentially be performed away from traditional office premises. Specifically, about 25.4% of Greek jobs are found to be fully teleworkable, 12% highly teleworkable, 25% little teleworkable and 37.6% fully not teleworkable. This indicates that the Greek labour market has marked scope in terms of expanding the use of remote working, considering that only 4.4% (about 110k) of employees worked from home in 2018.

For instance, the data reveal that only about 8-9% of Greek employees in potentially teleworkable jobs were exploiting this capability in the years preceding the Covid-19 crisis[52], implying that there is considerable space to further mobilise about 800-837k employees towards WfH arrangements. Annex 4 highlights that the type of occupations with greatest loss in terms of their teleworkability potential include general office clerks, teaching- and finance-related professions and other secretarial posts.

5.9 Wage effects of remote work

A final step in the analysis of this paper includes investigation of whether workers who perform their tasks at home receive a wage premium or penalty, compared to other equivalent employees who work at employers' premises[53].

Table 7 **Wages and WfH, ordered probit estimates, Greece, 2009-2018**

	(1)	*(2)*	*(3)*	*(4)*	*(5)*

[52] Similarly, for about 2.5% of the jobs classified as non-teleworkable, individuals are found to actually WfH.

[53] As the income variable is not available for 2008 in the LFS dataset, the analysis in this section is performed on the 2009-2018 period.

	Mincer	*full spec*	*WfH frequency*	*detailed occupation*	*job tasks*
WfH	0.19***	0.10***		0.17***	0.19***
	(0.009)	(0.009)		(0.011)	(0.029)
WfH occasionally			0.21***		
			(0.011)		
WfH usually			0.16***		
			(0.014)		
Mincer worker controls	x	x	x	x	x
Job controls		x			
Job tasks					x
Industry controls		x			
Occupation controls					
-1-digit-		x			
-3-digit-				x	
Region controls		x			
Time dummies	x	x	x	x	
Observations	429,656	417,043	429,656	309,776	37,527

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; Col. 1-3 includes data for 2009-2018; Col. 4 for 2011-2018; Col. 5 includes data only for 2015. Col. 1 controls for gender, age bands, tenure, tenure squared, highest education, continuous learning and time dummies. Col. 2 includes full set of controls as in Table 2. Col. 4 includes 3-digit occupations. Col. 5 includes job tasks after merging the LFS data with the European Jobs Monitor task dataset at "jobs (sector-occupation)" level. *Source*: Greek Labour Force Survey.

Column 1 in Table 7 shows the estimated coefficient on WfH when only the basic set of controls corresponding to a Mincer earnings specification is included. Column 2 also includes controls for job characteristics, industry and occupational dummies, as well as regional fixed effects. Column 3 also reports the coefficients when the WfH indicator is broken down into its frequency. Finally, given that the feasibility of WfH depends on the nature of the job and the work context, the wage impact of remote work is also estimated albeit with the inclusion of detailed 3-digit occupational codes as well as after controlling for the nature of a job's tasks, as described in section 5.5.

The estimations illustrate that remote work in Greece is associated with a significant monthly net earnings premium and that the effect is robust to the inclusion of a detailed set of control variables that provide a fuller description of the nature of a

job's activities[54]. Other things equal, it is calculated that the marginal probability of reporting the top income decile [*Pr(income = 10)*] is about 2% higher for remote workers in Greece. Reversely, the probability of reporting the lowest 3 deciles is about 1-2% lower for stay-home workers. This positive relationship between remote work and earnings is slightly greater for those who only occasionally perform work at home.

When the Mincer earnings specification is applied to a continuous (log) net monthly earnings dependent variable (see Annex 5), the latter constructed by considering the median values of each of the take-home salary bands, it is found that Greek remote workers earn about 7% higher net monthly wages, compared to equivalent workers who work at office premises[55]. At an average net monthly salary of about EUR 1114, this implies that remote workers in Greece earn about EUR 80 more per month than equivalent office-based employees[56].

Investigating the reasons behind the higher wage premium of remote workers in Greece is outside the scope of this paper and constitutes an interesting avenue for future research. However, considering the relatively standardised and interactive task content of the jobs of remote Greek employees, as described in section 5.5. above, a possible explanation for the higher wages of remote workers over their counterparts in traditional workplaces may be unobserved productivity differences, as opposed to job competition. These may include, inter alia, a premium attached to the higher aptitude of individuals working from a distance and their ability to deploy ICT-based technologies for their work, when necessary.

6. Conclusions

[54] The estimated coefficients on the remaining variables reveal statistically significant effects as anticipated from the literature, namely a concave age and tenure effect, highest returns to more education and a gender wage gap. Given the stark economic crisis that affected the country, the time dummies indicate a consistently declining trend of monthly earnings that was accentuated between 2012-14. Moreover, the analysis reveals a statistically negative relationship between wages and physical tasks and autonomous and routine tasks, while intellectual and team-working tasks are associated with wage premiums. A greater intensity of working with machinery and ICT tools is also associated with higher wages. See Annex 5 for more details.

[55] This wage premium is reduced to 6% when 3-digit occupational codes are included in the regression and to 3% when a full set of job, socioeconomic and regional factors are considered. Occasional (regular) remote workers earn about 8% (5%) more monthly earnings compared to those who do not WfH.

[56] Running a Mincer earnings regression using (log) net hourly pay as dependent variable, derived by dividing individuals' monthly net earnings with their usual weekly work hours, reveals that Greek remote workers earn about 17% higher net hourly wages than equivalent office-based employees. This higher estimate reflects the lower mean hours of WfH employees. Such findings are in accordance with similar analyses in the literature, such as Irlacher and Koch (2020), who report an hourly wage premium to WfH of about 12% for German workers after accounting for narrowly defined jobs and detailed work activities

The onset of the Covid-19 crisis has been accompanied by significant changes and challenges to labour markets, most notably an increasing reliance on online forms of working, taking place from a distance. While WfH was a rather limited form of work arrangement in the pre-Covid-19 era, recent estimates highlight that over a third of all jobs in advanced economies could be amenable to remote working. Such figures are likely to be an upper bound, as they capture the technical feasibility of remote work, while many organisations and individuals may decide to strike some balance between home- and office-working, or not use the WfH option even if available. Stories of several organisations shutting down their office spaces for the sake of remote work arrangements abound and several authors have argued that remote work is here to stay, due to advancements in technology and social developments, efficiency of online/social media communities and the low benefits of knowledge spillovers among knowledge workers who work in close proximity to others (Clancy, 2020).

On the other hand, others note that there have been several efforts to 'telecommute' work in the past, starting from the 1970s, that did not materialise into widespread adoption (Cappelli, 2020). As also supported by the evidence in this paper, most remote work is feasible for self-contained tasks, while due to difficulties in performance management it is dependent on high trust relations between managers and workers. Despite social distancing practices, concerns also exist about the negative impact remote work may have on teamworking and workplace innovation. Essential services and much low-wage work is also not amenable to remote work.

Greece, a country that was still bearing the brunt of its previous economic and debt crisis, entered into these challenging times with an ailing public health system, systemic and high unemployment and a labour market that was still mostly analogue as opposed to digital. While the country used the opportunity of the crisis to forcefully expand the adoption of digital technologies across many parts of its economy and society, it will require huge investment and commitment by government, organisations and individuals so that it is no longer a digitalisation laggard. The analysis in this paper has showed that up to 35-37% of all jobs in the Greek job market have high teleworkability potential.

Greek businesses, in particular smaller-sized ones, will have to embrace the WfH option as a viable and flexible option for its workforce, should they wish to remain competitive and to facilitate social distancing norms. And yet it is for such firms that the benefits of remote work may not materialise. In order to manifest into higher productivity gains, WfH requires significant investment into a higher-skilled workforce and substantial efforts to stimulate an innovation culture that supersedes the confines of physical workspaces.

Moreover, the paper draws attention to the fact that a supportive policy and regulatory environment is needed to facilitate the take-up of WfH in Greece. Such policy actions must provide stronger child care facilities and financial support to

households with children, especially females employees with young children, and to those providing essential services in times of a pandemic. Striking a better work-life balance, especially for females, is also necessary to avoid stress-related negative outcomes of working atypical hours from home. Moreover, reversing the limited take-up of remote work by younger individuals and those in early career stages will require elevated trust in industrial relations in the Greek job market.

At a time where continued adherence to social distancing practices may be required over the medium-term period, extending the option to WfH for employees most likely to be affected by the consequences of Covid-19 will be key for mitigating the continued adverse consequences of the pandemic for Greece.

References

Adams-Prassl, A.; Boneva, T.; Golin, M.; Rauh, C. (2020). *Inequality in the impact of the coronavirus shock: evidence from real time surveys*. IZA DP No 13183.

Alipour, J-V, Falck, O. and Schuller, S. (2020). 'Germany's capacities to work from home', *IZA Discussion paper series*, No. 13152.

Allison, P.D. (1999). 'Comparing Logit and Probit Coefficients Across Groups'. *Sociological Methods & Research*, *28*(2), 186–208.

Autor, D. H. (2013). 'The "task approach" to labor markets: an overview.' *Journal for Labour Market Research* 46(3): 185-199.

Autor, D. H. and Handel, M. J. (2013). 'Putting Tasks to the Test: Human Capital, Job Tasks, and Wages.' *Journal of Labor Economics* 31(S1): S59-S96.

Baert, S.; Lippens, L.; Moens, E.; Sterkens, P.; Weytjens, J. (2020). 'The Covid-19 crisis and telework: A research survey on experiences, expectations and hopes', IZA discussion paper; No 13229.

Bloom, N., Liang, J., Roberts, J. and Jenny Ying, Z. (2015). 'Does working from home work? Evidence from a Chinese experiment', *The Quarterly Journal of Economics*, 130(1), pp. 165-218.

Boeri, T., Caiumi, A. and Paccagnella, M. (2020), 'Work versus safety', *Covid Economics: Vetted and real-time papers*, No. 2, 8 April.

Brynjolfsson, E., Horton, J. and Yi Tu Ye, H. (2020), 'Covid-19 and remote work: An early look at US Data', MIT working paper.

Cappelli, P. (2020). 'Why we won't keep working from home', Human Resource Executive, available at: https://hrexecutive.com/cappelli-why-we-wont-keeping-working-from-home/

Cedefop (2015). *Skills, qualifications and jobs in the EU: the making of a perfect match? Evidence from Cedefop's European skills and jobs survey*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 103.

http://www.cedefop.europa.eu/en/publications-and-resources/publications/3072

Cedefop (2016). *The great divide: digitalisation and digital skill gaps in the EU workforce*. #ESJsurvey insights; No 9. Thessaloniki: Cedefop. https://www.cedefop.europa.eu/files/esj_insight_9_digital_skills_final.pdf

Cedefop (2018). *Insights into skill shortages and skill mismatch: learning from Cedefop's European skills and jobs survey*. Luxembourg: Publications Office of the European Union. Cedefop reference series; No 106. http://www.cedefop.europa.eu/en/publications-and-resources/publications/3075

Christopoulou, R. and R. Monastiriotis (2016). 'Public-private wage duality during the Greek crisis.' *Oxford Economic Papers*, 68**(**1), pp. 174-196.

Delaporte, I. and Pena, W. (2020), 'Who can work at home?', *Covid Economics: Vetted and real-time papers*, No. 14, 6 May.

Demoussis, M. and Giannakopoulos, N. (2004). 'Facets of the digital divide in Europe: Determination and extent of internet use', *Economics of Innovation and New Technology*, 15(3), pp. 235-246.

Dingel, J.; Neiman, B. (2020). *How many jobs can be done at home? Covid Economics: Vetted and real-time papers*. No 1, pp. 16-24.

Economou, C. et al. (2014). *The impact of the financial crisis on the health system and health in Greece*, European Observatory on Health Systems and Policies and World Health Organisation.

Eurofound (2016). *What do European do at work? A task-based analysis: European jobs monitor 2016*, Luxembourg: Publications Office of the European Union

Eurofound (2020). *Telework and ICT-based mobile work: flexible working in the digital age*. New forms of employment series. Luxembourg: Publications Office of the European Union.

Eurofound and the International Labour Office (2017), *Working anytime, anywhere: The effects on the world of work*, Publications Office of the European Union, Luxembourg, and the International Labour Office, Geneva.

European Commission (2019). *The Digital Economy and Society Index (DESI): 2019 Country Report Greece*, available at: https://ec.europa.eu/digital-single-market/en/scoreboard/greece

Eurostat (2020). 'How usual is it to work from home', available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20200424-1

Fadinger, H. and Schymik, J. (2020), 'Working at home in Germany', *Covid Economics: Vetted and real-time papers*, No. 9, 24 April.

Felstead, A. and Henseke, G. (2020). 'Assessing the growth of remote working and its consequences for effort, well-being and work-life balance', *New Technology, Work and Employment*, Vol. 32, No. 3, pp. 195-212.

Fernandez-Macias, E. and Bisello, M. (2016). *A framework for measuring tasks across occupations*, https://voxeu.org/article/framework-measuring-tasks-across-occupations

Fernandez-Macias, E. and Bisello, M. (2020). *A Taxonomy of Tasks for Assessing the Impact of New technologies on Work*, JRC Working Paper series on Labour, Education and Technology, 2020/04, Seville: European Commission.

Gottlieb, C., Grobovsek, J. and Poschke, M. (2020). 'Who can work at home around the world?', *Covid Economics: Vetted and real-time papers*, No. 8, 22 April.

Handel, M.J. (2016). 'What do people do at work?'. *Journal of Labour Market Research, Vol.* 49**,** pp. 177–197.

Hatayama, M., Viollaz, M. and Winkler, H. (2020). 'Work from home: which jobs?', *Covid Economics: Vetted and real-time papers*, No. 19, 18 May.

ILO (2020a). *ILO monitor: Covid-19 and the world of work. Second edition.* https://www.ilo.org/global/about-the-ilo/WCMS_740877/lang--en/index.htm

ILO (2020b). 'Working from home: estimating the worldwide potential', *ILO Policy brief*, April.

IOBE (Foundation for Economic and Industrial Research) (2018). *Measuring the economic impact of digital skills in Greece: challenges ahead*, October (in Greek).

Irlacher, M. and Koch, M. (2020). 'Working from home, wages and regional inequality in the light of Covid-19', CESifo Working paper, No. 8232, Centre for Economic Studies and Ifo Institute (CESifo), Munich.

Kotsakis, G.A. (2018). 'The burden of disease in Greece, health loss, risk factors and health financing, 2000-16: an analysis of the Global Burden of Disease Study 2016, *Lancet Public Health*, Vol. 3, e395-406.

Kyriopoulos, I., Nikoloski, Z. and Mossialos, E. (2019). 'The impact of the Greek economic adjustment programme on household health expenditure', *Social Science and Medicine,* Vol. 222, pp. 274-284.

Lintzeris, P. (2020). 'Technological change, digitisation, work and skills', Research papers IME-GSEVEE 14/2020, Athens: IME GSEVEE, 44 (in Greek).

Martins, P. (2020). 'O Potencial de Teletrabalho em Portugal', in observador.pt (in Portuguese).

Monteiro, N.P., Straume, O.R. and Valente, M. (2019). 'Does remote work improve or impair firm labour productivity? Longitudinal evidence from Portugal', working paper, Department of Economics/NIPE, University of Minho.

OECD (2016). *Greece – Country note – Skills Matter: Further results from the Survey of Adult Skills*, available at: https://www.oecd.org/skills/piaac/Skills-Matter-Greece.pdf

Paidousi, C. (2020). 'Digital transformation: mind the digital gap', National Institute of Labour and Human Resources (NILHR) (in Greek).

Pouliakas, K. (2017). 'Multiple-job holding: Career pathway or dire straits?*'. IZA World of Labour,* Vol. 356.

Pouliakas, K. and Russo, G. (2015). 'Heterogeneity of skill needs and job complexity: Evidence from the OECD PIAAC survey', IZA Discussion paper series, No. 9392.

Pouliakas, K; Branka, J (2020). *EU jobs at highest risk of Covid-19 social distancing: Is the pandemic exacerbating the labour market divide?*. Luxembourg: Publications Office of the European Union. Cedefop working paper; No 1 and IZA Discussion paper No. 13281.

Redmond, P.; McGuinness, S. (2020). *Who can work from home in Ireland,* Dublin: Economic and Social Research Institute (ESRI) working paper.

Russo, G. (2017), 'Job Design and Skill Development in the Workplace', *Skill Mismatch in Labor Markets* (*Research in Labor Economics, Vol. 45*), Emerald Publishing Limited, pp. 409-445.

Saltiel, F. (2020). 'Home working in developing countries', *Covid Economics: Vetted and real-time papers*, No. 6, 17 April.

SEV (Greek confederation of businesses and industry) (2020a). 'Employment after coronavirus: Six messages from Ergani and 5 recommendations', *Flash report: employment and labour market*, Vol. 22, 4 May (in Greek).

SEV (Greek confederation of businesses and industry) (2020b). 'Which are digital skills and how are they connected to occupations?', *Special report: occupations and digital skills*, 11 May (in Greek).

Song, Y. and Gao, J. (2020). 'Does telework stress employees out? A study on working at home and subjective well-being for wage/salary workers', IZA Discussion Paper series, No. 11993.

Sostero, M., Milasi, S., Bisello, M., Hurley, J., Fernández-Macías, E. (2020). *Teleworkability in Europe: what jobs can be done from home*?, Eurofound-JRC Working Paper.

Yasenov. V. (2020). 'Who can work from home?', IZA Discussion Paper series, No. 13197.

Annex 1.

Descriptive statistics

Table A1.1 **Sample summary statistics**

	Mean	s.d.	Min	Max
WfH	0.039	0.193	0	1
WfH never	0.961	0.193	0	1
WfH occasionally	0.022	0.148	0	1
WfH usually	0.016	0.127	0	1
Male	0.559	0.496	0	1
Non-native	0.104	0.305	0	1
Married	0.629	0.483	0	1
Age group				
15-24	0.057	0.232	0	1
25-34	0.251	0.434	0	1
35-44	0.314	0.464	0	1
45-54	0.272	0.445	0	1
55-64	0.106	0.308	0	1
Highest education attainment				
Low	0.240	0.427	0	1
Medium	0.415	0.493	0	1
High	0.345	0.475	0	1
Child < 15				
0	0.644	0.479	0	1
1	0.190	0.392	0	1
2	0.140	0.347	0	1
3	0.026	0.160	0	1
Years of tenure	10.59 0	9.225	0	48
Usual weekly hours	39.03 1	9.236	0.5	80
Atypical hours (Cronbach alpha; z-scored)	0.000	1.000	- 0.89075	1.98994 3
Part time	0.079	0.270	0	1
Temporary	0.122	0.327	0	1
Supervisory duties	0.114	0.317	0	1
Multiple jobs	0.018	0.132	0	1
Continuing learning activities	0.042	0.200	0	1
Labour market status before job				
Employed	0.943	0.232	0	1
Unemployed	0.042	0.201	0	1
Student	0.009	0.097	0	1
Inactive	0.006	0.075	0	1
Size of local unit				
1-10	0.354	0.478	0	1

10-19	0.149	0.356	0	1
20-49	0.118	0.322	0	1
50+	0.182	0.386	0	1
DK: <11	0.074	0.262	0	1
DK: >10	0.123	0.329	0	1
Economic activity of local unit				
Agriculture, forestry & fishing	0.025	0.155	0	1
Manufacturing (including mining)	0.125	0.330	0	1
Electricity, gas & steam	0.012	0.107	0	1
Water supply & sewerage	0.011	0.105	0	1
Construction	0.061	0.240	0	1
Wholesale and retail trade	0.152	0.359	0	1
Transportation & storage	0.049	0.215	0	1
Accommodation & food storage	0.078	0.268	0	1
ICT	0.023	0.149	0	1
Financial & insurance & real estate	0.031	0.174	0	1
Professional scientific & technical	0.031	0.173	0	1
Administrative & support service	0.023	0.151	0	1
Public administration & defence	0.140	0.347	0	1
Education	0.115	0.319	0	1
Human health & social work.	0.075	0.263	0	1
Arts, entertainment	0.013	0.115	0	1
Other service activities	0.037	0.189	0	1
Occupation				
Managers	0.016	0.126	0	1
Professionals	0.194	0.395	0	1
Technicians and associate professionals	0.103	0.304	0	1
Clerical Support Workers	0.152	0.359	0	1
Service and sales Workers	0.208	0.406	0	1
Skilled agricultural, forestry and fishing workers	0.009	0.096	0	1
Craft and related trades	0.119	0.324	0	1
Plant and machine operators and Assemblers	0.083	0.276	0	1
Elementary	0.116	0.320	0	1
Region				
East Macedonia, Thrace	0.063	0.242	0	1
Central Macedonia	0.154	0.361	0	1
West Macedonia	0.028	0.164	0	1
Thessaly	0.052	0.223	0	1
Epirus	0.057	0.231	0	1
Ionian islands	0.021	0.145	0	1
Western Greece	0.053	0.224	0	1
Peloponnese	0.057	0.232	0	1
North Aegean	0.022	0.146	0	1
South Aegean	0.028	0.164	0	1
Mainland Greece	0.056	0.231	0	1
Attica	0.332	0.471	0	1

Crete	0.078	0.268	0	1
Degree of urbanisation				
Towns/suburbs	0.247	0.431	0	1
rural	0.316	0.465	0	1
cities	0.437	.4960396	0	1
Income				
Monthly take-home income deciles	5.271	2.604	1	10
Monthly take-home salary	1114.6	581.1	200	2500

Annex 2.

Decomposition analysis

As is customary, the total difference in the incidence of remote work between the two groups is decomposed in the conventional Oaxaca manner, following estimation of equation (2) separately for the Greek and other European worker samples, as follows:

$$\bar{H}_G - \bar{H}_E = (\bar{X}_G - \bar{X}_E)\hat{\beta}_G + (\hat{\beta}_G - \hat{\beta}_E)\bar{X}_E \qquad [4]$$

where the first part of the equation ('explained' or 'endowment' part) reflects the component of the average difference in remote work between the two groups attributed to differences in the means of the explanatory variables (namely, *X = t, d, j, r, T*), which are in turn weighed by the estimated coefficients $\hat{\beta}$ following estimation of equation (2) for the Greek sample only. It measures the relative importance of observable differences in job tasks and other individual and job characteristics between the two sets of workers.

The second term (i.e. the 'unexplained' part) refers to the part of the gap in remote working that arises because of the differential manner with which different employee characteristics contribute to the probability of WfH. In this respect, it provides an indication of the extent to which the Greek and other European labour markets impose constraints on the ability of workers to engage in remote work given their observable characteristics. The latter may arise either because of discriminatory practices in the job market, or differences in work organisation and other institutional factors. Of particular interest for the purposes of this study is the extent to which the Greek and non-Greek samples deviate in terms of their measured task content of their jobs.

What Table A2 reveals is that the observed difference in the incidence of remote work between Greeks and other European workers can be attributed predominantly to their difference in the way their observed characteristics facilitate a higher probability of WfH. By contrast, it is found that the difference in endowments between the two groups accounts for a relatively small proportion of their difference in shares engaging in remote work. Significant deviations in endowments between Greeks and other European workers are only observed in the variables part-time, atypical hours and accommodation and food service (industry), which are characterised by a higher incidence in the Greek sample, while in other European labour markets remote workers are more likely to have supervisory responsibilities, be employed in micro-sized firms (1-10 employees) and belong to non-professional occupational groups.

Table A2.1: **Decomposition analysis of WfH differences between Greek and other European employees, 2018**

Raw differential (R) {E+C+U}:	-59.5
Amount attributable:	-84.7
- due to endowments (E):	-3.0
- due to coefficients (C):	-81.7
Shift coefficient (U):	25.2
Adjusted differential (D) {C+U}:	-56.5
Endowments as % total (E/R):	5.1
Unexplained as % total (D/R):	94.9

NB: Based on Oaxaca-Blinder decomposition of the WfH incidence between Greeks and other European workers; separate probit regressions are first run for each group with WfH as dependent variable on the full set of controls as in Table 2. Dummies variables have been transformed to reflect deviations from the 'grand mean'.
Source: EULFS

Annex 3.

Classification of "essential" occupations

To classify the jobs of Greek employees according to whether they involve the provision of 'essential' services during a pandemic, the following detailed occupational and industrial codes have been used:

Table A3.1: **Classification scheme for identifying essential jobs**

ISCO08 3-digit code	**Occupational group**	**NACE Rev.2 2-digit code**	**Economic activity**
221	Medical doctors	Q	Human health & social work
222	Nursing and Midwifery Professionals	Q	Human health & social work
315	Ship and Aircraft Controllers and Technicians	Q	
321	Medical and Pharmaceutical Technicians	Q	Human health & social work
322	Nursing and Midwifery Associate Professionals	Q	Human health & social work
522	*Shop salespersons*	*G*	*Wholesale & retail trade*
523	*Cashiers and Ticket Clerks*	*G*	*Wholesale & retail trade*
524	*Other Sales Workers*	*G*	*Wholesale & retail trade*
532	Personal Care Workers in Health Services		
541	Protective Services Workers	O, N, Q	Public administration & defence; Administrative & support services; Human health & social work
611	Market Gardeners and Crop Growers		
612	Animal Producers		
613	Mixed Crop and Animal Producers		
622	Fishery Workers, Hunters and Trappers		
751	Food Processing and Related Trades Workers		
816	Food and Related Products Machine Operators		

831	Locomotive Engine Drivers and Related Workers		
832	Car, Van and Motorcycle Drivers		
833	Heavy Truck and Bus Drivers		
911	Domestic, Hotel and Office Cleaners and Helpers		
921	Agricultural, Forestry and Fishing Labourers		
933	Transport and Storage Labourers		
941	Food Preparation Assistants		
961	Refuse Workers		
0	Armed Forces		

Annex 4.

Teleworkable occupations in Greece and "lost potential"

Table A4.1 **Distribution of Greek employees across occupations with full or high "WfH technical feasibility" and low incidence of "actual WfH"**

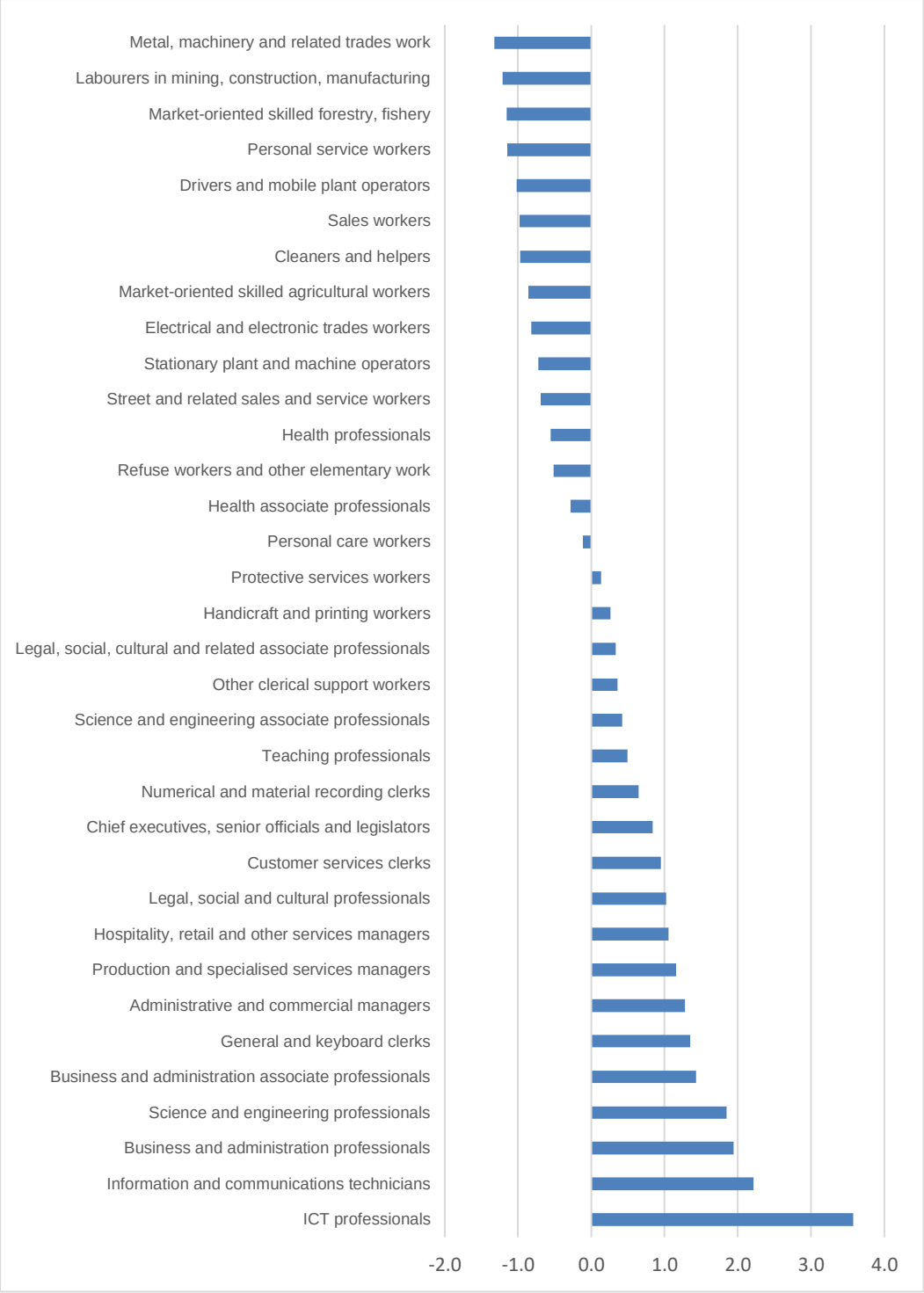
Occupation	*Freq*	*Percent*
General Office Clerks	170.5378	20.37
Primary School and Early Childhood Teachers[(h)]	65.83671	7.86
Secondary Education Teachers	57.47853	6.87
Finance Professionals	51.47156	6.15
Client Information Workers	51.33367	6.13
Financial and Mathematical Associate Professionals	40.99653	4.9
Secretaries (general)	37.92226	4.53
Administrative and Specialized Secretaries	34.4462	4.11
Other Teaching Professionals[(h)]	31.87285	3.81
Tellers, Money Collectors and Related Clerks[(h)]	31.50897	3.76
Social and Religious Professionals[(h)]	26.59	3.18
Numerical Clerks	26.56789	3.17
Other Clerical Support Workers[(h)]	22.22941	2.66
Software and Applications Developers and analysts	19.9796	2.39
ICT Operations and User Support Technicians[(h)]	19.16059	2.29
Administration Professionals[(h)]	16.13869	1.93
Sales, Marketing and Public Relations Professionals	13.11113	1.57
Government regulatory associate professionals[(h)]	12.24364	1.46
Other Health Professionals[(h)]	11.61799	1.39
Legal Professionals	10.66305	1.27
Sales and Purchasing Agents and Brokers	10.14796	1.21
Professional Services Managers	8.62549	1.03
University and Higher Education Teachers[(h)]	8.19005	0.98
Authors, Journalists and Linguists	7.633077	0.91
Vocational Education Teachers	6.9227	0.83
Travel Attendants, Conductors and Guides[(h)]	6.81191	0.81
Business Services and Administration Managers	6.258123	0.75
Keyboard Operators	5.586323	0.67
Sales, Marketing and Development Managers	5.20207	0.62
Legal, Social and Religious Associate Professionals	3.737652	0.45
Hotel and Restaurant Managers[(h)]	2.966725	0.35
Mathematicians, Actuaries and Statisticians	2.492598	0.3

Other Services Managers[(h)]	2.02696	0.24
Managing Directors and Chief Executives	1.809725	0.22
Business Services Agents	1.822695	0.22
Life Science Technicians and Related Associate Professionals[(h)]	1.7101	0.2
Librarians, Archivists and Curators	1.265247	0.15
Legislators and Senior Officials	0.9715	0.12
Database and Network Professionals	0.876185	0.1
ICT Professionals	0.495845	0.06
Total	837.26	100

NB: Table includes, in order of prevalence, the list of 3-digit occupational groups identified as "teleworkable" but with a high share of workers who do not WfH. [(h)] indicates occupations with high teleworkability, the remaining are fully teleworkable.

Source: Greek Labour Force Survey; Sostero et al. (2020)

Figure A4.1 **Teleworkability of occupations, Greece**



NB: Based on a WfH amenability index as derived by Hatayama et al. (2020), namely combination of groups of job tasks (physical and manual, face to face, low ICT use at work, low ICT at home) within detailed occupational groups. Higher values indicate a greater amenability of jobs to WfH. Caution is needed as some mean WfH index values are based on very small samples.

Source: Author's own analysis using Greek sample of PIAAC data (2014/15), N = 1467 employees aged 16-65.

Annex 5.

Additional empirical output

Table A5.1 **Share of Greek employees WfH (occasionally or usually), 2008-2018**

	Never	Occasionally	Usually	WfH	N
Total	96.14%	2.23%	1.63%	3.86%	582,592
Native status					
Non-native	96.62%	1.90%	1.48%	3.38%	216,327
Native	95.85%	2.43%	1.72%	4.15%	366,265
Marital status					
Married	96.62%	1.90%	1.48%	3.38%	216,327
Non-married	95.85%	2.43%	1.72%	4.15%	366,265
Children<15					
0	96.23%	2.15%	1.61%	3.77%	374,977
1	95.96%	2.38%	1.66%	4.04%	110,669
2	96.11%	2.31%	1.59%	3.89%	81,649
3	95.31%	2.76%	1.94%	4.69%	15,297
Labour market status before job					
Employed	96.03%	2.30%	1.67%	3.97%	549,348
Unemployed	98.08%	1.14%	0.78%	1.92%	24,484
Student	97.53%	1.16%	1.31%	2.47%	5,500
Inactive	97.42%	1.14%	1.44%	2.58%	3,260
Part-time job					
Yes	96.97%	1.63%	1.40%	3.03%	46,174
No	96.07%	2.29%	1.65%	3.93%	536,418
Temporary contract					
Yes	97.15%	1.53%	1.32%	2.85%	71,051
No	96.00%	2.33%	1.67%	4.00%	511,540
Supervisory duties					
Yes	93.20%	3.90%	2.90%	6.80%	65,930
No	96.52%	2.02%	1.47%	3.48%	514,275
Weekly hours					
< 25	89.77%	5.91%	4.32%	10.23%	67,832
26-39	92.63%	4.41%	2.96%	7.37%	67,424
>39	97.63%	1.35%	1.02%	2.37%	447,336
Years of tenure					
< 3	97.21%	1.56%	1.22%	2.79%	172,142
3-10	96.57%	2.02%	1.41%	3.43%	168,654
10-17	95.73%	2.51%	1.75%	4.27%	106,899
>17	94.55%	3.14%	2.31%	5.45%	134,897
Economic activity of local unit					
Agriculture, forestry & fishing	99.39%	0.43%	0.18%	0.61%	14,349
Mining	98.72%	0.81%	0.46%	1.28%	3,449
Manufacturing	98.65%	0.86%	0.49%	1.35%	69,207
Electricity, gas & steam	98.36%	1.05%	0.59%	1.64%	6,786
Water supply & sewerage	99.00%	0.56%	0.45%	1.00%	6,479

Construction	99.13%	0.54%	0.34%	0.87%	35,675
Wholesale & retail trade	98.86%	0.63%	0.51%	1.14%	88,584
Transportation & storage	98.29%	1.07%	0.63%	1.71%	28,293
Accommodation & food storage	98.84%	0.69%	0.46%	1.16%	45,511
ICT	94.14%	3.86%	2.01%	5.86%	13,164
Financial & insurance	97.51%	1.77%	0.71%	2.49%	17,939
Real estate	97.72%	2.28%	0.00%	2.28%	307
Professional scientific & technical	93.71%	4.49%	1.80%	6.29%	18,032
Administrative & support service	98.11%	1.46%	0.43%	1.89%	13,661
Public administration & defence	97.61%	1.36%	1.04%	2.39%	81,304
Education	81.75%	10.41%	7.84%	18.25%	66,838
Human health & social work	97.98%	1.46%	0.57%	2.02%	43,535
Arts and entertainment	97.78%	1.34%	0.88%	2.22%	7,758
Other service activities	97.47%	1.45%	1.08%	2.53%	9,514
Activities as households	92.72%	0.56%	6.72%	7.28%	11,880
Degree of urbanisation					
Cities	95.67%	2.35%	1.98%	4.33%	254,703
Towns/suburbs	96.05%	2.42%	1.53%	3.95%	143,775
Rural	96.86%	1.93%	1.21%	3.14%	184,114
Income decile					
1	97.73%	1.07%	1.20%	2.27%	32,946
2	98.09%	0.93%	0.98%	1.91%	45,912
3	97.99%	1.06%	0.95%	2.01%	51,117
4	98.02%	1.01%	0.97%	1.98%	46,272
5	97.47%	1.55%	0.99%	2.53%	47,746
6	96.53%	2.03%	1.44%	3.47%	51,421
7	95.10%	2.97%	1.93%	4.90%	58,390
8	93.56%	4.00%	2.44%	6.44%	44,548
9	92.94%	4.01%	3.05%	7.06%	23,889
10	90.83%	4.67%	4.49%	9.17%	27,416

Source: Greek Labour Force Survey

Table A5.2. **Wages and WfH, ordered probit regression, marginal effects**

Income deciles	dy/dx	Std. Err	z	P>z	[95% Conf. Interval]

1	-0.022036	0.001026	-21.47	0.00	-0.024048	-0.020024
2	-0.016478	0.000769	-21.42	0.00	-0.017986	-0.01497
3	-0.01156	0.00054	-21.41	0.00	-0.012618	-0.010502
4	-0.00554	0.000259	-21.37	0.00	-0.006048	-0.005032
5	-0.001059	5.44E-05	-19.47	0.00	-0.001165	-0.000952
6	0.004075	0.000193	21.16	0.00	0.0036977	0.004453
7	0.011215	0.000524	21.42	0.00	0.0101887	0.012242
8	0.013491	0.000629	21.46	0.00	0.0122591	0.014723
9	0.009507	0.000444	21.43	0.00	0.0086376	0.010377
10	0.018384	0.000858	21.43	0.00	0.0167025	0.020065

NB: Marginal predictions of ordered probit regression outcomes based on delta-method.
Source: Greek Labour Force Survey

Table A5.3 **Wages and WFH, OLS estimates, Greece, 2009-2018**

	(1) *Mincer spec*	(2) *Full spec*	(3) *WfH occasionally*	(4) *WfH usually*	(5) *3-digit ISCO*	(6) *Job tasks*
WfH	0.07***	0.03***	…	…	0.06***	0.07***
	(0.004)	(0.003)			(0.004)	(0.013)
WfH occasionally			0.08***			
			(0.005)			
WfH usually				0.05***		
				(0.006)		
Male	0.24***	0.12***	0.24***	0.24***	0.15***	0.19***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.006)
Age: 25-34	0.19***	0.08***	0.19***	0.19***	0.19***	0.16***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.018)
Age: 35-44	0.29***	0.14***	0.29***	0.29***	0.29***	0.30***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.018)
Age: 45-54	0.30***	0.18***	0.30***	0.30***	0.32***	0.33***
	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.018)
Age: 55-64	0.28***	0.18***	0.28***	0.28***	0.31***	0.33***
(ref: 15-24)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.020)
Education: Medium	0.17***	0.06***	0.17***	0.17***	0.08***	0.13***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.009)
Education: High	0.46***	0.16***	0.46***	0.47***	0.21***	0.30***
(ref: Low)	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.011)
Continuing learning	-0.01***	0.00	-0.01**	-0.01**	-0.05***	-0.09***

activities						
	(0.004)	(0.003)	(0.004)	(0.004)	(0.005)	(0.016)
Years of tenure	0.04***	0.02***	0.04***	0.04***	0.04***	0.04***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Years of tenure squared	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Non-native		-0.09***				
		(0.003)				
Married		0.05***				
		(0.002)				
Child15: 1		0.02***				
		(0.002)				
Child15: 2		0.04***				
		(0.002)				
Child15: 3		0.05***				
(ref: 0)		(0.004)				
Multiple jobs		0.02***				
		(0.006)				
Last status: unemployed		-0.11***				
		(0.004)				
Last status: student		-0.19***				
		(0.009)				
Last status: inactive		-0.10***				
(ref: employed)		(0.010)				
Part-time job		-0.75***				
		(0.004)				
Temporary		-0.07***				
		(0.003)				
Supervisor		0.16***				
		(0.002)				
Firm size: 11-19		0.07***				
		(0.002)				
Firm size: 20-49		0.11***				
		(0.002)				
Firm size: >50		0.17***				
		(0.002)				
Firm size: DK<11		0.02***				
		(0.003)				
Firm size: DK>10		0.09***				
(ref: 1-9)		(0.002)				
Usual weekly hours		0.01***				
		(0.000)				
Atypical hours		0.02***				
		(0.001)				
Urban: towns		-0.02***				
		(0.002)				
Urban: rural		-0.01***				

		(0.002)				
Physical tasks						-0.23***
						(0.056)
Intellectual tasks						0.89***
						(0.081)
Social tasks						-0.03
						(0.057)
Methods: autonomy						-0.72***
						(0.042)
Methods: teamwork						0.21***
						(0.019)
Methods: routine						-0.18***
						(0.030)
Tools: machines						0.58***
						(0.042)
Tools: ICT						0.69***
						(0.039)
2010	-0.01***	-0.00**	-0.01***	-0.02***	…	
	(0.002)	(0.002)	(0.002)	(0.002)		
2011	-0.06***	-0.04***	-0.06***	-0.06***	…	
	(0.003)	(0.002)	(0.003)	(0.003)		
2012	-0.18***	-0.15***	-0.18***	-0.18***	-0.12***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2013	-0.30***	-0.26***	-0.30***	-0.30***	-0.24***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2014	-0.30***	-0.24***	-0.30***	-0.30***	-0.23***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2015	-0.09***	-0.03***	-0.09***	-0.09***	-0.02***	x
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2016	-0.12***	-0.06***	-0.12***	-0.12***	-0.05***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2017	-0.13***	-0.07***	-0.13***	-0.13***	-0.06***	
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
2018	-0.13***	-0.08***	-0.13***	-0.13***	-0.06***	
(ref: 2009)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	
Industry controls		x				
Occupation controls						
- 1-digit -		x				
- 3-digit -					x	
Regional controls		x				
Constant	6.03***	6.20***	6.03***	6.03***	6.51***	5.74***
	(0.005)	(0.010)	(0.005)	(0.005)	(0.009)	(0.041)
Observations	429,656	417,043	429,656	429,656	309,776	37,527
R-squared	0.35	0.62	0.35	0.35	0.44	0.40

NB: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1; The dependent variable is a continuous measure of log monthly take-home pay derived by using the median values of the income deciles available in the survey.

Source: Greek Labour Force Survey

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