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The Heterogeneous Effects of Carbon Pricing: Macro and Micro Evidence

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Brendan Berthold[4], Ambrogio Cesa-Bianchi[1,2,3], Federico Di Pace[1] and Alex Haberis[1,3]

[1]Bank of England, [2]Centre for Economic Policy Research, [3]Centre For Macroeconomics, [4]University of Lausanne

In order to achieve the objectives of the Paris Agreement, governments around the world need to increase the ambition and implementation of climate change mitigation policies. Cap-and-trade schemes, which set overall limits on the quantities of emissions of greenhouse gases (GHGs) and allow their price to be determined by market forces, are likely to (continue to) be an important part of the climate policy mix necessary to meet objectives on climate change mitigation.

The European Union Emissions Trading System (EU ETS), introduced in 2005 under the Kyoto Protocol, is one such scheme and has reduced emissions in relevant sectors in the EU by over 40 percent. Moreover, in July 2021 the European Commission announced that the emissions limits defined by the ETS would be made stricter in order to reduce GHG emissions in the EU by at least 55 percent relative to 1990 levels by 2030.

While cap-and-trade schemes have long been part of the economic analysis of pollution mitigation, evidence on their wider economic and macroeconomic effects remains relatively limited.

The aim of this paper is, therefore, to provide empirical evidence on the economic effects of carbon pricing shocks and to understand their transmission mechanism. Our key innovation is to document the heterogeneous effects of carbon policies on macroeconomic and firm-level outcomes based on CO_2 intensity, and to exploit such heterogeneity to learn about the transmission mechanisms at play.

We find that carbon pricing shocks—identified as changes in carbon futures prices in the ETS associated with unexpected changes in carbon policies—lead, on average across countries, to a decline in aggregate economic activity, higher inflation, and tighter financial conditions. These average responses mask a large degree of heterogeneity: the effects are larger for higher carbon-emitting countries. To rule out the possibility that our results are driven by confounding factors (i.e. country characteristics that are correlated with CO_2 intensity), we turn to a granular firm-level data set to document that equity prices of firms with higher (within-sector) carbon emissions are the most responsive to carbon pricing shocks.

Finally, we develop a theoretical model with green and brown firms that accounts for these empirical patterns and sheds light on the transmission mechanisms at play. This shows that the bigger impact on brown firms' equity prices reflects the direct increase in their costs associated with

the higher carbon prices. The impact on green firms, in turn, reflects spillovers through product markets and those for capital and labour.

Our results are important to understand the macroeconomic impacts and economic channels associated with the transition towards a greener economy. Moreover, by highlighting the heterogeneous effects of environmental policies across countries, our results have potentially important implications for international coordination and the implementation of such policies.