

The Ever-Evolving Interrelationship Between GDP and Carbon Dioxide

Call it my pet peeve or even my obsession, but when I read about the claimed “decoupling” of carbon dioxide emissions and economic growth, I get annoyed. Webster defines decoupling as “eliminating the interrelationship” between two processes. But the linkage between CO₂ emissions and economic growth has certainly not been eliminated.

The carbon intensities of many economies, particularly in the industrialized nations, have — for many years — been falling, as those economies have become less energy intensive, and therefore less carbon intensive. For each dollar of economic activity, CO₂ emissions are less than they used to be. For each unit of economic growth, there is less growth in CO₂ emissions than previously.

In some cases, as economies grow, CO₂ emissions can actually fall. In an economy which is growing exclusively in its services sector, economic growth might be accompanied by no change in CO₂ emissions. In an economy which is growing in its services sector and shrinking in its manufacturing sector, economic growth might be accompanied by reduced CO₂ emissions. Add to this some public policies, such as those that cause the closure of coal-fired power plants, as well as greater dispatch of electricity from natural gas-fired plants, and the result can be that economic growth continues with falling CO₂ emissions. But there has been no decoupling.

The confusion arises from a common mistake: failure to use the right counterfactual for analysis. The fact that GDP is rising while emissions are falling does not mean that GDP is not affecting emissions. The appropriate counterfactual for comparison is how much would emissions have fallen had

there been no growth in GDP. Presumably, emissions would have fallen even more. The excess of emissions in the factual case compared with the counterfactual case is the magnitude of emissions growth associated with economic growth. There has been no elimination of the relationship between the two, although the nature and magnitude of that relationship has evolved.

Why have CO₂ emissions been declining in some countries? Or, more broadly, what factors have affected emissions? Four stand out.

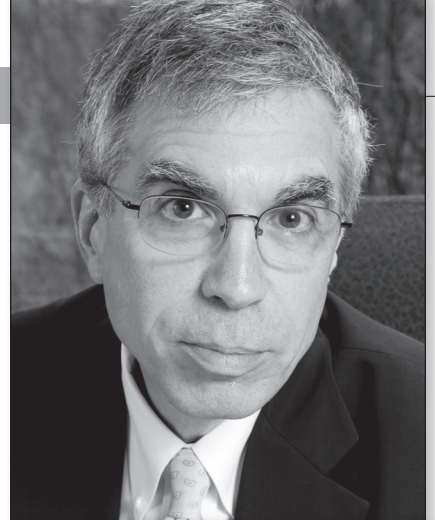
First, energy comes at a cost in all economies, and so economic incentives exist to economize on energy use through technological change. The energy intensity of the U.S. economy has gradually fallen — almost monotonically — since early in the 20th century.

Second, some technological change has worked against the use of carbon-intensive sources of energy. The most dramatic example, specific to the United States, has been the combination of horizontal drilling and hydraulic fracturing, which has

caused a significant increase in supply and dramatic fall in the market price of natural gas, which has thereby led to a massive shift of investment and electricity dispatch from coal to gas.

Third, in the richer countries of the world the process of economic growth has led to changing sectoral composition: heavy industry to light manufacturing to services. The deindustrialization of California is a graphic example.

Fourth, public policies in Europe, the United States, and most of the other OECD countries have discouraged carbon intensity. In the United States, this has happened both through climate policies and other policies. Some non-climate policies, such as EPA’s



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Mercury Rule, discourage investment, encourage retirement, and discourage dispatch of coal-fired electricity, while other non-climate policies, such as Corporate Average Fuel Economy standards for motor vehicles, bring about greater fuel efficiency of the fleet of cars and trucks over time. Climate-specific policies have also mattered, such as in California, where the Global Warming Solutions Act of 2006 (AB-32) has brought down emissions through a portfolio of policies, including an economy-wide CO₂ cap-and-trade system.

So, yes, the carbon intensity of many economies continues to fall — for a variety of reasons, including but not limited to public policies. And, in some cases, the combination of energy price changes, technological change, changes in sectoral composition, and climate and other public policies has meant that emissions have fallen in years when economic growth has continued. But don’t be fooled. Economic growth does affect CO₂ emissions. There has been no decoupling.

This is not an anti-environment message. On the contrary, a belief in decoupling per se could lead to a misguided, laissez-faire attitude about the path of CO₂ emissions. Being honest and accurate about the links between (desirable) economic growth and (desirable) CO₂ emissions reductions puts our focus and emphasis where it ought to be: finding better ways to have both.