

## Task 4.1

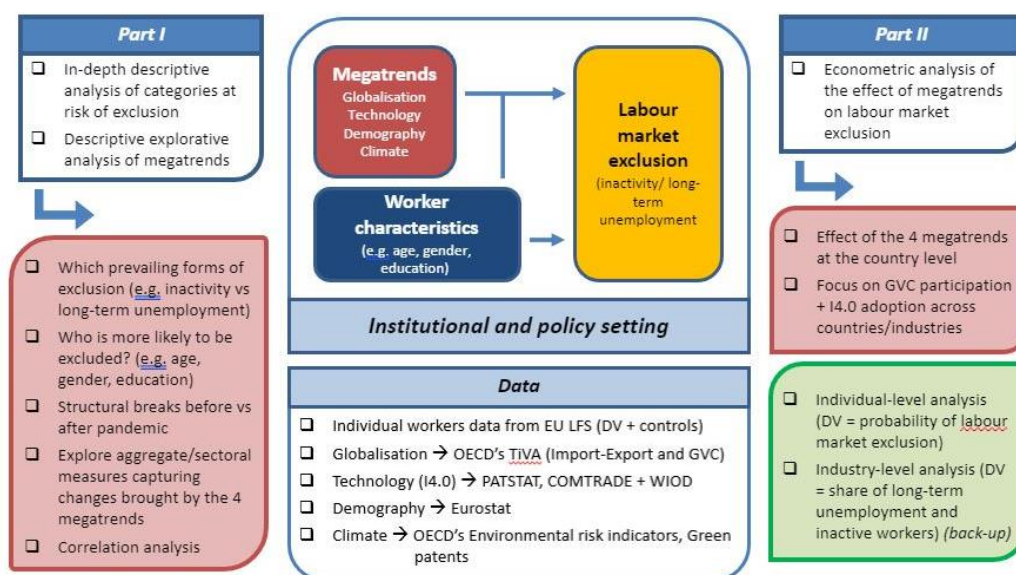
### Demand megatrends and risks of labour market exclusion

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#### 1. Task description

This task aims at identifying which groups of workers are at higher risks of labour market exclusion due to the megatrends. We will study the link between ‘context’ variables depicting megatrends and the probability of individuals being employed, unemployed, or out of the labour force. We will use econometric methods aimed at establishing causal relationships with observational data, e.g. IV, Diff-in-Diff, Heckman correction.

Figure 1. Overview of Task 4.1



## 2. Background / Setting

The European working population is undergoing structural and compositional changes hitting across different demographic groups, i.e. from younger to elder workers, across gender and between workers possessing different educational attainment. These changes have been exacerbated by various megatrends. First, technological change, with special reference to the diffusion of automation, artificial intelligence and, in general, advanced manufacturing technologies of the Industry 4.0 (I4.0) pushed through by the advent of the fourth industrial revolution (4IR) have fostered a renewed interest in the effect of technological transformations on the labour market. Second, trends in globalisation, with the emergence of Global Value Chains (GVCs) in late 80s – and the resulting international division of labour across value chain activities – have profoundly changed the structure and concentration of trade, related productive tasks, hence labour. Third, the challenges introduced by climate change and the recent commitment to shift towards a green economy and the revived ambition to reduce greenhouse gas emissions – signalled for example by the European Green Deal and the Inflation Reduction Act – are pushing through further structural changes across economies, ranging from subsidies to the development of green technologies to investments in the production of clean energy, which can have significant effect on the labour market. Fourth, changes in the long-run demographic trends characterising EU economies (e.g. aging, mobility, immigration, etc.) may play a role in either directly affect employment dynamics or indirectly boost or slow down the effects of other megatrends.

All these changes are creating winner and losers, and creating the condition for a rising number of workers to face the risk of labour market exclusion – i.e. those not in employment, education and training (NEETs) or, more generally, those facing long term unemployment, periods of inactivity, temporary employment. Thus, further contributing to increasing inequality.

## 3. State-of-the-art

The exclusion phenomenon has increasingly gathered attention given the profound implications that a worker's exclusion from the labour market has from an economic point of view – first and foremost, a higher risk of facing poverty – and, more generally, from a social and psychological perspective, being associated with self-worth issues, vulnerability, poor motivation or scarce social links (Fang and Gunderson, 2015). Furthermore, labour market exclusion becomes prominent in times of rising inequality (Fortin et al.,

2012), this being exacerbated by overall demographic changes, and structural shifts in the labour market, such as the emergence of skill mismatch.

Vulnerable workers at risk of poverty, labour market exclusion and/or limited participation may lack the skills and education to suit effectively in the new digital, green, and ever global economy. Indeed, returns to education remain high and the shortcomings associated with dropping out of school are substantial (Gunderson and Oreopoulos, 2010). Specifically, NEET individuals are one of the categories more exposed to such risk – being a heterogeneous group (Eurofound, 2016), but including many young people (Chung et al., 2012) – although the recent Covid-19 pandemic has resulted in an enlargement of the NEET category well beyond youths (European Commission, 2021).

Beyond this, vulnerable workers may be permanently and involuntarily trapped in low-quality jobs, often involving non-standard employment, preventing them from finding higher-quality jobs (Fang and Gunderson, 2015; Jackson, 2004). While these aspects of labour market exclusion are important per se, the intersection of these dimensions with major changes brought by the four megatrends discussed earlier remains under investigated.

Looking at the four megatrends under investigation, a wide empirical literature investigates the relationship between technological change and employment at different levels of aggregation (i.e. individual, firm, industry, and country level), using different sources of information to proxy technological progress (i.e. survey data, R&D or investment expenditures, patent and/or import data). More recently, a stream of this literature has focused on the diffusion (looking at either the production, the adoption or both) of specific capital-embodied innovations such as ICT, automation processes, and other I4.0 technologies. The empirical evidence is inconclusive when looking at the effect on total employment, while results are quite robust in showing a labour market polarisation effect of these technologies (Autor et al., 2013; Michaels et al., 2014; Dauth et al. 2021; Graetz and Michaels 2018; Acemoglu and Restrepo 2020; Felice et al, 2022; Mann and Püttmann, 2021). In turn, the skill-biased technological change triggered by these new digital technologies may contribute to further reinforce the mechanism behind the exclusion from the labour market of individuals not endowed with the right competencies and not able to keep up with the underlying adjustment processes.

At the same time, in a world that has become more and more integrated, witnessing the upsurge of different types of supply chain trade – mostly, but not only, importing-to-produce, importing-to-export and value-added trade (Baldwin and Lopez-Gonzalez, 2015) – the role of advanced economies in the production of

ever more ‘global’ goods has drastically changed. With that, the relative composition of employment in both advanced and developing countries, for instance, by potentially triggering an upskilling of the labour force – and a shift towards higher value-adding production – in advanced economies (e.g. Grossman and Rossi-Hansberg, 2008). The empirical evidence seems to suggest that more advanced countries participating in GVCs do not experience a reduction in overall employment levels and become more high-skill oriented, while findings on developing economies are mixed (e.g. Ma et al., 2019; Banga, 2016). Thus, labour market polarisation effects seem to emerge (Crinò, 2012). Furthermore, traditional statistics may not reveal the full extent of global linkages (e.g. consumption of goods and labour demand, backward-forward industrial interdependencies) and how they relate to employment (Horvát et al., 2020), thus calling for further analysis on how such dynamics may affect the labour market exclusion of more vulnerable groups.

Finally, more vulnerable individuals – already exposed to the above-mentioned megatrends – are also likely to further suffer from a higher risk of exclusion resulting from demographic changes. For instance, empirical evidence suggests that an aging population trend, like that observed in more advanced European economies, is likely to induce further automation (Acemoglu and Restrepo, 2022). Similarly, exogenous shocks hitting the European labour market such as immigration – and, to a lesser extent, mobility within and across countries – is likely to lower chances of future employability for inactive or unemployed individuals, exacerbating their risk of exclusion from the labour market. Yet, such mechanisms may be conditional to the motives behind international migration (Dustmann et al., 2017) as well as policy responses, thus far from being clear and left for empirical assessment.

One potential ‘compensation’ mechanism could lie in the economic boost associated with the green transition, and the related potential for job creation (Markandya et al., 2016). The large effort required to reduce the environmental impact of economic activities (e.g. emissions of CO<sub>2</sub> and other greenhouse gases) has recently gathered attention, especially in the aftermath of the Covid-19 pandemic and the related EU recovery plan, i.e. the European Green Deal (European Commission, 2023). This huge commitment of economic resources is expected to contribute positively to European labour markets thanks to large investments in energy, transport and mobility infrastructures, potentially creating new opportunities also for those individuals more exposed to other structural shifts.

## 4. Advancement compared to the state of the art

We will provide a novel and nuanced understanding of the effect of the megatrends on labour market exclusion across countries and sectors. Key advancement on the state of the art will be:

- the joint effect of megatrends ranging from technology, globalisation, demographic changes and climate change on the categories of workers featuring the higher risk of labour market exclusion.
- the identification of the effect of specialisation of countries and sectors in global value chain activities on labour market exclusion of different categories of workers.
- the introduction new measures of introduction and adoption of Industry 4.0 technologies, relying on an innovative classification of patent information and import data at a very granular product level.

## 5. Research to be done

We will estimate the probability of labour market exclusion for different categories of workers at risk, by investigating long term unemployment and inactivity by gender, age and education as a function of proxies of megatrends, including globalisation (as measured by trade and GVC participation) technology, (as measured by innovation and adoption of I4.0 technologies), demographic changes (as measured by long run changes in the age composition of the workforce) and climate change (as measured by environmental risk indicators).

## 6. Methodology

We will produce in-depth descriptive analysis of the evolution of megatrends and their correlation with long term unemployment and inactivity.

We will employ regression analysis to estimate the probability of labour market exclusion. Ideally, we will try and exploit individual level information from the EU Labour Force Survey as a function of country-sector proxies of megatrends. This would allow to control for a range of worker-level characteristics. Alternatively, we will utilise information on the share of long-term unemployment and inactive workers (for different categories of workers at risk) at the country-sector.

## 7. Data sources

Dependent variables

- EU LFS data on long-term unemployment and inactive workers

## Independent variables

- Patent data (automation and green technologies) from PATSTAT and OECD's Regpat
- International trade data from COMTRADE
- Cross-country/cross-sector trade in intermediates data from WIOD
- Trade in Value Added data from OECD's TIVA
- Employment, labour costs, gross output, R&D and other country-sector variables data from OECD STAN and EU KLEMS
- OECD's Environmental risk indicators

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