Task 4.5

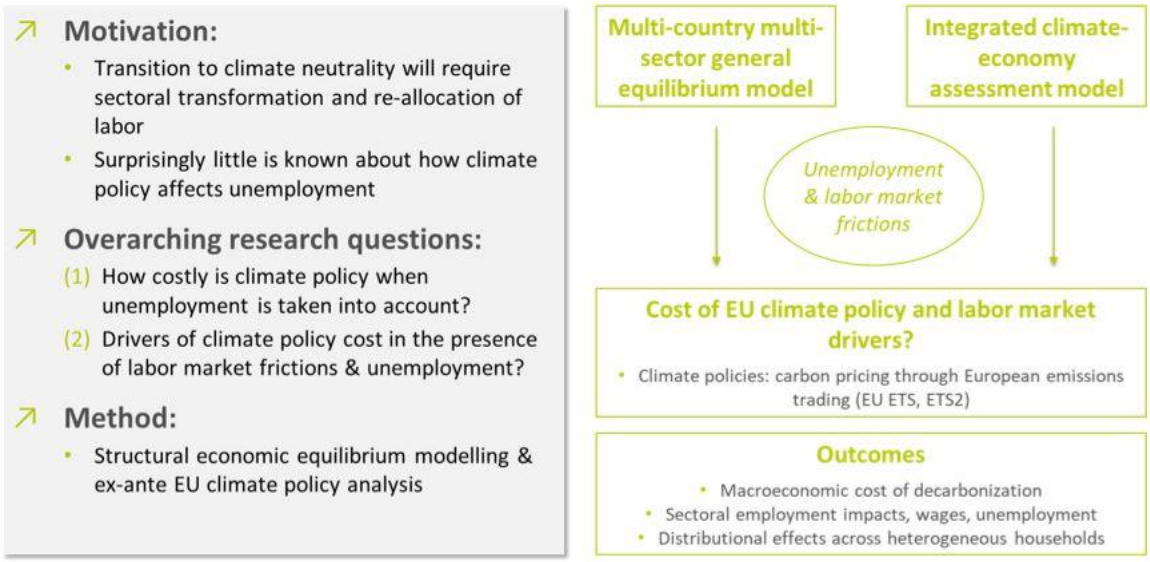
The effect of energy and climate policy on employment, wages, and income inequality

Leader: ZEW; Contributor: IBS

1. Task description

We will study the employment and inequality effects of climate policy, identifying which countries, regions, and groups of workers will face the strongest labour market shocks associated with the green transition in Europe. We will use a multi-sector Computable General Equilibrium (CGE) model of the European economy (each EU Member State), combined with a micro-simulation model calibrated on EU-HBS and EU-SILC data. We will account for price reactions, income effects, and labour market adjustments (employment, wages). We design scenarios for EU climate policy and will determine their distributional effects across regions, industries, and various types of households (e.g. by income groups).

Figure 1. Overview of Task 4.5



2. Background / Setting

Cost assessments are important for climate policy design and evaluation. Most studies modeling climate policy costs assume full employment and abstract away from labour market imperfections. A drawback of this approach is that it neglects any interactions between climate policy and unemployment. Failing to account for employment effects might alter the perceived efficiency of a given policy. It is therefore important to understand whether economic outcomes change if the impact on unemployment is considered. This would shed light on how unemployment interacts with climate policy costs. It would also provide an indication of how well models without unemployment describe the economic performance of climate policy.

3. State-of-the-art

The literature on labour markets and climate policy is still sparse but emerging. A major strand of this literature has examined the impact of environmental regulation on unemployment using empirical methods (Yip, 2018; Curtis, 2018; Greenstone, 2002; Morgenstern, Pizer and Shih, 2002) and GE models (Hafstead and Williams, 2018; Hafstead, Williams and Chen, 2022; Castellanos and Heutel, 2019; Heutel and Zhang, 2021). These studies focus on the employment consequences of environmental regulation. Surprisingly little is known on how unemployment affects the cost of environmental regulation. In this project, we aim to fill this gap and propose a different approach from the studies using general equilibrium (GE) modelling, i.e. which have traditionally been used to assess the economic cost and benefits of climate policy. While in previous studies unemployment is a permanent model feature, it is important to understand how welfare of a carbon emissions reduction policy depends on whether unemployment is included or not. A study most similar to our planned project is Guivarch et al. (2011). Using a dynamic GE framework, they model unemployment with a wage curve and assess various carbon pricing scenarios with and without unemployment. They find that the inclusion of unemployment in their model exacerbates welfare losses from carbon pricing. A similar result is shown by Babiker and Eckaus (2007) who represent unemployment with a minimum wage in the EPPA general equilibrium model. They find that accounting for unemployment increases the cost of aligning emissions with the Kyoto Protocol.

4. Advancement compared to the state of the art and research to be done

We make two contributions relative to the existing literature. First, we assess the importance of unemployment for climate policy costs in two of the most prevalent modeling paradigms: a numerical GE model and an Integrated Assessment Model (see Nordhaus DICE model). While several studies have incorporated unemployment in numerical GE models, few have added unemployment to IAMs. We aim to fill this important research gap by showing how the cost of climate policy in DICE is impacted by unemployment. Second, we provide a systematic analysis of the cost drivers of climate policy with unemployment. In particular, we examine the roles of key parameters that shape the relationship between unemployment and climate policy costs. We thereby build on the analysis of Guivarch et al. (2011) who assess the impact of changing the wage curve elasticity. We also show the effects of varying the benchmark unemployment rate, the emissions reduction target and the determinants of the endogenous real wage.

This project aims to answer two main questions: (1) How costly is climate policy when unemployment is taken into account, and (2) What determines the cost of climate policy in the presence of unemployment? Besides these main questions, our analytical framework will enable to examine how wage and income inequality (between labour and capital income, and potentially heterogeneous households) is affects by climate policy and through the "unemployment" channel. We design scenarios for EU climate policy and will determine their distributional effects across regions, industries, and various types of households (e.g. by income groups).

5. Methodology

We will develop and apply ex-ante simulation analysis based on two modelling paradigms to conduct positive and normative welfare analyses of the effects of unemployment for the cost and benefits of climate policy in a system of interconnected markets for output, intermediate inputs, and factors markets. First, we will develop and apply a multi-country multi-sector general equilibrium models which is calibrated to the EU economy. Second, we develop a novel version of Bill Nordhaus' DICE model, a dynamic integrated assessment general equilibrium where we re-formulate the conventional optimization model as a decentralized equilibrium problem and introduce unemployment.

6. Data sources

GTAP: National income and product accounts for EU countries and "Rest of the World" based on data from the *Global Trade Analysis Data Project.*

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