DEPARTMENT OF BANKING AND FINANCE
UNIVERSITY OF ZURICH

University of Zurich UZH

M.A. RESEARCH PROPOSAL

MICHELE SENKAL
17-317-868
Proposed: 15/02/2023
Supervisors: Dr. Ongena Steven UZH
External Supervisors: Dr. Unterberger Christian UBS &
Dr. Hammer Dominik UBS

UBS

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1 Proposed Title

Impact of climate change and low carbon emission policies on inflation in OECD member countries.

2 Background and Literature Review

2.1 Introductory Statement

According to the annual report of FINMA (2020) in the long run, financial institutions and society at large may face significant financial risks due to the effects of climate change. The IPCC (2022) report points out the importance of taking action towards limiting global warming to 1.5 degrees by 2050 in order to prevent dramatic repercussions to future generations and it clearly shows the link between anthropogenic greenhouse gas emissions and global warming. To limit the latter, large transitions in the energy sector are required, which means a paradigm switch from a widespread fossil fuel use to the electrification, alternative fuels and improved energy efficiency. Along with new climate policies, the development of new infrastructure and technologies are needed to significantly cut greenhouse gas emissions by 2050, as per the Paris Agreement [1]. Albeit, this is an imperative, the shift to a low-carbon economy bears transitions risks for the wider economy, through two channels. First, emission reduction policies, e.g., carbon pricing, may particularly affect carbon intense production as well as sectors that can not easily move to low emission production technologies. At the same time, expansionary fiscal policies supporting the green transition potentially create inflationary pressure.

This thesis analyzes climate change related transition risks associated with policies that target to accelerate the move to low emission production and lifestyles. Specifically, the thesis analyzes how carbon emission policies affect inflation. This is particularly relevant since several economies started to introduce policies, which are targeted at accelerating a green transition. Generally, these fiscal policies are of expansionary nature, hence for monetarty authorities it will be crucial to understand their impacts on inflation.

Finally, the critical macro indicators, under scrutiny, linked to transition risks such as CPI, energy prices and fossil fuel price call for a thourough empirical analysis of such linkages.

2.2 Research Context

Several new policy initiatives targeting the transition to a low emission economy have been put forward. Essentially, three initiatives deserve particular attention. 1) The EU's "fit for 55" policy that aims to reduce greenhouse gas emissions by 55% by 2030, compared to 1990 levels, through a mix of renewable energy and energy efficiency measures. 2) The US Infrastructure Investment Jobs Act 3) The Inflation Reduction Act aim to upgrade and improve the country's infrastructure and promote economic growth, in part through investments in low-emission energy technologies.

While these policies may have different specific goals and target different issues, they are all policy actions taken by government entities to address important environmental and economic issues, such as countries' way in the global fight against climate change or drive the global clean energy economy

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[1]The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP21 in Paris, on 12 December 2015 and entered into force on 4 November 2016.Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels.

forward, through carbon energy taxation, alternative fuels infrastructure, energy efficiency, emissions trading system, renewable energy.

The first policy, could potentially increase the cost of energy for consumers and businesses, leading to higher prices and inflation. However, it may also stimulate economic growth by driving innovation and new technologies. The second policy, could potentially increase inflation in the short term if there is a surge in demand for goods and services, leading to higher prices. However, it could also stimulate economic growth by creating jobs and improving productivity. The third policy would aim to reduce inflation, but some policy measures that could be implemented, such as interest rate hikes or decreased government spending, could also have negative impacts on economic growth.

All in all, this thesis will be set against a current backdrop of rapid urbanisation, biodiversity loss, a growing and dynamic global human population, significant inequality and demands for social justice, rapid technological change, continuing poverty, land degradation and food insecurity, and risks from shocks such as pandemics and increasingly intense extreme events from ongoing climate change (IPCC, 2022) Pörtner et al. (2022).

To get an impression of recent research question and the current understanding on the topic the following articles were chosen as a starting point: Below a short summary for each article containing 1) central research question and findings, 2) relevance for the thesis and 3) remaining open questions.

- **Semieniuk et al. (2021):**
  1) The financial risks associated with transitioning to a low-carbon economy. The author finds that such a transition carries significant risks for investors, particularly in fossil fuel-related industries, and that these risks may not be fully priced into financial markets.

  2) It provides insights into the financial implications of transitioning to a low-carbon economy, which is directly linked to the goal of this thesis. Moreover, the author's empirical approach, which involves using financial market data to estimate the magnitude of transition risks, is particularly interesting.

  3) For instance, how financial regulators and policymakers can ensure that transition risks are accurately reflected in financial market prices, given the uncertainties associated with the transition to a low-carbon economy. Additionally, it is unclear how different industries and regions will be affected by the transition, and how these effects will vary over time.

- **Celasun et al. (2022):**
  1) The central research question of this IMF publication is how to support vulnerable households and accelerate the transition away from fossil fuel in the face of surging energy prices in Europe after the Russia-Ukraine war. The authors find that policy interventions such as targeted transfers, energy efficiency improvements, and renewable energy subsidies can help mitigate the impact of rising energy prices on the vulnerable while promoting a transition to a low-carbon economy.

  2) It provides insights into how policymakers can effectively address the challenges of transitioning to a low-carbon economy while ensuring social and economic sustainability. The authors' empirical approach, which involves analyzing the effectiveness of policy interventions in different European countries and the analysis on ETS and "Fit for 55" emissions goals are of particularly relevance.

  3) With part of the rise in energy prices expected to be persistent and the fiscal burden of support growing in the context of lower overall national incomes due to the negative terms-of-trade shock, designing support policies in a cost-effective manner remains a key challenge for policymakers. Another open question is what the surge in energy prices means for European countries' policies for reducing fossil fuel emissions.

- **Konradt and Weder di Mauro (2021):**
  1) The impact of carbon taxation on inflation, or "greenflation," in Europe and Canada. The main

finding is that carbon taxes are not inflationary, on aggregate. Both for Europe and Canada, they do not find robust evidence that pricing carbon leads to an increase in inflation, when controlling for economy and year fixed effects.

2) This article is relevant for the thesis because it sheds light on the potential economic impacts of carbon pricing policies, which are a key tool in the transition to a low-carbon economy. Moreover, this thesis aims to use the same author's empirical approach be it panel-VAR and synthetic control method for potential robustness check. What makes this paper even more insightful is the comprehensive sample analysis on 26 EU ETS [2] countries with available data.

3) A study encompassing shadow prices from other instruments complementary to the carbon taxes could be a promising avenue for future research.

- **Moessner (2022):**
  1) The impact of carbon pricing on inflation in advanced economies. The author finds that the effect of carbon pricing on inflation is generally small and short-lived, and that the impact is highly dependent on the specific policy design and the behavior of firms and consumers in response to the tax. In short, higher carbon taxes and prices of permits in ETS have not led to large increases in headline CPI inflation.

  2) This article is relevant for the thesis, because it gives guidance on how to analyse the carbon pricing policies i.e. ETS and carbon taxes implications to CPI in all of its components, which is one of the focal points of this thesis. Moreover, it has many interesting references to Konradt and Weder di Mauro (2021) and Känzig (2021) working papers.

- **Min (2022):**
  1) The impact of energy price volatility on commodity prices from the perspective of the energy supply chain. The central research question is whether and how energy price volatility affects commodity prices in different stages of the energy supply chain. The price of corn, which may then have an impact on food prices, can be well predicted by oil price, according to the author's convincing evidence. In light of this finding, the living costs and business expenses could substantially increase if the price of oil is not stabilized.

  2) This article is relevant for the thesis, because not only it identifies a multitude of factors that can influence fossil fuel price and its volatility, but it also develops an oil/gasoline supply chain map that can visualize the weak points of an oil/gasoline supply chain vulnerable to disruptions.

  3) The investigation of causal links between crude oil prices and consumer price indexes (CPIs) in both advanced and developing economies worldwide is one of the promising areas of future research. The creation of resilient energy supply chain solutions that are aimed at certain nations e.g. EU-Zone that are susceptible to interruptions in the energy supply chain is another promising area for future research.

3 Program and Design of the Research Investigation

3.1 Objectives

In essence, the aim of this thesis is to answer the following research questions:
"How do low carbon emission policies and increasing carbon pricing targeted at boosting the transition

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[2]The ETS is a "cap and trade" system, which has been introduced in 2005. Due to design problems such as free allocations and oversupply, prices of ETS fell below 5 euro and remained at that level for several years. Only in 2018, after the EU fixed some of the related issues, has the price of the ETS started to rise steadily. Switzerland had a parallel cap and trade system in place since 2008, but joined the EU ETS in 2020. For more details, see https://ec.europa.eu/clima/policies/ets en.

toward a low-carbon economy impact inflation?". The objectives of this thesis can be summarised as follows.

1) Analysing the impacts of climate change and low carbon emission policies - on CPI in OECD member countries.
2) Analysing the impacts of climate change and low carbon emission policies - on Energy CPI in OECD member countries.
3) Analysing the impacts of climate change and low carbon emission policies - on Fossil Fuel Price Index in OECD member countries.
4) Analyzing and comparing existing emission trading system with respect to the price setting mechanisms, current emission coverage and future targets. From the new China National ETS [3] to the EU ETS. [4]
4.1) Analysing the key impact mechanisms via which transition policies may have wider economic impacts, i.e. reputational risk, credit risk, stranded assets etc. by pointing out the relevance for/of nancial institutions as key players for the green-transition.
5) Analysing the current policy initiatives [5], and their effects on carbon pricing across Emission Trading Systems, whereby changes to the allocation of emission allowances: the way emission allowances are allocated within a trading system can have a significant impact on carbon pricing. For instance, if a government decides to reduce the number of allowances it gives out, this can increase the scarcity of allowances and drive up their price.

3.2 Contribution

The relatively new ground of research on climate-related financial risks leaves a door open for a great deal of groundbreaking findings for the whole financial sector and society at large. This thesis contributes to the scarce research on the correlation among the following variables: low carbon emission policy, energy prices, fossil fuel prices and CPI. For this reason, but not only, financial institutions, banks, risk managers, commodity traders, asset managers and insurance companies will benefit from the empirical results of this thesis. In effect, financial institutions, have significant exposure to carbon-intensive industries, and the transition towards a low-carbon economy can result in significant financial losses for these institutions. For example, banks may face loan defaults from firms operating in carbon-intensive industries. Furthermore, financial institutions also have a proactive role to play in financing the transition towards a low-carbon economy by steering "green" investments and transitioning their own operations towards sustainability.

3.3 Empirical Methodology

The panel-VAR Canova and Ciccarelli (2013) approach, a workhorse model in empirical macroeconomics (e.g., Sims 1980; Christiano et al. 2005; Beaudry and Portier 2006; Brunnermeier et al. 2021a), will be used to investigate the effects of transition risk i.e. carbon emission policies on CPI, energy prices and fossil fuel prices. Panel-VAR method has been used for similar purposes by Konradt and Weder di Mauro (2021), therefore this thesis is based on this methodology. This type of VAR method, which was pioneered by Sims (1980) and suggested by Auerbach and Gorodnichenko (2012) is a prominent time

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[3]China's national ETS – the world's largest in terms of covered emissions – started operating in 2021. It builds on the successful experience of pilot carbon markets implemented in eight regions. https://icapcarbonaction.com/

[4]The Commission has proposed a comprehensive set of changes to the existing EU ETS that should result in an overall emission reduction in sectors concerned of 61% by 2030 compared with 2005.`https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/#:~:text=The%20Commission%20presented%20the%20proposal,in%20the%20fossil%20fuels%20sector.`

[5]The US Infrastructure Investment Jobs Act, Inflation Reduction Act, and the EU's fit for 55 package

series model utilized to comprehend and forecast economic impacts and ramifications from monetary and fiscal policy shocks as well as other non policy shocks like climate and technology shocks. Moreover, multiple recent studies (e.g. Cheng and Chiu (2018);Dibooglu and Kapounek (2021) have also proposed the aforementioned approach.

3.4   Data and VAR Methodology

The data for this master thesis will be retrieved from World Bank's Carbon Pricing Dashboard, Refinitiv Eikon and/or Bloomberg. The latter are represented by mainly 5 times-series variables. Respectively, CPI, Energy Prices, Fossil Fuel Prices, Carbon Pricing and Climate Change Performance Indicator from Germanwatch (2005). Since the CCPI (made up by fours categories: GHG Emissions, Renewable Energy, Energy Use and Climate Policy) has been first published in 2005, this research will cover time-series period and yearly lags of order X, denoted as VAR(X), for an integration of CCPI see Puertas and Marti (2021) paper. Lastly, for region specifics, the selection might fall on the following OECD countries: Switzerland, France, Germany, Italy, United States, China, United Kingdom, Russia and Turkey. These latter, will be weighted in descending order, according to GHG emissions for OLS regression purposes.

3.5   Timeline for Completion

The starting date will be on the 20th of February. A rough time schedule is given as follows:

- **Week 1-4:**
  Coarse arrangement, selecting the statistical software to implement the event study and getting familiar with it, data selection and download

- **Week 5-10:**
  Refining the structure, understanding the event study methodology, gathering literature, data adjustments, conducting empirical analysis, descriptive statistics

- **Week 11-19:**
  Compiling the draft version, analyzing and interpreting empirical results, conducting robustness checks, considering potential shortfalls

- **Week 20-24:**
  Elaborating final version, final proofreading

4   References

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