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## How can Chile move away from a high carbon economy?

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### ABSTRACT

This paper quantitatively evaluates the performance of Chile's CO<sub>2</sub> emissions between 1991 and 2013 using a 'complete decomposition' technique to examine emissions and their components. A decomposition analysis based on log-mean divisia index method (LMDI I) was conducted. Six decomposition factors were considered: Carbon Intensity effect (CI), RES penetration effect (RES), Energy Intensity effect (EI), Economy Structure effect (ES), Income effect (Yp) and Population effect (P). To know how these factors could influence each other in the future, the Innovative Accounting Approach (IAA) was used, including forecast error variance decomposition and Impulse Response Functions (IRFs).

These two methodologies allow us to identify the drivers of CO<sub>2</sub> emission changes in the past (1991–2013), test policy measures and learn how these drivers could influence each other in the future, to evaluate whether the current measures meet the Paris commitments. The LMDI analysis results show that the Energy Intensity Factor is the main compensating factor of Chile's CO<sub>2</sub> emissions and the only effect with a clear trend to aid the economy's decoupling. IAA and IRFs results react similarly and confirm that carbon intensity reacts to shocks more significantly in the short term. The reaction to RES has the same and opposite behavior to shocks in ES and Yp, to disappear in the long term.

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### 1. Introduction

Energy related CO<sub>2</sub> emissions in Chile increased 178% for the 1990–2013 period, which is well above the world average (56%) for OECD-American countries (104%) and all of OECD economies (9.4%) (IEA, 2017). These emissions derived only from fuel combustion; therefore, they are associated to anthropogenic actions. Unless Chile's energy-related CO<sub>2</sub> emissions shares only 0.2% of total world, its percentage increased in 78.5% for the aforementioned period.

Within the global context fighting against climate change, Chile

social and economic losses derived from climate change could amount to 1.1% of the country's GDP in 2100 (CEPAL, 2012). Growing concerns about climate change in Chile explained the formalization of the pledge made in Copenhagen by registering it in Appendix II of the Copenhagen Accord (UNFCCC, 2009). Within the framework of COP21 in Paris, Chile decided to present its Intended Nationally Determined Contribution (INDC) defining its commitment in the battle against climate change, in terms of emission intensity (tons of CO<sub>2</sub> equivalent per unit of Gross Domestic Product –GDP– in millions of CLP\$ 2011).

Chile's commitment is based on sectorial analyses and mitigation