ASK: NUS ECONOMISTS

Using property prices to guide climate change policies

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How do governments estimate the impact of costs and benefits of strategies to reduce carbon in cli- mate change? What research can guide such estimates of costs and benefits over the very long term?

In 2013, the Intergovernmental Panel on Climate Change reported that warming of the earth’s atmos- phere and oceans is “unequivoca- lly” and the dominant cause is hu- man influence.

Among the expected effects of rising atmospheric concentrations of greenhouse gases are heat waves, rising sea levels and coast- al flooding and droughts, among other extreme phenomena. Influ- ential reviews such as the one headed by British economist Nick Stern described climate change as “the greatest and widest-ranging market failure ever seen.”

In response to such views, gov- ernments are considering invest- ments in carbon abatement strate- gies. These are designed to reduce greenhouse gas emissions, such as by increasing petrol taxes and switching from coal to cleaner but more expensive fuels.

A government’s decision to in- vest in such carbon abatement strategies depends heavily on a cost-benefit analysis. If the bene- fits of greenhouse gas reduction outweigh the costs, then invest- ments make financial sense. But abatement strategies have costs and benefits that occur over many decades or centuries.

Since a dollar today is worth more than a dollar in the future, a cost-benefit study requires all fu- ture dollars to be converted into an equivalent number of dollars. The rate of conversion used is called the discount rate.

Because costs are mostly con- centrated in the first few years whereas benefits are enjoyed pos- sibly many years in the future, the discount rate is a major determinant in whether an investment project is economically justified. A high discount rate emphasises the present, valuing costs rela- tively more importantly than bene- fits, making it less likely that the net payoff to an investment is posi- tive.

Similarly, a low discount rate means costs are treated as relatively less important than benefits, and an investor’s net payoff is more likely to be positive.

Cost-benefit analysis can be controversial, par- ticularly when applied to valuing policies to protect the environment, but we will not dis- cuss the controversy here.

Our focus is on how Singapore’s property market can guide us on discounting future benefits or “dis- counting the value of the future” — a low rate at $500 per dollar more than commonly adopted in many policy cir- cles. Thus, a cru- cial question is what discount rate to use. The answer depends on how society values the future. If society places a high value on the future, then a low discount rate should be used since society cons- iders a future dollar the worth almost as much as a current dol- lar. If, instead, society considers the future relatively unimportant compared to the present, it dis- counts the future heavily and a high discount rate is appropriate.

In the last few years, many studies and researchers are finding it difficult to decide on the proper discount rate to use to evaluate carbon abatement strate- gies. One problem is the lack of real-world data indicating how households actually value the far-off future.

Leasehold versus freehold

In our recent paper, we take ad- vantage of a familiar feature of the Singapore property market, the co-existence of lease- hold and freehold properties, to es- timate discount rates far into the future.

Leasehol and freehold proper- ties differ in their tenure length, the number of years until a prop- erty reverts to the landowner, of- ten the government. Under leasehold, prop- erty reverts to the landowner at the end of either 99 years or 999 years. A freehold property reverts to the owner of the prop- erty.

The premium paid for a free- hold property over a 99-year or 999-year lease- hold property is partly due to how people value the future. Since the utility provided by a freehold prop- erty extends beyond that of a 99-year or even a 999-year lease- hold property, the discount rate for a 99-year or 999-year lease- hold property is partly due to how society values the future. If society places a high value on the future, then a low discount rate should be used.

We estimated that a freehold property fetches about 15 to 20 per cent more than a 99-year leasehold property and about 3.5 to 5 per cent more than a 999-year leasehold property. In dollar terms, this means a $1 million freehold property will sell for about $200,000 more than a 99-year leasehold property and 999-year leasehold property be- cause of the differences in tenure length.

Annual discount rate

How do these price differentials convert into discount rates?

Assuming that the discount rate constant over the length of tenure, the price premium of free- hold properties over 99-year leasehold properties suggests an annual discount rate of 1.8 per cent. This rate differs between a 99-year leasehold and a 999-year leasehold property suggests a dis- count rate of only 0.2 per cent.

These rates are much lower than the rates typically used to evaluate public policy. For exam- ple, the US Office of Management and Budget recommends using dis- count rates of up to 7 per cent.

Given our findings, the use of such high discount rates over-empha- sizes current costs relative to future benefits, which can lead to incoherently rejecting economically viable investments in greenhouse gas reduction strategies.

Consider, for example, a study by Imperial College London that estimated the annual cost of halv- ing CO2 emissions by 2050 to about 1 per cent of world gross domes- tic product (GDP), or $2 tril- lion per year. For the sake of com- parison, let us assume that the an- nual benefit of such a decrease ac- count for 1.5 per cent of world GDP, $3 trillion, from 2050 on- wards.

If we were to apply a discount rate of 4 per cent per year, which to some might seem low, the dis- count rate of value of costs over the next 25 years would amount to $31 trillion, compared to discounted benefits of $26 trillion, suggesting that the project to reduce carbon emissions should not be imple- mented.

By contrast, if we were to apply the discount rate of 1.8 per cent per year that we estimated, discounted costs of $40 trillion would pale in comparison to dis- counted benefits of $107 trillion, indicating that the payback to worldwide reduction in carbon emissions would be massive.

We might ponder this the next time we read in the papers that governments around the world are raising petrol taxes. Eric Fesselmayer is Senior Lecturer; Hasnaini Ulli Li, Associate Professor; and Alberto Salvo, Associate Professor, all with the Department of Economics, National University of Singapore. This is a monthly series by the NUS Economics Department. Each month, a panel will address a topical issue. If you have a burning question on economics, write to straits@sphtp.com.sg with “Ask NUS” in the subject field.