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**THE EFFECTS OF COVID-19 ON THE
LABOUR MARKET**

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ABSTRACT

COVID-19 completely changed the way we live in a matter of months and drastically changed the economic landscape, increasing unemployment and changing the way people are required to work, implementing new technologies to maintain a safe working environment.

This research tries to list how deep the change has been for the western world, also analysing how these new solutions affect the workers and the labour market, we will try to understand from a mathematical standpoint the effects of the pandemic itself and the solutions put in place to limit the spread of the virus.

In conclusion, the most frequent solutions, namely: remote working, momentary furlough plans and part-time schemes, are the most efficient ways to retain workers, because they reduce the disutility obtained by the worker that is generated by the new means introduced in order to limit the virus from spreading, such as social distancing, the obligation to wear a facemask at all times and to constantly keep the workplace clean and disinfected.

ABSTRACT

Il COVID-19 ha completamente cambiato il modo in cui viviamo nel giro di pochi mesi e ha stravolto lo scenario economico, facendo aumentare la disoccupazione e cambiando il modo in cui le persone devono portare a termine il loro lavoro, portando all'implementazione di nuove tecnologie per mantenere un posto di lavoro sicuro dai contagi.

Questa ricerca elenca quanto profondamente il virus ha cambiato la vita nel mondo occidentale, analizzando anche come le soluzioni per prevenire il diffondersi del virus abbiano impattato i lavoratori ed il mercato del lavoro, cercheremo di capire quali effetti ha generato sia il virus stesso che le soluzioni scelte per ridurre il contagio da un punto di vista matematico.

In conclusione, le soluzioni scelte per mantenere bassa la disoccupazione sono state adeguate, precisamente il lavoro da casa, la riduzione degli orari di lavoro e i contratti part-time, in quanto hanno ridotto la disutilità creata dai nuovi obblighi per il contenimento del virus, quali il mantenimento del distanziamento sociale, l'obbligo di indossare la mascherina e di mantenere un posto di lavoro costantemente pulito e disinfettato.

INTRODUCTION

COVID-19 is a newfound virus that has started spreading worldwide in early January 2020, reaping victims throughout its path without leaving much time for the infected to react and look for medications after the symptoms were discovered. Intensive Cares in every hospital of any country has rapidly filled with diseased while doctors knew very little about the virus itself and how to cure it, scaring the population and forcing Governments to take extreme measures, at first by cutting communications and transports from known infected countries, imposing the obligation of wearing a facemask in public and confined places, up to imposing lockdowns and curfews depending on the severity of the situation. The virus started spreading from China, then Italy had cases quite early, followed by many European countries and finally it reached even the United States of America, quickly becoming the most hit country worldwide.

Between lockdowns, mandatory closure and general fear of going out in crowded places, economy suffered greatly during this period, and with it, the working people who found themselves without either any work to do or just unemployed because of the firm downsizing or more simply going bankrupt.

In this dissertation we will analyse contemporary literature on how COVID-19 impacted firms and how they reacted to keep up their business. At first, we'll list the variations in employment suffered by Italy, several European countries and USA, how these disrupted positions are spread between genders and races and what are the main policies implemented by each Government, so that they can manage to retain job positions without exposing workers to any unnecessary risks, balancing precautions with social needs of their population. The most common solutions have been the implementation of remote working and the reduction of working time with mandatory furlough for certain positions.

On the next chapter we will analyse such policies from a mathematical point of view, trying to understand what they mean for the involved subjects and how the virus changed the way they lead their jobs: starting from the workers themselves, how the utility earned from working changed after the new situation, how their preferences shifted and how the new solutions compensated for the change; we will then look at the situation from the employers' point of view, what they can and cannot do about the employment level when they have to downsize, the kind of contracts that they offer to their employees and how Government's support helps in that regard; going on we will look at how product lines can implement new products completely outside the mission of the firm or for a drastically different segment, how they can invest so that their workers feel motivated and what actions are more efficient to do so, digging into the importance of good leadership.

Finally, we will look at the future: what we can expect for the next part of living with the pandemic and how it will leave the world after it's over, what jobs will become redundant and which ones will be prolific, also considering all the new skills acquired during the lockdowns (such as the use of remote working, that is believed to stay for the long-term) and what new jobs will come up with the adoption of always new technologies. As a matter of fact, COVID pushed towards a reshaping of the labour market that was expected to come, anticipating the need of reskilling and upskilling the current working population.

Wrapping it up, we'll focus on the future of tourism, a frozen sector that need desperately to start again, what is its possible future and how it can be reached; and how the new unemployed can start a new business, becoming self-employed, why it's better and more motivating for entrepreneurs and why it's crucial for every country, mainly since it's the form of employment for the most part of the population.

1. LITERATURE REVIEW

The literature about employment and the best way to either acquire or use human resources is pretty much unlimited. For the purpose of this dissertation we will focus only on writings that analyse how the virus COVID-19 affected people's life from a working perspective, alongside how firms (more specifically managers) had to adapt and evolve their productive structures after the outbreak. Most of the data acquired about employment, unemployment rates, working hours, and GDP (aggregate information at a country level) are taken directly from ISTAT, EUROSTAT and BLS (Bureau of Labor Statistics), respectively for data concerning Italy, Europe, and United States of America, alongside some of the main news websites such as ANSA, the BBC and studies from the McKinsey institute. Furthermore, there are deeper studies about employment and job posting variations conducted by Groshen (2020) analysing the impact of COVID-19 on U.S. labour market through mid-September 2020, through data published by the Bureau of Labor Statistics (BLS), more specifically pay rolls, unemployment, and disparities between genders and races.

Campello et Al. (2020), focus instead on job-vacancy postings in the U.S. market, finding that low tier jobs have been cut more than high tier jobs, cuts and down-skilling are more prominent for smaller enterprises, low income areas, zones with high income inequality, and where unions are stronger than average.

Hensvik et Al. (2020) instead focused on how both unemployment and job postings developed in Sweden, a severely hit country with a strong labour force, whose data are more distant when compared to what other European countries have faced.

Del Boca et Al. (2020) look at unemployment differences between genders in Italy, conducting an interview to more than 800 women and their respective partners (where present), asking about how they reacted and adapted to the coronavirus control policies, more in detail how they changed their working schedules, how they changed house-care chores and whether they spend more time in childcare.

Denny-Brown et Al. (2020) look at how the healthcare department in USA is faring during the pandemic, as it has very high turnover with extremely high levels of shirkers, i.e. workers who do not show up in the place of work, analysing the reasons behind and what led to such behaviour.

Finally, Pouliakas (2020) puts in place a skill-based approach to better understand what are the most affected sectors and professions by the implementation of social distancing in the specific, categorising jobs based on the need of physical proximity, skillsets required, and level of digitalisation, listing what are the most endangered jobs by this new policy.

Going further, we will analyse how the virus affected firms from a managing point of view, using functions and formulas from Staffolani's "dynamic notes on

personnel economics” (2019), applying them on today’s situation in order to understand the outcomes from a mathematical point of view.

Bienkowska et Al. (2020) write about the Organizational Reliability Model (ORM), a prerequisite for sustainability of contemporary organisations, which is constructed on human resources, information technologies, and management. They verified such model’s reliability in the stressful condition created by the COVID-19 pandemic, concluding that it drastically changes in stressful conditions, mainly because the first two factors are heavily influenced by management, so escalations need a flexible upper level personnel, otherwise the whole system’s reliability comes short.

Akolaa et Al. (2020) treats the topic of new forms of commerce, classifying “opportunity products” as those started producing only to face an abnormal demand caused by a non-cyclical crisis, and the introduction of new modernized services to adapt to mandatory lockdowns or forced closure.

A paper from Izzah et Al. (2020) discusses the theme of managing human resources and keeping them motivated to give the best they can offer in the particular instance of a drastic change in how the job is done, adaption of a new regime is immediate in real life (abandoning the office in favour of working from home), so employees need to be followed and listened to in order to not let them scare away, therefore motivation and proper leadership can heavily affect how a

worker performs on the spot, offering useful inputs on how to react to this or any possible crisis, on top of normal management.

Giguari (2020) instead focuses only on leadership, how it can be used to navigate in a constant changing present and an unforeseeable future. In order to find an answer, she interviewed several Georgian employer and HRMs to understand how they faced the pandemic and what they believe they lacked, coming out with the result that a crisis prevention plan must be set in place, workers must be aware of any possible scenario and how to react, so that they waste no time wondering what is going to be of them, reducing any fear of being fired or, if not, having no doubt on what to do in case of complications.

Similarly, Ilie et Al. (2020) investigate which activities and action that management and leaders can and should take to overcome the crisis, so that they can reduce the damage and the amount of disruptions, finding that entrepreneurs act more on instincts instead of following a certain mathematical approach.

Going on, the World Economic Forum wrote a paper collecting a series of interviews done to employers and employee all around the world, merged with general data of each individual country, offers a collection of opinions on how the world's labour market might evolve, what is going to be required and how the pandemic affected the change that was already taking place, which is strongly negatively, but also offers a subtle silver lining, incentivising technological upgrades and forcing firms to implement new processes so that they can achieve

the same (or better) result with not as much effort and labour force, which is going to be redirected towards new positions that implement and supervise such technologies.

2. DISRUPTION OF JOBS IN THE EARLY COVID-19 STAGE

All around the world, the COVID-19 had a significant effect in changing the population's lifestyle, either they are willing or not. Each country had different effect in different times, each one reacted differently, but there are some similarities among them. In this chapter we're going to analyse how it affected the labour market, forcing firms to let go of their employees or stop looking for new ones, what policies each government implemented and whether they have been effective or not.

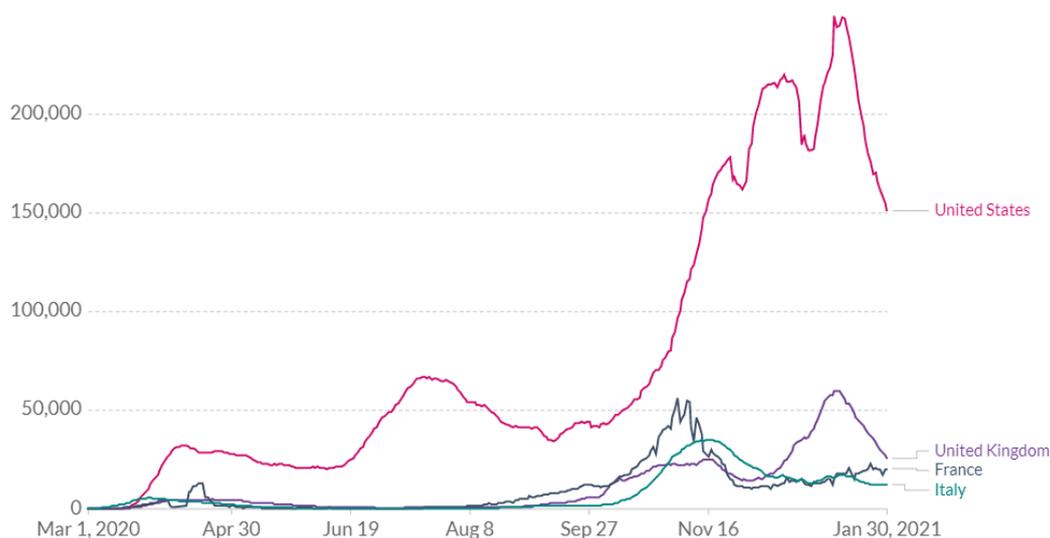


Figure 1: Plot of daily cases throughout some analysed countries

2.1. HOW ITALY IS FACING THE PANDEMIC

Italy has been heavily affected by the virus, being one of the first western countries with evident cases. As of January 2021, there has been more than 2 million cases with a total death toll of 90.000 people. Infections began in early February and most international exchanges were shut down, beginning the economic decline that we are still enduring.

2.1.1. *Unemployment throughout the year*

There wasn't a steep decline in occupation and workforce according to Eurostat: before the outbreak unemployment was at 10% reaching 13.7% in September¹. Most of the job disruptions happened in sectors that need to interface with other people such as tourism, culture, and restoration. Despite the relatively low loss in employment, there has been fewer job propositions and the number of internships started until June is 73% less than before the pandemic, while online job postings decreased of around 33% in March, albeit they promptly recovered by summertime. This diluted effect happened thanks to the implementation of "smart working", where office workers simply keep doing their job from home using internet calls to coordinate, thereby avoiding the risk of going out and being infected. Some other responses were to increase the number of employees but with a part-time contract,

¹ <https://ec.europa.eu/eurostat/web/covid-19/society-work>

allowing workers to make more shifts while keeping the distance required, or hiring security workers to ensure both employees and clients are respecting the social distancing policies and cleaning crew to constantly disinfect the environment, or yet again offering an additional service to avoid having clients come within the company perimeters, such as take out and home delivery from bars and restaurants.

The Government strongly suggest that the population works from home if possible, also to make firms hire they exonerate employers from paying any contribution for the first year. These policies helped several sectors, albeit they banned any form of aggregation and forced bars and restaurants to close or work in extremely harsh conditions (limiting the number of clients or services they can offer).

2.1.2. Different reactions from men and women

It might be worth looking into how differently the two genders reacted to the crisis, either adapting to the change or trying to maintain things as they were. Job disruptions were tendentially more frequent in majorly female populated environments, especially in the aforementioned sectors and in low skilled positions.

Numbers were clearly different between the two: more than 400000 women lost their jobs out of around 650000 disruptions, but 70% of reintegrated personnel were male workers. Considering also that Italy is the country with the lowest rate of female employment in Europe, the numbers represent a severe problem of

productivity and equality in the country. Women not reinstated to their previous position now are mainly reverting to housekeeping, childcare, and following the elderly, basically being deprived of their hard fought and still incomplete equality.

Without considering job disruptions, a team of researchers² interviewed 800 Italian individuals both in 2019 and 2020 asking about their working conditions and what changes in their ordinary life were necessary in order to adapt during the pandemic and the subsequent lockdown. Empirical data shows that just 23% of the women kept going to their usual workplace and 44% decided to work from home (the so-called “smart working”), meanwhile men are 33% and 30% respectively. An interesting statistic they came up with is the amount of time spent doing housework: two women out of three spend more time than before the pandemic and 61% of them spend more time with their children when present, while men doing more housework are 40% and 51% more in childcare. Basically, people spend more time at home with their children and doing home chores, yet women tend to do more so than men. This can be partially justified by schools being shut down, increasing the need to work in their homes but also having the children home for more time, and this is truer the younger the children are. Moreover, the Government implemented a policy allowing parents with children younger than 12 years old to take a 50% paid furlough for a maximum of 30 days which, according to Italian

² Women’s and men’s work, housework and childcare, before and during COVID-19, Del Boca D., Oggero N, Profeta P, Rossi M., 2020

National Social Security (INPS), 76% of the requests came from women. Another policy implemented was the babysitter voucher, granting easy access in case the parents need to work and can't keep looking after the children.

To evaluate the variables associated with the use of smart working, taking into account all relevant factors, Bank of Italy has estimated a linear probability model. In particular they considered differences related to the family unit (macro-area of residence, number of members of the family, type of family unit, distribution by age of children), individual characteristics (gender, age and education, years of experience in current job, professional position, type of contract, distinguishing between temporary and permanent, full and part-time) and the company (sector and size). In general, remote work is more widespread: among women (about 1.5% more than men, column 1), especially among those with children between 6 and 14 years old; among workers with the highest educational qualifications or employed in managerial positions; in the Centre and in the North. The use of smart working also increases with company size and activity in certain sectors, especially related to information and communication.

Some features that determine the likelihood of working remotely increase their impact between 2019 and 2020. In 2019, the agile way of working was most used by workers of large companies and those in top positions, managers, or personnel with at least a degree, while differences due to other characteristics were not significant. In 2020 the differences in educational levels and company size become

more marked; in addition, agile work becomes more common among women (2% more than man), in information and communication sector (by almost 30% more compared to the industry) and financial and insurance activities (by almost 20% more).

In 2020, having children in the family increases the likelihood of working remotely for women: compared to men, the gap is 5% points if the children are between the ages of 6 and 10 and 3 points if the age in between 11 and 14. These results indicate that the measures aimed at parents introduced during the pandemic have had, at least in part, a differentiated impact by gender (del Boca et al. 2020).

In the end, we see people spending more time home than what they did before the virus outbreak, even if not totally balanced gender-wise, these results may have long-term implications, leading couples to spend more time with their families.

2.1.3. Women on the front line: new opportunities

It is important to ask what kind of role women should play in the next economic challenge that Italy is going to face in the middle of the emergency. According to “Istituto Giuseppe Toniolo”, women must be at the frontline, considered as the main tool for a change, unlike what has happened so far. There are enormous risks, but also great opportunities to improve the country and Italian families’ welfare, as long as the supporting pillars of an inefficient organisational model are being reinvented.

There are several possible scenarios, few certainties, but one thing is known for sure: in a world impoverished by the pandemic, social inequalities are destined to grow. Those who were fragile will be more so, those who lived precariously will see their precariousness increase. Women are certainly among the weakest subject in the labour market, but the risks could be bypassed and transformed into opportunities. Let's not forget that Italian women are more educated than men and represent 60% of graduates. Their skills are an opportunity to take into account, unlike what has been done so far even in the management of the COVID-19 emergency, left behind especially in male hands. The recovery will be faster the more we will be able to make use of solid skills transcending gender. Especially in periods of profound rethinking, soft skills, which are a recognised characteristic of women such as time management, organisational skills, and more, will be precious, those transversal skills made of flexibility, adaptability, and ability to interact harmoniously. There is a need to review the old organization and put in place a new one that is more functional not just for the firms' productivity, but also for families. Public and social policies should offer the necessary services required in an advanced economy that enhances the value of women, not dumping on them the whole burden of family management. More nurseries at a sustainable price are needed, more childcare services, mandatory and prolonged leave for fathers who help redistribute such burdens and rebalance the cost of work between genders. Some extraordinary measures discussed in the previous paragraph were put in place

during the pandemic, considering whether they have been helpful to women and, if necessary, support them. Companies have rethought shifts and roles: a valuable organizational reshaping is an opportunity to allow women to work and advance in their careers without all the obstacles that still exist and are evident at the birth of children.

Part of the solution for one concrete gender equality are smart working, flexibility of leave, equal pay, career monitoring. The lockdown due to COVID has penalized everyone, and as usual women are paying a higher price. Female commitment in domestic work was burdensome even before the pandemic (74% of Italian women do not share it with the partner). Now, smart work with closed schools has made it even heavier, since in Italy gender stereotypes assigning family roles and tasks to women are still deeply rooted, in comparison with other countries where they are shared more equally in the couple. There will surely be virtuous men who already take charge in an equal way of family duties, but since the statistics tell us that the majority do not, it is reasonable to set back and look at the family balance in favour of a greater sharing. The greatest risk, that in part has become reality, is that women are affected far more than men in the recessive phase we are facing.

The starting conditions for the Italy pre-COVID were not among the best: the female employment rate was the lowest in Europe (49.5%), with lower wages than men and employed mainly in sectors that are among the least paid and harshly tested

by the coronavirus emergency such as tourism, retail, while there is a little presence in other sectors where managers are better paid like pharmaceuticals, banks, luxury, chemicals and metallurgy. The shortage of women in science and technology, two of the most popular and best paid sectors for the future, is becoming a real emergency, especially now that the coronavirus has shown how connectivity is indispensable. Women are financially weaker than men and this contrasts with the fact that there are more female than men graduate. This economic fragility is highlighted in the Ipsos survey proposed by “Istituto Giuseppe Toniolo”, where a financial gender gap is evident and leads men to hold more current accounts than women. At a time when the future appears uncertain, it is interesting to note how Italians have in general poor financial skills, but with over 63% of women claiming to have never participated in one economic discussion and not having purchased a financial product in the last year. These data make it urgent to strengthen this type of skills in the Italian population, because people’s economic security passes also through a careful choice of financial instruments to rely on for a personal and a familiar planning. Making proper policies to incentivise women employment and a greater gender financial equality is important to encourage the economic recovery and, at the same time, a more sustainable growth.

2.1.4. Introduction of smart working through laws

The policies put in place by the Italian government to fight against the COVID-19 pandemic have led to a strong growth in remote working in Italy. In the first part of 2020 over 14% of non-agricultural private sector workers has been carried out remotely; a year earlier the percentage was less than 1.5%. The increase mainly affected women, the workers of larger companies and sectors whose jobs can be easily carried out remotely, i.e. those of information, communication and financial and insurance activities; the use of work in remote was greater for managerial and clerical figures than for blue-collar workers and was higher for graduates compared to those in possession of a middle school or a lower degree.

Compared to those who have not worked in smart working, on equal terms, the average employee who have benefited from agile work has achieved a higher monthly salary, due to a greater number of working hours (+6%) and a lower use of the redundancy fund. Moreover, the probability of looking for a new job or the perceived risk of losing the current one within the following 6 months were significantly lower.

In Italy, the legislator defines smart working as a method of subordinate work established by agreement between parties, without precise constraints of time or

place of work, within maximum duration limits of daily and working hours deriving from the law and the collective bargaining.³

In order to limit the economic consequences of the business' mandatory closure introduced to counter the COVID-19 from spreading, the government has encouraged since March the use of smart working: in particular, the DPCM 22 March 2020 (modified by the DM 25 March 2020), ordering the suspension of all non-essential productions, industrial and commercial activities, allowing explicitly to continue remotely for every company. The agile work has also been extended to address family care needs; with reference to the private sector the DL 19 May 2020 n. 34 ("decreto rilancio") introduced the possibility of using smart working for the entire period of the health emergency for employees with children younger than 14 years old, only for families in which there is no other unemployed parent or beneficiary of income supporting instruments. These measures were accompanied by regulations aimed to ease the access to smart working by removing the need for agreement between the parties and the streamlining of disclosure obligations. The regulatory simplifications introduced in March and April were then confirmed and extended by subsequent measures implemented to face the emergency.

³ Legge 22 Maggio 2017, n.81.

The number of smart workers has grown from less than 200 thousand to 1.8 million. Important differences in the use of smart working are based on both the characteristics of workers and of the company. In 2019, the percentage of men and

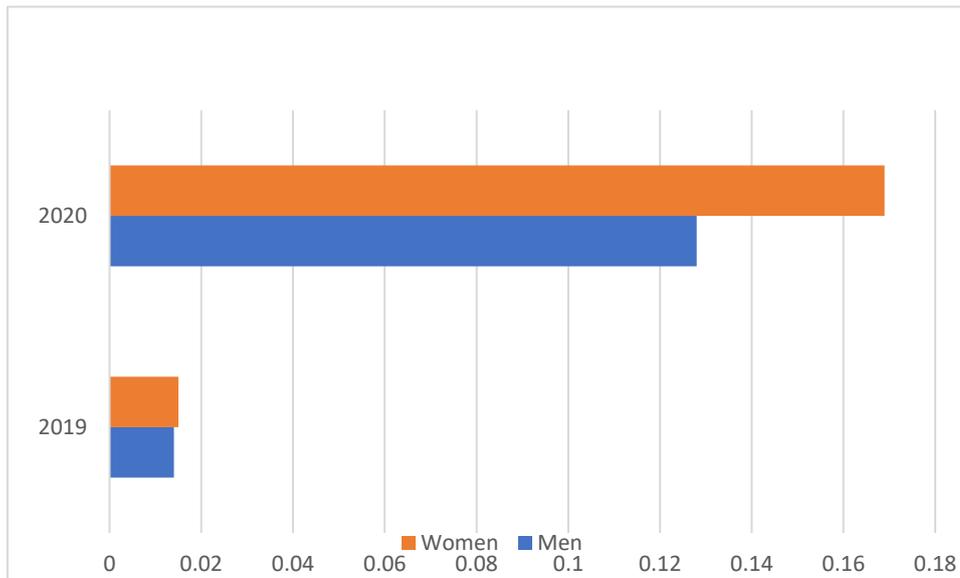


Figure 2: Work from home percentage over labour force

Source: Istat, workforce publications

women using agile working was similar (see Figure 2); during the pandemic, the increase in smart working for women was of 15.4 percentage points, reaching 16.9%, i.e. 4.1% more than men. Using the Sondtel survey conducted by the Bank of Italy on businesses, therefore on the side of the job demand, Basso and Formai (2021) also conclude that the use of agile working is higher where the percentage of female employment is higher.

2.2. EUROPE'S TAKE ON THE VIRUS

As one of the biggest economic areas, it's also worth to give a look to Europe as a whole, instead of analysing state by state their situation. Infections trend was like Italy's, with France, Spain, and Italy as the countries with most cases, reaching a total infection number of over 25 million cases in January 2021.

2.2.1. Labour market variations

Just like in Italy, unemployment grew in average from last year's 6.5% to 7.8%. A fairly small amount when compared to 2008's financial crisis, which peaked at 11.5% over the years. Overall online *job postings* also decreased averaging at 31% fewer from March to June. It is worth noting the difference between western and eastern Europe: in the former being around -33% and the latter at -15%, the difference is possibly linked to western countries' higher use of internet and while in the east they started using online search for jobs more often, therefore mitigating its overall decline. In the second quarter of 2020, there were 5.2 million fewer people employed than by the end of 2019, a fall of 3.2%. This decline corresponds to approximately 44% increase in the number of people employed since the second quarter of 2013. Employment recovered in the third quarter but remained below its level in the fourth quarter of 2019.

Total working hours changed considerably more than employment, and even more than GDP. In the second quarter of 2020, the most affected by the containment

policies, total working hours declined by 16.8% and average hours decreased by 14.3%. Labour productivity per employee declined substantially during the COVID pandemic, while labour productivity per hour improved marginally. In the first half of 2020, labour productivity per employee declined deeply, with a year-on-year change of -12.1% in the second quarter of 2020, as employment declined less than GDP. By contrast, labour productivity per hour increased by 2.6%, because working hours dropped more than GDP. This contrast between productivity per person and per hour worked is more evident than in previous downturns, because of the implementation of job retention schemes. Nevertheless, labour productivity per person improved significantly in the third quarter.

Despite the large decline in employment, the unemployment rate in Europe increased by only 1.2%, reaching 8.4%. This limited increase in the unemployment rate was in strong contrast to the situation in the US, where workers went in temporary furlough. As a matter of fact, in Europe those affected by temporary layoffs remain often on the payroll and are not considered unemployed. Moreover, containment measures reduced labour demand and disincentivised workers' search

for a new job. The labour force recovered in the third quarter but remains smaller

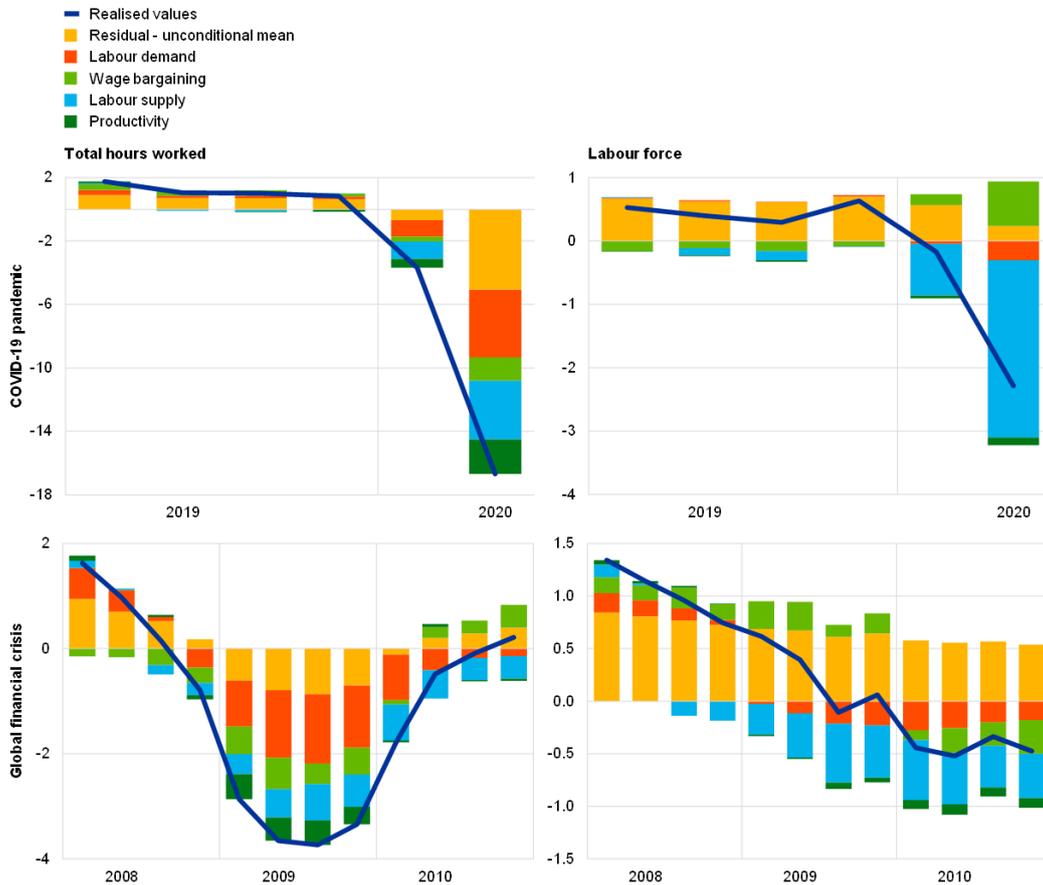


Figure 3: Contributions of shocks to changes in total hours worked and the labor force in the euro area

Source: Eurostat and ECB

than in the fourth quarter of 2019.

As we can see in the Figure 3, the large decline in working hours observed in the second quarter of 2020 was primarily caused by supply-side and demand shocks. On the supply side, labour supply, and productivity shocks together account for more than one-third of the total decline in working hours. This is the result of lockdown and containment measures introduced by national governments during

the crisis, which imposed a temporary closure of many shops and firms or a reduction in their operations. Furthermore, there was a decline in the labour force due to workers who lost their jobs and did not immediately search for new jobs. The negative demand shock accounted for one-quarter of the decline in total working hours in the second quarter of 2020 and was caused by a decrease in consumption as a result of an increase in uncertainty during the pandemic. The residual component accounted for less than one-third of the decline in total working hours. The upper right panel of Figure 3 shows that the large decline in labour force participation is largely due to the impact of labour supply shock.

It is interesting to make a comparison between the impact of the shock produced by the spread of COVID-19 and the effects of financial crisis, highlighting differences and similarities. As in the current crisis, the largest part of the total decline in working hours was caused by labour supply, productivity and demand shocks. Nevertheless, during the financial crisis in 2009 the dominant shock was the demand one. Ultimately, in both recessions labour supply shocks were the main factors for the decline in the labour force.

After June 2020, some European countries promptly recovered and started hiring (in some cases even more than 2019's numbers) such as Germany with a culture of short-term working relationships (only 5% of lost jobs) or Denmark that instituted policies in order to favour furlough instead of firing people; other states had more severe recessions, particularly in Sweden the decline in job postings was above

40%. The most resilient occupations are obviously health professionals, cleaners, technicians, and agricultural workers, while occupations that involve serving food, hospitality, retail or requiring high skills were affected more by the pandemic.

A study analysed the employment level and made a regression to better understand which factors impact more towards putting a sector in a risk situation⁴ and found that the degree of communication skills required by the job, along with teamwork capabilities and customer service have a positive effect on the virus's contamination risk, while the ICT level required from the worker (moderate knowledge on computer's use or advanced capabilities on programming and developing) affects how resilient a sector is, strongly reducing the risk factor faced for advanced ICT technicians. Obviously, the sectors more endangered were the typical ones such leisure and accommodation, retail, culture etc... while the safest were manufacturing, constructions, and professional services.

2.2.2. Job retention schemes

At the beginning of COVID-19 spread, job retention schemes reached extraordinary levels, playing an important role in the labour market evolution. In April 2020, 15% of all employees in Germany, 34% in France, 30% in Italy and 21% in Spain were on short-time work (see Figure 4). While these levels have since dropped, they remain elevated. Just to make a comparison, in 2009 job retention

⁴ EU Jobs at highest risk of COVID-19 social distancing, Pouliakas K., Branka J, 2020

schemes reached 3.2% in Germany, 0.8% in France, 3.3% in Italy and 1% in Spain.

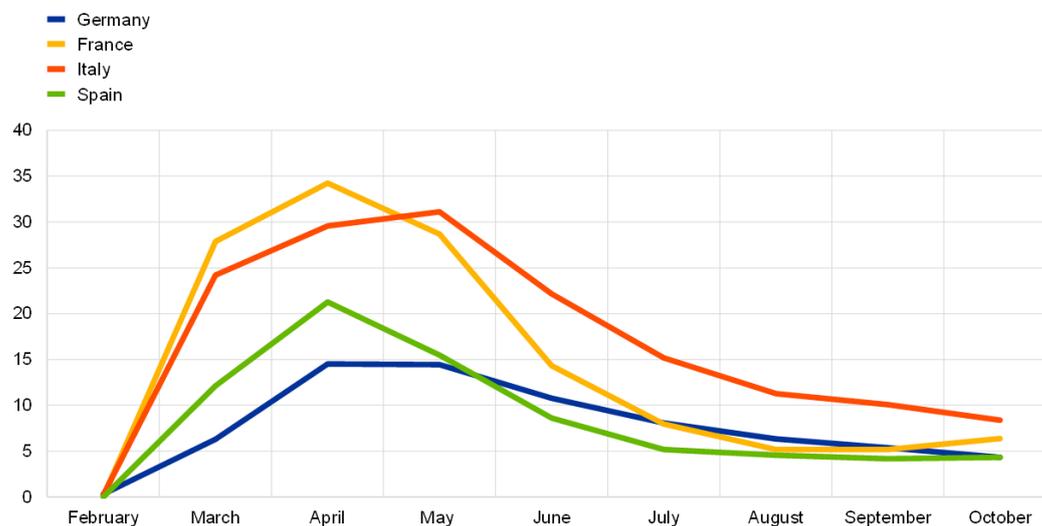


Figure 4: Share of employees on job retention schemes.

Source: ECB calculations

These schemes help to explain why wages per employee declined significantly in Europe, while compensation per hour increased slightly.

Job retention schemes were designed to support workers' incomes and to protect jobs during the COVID-19 crisis, when firms faced a sharp decline in demand. There was also support for the implementation of these measures at European level. It is true that these schemes help to keep employment stable in the short term, nevertheless it is important to build a mechanism that limits undesirable effects. As a matter of fact, job retention schemes also involve an amount of deadweight losses, for example when they support jobs that would not have been lost. This is the reason why they shouldn't be used for long periods of time, otherwise they may decrease the allocative efficiency of the economy.

2.2.3. Wages per hours and per employee

During normal times, wages per hour and per employee tend to move in the same direction. However, in times of crisis their trends can differ considerably, reflecting for example reductions in working hours per employee. As a matter of fact, the COVID-19 pandemic has provoked a significant divergence between compensation per employee and compensation per hour. Since the beginning of the pandemic, particularly in the second quarter of 2020, the compensation per employee decreased at an annual rate of 4.7% and compensation per hour increased by 9.3%. The number of workers on job retention schemes played an important role in these developments. Such measures have a negative effect on compensation per employee, because employees maintain their status, but face pay cuts. At the same time, these measures have a positive effect on compensation per hour, as working hours are reduced more sharply than wages.

It is to consider that government supporting measures complicate the evaluation of compensation trends during the pandemic. First, the assessment of how job retention schemes affect aggregate wages and how many employees are involved requires some data that are available only with a considerable time delay. Second, statistics usually differ across countries. While in most of the largest European countries' benefits are paid directly to employees and recorder as social transfers, in the Netherlands employers receive a subsidy to finance their payments to employees, not leading to a strong reduction in compensation per employee.

2.2.4. Gender-based differences

As we saw while analysing the situation in Italy, more women are losing jobs compared to men. The reasons might be multiple, yet the effects are the same. One of them might be because women tend towards occupations around other people, such as restaurant clerks, barmaids, shop assistants and so on, which are the areas most affected by the virus, especially in the hard hit healthcare, where male nurses fluctuate around 5 to 20%, depending on the country.

Another point of view to keep in mind is that women are more cautious and they abide the rules compared to men, who discard precautionary measures, leading to a higher death toll for men of about 50% for reasons such as more vulnerability to illness, higher smoking and drinking rates, and reluctance to seek healthcare when needed. A poll found that 59% of women took the virus seriously, while 49% of the interviewed men were worried. Albeit the rates on wearing the mask for precaution are similar (49 against 43%), men don't seem to be bothered to cover their face when sneezing, showing the relative more disregard for everyone else around men dominated environments. The biggest difference is when comparing men living alone with men living with a woman and/or children: sharing a common space influences how people see the virus and they choose accordingly, for the best outcome for everybody.

Despite the effort by some, men are generally more affected by the virus, and yet jobs disruptions happen at higher rate to women. Funds granted by the

governments must also address this severe issue, granted it might be a side effect of different preferences between the sexes, this could be a key period to implement better rules and laws that prevent sexism and racism in the workplace.

2.3. IMPACT ON THE UK LABOUR MARKET

Great Britain registered more than 4 million cases of COVID-19, with over 100,000 deaths. The prime minister wanted to face the pandemic with minimal closures opting for herd immunity: people were supposed to become infected and develop antibodies, subsequently becoming immune to the virus; The strategy was quickly reconsidered as the death-toll rose, imposing more strict containment measures.

2.3.1. Unemployment rate and job retention schemes

Unemployment reached the highest level for more than four years as the second wave of the coronavirus pandemic and tougher lockdown measures place more pressure on businesses and workers.

The Office for National Statistics said the unemployment rate rose to 5% in the three months to the end of November, representing more than 1.7 million people, reaching the highest level since August 2016. Unemployment was 4% in February 2020, before the pandemic struck. A centrepiece of UK policy has been its Job Retention Scheme (JRS) or furlough system, whereby employers receive 80% (up

to a limit of £2,500 per month) of the wages of employees who are temporarily suspended. It became active in April and was initially set to last until the end of June. The logic of the policy has already been discussed. The main reason is to allow workers to turn back to their jobs once lockdown restrictions start to be lifted. It is meant to avoid large-scale dismissals and the subsequent problems of large numbers of employed people trying to find their way back into work. Some European countries mentioned above, such as France, Germany, the Netherlands, Portugal, Sweden, Spain, Sweden, and Switzerland, have followed the same purpose, even if the precise content and strength of policies differ from country to country.

The UK's job retention scheme has been one of the most effective responses to the crisis but has inevitably left large gaps. These schemes have failed to include self-employed, temporary, gig-economy workers or those in zero hours contracts, hence 20% of the UK's workforce had not been covered. In addition to those measures, social security benefits have been enhanced for those who have lost their jobs or who are already unemployed. Nevertheless, a lot of people have experienced a fall in disposable income, about 68% of the households, as estimated by the Resolution Foundation. Younger people are the hardest hit, because a lot of them work in low-paid jobs which cannot be done from home (Hensvik et al.,2020), hence they are more liable to be laid off or put on job retention scheme. Young workers are also present in two of the hardest hit sectors – retail and hospitality.

According to Bell et al. (2020), young workers in small firms will face an earning's loss of 8-9%, and older women in large firms are also exposed to substantial losses.

The hope for a rapid V-shaped recovery was based on the presumption of a short period of social distancing; however, now there is a considerable uncertainty about the future. It seems inevitable that some forms of social distancing will remain in the UK for several months to come, implying a long time for overall employment rates to get back.

According to Nye Cominetti, senior economist at the Reolution Foundation thinktank, around one in six private sector workers were furloughed during England's second lockdown in November, and even more are likely to be furloughed in early 2021. The number of people claiming unemployment-related benefits has shot up to more than 2.6 million, a rise of 113% since March last year, as the pandemic puts people out of work and reduces opportunities for finding a new job. Although the government is helping the private sector with a range of subsidized loans and tax waivers, the longer restrictions on normal economic life remain, the more companies will cease trading. The retail, hospitality tourism, leisure, and parts of the transport sectors are particularly vulnerable. The high street retail sector was already in trouble before the virus hit and Debenhams, for example, has gone into liquidation and has announced plans for store closures. Employers in other sectors have postponed redundancies. British Airways and Virgin Atlantic,

for instance, will take years to recover to pre-crisis level, and made proposals for a large programme of redundancies.

Even if Job Retention Scheme is undoubtedly an audacious initiative, there are problems with its application. First, it is a burden on public finances – it has been calculated that it is currently costing £14 million per month. In other words, it is much cheaper to pay people out of work benefits than it is to maintain them on Job Retention programmes. Second, the greater number of employers that start to predict medium-term downturns in demand, the more employers will retire from any job retention programme, laying off many workers.

2.3.2. A comparison with Germany

Now that a quick bounce-back of the economy to its previous state seems unlikely, we must think about the longer-term effects of the COVID-19 spread on the labour market. Some insights can be gathered from Germany's policy initiatives during the 2008 financial crisis and their impact. At that time, Germany implemented the short time work scheme which paid firms 67% of an employee's loss of pay resulting from shorter working hours for up to 2 years (Bosch, 2011). German government policy was quite unusual at that time, but it has influenced the UK and other countries in their recent adoption of similar schemes to keep employees attached to their firms. However, the situation of Germany is not much comparable with that of other countries, because German employers usually tend

to take long-term employment decisions, hiring fewer workers in the period prior to the crisis, subsequently laying off fewer employees. In Germany, wage moderation is important in combination with the adoption of working time accounts. The latter last typically for anywhere between 6 months and 2 years and allow employees to work more or fewer hours in any given week, as long as the average over the relevant time period corresponds to the agreed weekly working hours, without having to experience variations in pay. This flexibility reduced the incentive for employers to lay workers off during downturns. However, according to Arpaia and Curci (2010), working time accounts work well only if there is an external demand shock which is short-lived.

In order to understand how the labour market is evolving, it is worthwhile to remind the effects of previous recessions on employment and how well the different countries recovered some years later. Following Coulter (2016), after the recession started in 2008, significant reductions in public-sector employment were offset by the creation of jobs in the private sector. However, this came at the expense of falls in real wages and stagnant productivity, with increasing labour market polarization. It took nearly a decade for the real wages of UK workers to return to their pre-2008

levels, before the COVID-19 crisis hit (see Figure 5). In contrast, Germany

	Unemployment rate 2010	Unemployment rate 2018	Total average wages 2010	Total average wages 2018
UK	7.81	4.02	45,527	44,770
US	9.62	3.90	59,477	63,093
Germany	6.97	3.40	44,451	49,813
Spain	19.88	15.27	41,034	38,761

Figure 5: Unemployment and income changes after the 2008 financial crisis.

Source: OECD database

managed to achieve a labour market recovery with less cost in terms of real incomes. In Spain unemployment had peaked at a much higher level, and after a decade is still high in comparison with other countries.

2.3.3. Future jobs

Recovering from such deep unemployment could take a decade and it may come at expense of real wages. What is different now is that the shock is not focused on markets for housing and lending, but there are risks to several sectors – accommodation and food, real estate, business and administration, manufacturing, wholesale and retail, vehicle repair, transport, storage, communication, art entertainment and recreation.

One of the main problems regards school leavers who are entering the labour market. After the crisis, some of them will become unemployed or inactive; others will get jobs, but lower-level ones than what they expected, such as jobs that do not fully use their capabilities and offer a correspondingly lower pay. Research from

Resolution Foundation called those young people who entered the labour force during the 2008 financial crisis the “crisis cohort”, because they continued to face higher unemployment, lower pay and worse job prospects up to a decade later as compared to other young people entering before the crisis.

It is likely that after the crisis, we will face a different structure of production and thus of available jobs. Following a supply disruption and the consequent rise of global prices, firms reconsider whether more reliance should be placed on domestic production of some items. There may be a significant increase in the demand for UK workers to fill unskilled jobs in agriculture and food processing. There will also be demand for more skilled employees. The issue is whether the skills available will match the skill needed. For instance, one UK-based oil major is reskilling large numbers of engineers in artificial intelligence, but it seems to be an investment that most other companies would find difficult to make. As a matter of fact, the UK have faced this crisis with a shortfall of STEM (science, technology, engineering, and mathematics) workers at all levels, from highly qualified university graduates to technicians (see Caselli and Manning, 2019).

In conclusion, some countries have tackled the current crisis more proficiently than others. Unfortunately, the UK is not among this group of countries. First, job retention schemes should be kept in place for as long as possible. However, it is costly for the government treasury compared to the cost of paying out social security benefits. Hence, it is inevitable a reduction to the 80% subsidy and the

£2,500 upper limit. Second, it is possible to provide some more targeted schemes to help employers, maybe a version of the German working time accounts previously discussed. Third, people should not just be matched to available jobs, because the quality of jobs offering should be improved, and it should be given to individuals the training necessary to get them. Fourth, the UK's Apprenticeship Levy (a tax on temporary employers to fund training) has not worked and should be suspended. Instead, there should be a subsidy to firms offering apprenticeships to young people. Fifth, it should be required a better labour market intelligence than is currently available. Information could be gathered on the employer demand for individual skills and on the range of pay offered for these skills. This information would be made available to workers looking for a job. In order to achieve the skills required and offer the courses needed, further education and higher education institution could be encouraged and be paid a fee directly by the government, while people would receive a maintenance loan to cover their living expenses for the duration of the course.

2.4. THE SITUATION IN USA

USA is so far the most hit country, with 27 million of documented cases and over 450.000 deaths due to coronavirus, accounting for over a quarter of the world's total cases. This high infectivity might be due to government initial dismissive

behaviour that heavily influenced the public, disregarding any risk or even arguing against the existence of the virus from the population's more extremist side.

2.4.1. The greatest peak of unemployment

Coronavirus generated a massive peak in unemployment, especially in USA,

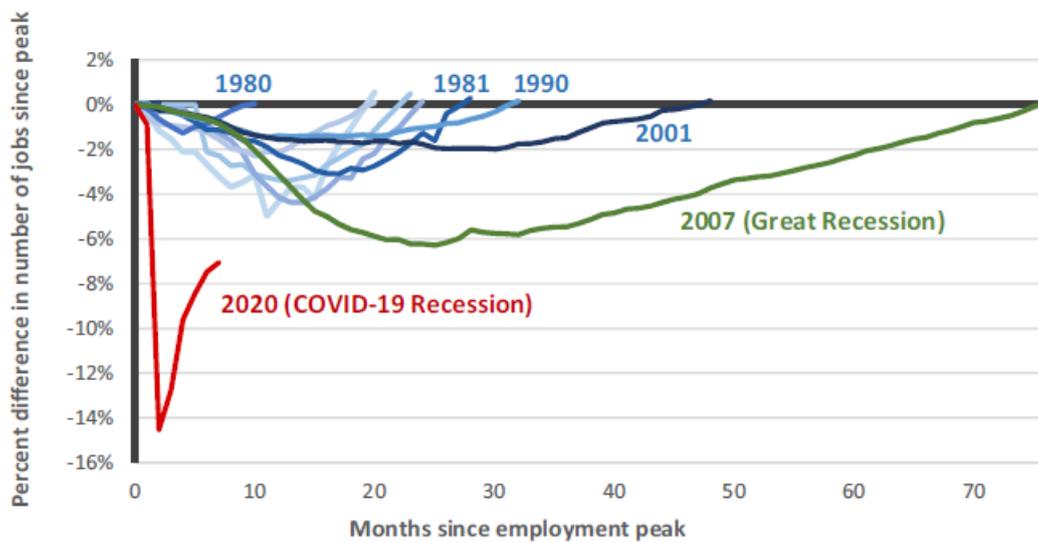


Figure 6: Number of months needed to recover since the beginning of each crisis

although they deserve to be looked at from several points of view. In March, unemployment rate skyrocketed from 3.5% to an astounding 14.7% creating the biggest jump ever in the American recent History, much bigger than the 2008 financial crisis. It's also worth noticing that after February, many jobs have been reinstated bringing down the unemployment rate to 7.9% in September 2020 (a stunning 52% recovery in just a few months), but still a higher number if compared to any previous crisis (i.e. after the 2008 financial crisis unemployment rate gradually increased up to 10% and it took 3 years to get below 9%).

The graph⁵ in figure 5 plots how unemployment changed since the start of several crisis in U.S. history, and how many months it took to get back at its starting level: it's mostly clear how hard it stroke, but also has this unique recovery just as steep as it plummeted down. This gives a glimpse of hope other recessions didn't have.

This phenomenon can be explained by how those layoffs were made: many enterprises didn't permanently let go of their employees but has put them in temporary furlough, therefore, when interviewed they passed as unemployed despite having a possibility of quickly being reinstated to their position. The Bureau of Labor Statistics found that the amount of unemployment rate in temporary layoff in April (when unemployment peaked) was 78.3%, partially explaining the number of jobs reinstated in such a short time⁶. Another effect to take into consideration is the number of full-time workers who had to cut their working hours to part-time due to the pandemic. The BLS also found that 2.7% of the part-time workers were involuntary in February due to economic reasons, while in April they were at 8.2% of workers at reduced hours. Following the trend, in September they fell to an acceptable 4.3%⁷.

⁵ BLS current employment statistics program

⁶ COVID-19's impact on the US Labor Market, Groshen E., 2020

⁷<https://www.bls.gov/covid19/effects-of-covid-19-pandemic-and-response-on-the-employment-situation-news-release.htm>

In the other hand, there was a huge reduction in new job posting in the first months of 2020: when compared to the previous year the reduction averages around 40% less job postings with variable values when discriminating between large or small firms or if the positions require a high skilled employee or a low skilled one. As a matter of fact, job offerings from large firms are relatively more abundant but low skilled workers are more requested⁸.

These findings are true for some sector more than others, in fact the impact in jobs disruption in sectors such as healthcare, public or construction are sensibly reduced, while retail, restoration and hotels are forced to let go their employees and stop searching for more personnel. Restrictions and cautionary precautions affected more companies that rely in interpersonal interactions, while workplaces that can maintain distance and reduce physical interaction with their clientele managed to have a less violent recession.

2.4.2. Policies to soften the fall

In US, over six millions of people graduated at high school, obtained a college degree, or quit college prematurely in order to enter the labour force in 2020, and about 13 million workers aged 16-24 are currently in the labour force, signalling a particular high risk of exposure to recession for 20 million young people. Empirical evidence suggests that unlucky labour market entrants suffer losses in earnings that

⁸ Corporate hiring under COVID-19, Campello, Kankanhalli, Muthukrishnan, 2020

last 10-15 years, depending on the gravity of recession (see, for example, Kahn (2010), Oreopoulos, von Wachter and Heisz (2012) and Schwandt and von Wachter (2019)). Considering just the entrants, the loss in earnings over 10 years is supposed to be about \$320 billion.

There are several policy options available to soften the unemployment fall, also considering the long-term costs connected to the recession, focusing on proposals to expand the Short-Time Compensation (STC) programme. The two main policies pursued have been an expansion in unemployment insurance (UI) benefit and an extension in business loans. The level of success of these approaches depends on the validity of two assumptions: first, the presumption that the economy will return to its previous state once the pandemic is contained must hold; second, workers' incomes must be sufficiently sustained in order to avoid poverty, because during this crisis most job losses are concentrated among low-paid workers.

In many developed countries, including Canada, France, Germany and Italy, workers are subsidised through STC (short-time compensation) programmes. These measures allow firms to reduce their payroll costs through a shared reduction of hours than concentrated layoffs, while the shortage in workers' wages is partly made up by payments from the UI (unemployment insurance) system. In Europe these programmes have served millions of workers, in contrast to what happened in the US. Even though most US states have implemented those as part of their UI

programme, they have been underutilised during the crisis⁹. STC could reduce crowding in the labour market and support firms in rehiring laid-off workers part-time, a particularly useful feature given the high rates of temporary layoff.

There have been a few proposals to make STC programmes a widespread tool during periods of crisis. First, it should be instituted a fully federally funded STC that do not increase participating firms' payroll taxes; second, STC should be a requirement to obtain business emergency loans; third, firms should be allowed to pay benefits to workers in times of recessions and should be reimbursed through payroll tax credits. Finally, states should fully automate the processing of STC programmes. An alternative would be to institutionalise a national STC programme, as proposed by von Wachter and Wandner (2020).

2.4.3. Different impacts on various categories of workers

As happened in every other country, COVID-19 affected different people in multiple ways all over the world, and America is no exception. Just like most western countries, the recession hit hard on almost every sector and possibly has the worst outcome than any other, at least until the writing of this paper.

Male and white workers fare better during the pandemic, being more resilient and even if the job position is disrupted, they manage to keep a tie with the

⁹ Currently, close to 30 states covering over 70% of the US workforce have existing STC programmes that are integrated into their UI programmes

employer. By contrast, African Americans and Hispanics have been affected the most with involuntary termination, both for downsizing and for the facility being shut down. Even considering them singularly they have lost more jobs and keep losing them, without new opportunities being created; this is not at all proportionate to the demographics in USA, as it is mainly populated by white citizens. Also, African Americans tend to work low-middle tier jobs that span from healthcare, to social workers, and bus drivers, which are sectors more heavily affected by the pandemic and the lockdowns, while white people (especially male) tend to have high tier jobs which are more resilient, explaining partially the exponential difference between the two races. A similar argument can be said for Hispanics, who typically take jobs that Americans avoid (such as farming, constructions and so on) and more often than not with illegal papers or without a contract, making them easy targets for wrongful terminations.

Women in the other hand, chose to simply step out of the labour force after their job was disrupted, choosing to spend time in house care and childcare, consistently with a report in increased needs of family responsibilities. As discussed previously in the chapter, it is as much of a severe issue just like in Europe, although in USA is more prominent a race-based discrimination, gender differences aren't big, and well within the deviation to make a difference.

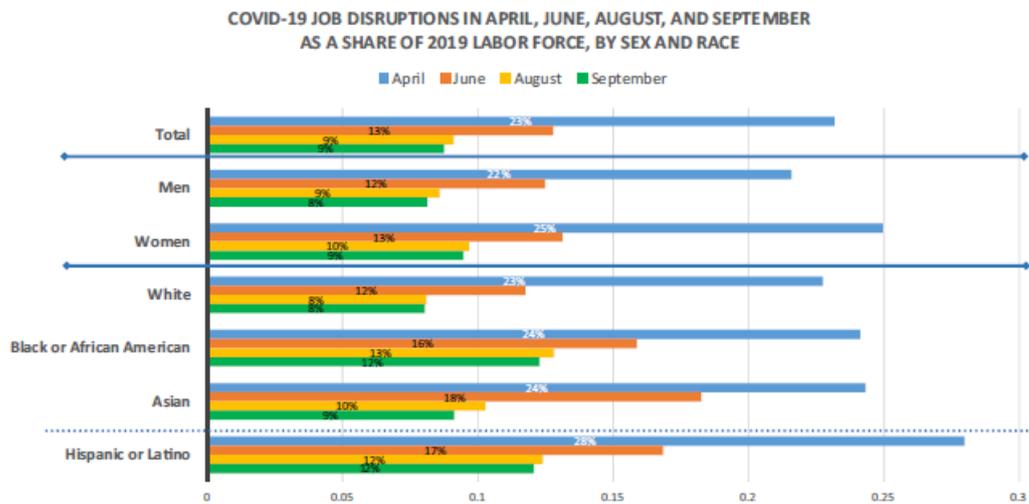


Figure 7: Race and sex disparities in job disruptions; source: us bureau of labor statistics

Note: Hispanic or latino may be white, African American or Asian

3. MICROECONOMIC ANALYSIS

In this following section we're going to analyse all the information we listed in the previous chapter and read it from a micromanagement point of view. For simplicity reasons, we'll only consider sectors that weren't targeted to close or limit their main source of affairs by a Government law (such as bars and restaurants in Italy), analyse the effects and trying to find the causes that led to a firm's action, a firm who's facing strong restrictions in its operations but still able to work. The end goal of any firm will still be to maximize profits, while keeping in mind the different utilities of its employees and new costs needed to face in order to comply to the Government's legislation.

We will simplify the representation of the firm, only considering costs and revenues linked to labour (ignoring machinery, materials, and overhead structure) in order to better understand the importance of human capital and how much is affected by COVID-19.

3.1. WORKERS' UTILITY

Utility is defined as the advantages a worker obtains from his job less the disutility he generates by working with given effort for a certain amount of time. In mathematical terms:

$$u = \omega - \delta \frac{e^2 * h^2}{2}$$

Where ω is the wage or salary stated by the contract, δ is the disutility generated by working in his position with a certain level of effort for a set amount of time. Furthermore, the utility cannot be negative and must be bigger than his marginal utility (\bar{u}), otherwise the job is either too much consuming for the worker or not enough remunerative, so he would rather be unemployed.

Utility is also used to calculate the total rent, defined as the sum of profits generated from one employee and his utility, less the marginal utility.

$$R = \Pi + u - \bar{u}$$
$$R = y - \delta \frac{e^2 * h^2}{2} - \bar{u}$$

During the COVID, workers are facing higher disutility by going to work every day, which is due to the increased risk of contracting the virus and an increased effort in order to keep his workspace disinfected and keeping his mask on for the whole time. This is especially true when the job is not him sitting on a desk in a controlled environment, but a physical activity among other co-workers.

In order to decrease this additional disutility, there are some variables the firm can change except increasing the wage level (we assume that the firm's income is decreasing so they wouldn't be able to afford such strategy and it doesn't affect directly the new problem) so we're focusing on the second part of the utility equation.

3.1.1. Remote working

A simple yet effective way to remove altogether these new risks is to not go to the workplace at all. Thanks to the technological advancement in communication and transports and since every household has at least a computer and internet connection, a worker can simply do his job from the comfort of his living room, easily connecting to his work PC and coordinating with his team. This accommodation also allows parents to spend more time with their children (who in most cases are following school programs online) and the care of their household between a conference call and the other.

Most of the times, we can give for granted that anyone has a PC and a stable internet connection in his house, alongside basic capabilities on how to use them, making the transition quick, simple, and inexpensive. A minimal training might be required, or to supply a certain software. In the worst-case scenario, a worker with no personal computer and no internet plan must be supplied by the firm. Considering a decent mid-tier laptop in Italy costs around 500€ and an average data plan goes around 30€ seems affordable for a firm, plus they can register the invoice as a non-current asset, recovering the VAT of each transition and, depending on the juridical form of the firm, they can also access a Governative incentive up to 60% on any purchase of PC or specific software, and 500€ for families with children who must follow their lessons from home.

Working from home was a possibility already conceived before the outbreak, wanting to add more flexibility to a firm’s processes, a worker has the chance to better manage his personal time and space, balancing work and free time apparently increases productivity because a worker feels less restricted and more involved in what he’s doing, feeling less encumbered by the tasks, with the ability to stop and look at what he’s doing from a different angle, while also decreasing overall cost of a structure or office area.

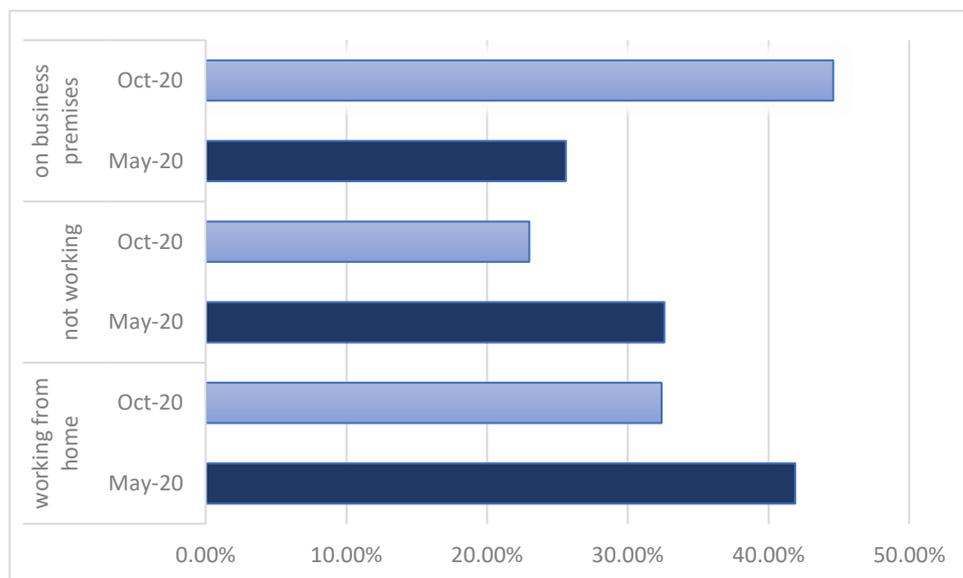


Figure 8: Evolution of employment situation according to an interview of 15000 individuals conducted in US

The increase in the use of smart working was heterogeneous between sectors, reflecting above all the different possibility of carrying out tasks remotely (the so-called “teleworkability”, see Figure 9). The majority of employees in the sectors who, according to the indicator developed by Barbieri et al. (2020), are characterized by greater teleworkability, has actually worked remotely in 2020: it

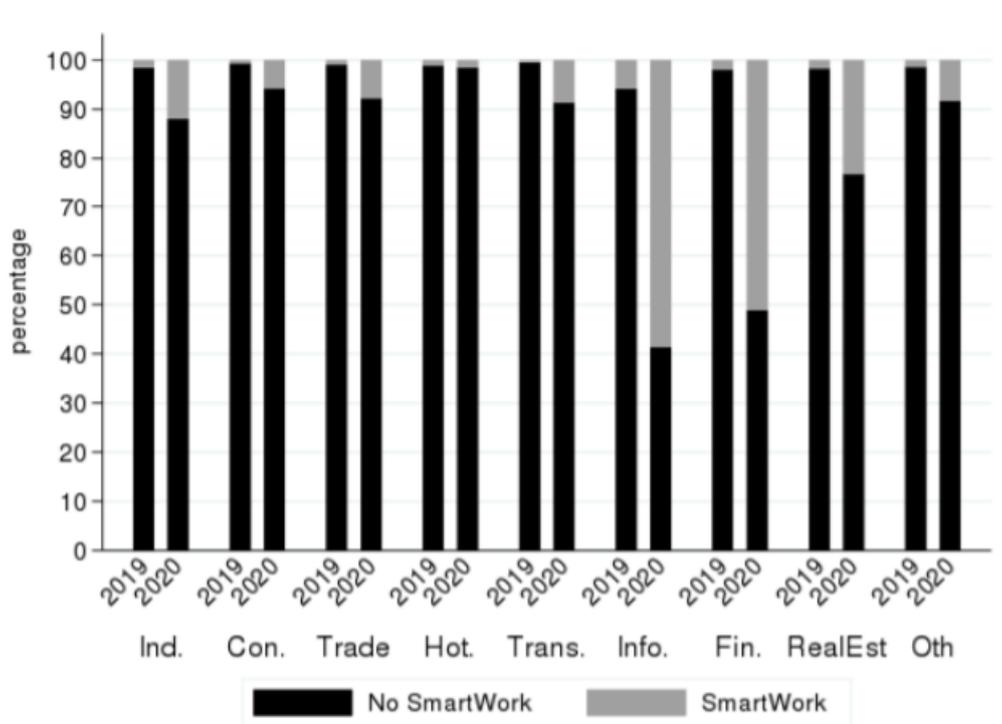


Figure 9: Share of home workers in each sector compared to last year's
Source: Istat

is this the case of the information and communication, financial activities and insurance sectors, in which employees in agile work were respectively 58.6% and 51.1% of the total (from 5.8% and 1.9% in 2019, respectively); on the contrary, smart working in the hotel and restaurant sector, where teleworking is extremely low, has remained at low levels recorded in 2019 (less than 1.5%).

It is also possible to analyse the effect of agile working on monthly wages, on working hours per week and on the access to forms of wage supplement (CIG), on the current search for another job and on individual evaluation of the risk of losing a job, which are indicators of perceived uncertainty or precariousness. During the COVID-19 pandemic, compared to workers not in smart working, the salary of

those who did the work remotely was 6% higher, largely reflecting the higher number of working hours (on average, 2 hours per week, equal to about 6%): considering the number of working hours, the differential in wages is not instead significant. In the same direction, Bloom et al. (2015) estimate an increase in output for worker of 13%, largely attributable to the increased amount of actual work (9%).

Compared to other workers, performing remote working reduces both the chance of being placed in CIG (by about 10% points, as in Basso and Fornai, 2021), and the probability of looking for another job (by 2.3%) or the perceived one of losing the current job within 6 months (by 3%).

Following these estimates, we can conclude that the ability to perform agile working in Italy had positive effects during the COVID-19 pandemic, with both private benefits (for example a minor perceived probability of losing a job), and, probably, collective ones (e.g. the lesser use of CIG, which reduces the implicit cost for public finances).

Empirical evidence leads us to believe that the effects of smart working on working and businesses have been positive, preserving the wage levels and employment. Therefore, agile working has helped to limit the negative consequences of shock associated with the pandemic on aggregate demand and employment, also giving the opportunity to become more efficient. Since in the second quarter of 2020 the number of remote workers was still low compared to the

potential, it is likely that the extension of smart working to a larger number of employees could have positive repercussions for the labour market.

After all, opportunities aren't missing, if possible smart working can really help fighting the virus and reducing any possible contamination chance. It's also important to note that the added flexibility of the system (workers already have the skills for remote working) can make it a valid process even after the end of the crisis, whether it's for convenience, productivity or overall cost of the office. Moreover, the social stigma connected with a secluded workplace are now gone, people feel comfortable working from home and aren't anxious to go back, after investing money to learn the skills and buy the tools, on top of being reluctant to start taking public transport again and attending crowded places. A grave side-effect generated by remote working is that people get "cabin fever": staying inside all day every day can lead to depression, lack of patience, hunger and more, so it's also important to get outside regularly, have a quick walk, going for groceries, exercise but also setting goals for every day or starting a new hobby can massively help towards maintaining our mental sanity.

3.1.2. Fewer working hours

Since not every job can be done from home, a valid alternative to decrease the disutility generated by COVID-19 preventive restriction can be switching to part-time. This can be effective for factory workers or employees that need to use

specific machinery to fulfil their orders, making their job more endurable, or at least to endure it for less time.

With more part-time contracts, the firm can hire more workers and keep their production with multiple working shifts, allowing people to rest frequently, disinfect and prepare the workplace for the next shift. We will analyse this topic more specifically in the next paragraph, this is called an extensive adjustment to an external shock, so that a firm hires more personnel instead of asking the workers already on payroll for overtime, stressing them too much and affecting the workplace's morale. Sadly, this choice must lead to a reduced wage for each worker, since overall production is sensibly decreased, but it's still the best scenario to prevent any need to lay-off or halting the production in case a few workers contract the virus or shirk for fear of contracting it, and subsequently softens the increase in unemployment by allowing more people to work. In this way a worker would prefer to keep the less remunerative job and he would be scared to voluntarily leave, mainly because of reduced job postings from other firms in any sector. Therefore, it might be better to receive less and consume less while being modically sheltered from the disease than risking being unemployed for an indefinite amount of time, or even having a full-time contract with no form of protection from the virus.

As favourable as it can be for the firm, choosing to hire more workers to keep production up isn't as easy as it seems. It requires an active change on working

hours that are granted by a signed contract, something not so easy to do anywhere, and especially in certain jurisdiction with a particularly strong syndicate activity. Granted that an agreement with the syndicate (one or more) is reached, production needs to remain high otherwise the new workers become sunk costs that are barely producing anything. And again to reduce volume and let go some employees isn't always as easy as it sounds, termination (this example is based on Italian laws for instance, other countries' legislation on the matter may widely vary) must be properly justified with a proper cause, of course financial difficulty is a good reason, but still workers have rights that cannot be overcome in a short period, making the whole process lengthy and costly.

3.1.3. Maintaining the situation as is

A firm might choose not to change their schedule and keep their employees in the same situation as they were before the pandemic by simply asking the employee to adapt to the new situation, provide tools to meet the regulations (masks, Plexiglass separators, hand sanitizers, maintaining 1 metre between people inside the business' perimeters, allow a limited amount of customers to enter at the same time depending on available space, continuous cleaning even during hours open to the public) and keep everything normal. Although it doesn't maximize the total rent achievable (the sum of firm's profits and workers' utility) it can be a valid alternative in case there is enough space to maintain social distancing and the

workers can endure new responsibility without being too much stressed about. Although it might be better for the workers, this alternative isn't applicable for anyone outside senior staff, an arguable choice in the eyes of the public and the employees.

A way to do so might be to have some workers go in voluntary (or forced) furlough so they still receive their deserved wage and keep the workplace less crowded. It's a valid alternative for the short term only, as this last choice might have some setbacks: we presume that the firm's volume of affairs is decreased due to the reduction in consumption by the public (as a matter of fact, 17.3% less in 2020's second quarter compared to 2019's¹⁰), therefore it's not at all easy for a firm to support every employee with always less resources for an unclear amount of time, but it will reduce the fear of infection drastically, providing a better security.

Furthermore, employees get demotivated if they must work every second week, they lose their rhythm and need some time to get back on track, costing to the firm time and overall quality of the outcome. Obviously, the success of such strategy isn't granted, it depends on how much affected the sector is and whether they can obtain support from the Government or banks, on top of the resilience of the workers who have unsteady hours, whether they can resist being demotivated and having an unsteady future. Such alternative can be efficient as a transitory period

¹⁰ <https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20201110-2>

before entering in smart working, allowing employees to adapt, finish training and take what they need from office, or by giving them the opportunity to change environment, in order to prevent them going house-sick.

3.2. FIRM'S HIRING DECISIONS

Hiring during a crisis can be tricky, it's hard to forecast for how long it will prolong and how demand will go in the future, but also firms need personnel in order to function, since the workers' preferences cannot be foreseen, they can simply get sick or sometimes they use shirking behaviours, simply not showing up for work, out of fear for the virus. The latter happens with a certain regularity especially in the healthcare sector, where a mix of low wage, poor working condition and high risk of infection can drive away the staff when they are most needed. In the USA, after taking regular screening of their nurses, facilities have discovered that between 15 and 35% of their staff doesn't show up for these reasons¹¹. Whereas nursing homes have taken non-traditional methods in order to hire people in the most critical areas, by hiring under-prepared personnel, the situation is quite different for regular manufacturing or any other kind of firm. Overall, jobs postings are just reduced, finding a new job is very difficult while near impossible to start a new business. Most firms that hire are mainly taking back

¹¹ COVID-19 intensifies nursing home workforce challenges, Danny-Brown et al., 2020

personnel they had to let go at the start of the crisis, as we saw in the previous chapter is quite a recurring case. We will now consider how can hiring be done to maximize profits and overall rent, and how it can affect workers who have not been fired.

3.2.1. Full-time or part-time contracts

External shocks that change overall demand or the general way of life, thus it's important to have an idea on how it can be faced so that the firm can remain competitive (or operational in case of a negative shock). Adjustments can be extensive or intensive: we consider production as only the product of the number of employees and the time they work there (excluding any cost of machineries and materials, which we assume are still widely available) so that

$$\Delta Y = \Delta h + \Delta L$$

Therefore, an increase in demand (and the higher production needed to match it) requires either a boost in workforce, so the extensive adjustment, or by asking overtime to the workers already employed, also known as intensive adjustment. Obviously, it's still valid in negative terms, where an extensive adjustment means letting go of some employees and the other one means having them work less than full-time. We've seen that COVID-19 created a lot of vacancies, so in this paragraph we'll focus exclusively in intensive adjustments.

The difference between full-time and part-time mainly depends on the preferences of each individual: as we saw in the utility function, hours worked affect negatively the well-being of the worker in a quadratic proportion, hence one hour less working means a lot more than a slight salary increase. The other factors affecting his preference are his talent and effort: a more talented worker needs to put less effort in his work, becoming more efficient and being able to earn more if wage is linked to productivity. Out of simplicity we assume that effort put in the job is equal to 1 ($e=1$) and that the firm faces fixed training and fiscal costs linked to each employee, independently from the type of contract.

Firm's cost function and revenues are therefore:

$$TC = (v h + F) \cdot L$$

$$Y = \theta_i h \cdot L$$

Where θ is the given talent of each worker, v his hourly wage, F represents fixed costs linked to a worker and L is the number of workers. From this we can obtain total rent obtained from each worker:

$$R = \theta h - v h - F + \left(v h - \delta \frac{h^2}{2} - \bar{u} \right)$$

Profits are, by definition, a fraction of total rent and depend on the bargaining power (β) withheld by the firm.

$$\Pi = \beta \cdot R$$

$$\theta h - vh - F = \beta \left[\theta h - F + \left(-\delta \frac{h^2}{2} - \bar{u} \right) \right]$$

$$v = \left(\theta - \frac{F}{h} \right) \cdot (1 - \beta) + \beta \delta \frac{h}{2}$$

The average cost of production in order to maximize profits will be:

$$C/Y = (1 - \beta) + \beta \left(\frac{F}{\theta h} + \delta \frac{h}{2\theta} \right)$$

Calculating the first derivative on the working hours and putting it equal to 0 so that we can maximize it we obtain:

$$h^* = \sqrt{\frac{2F}{\delta}}$$

So, the optimal working time for a worker to maximize total rent generated by the employer-employee system (this is valid in every situation, not only during COVID-19) is directly proportionate to the fix costs linked to the worker and indirectly proportionate to the disutility generated by working. Hourly wage is the outcome of a bargaining process between firm and workers' syndicate, so it's an extrinsic variable. This makes us understand that a firm wants to prevent negative behaviours from their workers, disutility is in the dividend of the function because it means a firm prefers having workers for a shorter time each day if it becomes tedious to remain for any longer, otherwise they would be less productive than what it costs to keep them there, eventually favouring part-time contracts, making it a

valid last resort to maintain a lower than before standard of production, but still being able to keep up the business.

Further on, to understand the differential between part-time and full-time from the workers' point of view, we'll analyse what utility each contract generates for each worker, assuming that a new hire must choose between the two contracts, so that we understand what may drive him towards one option or the other.

First of all, assuming effort is constant and equal to 1, we define v as the hourly wage, h_f as the number of hours worked in full-time and h_p as the hours worked in part-time, with $h_f > h_p$. We then obtain each utility function applying the formula stated at the beginning of the chapter obtaining:

$$u_f = vh_f - \delta \frac{h_f^2}{2} \qquad u_p = vh_p - \delta \frac{h_p^2}{2}$$

And substituting part-time hours as a fraction of full-time, so that $h_f = 1$ and $h_p = h_f\mu$ with $0 < \mu < 1$, out of simplicity we assume that reservation utility is equal to 0 ($\bar{u} = 0$)

$$u_f = v - \delta \frac{1}{2} \qquad u_p = v\mu - \delta \frac{\mu^2}{2}$$

We can find the participation constraint, or the minimal requirements needed so that the agent is willing to accept the contract, so offered utility must be positive

$$\delta < 2v \text{ for full time}; \qquad \delta < \frac{2v}{\mu} \text{ for part time}$$

A worker prefers full time when $u_f > u_p$ so, after some simplifications, when

$$\delta < \frac{2v}{1 + \mu}$$

As we stated at the beginning, every worker finds a greater disutility from going to work tied to a set of new precautionary measures so that we can prevent the virus from spreading but since disutility is given and higher than usual, the only alternative to make an employee accept a job that must be attended within the company's premises, is to make him work for fraction of the regular time, so by offering a part-time contract, while full-time contracts are widely favoured by people that must occupy a position that allows remote working.

3.2.2. Internal or external hiring

When an employer needs new employees to carry out a job, he gets to choose the hiring process and where to get the candidates from. Hiring from the labour market (external hiring) is typically the best call one can make in regular times, especially for low ranking and low talent positions, because the applicant isn't required any particular skill-set so there is no need to put them through a screening process in order to determine who is the best fit for that specific vacancy, if done it's possible that every applicant is due to the low level of skill required, making random selection the best selection process; in other words, the production differential between a bad worker and a good worker is negligible at best, hence making less useful to select applicants.

Selection becomes important when the vacancy is for a higher tier job, where production difference between a bad and good worker becomes much more sensible, and that's where an employer wants to pay more attention to who he hires, where screening costs become more worthed and in what situations he can find it advantageous. After the most obvious ways of screening, so after checking their signalling (past experiences and certifications, basically what the CV says about them), references from past employers, and if need be a test to understand their preparation (either a written test or an oral interview), an employer may choose to offer a probationary period for a reduced wage, so that he can understand how good the applicant actually is in the position he is needed. By doing so, the employer could see the applicant directly on the job, therefore basing his decision to what he accomplishes, not on first impressions and his past career. It's not the exact same concept but is still based on getting to know better the applicant, so we can better argue about the difference between internal and external hiring: internally promoting an employee means the employer already knows the talent he has and the effort he puts in the workplace, therefore there is no screening cost required. On top of this, internally promoting employees for better paying positions, asking more responsibilities to be taken, also acts as a motivational factor, having employees putting more effort on the job in sight of the better asset value they can obtain in the future.

Applying these theoretical concepts to the COVID pandemic, we see no real need of additional low-level employees, as a fact, they are the ones being let go since there has been an overall decrease in production, so blue collar jobs are the ones disrupted and with fewer job postings. What employers really need are motivated workers and white collars employees, so the best way to obtain both for them is internally promoting the ones they already have also due to the harshness of labour market. They can incentivise their workers with a promise of promotion (there are multiple ways to do so, either are viable as long as the applicants don't sabotage each other) so that it acts as a motivation incentive, they already know if they are good or bad workers, so screening isn't required, plus the vacancy they leave behind doesn't need to be filled, since they are facing a decreased demand.

Would the firm opt to use external hiring to fill a top managerial position, they would have faced substantial screening costs (in order to prevent the disadvantage from asymmetrical information, or the agent not sharing clearly his knowledge and his motives) and choose the most talented within the many applicants (which can be more than usual, as we can expect that any job posting will be overwhelmed with applications, since unemployment is high and hiring positions are at their lowest level), and said chosen most talented worker might also perform a hidden action (ex-post the signing of the contract, the agent decides to put less effort than he's required, becoming a "bad worker" and resulting in a negative outcome of the screening process), plus they would have to let go of several lower level employees,

with whom they already have an ongoing relationship, and to do so they also have to face firing costs, which may vary from one country to the other, and depend on how strong the syndicate of such category of workers is.

On the other hand, by internal promotion combines multiple effects in one simple solution, workers are more motivated because they expect a promotion, they can be offered training and get upskilled without the fear of losing them to other competitors and finally there isn't the need of firing as much low-tier workers, because the vacancy is created by the promoted employee, so there is no additional cost of firing and no cost whatsoever on screening, there is only the cost to upskill, that is moderate when considering the increased productivity of the promoted individuals on top of the skills acquired also by those who didn't obtain such promotion, that also comes with no increase in the salary for the latter category, since there hasn't been a change in their situation and they can't ask for a raise out of fear of not finding a new job outside the firm they got out of, as we previously discussed.

3.2.3. Government support

One of the last things the Government wants is for all firms to shut down and stop producing, bringing GDP down and the economic relevance of the state down. There's been an overall decrease for every economy in the world (Except in China, that saw a solid increase in GDP possibly due to the fact it's an economy based

more in export of goods instead of tourism or services, but yet isn't analysed due to a lack of reliable sources) and every country has tried to support their citizens by granting finances in various ways. For instance, Italy decided to fully exonerate the first year of contributions for a new hired employee, paying those without a job with their redundancy fund, or incentivising investments allocating money for both investments and job retention, offering additional opportunities to the sectors that have been hit the most by the pandemic. Looking back to the previous formula, this means that the amount of fixed costs linked to the worker is decreased, decreasing even more the optimal number of hours worked. On top of that, they granted a fiscal credit for enterprises that can prove a reduction in sales of an amount that can go from 30 to 60% of the rent paid for small-medium enterprises.

France implemented a “temporary unemployment”, providing direct funds to whoever asks for them to maintain employees who are unable to work, thus reducing redundancies and lay-offs; UK chose to offer aid directly to those in financial hardship with the furlough scheme that reduces the number of working hours without letting go the employer, much similar to what Germany has done with the “Kurzarbeit”, favouring sectors that experienced a steeper decline and paused employers' social security contributions for employees.

In USA, the administration signed the CARES act (Coronavirus aid, relief, and economic support), incentivizing employers to keep their employees in their payroll even if not needed (a job retention scheme, in practice), by granting a tax credit of

50% up to 10.000\$¹². In addition to that, the government provides assistance for families, small enterprises, institutions and financial asset owners, allocating direct relief and guidance for those in need.

In conclusion Government policies have a direct effect in employment, reducing the costs linked to hiring and maintaining workers so that firms can function. Policies such as these can break or save a firm from bankruptcy, especially in America, where the market is less regulated, but it's also important to consider that it's not free money: aids create a debt imbalance which will require to be refunded by future taxpayers. The trade-off is still worthed for most companies, but still an improvement of the system itself could be more beneficial and less expensive for the treasury, and consequentially a smaller burden to withstand for tomorrow's citizens.

3.3. PRODUCTION VARIATIONS

As far as production's operational side is concerned, there hasn't been a great change for firms. Obviously, the reduction in volume is sensible, yet not for every sector: business that produce necessity goods such as food, hygiene products and so on, have seen a slight increase, while e-commerce sales have exploded up to 50.2% more, but more traditional business such as clothing and shoes plummeted

¹² <https://home.treasury.gov/policy-issues/cares/preserving-jobs-for-american-industry>

with 37.7 and 45.8% reduction respectively. Despite the massive decrease in GDP, in one hand this issue doesn't affect much our analysis, being focused on the labour market from an operational point of view; in the other hand, firms require more effort from a single worker (the ones that have not been fired), training them and giving them more responsibilities than before, resting assured that he wouldn't risk unemployment to have his talent recognised.

3.3.1. Product diversification

The very first thing a firm do to adapt to consumption's variation is to follow demand fluctuations. As old products lose demand, it becomes pointless to keep producing them, since it would only increase warehousing costs, with slim possibility of selling the stock. A flexible production can adapt to what people want in the amount that they want, starting new product lines even if they have no relevance to the firm's mission itself. Some examples can be BrewDog, a British brewery that started producing hand sanitizers, or Foxconn technologies group, an Apples' iPhone manufacturer, diverted their production to face masks after the COVID-19 outbreak. Some less drastic example can be Pfizer, a pharmaceutical company that halted other medicines to focus on the research for a vaccine, outsourcing their core production to other companies.

These products are defined "opportunistic products", developed after a catastrophic occurrence and of which demand has exploded in a very short amount

of time. They depend on society's needs and are typically seen as a positive action from the public, but it's a diversification not planned, an adaptation with no clear prospects, it might continue even after the end of the emergency or demand may stop abruptly, leaving the firm with worthless items to account for. Opportunistic products are just not supported by the system, they need a partial restructuring of the firm to be properly implemented and it might be hard to revert once the opportunity is over. And yet, it might be the only way to retain competitiveness.

Their difference from "emergency goods" or just a proper product differentiation is the time spent before launching the product itself: the latter ones have a longer development period with a mid to long term positioning strategy, an example of emergency good might be an umbrella, every store has them but they sell more during a rainy day; or as toilet paper has been at the start of the pandemic in USA, despite there not being such a clear connection between the two. Opportunistic products just sell as long as the emergency prolongs, gradually losing value as the risk diminishes and not having much use after the emergency's over.

Another issue with those products is on how to handle the new customers, which are not easy to retain after the opportunistic product has lost its use (think of BrewDog's hand sanitizers, they now added pharmacies to their clients and they operate in a different way than pubs and such, requiring sensible changes to their internal and external logistics), therefore firms shouldn't heavily invest to change

their production system, only if it's easily implemented, always keeping in mind what effects their decisions might have in the long term, not just in the short term.

3.3.2. Investment in skills

Reduced job postings and an increased number of layoffs has led firms to make the most of the workers they already have, making an investment in skills more worthed than ever. The simplest example can be training their people to use a selected software for conference calls, or how to remotely access their office documents when in smart working.

Additional generic training in a perfect market situation (perfect mobility from a firm to the other, low unemployment and high turnover) typically leads to the worker asking for a raise and take all his increased productivity or leaving the firm, looking for a better paying job. These outcomes were uncommon before since the labour market has always been far from perfect, but now more than ever looking for a better paid position it's too much of a risk and a non-believable threat due to the previously discussed stop in hiring new personnel. In a perfect labour market, the employer never finds convenient to pay generic training for their employees. In fact, according to the game theory in a situation of subsequential moves, after receiving training a worker can be content or acknowledge his increase in productivity and ask his employer for a raise. Would the employer grant the raise, he would lose the extra productivity linked to training and still sustain a fixed cost

of training, finding himself at loss. If he denies the raise, the worker than can choose if staying with his usual pay or quit the firm, or quit his position knowing that in the labour market there is at least another firm with a better offer, leaving the firm short of the training cost and the whole productivity generated by a worker¹³. Would he choose to leave, he might face some costs such as preemptive termination of a contract, costs to move near the new facility, opportunity cost in case he cannot find a new position straight away, meaning he's unemployed for some time. In the perfect labour market such preoccupations aren't considered, but in the real world and especially during a crisis, they become insurmountable problems that discourage

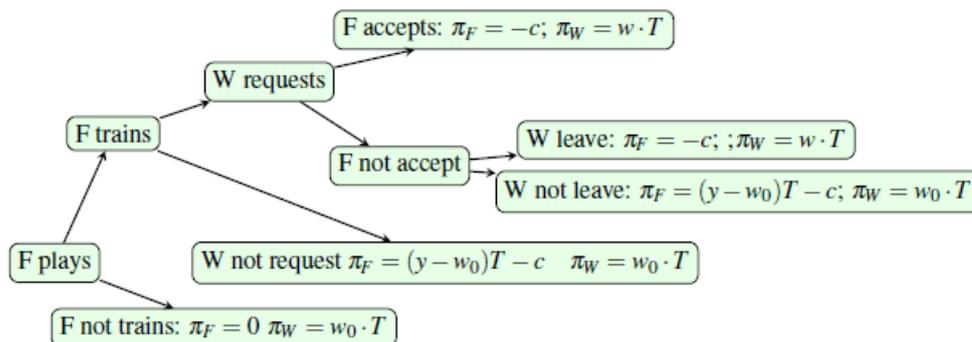


Figure 10: Subsequential game, in a perfect labour market the equilibrium would lead the worker to leave

workers from leaving the firm.

Otherwise, a firm can offer specific training, making the increased productivity worthless to other firms, therefore preventing a worker from threatening to quit.

¹³ Generic notes on personnel economics, S. Staffolani, 2019

Specific training is in fact only usable by the firm that supplies it, an example can be how to use an internally produced machinery or software.

A firm's option is typically to train lower level employees with generic training, if they want to resign, they can easily be substituted, the capital loss is smaller and so is the increased productivity. For higher levels, it's always preferable to train with specific training since they have a much more sensible increase in productivity and it highly reduces the risk of any relevant employee from quitting.

Aside from what is convenient and what's best for a firm, training is never exclusive and specific or too much generic, as any other thing is a compromise of the two. In fact, specific training always has a degree of skills that can be valid for any other firm, even if they cannot use it entirely. We will call the amount of general training μ , where $0 < \mu < 1$ and when it's equal to 0, it means that training is completely specific. Also, after training we define the increased productivity as $(1 + \alpha)y$, while the new wage depends on the bargaining power of the firm (β). After calculating expected profits, utilities, and total rent, we can find the optimal wage deserved by the worker also including the cost of training divided the timeframe we expect to retain the worker, therefore we eventually find:

$$E_{(\pi)} = -c + [(1 + \alpha)y - w^*]T$$

$$R = -c + [(1 + \alpha)y - w^*]T + [w^* - (1 + \alpha\mu)w_0]T$$

So, after defining $\beta = E_{(\pi)}/R$ and solving for w^* ,

$$w^* = \beta(1 + \alpha\mu)y + (1 - \beta) \cdot \left[(1 + \alpha)y - \frac{c}{T} \right]$$

our future wage is function of the expected productivity on other firms and the increased productivity in the firm that disbursed training.

During COVID-19, the firm has a much stronger bargaining power linked to a more volatile labour market and the reduced job postings, bringing β closer to 1 and so the wage variation doesn't need to take into consideration what other firms can offer. Whether training is specific or generic, Nash's equilibrium from the subsequential game doesn't lead to the worker leaving, since it's not believable that he goes back to the labour market, but it's either him not asking for a raise or him being denied said raise, therefore it doesn't even matter how generic the training is (μ can be anything between 0 and 1) since it cannot be used by others anyway due to the unbelievable threat of being hired somewhere else, leading to an optimal wage that is the same wage rate before training with an increased productivity during and after the pandemic. Things may change after the crisis, forcing firms to eventually grant the raise to retain workers, but it's still convenient as long as the short-term extra profits can cover the training cost.

There has also been a massive increase in the use of webinars, remotely conducted seminars on any topic. It became common practice as soon as the pandemic started, especially between intellectuals and scholars, but also in the managerial environment, allowing people to attend seminars and lectures

worldwide through a computer application, depending on the topic and who is attending, it can reward certifications or credits, can be easily conducted from home (since smart working is so much common, people already know how to use such soft-wares) and it doesn't take much more effort, compared to having to travel to some city nearby, either in an university or an auditorium, taking half a day off or more to achieve the same end result. It's a quality of life improvement that wasn't yet deemed necessary until movement hasn't been commonly prevented. Webinars can be either for free or for a small fee (going from 20€ up to 100€ on average), now used as a training platform for a wide array of people, spanning from employees to updating professionals in their line of work to so that they can keep up with the constantly changing laws (for instance accountants in Italy already used webinars to learn about some of the most recent changes in the fiscal framework, obtaining their credits along with some seminars that required physical attendance, now exclusively done on line), on top of teachers who are obligated to have classes and lectures from the distance, now even used from actors, as a matter of fact they started streaming theatrical works, allowing even a night at the Opera from the comfort of our living room.

3.3.3. Motivating workers

Despite talent and effort differences between workers, it's also important to make them feel safe and protected in their environment, so that they have fewer

distractions. A quote used often is “a happy employee is a productive employee”, meaning there is a relationship between the mental state of a worker and his actions on the job. Scholars have tried to find the reason behind this statement and defined motivation as “the process of influencing or encouraging from outside a person or a group so they will carry out a predetermined action” and it can be achieved in a multitude of ways. It’s usually divided in extrinsic and intrinsic motivation:

- Extrinsic motivation comes from outside the employee and is simplified with the wage he receives. It’s simple and straightforward, he’s happier if he’s paid more to do something, we analysed this within the utility function. Some examples can be bonuses, seniority payment, variable paying schemes and the chance of an internal promotion, its efficiency is linked to the cash-flows available, but in this particular situation we assume it’s not the best course of action (the reduced volume of affairs doesn’t provide enough money to extrinsically motivate workers);
- Intrinsic motivation comes from within the worker and is described as the satisfaction he obtains by simply doing what he is supposed to do by the contract. It can be naturally coming from within, such is the case for voluntary work, people aren’t usually paid much but they do it anyway because helping others makes them feel better about themselves, they help their community in order to offer a better life for their peers and the future generations; or a worker who particularly enjoys his position,

obtaining a personal gratification that makes him want to do more. Otherwise, it can be pushed in from his superiors, by offering a healthy workspace, by praising little successes and make them feel cared for as a person, opposed to being just means to obtain more profit. It's usually preferred when the task is complex and requires creativity, incentivising workers to put in more effort. During the pandemic, it can mean the difference between a worker who shows up despite the risks involved and a shirker who halts the production or slacks off.

Since extrinsic motivation was indirectly considered early on in this dissertation, let's focus on intrinsic motivation, how it can be useful and how companies used it during COVID-19 to maximize productivity and profits.

To do so, we will follow a study conducted in Indonesia, where staff members from several universities are interviewed to understand how they were affected from working from home, how their superiors interacted, motivated, and supported them in both the transitional period and after the established decision to keep working via internet calls¹⁴. Then, they clustered the answers confronting staff from the top 10 universities in Jakarta with the others. Results show that top universities' overseers follow and help their subordinates more, introducing them to a set of new possible solutions to new issues, assisting them through conference calls with

¹⁴ The role of motivation and leadership style in improving the quality of employee performance, Izzah, 2020

setting up any change in the work system, providing internet connection and tools when needed and tranquilizing their peers against involuntary layoffs or any possible schedule change. In this way, people remained optimistic and kept working normally with minimal distractions from their homes and families, safe from infections and assured from their superiors. In contrast, staff from outside the top 10 universities in Jakarta showed low or minimal indications on how to work from home, no support either emotional or technical, strict controls and sanctions to prevent slack off and a general lack of coordination.

In the end, limited attentions from a superior during a complicated time discouraged employees from giving the best they can, they were distracted by the different environment and the fear of what would have happened in the case they lost their job, having to work in order to not be sanctioned in the meanwhile.

3.3.4. Leadership

The role of a leader is crucial during the pandemic, we already saw how much it affects subordinates, now let's focus on what he can do to have such effect.

A leader is someone who can influence the behaviour of others without using force, by inspiring and motivating, so that he becomes commonly accepted by the people he leads, and he isn't seen as a distant authority who doesn't care of who is beneath him as long as the job he requires is done. This is crucial during a crisis because workers are unsure and scared of the future, and they feel more comfortable

if they have a superior they can easily ask questions, from whom they don't feel belittled but encourages them instead. There are multiple ways to achieve this outcome, either by understanding personal needs of the workers and reward them for a well done job (defined transactional leadership, use of contingent rewards and immediate correction in case of mistakes), or by making them understand the importance of what they do and what more the industry can become (transformational leadership, who manages to transform the needs of his followers into the needs of his company), or by giving a vision of what they need to achieve, inspiring his workers to help him transform his vision into reality (visionary leadership, which is harder to pull off unless it's based on innovative technologies, but yields typically better results), giving them a sense of satisfaction just for being part of the process, boosting self-confidence and creating a generally positive environment. These are all forms of intrinsic motivation that help maintain productivity high, considering the number of fears that employee face daily during these trying times (i.e. job security, health safety, financial security and so on). The only way to positively influence his subordinates is by communication and example: making sure people can rely on him, talking casually about any concern, whether personal or professional.

A leader may use the fear of COVID-19 itself as a reason to have his team join together, because they all share the same personal uncertainty and it may help them ignore other lesser problems, employees are more prone to attend to training courses

(for instance LinkedIn has seen an increment in learning courses of three times since before the pandemic) and finally are proved to have fewer prejudices of their peers, all because they band together against the virus.

Basically, the leader's role is still the same, he still has to work with people but now he has to understand what changed and make sure his underlings do too, he must provide a sound system for the workers and make sure they feel comfortable with it.

4. WHAT WE CAN EXPECT FROM THE FUTURE

Predicting the future isn't possible obviously, what is instead doable is using data already collected from past crisis and the one we're living in order to understand what possible paths are more likely to be taken, what are the best options available to firms in order to survive, keeping in mind what they already learnt and achieved so far and during the pandemic. The world economic forum is specialised just in that: they tracked every variation in the labour market, learning strategies for empowering job transition from declining sectors and finding what are the best opportunities, what are the jobs that need to reskill and upskill their employees and which ones are doomed to decline with the implementation of automation and artificial intelligence.

4.1. COVID-19'S INTERFERENCE

COVID-19 is believed to have accelerated the changes that were due to come, despite the tragic deepening of the already existing inequalities on wage difference between men and women, but also between races belonging to specific minorities.

Automation, also boosted by the pandemic recession, has created a double disruption situation, where employers are incentivized to invest in new technologies in order to keep workers away, but also there hasn't been the expected creation of

new positions as of yet, therefore creating redundancies without implementing new positions and new jobs for the most recently unemployed.

As a matter of fact, thanks to the virus, we've seen an incredible leap in the day-to-day digitalisation, increasing the use of internet for work and leisure exponentially, but we've also seen job disruptions happening at an unprecedented pace, affecting the already sensible wage difference between sexes and between classes. For the following of this chapter we will focus on how employers believe they can implement technology so that these disruptions can be recovered, by offering something new, but also what is required from workers in order to be selected for such jobs.

4.1.1. The jobs of tomorrow

Companies all around the world are strongly interested implementing new technologies in order to increase the quality and reach of their core processes and products: most common technologies foreseen to implement are cloud computing, e-commerce, big data, but also encryption, non-humanoid robots, and AI, the final two being at first just a vague idea but now always more common, seen as the next frontier to reach. Those new technologies are believed to drive the future of production; therefore, firms are more than willing to spend capitals and invest in prepared personnel so that they can be the first to implement them. Some of them negatively affect the level of workforce, such as automation, which takes the place

of workers who physically do the job, but some firms believe they can expand employment by furtherly integrating said technologies with more prepared and trained labour in their production processes.

WEF conducted an interview worldwide to employers and employees, finding out what they think are going to be the jobs of our near future: redundant jobs are expected to decline, from 15.4% to 9% by 2025, more than 85 million positions will be disrupted and substituted by machines, while 97 million new roles may emerge in the form of labour augmented by the support of future machines, algorithms and AI, meaning new jobs positions may require capabilities concerning those fields and, most importantly, the willingness to learn more about them. These lead to an increasing need of cybersecurity since a fail in the system may compromise the whole operation, a topic not as thoroughly studied and discussed as it should, because ill-intentioned individuals can surf the web and easily access any system with little effort, with no risk of ever being discovered or caught. Higher level positions are expected to digitalise their operations, as 84% of employers are expecting to improve the working processes of the white-collar division, while 44% of the workforce can still operate remotely after the crisis.

The roles that are becoming redundant are the ones already displaced by new technologies, such as data entry clerks, secretaries, accountant and auditors, factory workers and finally administrative managers as the most threatened, followed by mechanics, financial analysts, bank tellers, and construction workers. Those

positions will be replaced by the “jobs of tomorrow” in a greater amount, but it surely requires a vast transformation of skills required over the flexibility and willingness to learn more.

4.1.2. *The path of change*

The potential transition to these new positions is slowed down by skill shortages, defined also as skill gaps, making it the biggest barrier needed to cross in order to start adopting new technologies. Employers interviewed supply consistent data and try to reduce such gap by providing courses of reskilling and upskilling to 62% of their workforce, aiming to increase said number of another 11% within 2025. However, only 42% of employees take up on these programs, with shortages more

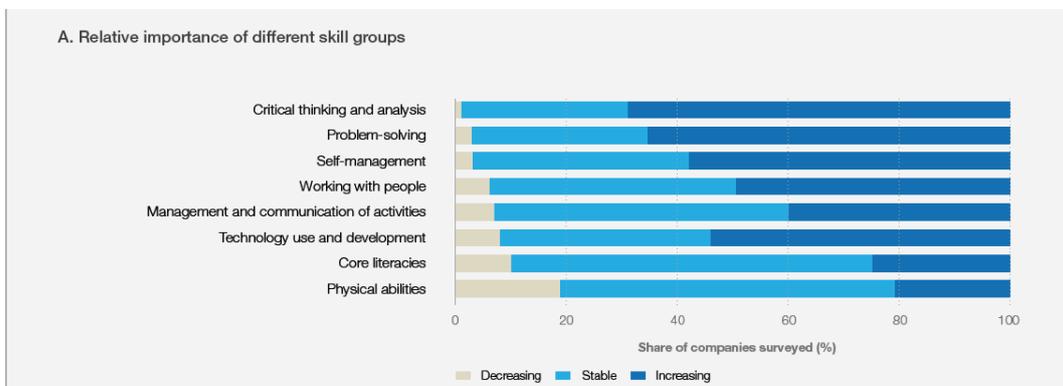


Figure 11: Important skills and how they need to evolve by the next 5 years

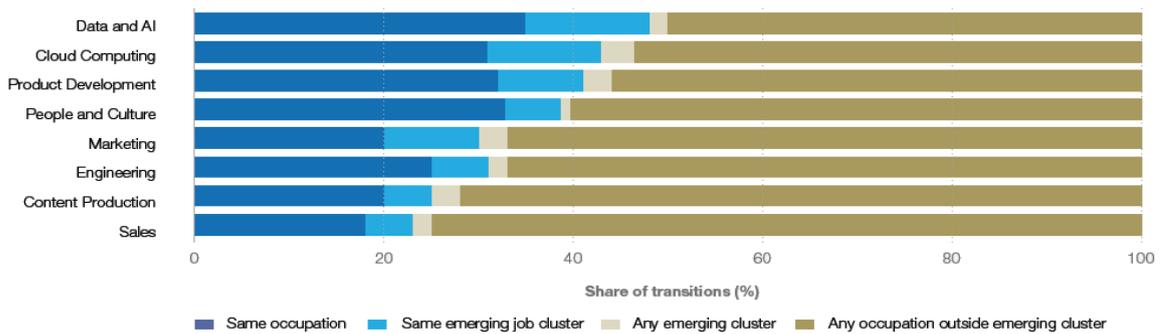
acute in emerging professions, making much more difficult for employer to find a good hire in the jobs of the future.

Figure 11 shows a plot of how skills are needed to evolve according to the employers interviewed, showing a stronger need of adaptability and soft skills, and

not specific knowledge of what is actually required to do, additional skills desired are personal development, health and more digital skills, spanning from data analysis to information technology, while physical and core abilities aren't required as much anymore.

Employees tend to prefer learning skills in self-management too, instead of more technical skills such as engineering, which was more in focus in 2019, meaning they are transitioning towards the fields more required by firms. The paper

A. Transition by occupation and job cluster of source occupation



B. Job pivots by skills similarity with source occupation

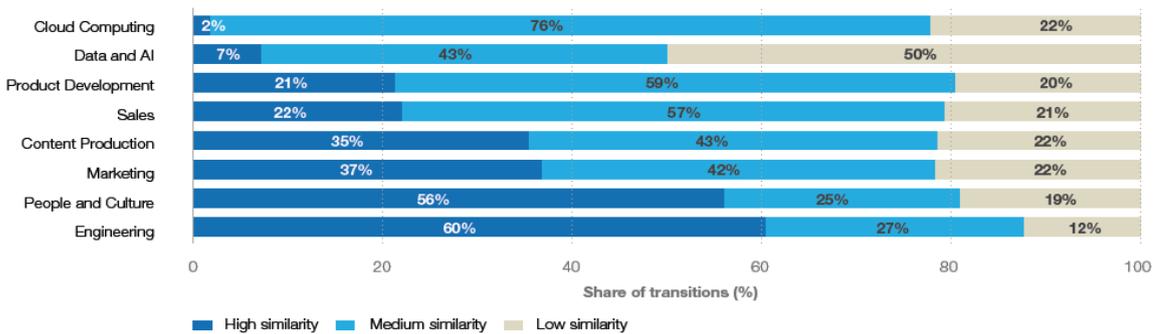


Figure 12A: Transitions into the emerging jobs, share based on the position of provenience.

Figure 12B: Share based on skill set

subsequentially analysed LinkedIn data about all employees who transitioned into a job of tomorrow between 2015 and 2020, the skills they already had and the ones they had to obtain: they found that 50% of new employees in data and ai professions come from a completely different sector and a non-emerging role, while marketing, engineering and content production have a much higher share of new workers coming from a completely different position.

Training will be disbursed mainly by firms with their internal capacity (covering as much as 39% of the total), supplementing it with external consultants (for 11%) and using on-line platforms (for 16% but it's strongly believed to grow), which has been strongly appreciated during the COVID-19 pandemic, as previously discussed in this dissertation, employees discovered how easy and convenient it is and they look out for opportunities by their own, quadrupling the previous number, while courses offered by employers and government programmes have increased respectively by five and nine times. The widespread availability of courses allows reskilling for workers who move between positions with different requirements, and they can be up to date in a matter of a few months.

All this data makes us understand that technological advancement shouldn't be looked as a threat to employment and future well-being, but as we started to witness during the pandemic, automation and human labour augmenting technologies will create more positions that weren't even considered before, COVID-19 simply pushed and accelerated the transition, but job creations is still lagging behind how

quickly they are disrupted, due to an overall decrease in the volume of exchanges. It's essential to keep monitoring new opportunities emerging in the labour market from enlightened employers who pioneer new technologies, because there is no real hope for those stale positions that were disrupted to come back, or if they do, they won't stay for long.

This transition is impossible to apply without a proper government support, workers can't possibly figure by their own what opportunity is better for them and what skills they are required to learn in order to obtain that position. Moreover, employers and shareholders must understand the newfound importance of man for the jobs of tomorrow, furtherly investing in human and social capital.

Government must simply simplify the paths for employees and employer to meet education providers, so that they can acquire the skills so much required, instead of constantly lagging behind and learning them after they have already occupied the position, as a LinkedIn collection of data proved.

4.2. TOURISM AND SELF-EMPLOYMENT

As discussed previously, tourism has been one of the most affected sectors world-wide, since people were not allowed to go out either for a fun night with friends or a family holiday, alongside travel institutions, private and public transportation, receptive enterprises such as hotels, restaurants, pubs, and discos, shifting many owners of such structures to implement their offers or just close for

bankruptcy and open a different enterprise, given the owner can afford and has the opportunity to do so.

4.2.1. Tourism industry's future

Tourism is a sector that literally froze, facing mandatory closure in order to slow down the contagion, people prevented to travel by law (e.g. Italian government modulated the freedom to travel according to how much infected the region is, dividing the peninsula in three colours: red blocks any movement, even between municipalities, orange allows travels within the region and yellow allows to move to other regions), or even if they can move but are either simply scared to because of the virus itself, or who are not motivated because social life restrictions and no real entertainment locations to attend, led to a dampening of affairs, eventually closures, affecting overall economy of the country itself (especially those whose GDP are made by a large part by tourism, such as Italy or Spain).

Tourism has also been one of the biggest sectors for employment in pre-Covid era, for both full-time and casual workers, leading to a big portion of disruptions created last year.

Italian government tried to save this sector offering a holiday bonus up to 500€ to families as long as they made their holidays within Italy, with the “decreto rilancio” (DL n.34 of 19/05/2020), but wasn't really enough to motivate citizens to travel, and didn't support any of the enterprises after the summer, convoluting back

to a stale situation where no one spends money for leisure and similar activities, eventually reverting back to general closure as soon as the “second wave” started, so as soon as summertime ended. As a matter of fact, winter tourism in early 2021 faced a mandatory lockdown, closing every ski resort, costing around 9.7 billion euros and leaving with no occupation over 9.000 seasonal workers with 5.000 more with a permanent contract, basically annulling any possible income for such enterprises and killing this year’s possible income for a big portion of the mountain population in Italy.

4.2.2. Self-employment

Throughout the last decades we saw an increasing trend on new Small-Medium Enterprises (SMEs), both due to an increase in competition and a more difficult labour market, making it advantageous for a newly unemployed to start his own business instead of remaining unemployed for longer periods of time. People start SMEs for necessity, as there is no possible opening for them in the area they reside, or for personal vocation, especially individuals of 25 years and older, highly educated and with higher risk tolerance choose to make their own start-up, people with a need of personal accomplishment and a will of adopting new technologies, or maybe because they can’t stand being dependent of someone else, because they want to call their own shots while doing what they love.

Self-employment allows people to create their own image and product, building up a loyal clientele with whom they directly interact, opposed to the hierarchy of command in a multinational, customers feel more cared for and the products offered tend to be of better quality, also offering a higher degree of personalisation of such products. Italy for instance has one of the highest shares of small and medium enterprises, making up to 40% of Italy's GDP and employing around 6 million people. On average men tend to prefer going on their own, with women occupying around a third of the self-employed, but they tend to select sectors with high technological and knowledge level.

The beginning of the COVID-19 pandemic heavily affected SMEs, since they have a much weaker structure, they are less prepared to face a full scale crisis, especially those that require a certain degree of physical movement and interpersonal interactions (those belonging to the discussed, strongly affected sectors), also those led by an entrepreneur with a lower level of education don't fare as well (Beland et al., 2020), while the more educated are more versatile and manage to face difficulties and overcome them by adapting. The small scale of their production process also makes it easier for SMEs to be flexible with their outcome, they can also exploit opportunity products and quickly adapt their offer with what is asked by the population, something that will take longer times and bigger investments from a big firm or multinational. Entrepreneurs are also more used to

innovative thinking and out-of-the-box solutions, allowing them to find original solutions to every problem.

Self-employment is also a valid solution for the most recently unemployed, they can personally start their own activity and put their collected knowledge to the table, offering new products and services, using the most recent technologies to achieve what they never had the courage to do because they had the safety of their previous position. Utility earned by a self-employed subject is drastically different from the one obtained by an employee of any firm: the self-employed does not obtain a fixed salary but it depends on how well business is going for his firm, so he does not have any form of tranquillity or safeness, on that regard, but he also obtains less disutility for the same amount of effort and time spent inside his firm, because he is directly interested in the business's well being plus he obtains a personal satisfaction for doing what he likes in the way he likes, taking his own decisions and making his own mistakes, even mistakes are a way to learn more and grow, he's not scared to make them because no one is going to punish him for them (he might earn less for them, but he will not repeat them so in the long run it can be seen as an investment in knowledge, not as loss). Even the disutility obtained from working is reduced, the self-employed feels less encumbered by the workload, sometimes to the point of working way more than what they ought to do, scared to have someone else in charge, maybe because they believe a subordinate cannot do a job good enough, therefore they want to supervise every single aspect of their enterprise.

In conclusion, self-employment gives the opportunity to better react to the pandemic, compared to a low level employee who has to wait for instructions and depend on what his superiors believe to be the best course of action and are too scared to reject any decision they perceive as unfair since their income depends on it, entrepreneurs are more inclined to take risks, they also have a higher motivation because the enterprise is what they created through the years and have no intention of losing it and seeing it struggle for external reasons, plus they receive more government support given their delicate structure, or simply for the reason that they make up for the majority of any country's gross production. The sum of these factors allow self-employed entrepreneurs to quickly recover after the crisis, the entrepreneurial spirit fuels them to overcome any inconvenience, being far more motivated since not only their salary is at risk, but their dreams as long as the emergency situation gives them the means to do so, otherwise the decline in GDP and employment will be much worse than what we have seen so far.

CONCLUSIONS

COVID-19, on top of the millions of lives it took so far around the globe, has had tremendous side-effects to the economic fabric of every country, this without a doubt has been a tragic outcome. It mined the tranquillity people had to do basic things in everyday life, transforming the attitude we have when facing the most simple things and completely changing our mentality, we renounced at social functions that we always assumed for granted, we avoid to go places if there are people inside, we keep distance from bystanders and avoid body contact at all costs. The fear it created led governments to mandatory lockdowns and curfews, renouncing our freedom to prevent the virus from spreading, despite such laws in a different time would have never been accepted by the public.

By consequence, when people stop going around, scared of what might happen, on top of the inability to open several types of business, companies stop their transactions, goods are not exchanged in the same amounts and productions need to decrease, and so do the people working there. We saw how unemployment spiked in just a few days, we witnessed stores not able to function for lack of clientele and we are accomplices of their termination without any power to prevent it. But after the initial fear, some firms restarted producing, some came up with innovative ways to resist by changing their production system or by offering new products and services altogether. Many employees who had been fired for the lack of business

were reinstated to their previous position, remote working (“smart” as it’s called in Italy) turned the normality while it was disregarded before, people are more willing to train to increase their productivity and are less discouraged from taking responsibilities, becoming a more valued asset for the company they work for.

In conclusion, what we learned from this crisis, as far as the labour market and the firms’ productivity are concerned, is that workers are willing to do whatever it takes, they adapt easily to necessity and they’re willing to learn. Some new routines are expected to last even long after the crisis has passed, such as working from home, that standing to what employees say they’re more than willing to retain this drastic measure, appreciating the freedom it gives them and the flexibility to better use the time in a day, mixing work and hobbies without having the need to go outside, without traveling by car or by public transit.

On the other side, employers widely appreciate the boost in productivity, despite being less willing to keep work from home as widespread as it now is, plus they learned how important their presence is for their underlings, how they need to talk and motivate them all the time and understand their problems and fears.

After all, we’ve all grown during the pandemic, learning new skills, putting more effort in what we do, especially during such daring times, for the sake of everybody around us; from now on we just have to hold dear of what we learned and keep doing the best we can to keep improving ourselves, because by doing so we can face the pandemic with the minimal amount of issues, confident of what we know

and we will also be better prepared for facing similar inconveniences that might happen in the future, for how bad and ugly it can be we now have the tools, the methods and the abilities to not panic.

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