



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*



Australian
National
University

Crawford School of Public Policy

Centre for Climate Economic & Policy

Green Pricing in the Asia Pacific: An Idea Whose Time Has Come?

CCEP Working Paper 1409
June 2014

Paul J. Burke

Crawford School of Public Policy, The Australian National University

Abstract

This article discusses the potential benefits of an enhanced use of externality pricing schemes in the Asia Pacific. Prices on emissions and congestion could ameliorate the negative effects of underpriced resource use, be pro-poor, and improve fiscal capacities. The main implementation challenges are political and institutional. Lessons are drawn from recent experiences in environmental taxation and the removal of fossil fuel subsidies.

Keywords

pricing, taxation, externalities, green, Asia Pacific

JEL Classification

H23, Q53, Q56, Q58, R48, R41

Suggested Citation:

Burke, P. (2014), Green Pricing in the Asia Pacific: An Idea Whose Time Has Come?, CCEP Working Paper 1409, June 2014. Crawford School of Public Policy, The Australian National University.

Address for correspondences:

Paul J. Burke
Fellow
Crawford School of Public Policy
The Australian National University
Canberra ACT 0200
Tel: +61 2 6125 6566
Email: paul.j.burke@anu.edu.au

The Crawford School of Public Policy is the Australian National University's public policy school, serving and influencing Australia, Asia and the Pacific through advanced policy research, graduate and executive education, and policy impact.

[The Centre for Climate Economics & Policy](#) is an organized research unit at the Crawford School of Public Policy, The Australian National University. The working paper series is intended to facilitate academic and policy discussion, and the views expressed in working papers are those of the authors.

Contact for the Centre: Dr Frank Jotzo, frank.jotzo@anu.edu.au

Green Pricing in the Asia Pacific: An Idea Whose Time Has Come?

Paul J. Burke

Crawford School of Public Policy, Australian National University, Canberra, ACT 0200,
Australia

E-mail: paul.j.burke@anu.edu.au. Telephone: +61 2 6125 6566

20 June 2014

This article discusses the potential benefits of an enhanced use of externality pricing schemes in the Asia Pacific. Prices on emissions and congestion could ameliorate the negative effects of underpriced resource use, be pro-poor, and improve fiscal capacities. The main implementation challenges are political and institutional. Lessons are drawn from recent experiences in environmental taxation and the removal of fossil fuel subsidies.

Key words: pricing, taxation, externalities, green, Asia Pacific

JEL codes: H23, Q53, Q56, Q58, R48, R41

Acknowledgements: I am grateful for comments from Ryan Edwards and Ross McLeod.

1. Introduction

Many countries in the Asia Pacific are facing a trifecta of challenges: the needs to (1) reduce pollution, traffic congestion, and other negative externalities; (2) continue to improve living standards, particularly for the poor; and (3) strengthen the state of public finances. There is one reform programme capable of making a contribution to tackling all three challenges. This programme is known as environmental, externality, or “green” pricing.

Economic theory indicates that market economies work well when prices reflect the marginal costs of resource use. In practice, however, there are a variety of reasons why prices diverge from marginal-cost levels. Economists have long (Marshall 1890, Pigou 1920) recognised that among these is the existence of external effects (or *externalities*). If my driving adds to pollution, traffic congestion, and crash risks, my private costs of driving will be less than the social costs, and from society’s point of view I will likely drive too much. Orthodox economic theory suggests that I should face appropriate prices for the negative externalities that I cause.

A natural implication is that tax policy can be used to achieve environmental and other goals in addition to raising government revenue, killing two (or perhaps even three) birds with one stone. While the usefulness of price-based approaches to managing externalities is widely accepted among economists (Mankiw 2009, Parry et al. 2012), in the Asia Pacific green pricing remains in its infancy. Some countries instead maintain large subsidies for fossil fuel use. These exacerbate rather than reduce budgetary, pollution, congestion, and other problems.

This article discusses how green fiscal instruments can address the trifecta of challenges. I first review these challenges (Section 2) before discussing the benefits of green pricing (Section 3). Section 4 discusses a number of potential green pricing initiatives: carbon pricing, pricing local pollutants, congestion pricing, and the elimination of fossil fuel subsidies. Section 5 reviews the main hurdles for green pricing – both political and institutional. Section 6 reviews lessons from three important cases of green pricing reform in the region: Australia’s carbon price, Singapore’s congestion pricing, and Indonesia’s fuel subsidy reductions. The final section concludes. My focus is on the Asia Pacific, defined here as all countries in the World Bank groups of (1) East Asia and the Pacific and (2) South Asia, a bloc representing 55% of the global population. The case for more appropriate resource pricing also holds more broadly. Indeed, underpricing of fossil fuels is particularly pronounced in a number of mostly oil-rich countries outside the region (e.g. Iran). The paper concentrates on atmospheric pollution and road congestion, although the discussion is relevant for resource management more broadly.

2. A Trifecta of Challenges

The first challenge in the trifecta is the sizeable negative externalities associated with underpriced resource use in many countries in the Asia Pacific. Environmental degradation is among the worst side-effects of Asia’s rapid economic growth. 57 of the cities ranked as the world’s 100 most polluted in terms of atmospheric particulate matter of 10 micrometres or less in diameter (PM10) are in the Asia Pacific (World Health Organization [WHO] 2011).¹ The health and economic costs of this pollution are substantial: outdoor air pollution is a leading cause of sickness and mortality, resulting in an estimated 1.8 million deaths each year in China and India alone (Wong 2013, Yee 2013). The Asia Pacific is now also the source of

¹ Energy-intensive Iran accounts for 16 of the other cities among the top 100.

40% of annual anthropogenic greenhouse gas emissions, a share that is set to continue to increase over coming years (World Resources Institute 2013).

A similar “tragedy of the commons”-type problem is the crushing road congestion that clogs many Asian cities, particularly megacities such as Jakarta, Manila, and Delhi. Some residents spend as much as four hours each day commuting to and from their workplaces (Cochrane 2013). The costs of congestion in terms of inefficient time use and increased fuel use and pollution are sizeable. The root cause of excessive road congestion is the same as the root cause of excessive pollution: underpricing.

The second challenge, and one rightly afforded high priority by many governments in the region, is the need to improve living standards and alleviate poverty. Despite rapid progress, the Asia Pacific is still home to the majority of the world’s poor. In 2010 the region accounted for around 750 million of the world’s 1.2 billion people living on less than US\$1.25 a day in purchasing power parity terms (World Bank 2013a). Most of the region’s poor live in the two giants of India (400 million) and China (156 million), although poverty rates are higher in low-income countries such as Bangladesh and Myanmar.

The third challenge is the tight fiscal constraints faced by many countries. Total tax revenue collected by all levels of government equals only 3% of gross domestic product (GDP) in Myanmar, 7% in India, 8% in Taiwan, 9% in Afghanistan and Bangladesh, 10% in Pakistan, 11% in Cambodia, and 12% in Indonesia and the Philippines (Heritage Foundation 2013). The reasons for small tax collections include low tax rates and rampant non-compliance due to the large size of informal or “hard-to-tax” sectors and the weakness of tax agencies (Keen 2012). Limited fiscal bases restrict abilities to provide the public investments in health,

education, and infrastructure that have normally been required for sustained poverty reduction. China collects 18% of GDP in taxes, still less than developed countries (Australia: 21%; United States: 25%; Japan: 29%; United Kingdom: 35%).

Constraints on public finances are compounded by the large fossil fuel subsidies that exist in some countries. Figure 1 shows International Energy Agency (IEA) estimates of year-2011 fossil fuel consumption subsidies for 13 Asia-Pacific countries with a combined population of 3.5 billion (91% of the region's population). These exceed 5% of GDP in Pakistan and Bangladesh, and non-negligible shares in all of the listed countries except the Republic of Korea. In dollar terms, fossil fuel consumption subsidies are largest in India (US\$43 billion in 2012), China (\$27 billion), and Indonesia (\$26 billion) (IEA 2013b). Data on retail pump prices reveal that the region's most heavily subsidised gasoline is in Brunei Darussalam, Indonesia, and Malaysia (World Bank 2013b). In Indonesia, a quarter of central government spending goes to subsidising fuel and electricity. In Pakistan and Bangladesh, fossil fuel consumption subsidies substantially exceed public expenditure on health and education (Figure 2).

-Figure 1-

-Figure 2-

3. Potential Benefits of Green Pricing

The merits of environmental pricing are increasingly recognised, with the United Nations (2011), World Bank (2012), Asian Development Bank (2013), International Monetary Fund (2013a), and Organisation for Economic Co-operation and Development (OECD 2013)

forming a growing chorus of support. A Global Green Growth Institute, based in Seoul, was established in 2010. The leaders of several Asia Pacific countries have also adopted the language of green growth, even if policy progress has not always been impressive. This section discusses the ability of externality pricing to address the trifecta of challenges.

3.1 Reducing Externalities, Cheaply

The most obvious benefit of pricing negative externalities is a reduction in those externalities. Gasoline taxes provide a useful illustration. While the rationale for taxing gasoline may often be simply to raise revenue, gasoline taxes nevertheless have important effects on road-sector externalities. Figure 3 presents new estimates of the average effects of a 10% increase in gasoline prices. The estimates are long-run elasticities using international panel data, and suggest that a 10% increase in gasoline prices on average leads to a 6% reduction in gasoline use and related carbon dioxide emissions and a 4% reduction in road deaths. These reductions in gasoline use and emissions are in part a result of an average improvement in new-vehicle fuel economy of 2%. While gasoline demand is price inelastic, increases in gasoline taxes (and reductions in gasoline subsidies) can thus still make an important contribution to conserving gasoline, cutting emissions, and reducing road death rates.

-Figure 3-

Externality pricing can not only reduce externalities, but reduce them in a *low-cost* manner. The reason for this is that firms and individuals are expected to respond to an externality price by reducing the least-valuable units of that externality (those units for which abatement is cheaper than paying the charge). Alternative approaches, such as regulations and subsidy schemes, are unlikely to be least-cost because it is difficult for governments to (a) identify

what the least-cost abatement opportunities are, and (b) design a system of regulations or subsidies able to capitalise on these opportunities. Externality pricing ensures economies pick the “lowest hanging fruit” in reducing negative externalities. Pollution and congestion are economic phenomena, and economic instruments provide an attractive solution.

A related point is that externality pricing makes it possible to phase out competing policies, which themselves typically involve higher economic costs. Once congestion pricing is in place, for example, other (less-efficient) policies aimed at reducing congestion, such as bans on the use of vehicles on certain days based on the digits of their numberplate, can be eliminated. Such schemes miss many of the least costly congestion reduction opportunities and prevent some high-value uses of vehicles. The introduction of a cap-and-trade scheme for carbon dioxide emissions serves as a second illustration. If a cap has been set, there is little need to retain existing policies aimed at reducing (within-cap) emissions. Retaining these policies would lead to higher abatement costs but the same emissions outcome (as set by the cap). Exceptions are policies for emissions that are not covered by the cap (in the agricultural sector, perhaps) or emissions that might be relatively immune to price effects due to principal-agent or other problems.

3.2 Reducing Poverty

There is growing evidence that moving from subsidising to taxing fossil fuels helps to reduce income disparities in developing countries, as a disproportionate share of fossil fuels is consumed by the well-off (Sterner 2012). Modelling for India, for example, shows that both gasoline and carbon taxes are (or would be) progressive (Datta 2010). More broadly, only around 7% of fuel subsidies in low- and middle-income countries reach the poorest 20% of people, while 43% flow to the richest fifth (Arze del Granado et al. 2012). The true poor do

not drive gas guzzlers; the relatively rich are the largest users of private road vehicles in developing countries, particularly four-wheeled vehicles (Kutzbach 2009). Congestion pricing in developing countries would also be likely to raise revenue mostly from the relatively well-off.

The effect of green pricing on *poverty* (as distinct from inequality) depends largely on how revenues are used. If an adequate share of revenues is directed toward infrastructure and services that are used by the poor, cash transfers to the poor, or reductions in existing taxes that in final incidence affect the poor, a move to green pricing may be pro-poor (particularly because revenues from green pricing are primarily raised from the non-poor). While economic growth will remain the primary alleviator of poverty (Dollar et al. 2013), green pricing reforms thus have the potential to play a supporting role in progress toward this objective.

There is a possibility that green pricing schemes that facilitate reductions in existing taxes may help countries to increase their economic growth rates. This is known as a *double dividend* (strong form), and could have beneficial effects in terms of poverty reduction. Evidence on the strong form of the double dividend is mixed, and it is known that environmental taxes can reduce the incentive to use inputs by increasing the effective tax on their use (e.g. Bovenberg and de Mooij 1994). Nevertheless, there is no reason to think that green taxes are generally more malevolent for the economy than the worst existing taxes, some of which are highly inefficient and distortionary.² From an efficiency viewpoint, green

² The Henry Review (Henry et al. 2009, Chart 1.5) identified that taxes on insurance, payrolls, and corporate income are among Australia's most distorting taxes in terms of the marginal welfare lost per dollar of revenue collected. Fuel tax was identified as having a lower per-unit welfare loss. There is scope for additional

pricing is best considered as part of tax reform packages aimed at eliminating taxes that have the largest deadweight losses. Lower levels of congestion and pollution may also themselves directly facilitate faster economic growth and/or benefit the poor.

3.3 Fiscal Benefits

The revenue collected from green prices can make a contribution to strengthening governments' fiscal positions and broadening their revenue bases. Governments need to raise revenue in some form, and while environmental prices are never likely to provide a dominant share of government collections, they can be handy. Revenues from Australia's carbon price equalled 2% of central government cash receipts in its second year of operation, for instance (Australian Government 2014). Environmentally-related taxes, mostly on motor vehicle fuels, typically contribute around 6% of total government tax revenue in OECD countries (OECD 2010). Alternative approaches to reducing pollution, such as abatement subsidies or regulations, impose net financial burdens on governments in the form of cash payments and monitoring and enforcement costs.

Many developing countries have had a historic reliance on revenue from import taxes, principally because these tend to be cheaper to administer than broader-based taxes such as income tax (Besley & Persson 2013). Some externality taxes are similarly advantageous in terms of their low administration costs. A carbon price, for example, can be levied upstream and collected at fossil fuel extraction and importation sites (Jotzo 2013). A tax that needs to be acquitted by a relatively small number of taxpayers in this way is an attractive option for tax agencies in developing countries.

modelling of the general equilibrium effects of environmental taxes vis-à-vis other taxes, especially for low-income countries.

There are important fiscal benefits from removing fossil fuel subsidies. Doing so frees up resources for other spending, to reduce taxes, or to improve the fiscal balance. Fossil fuel subsidy reform also reduces the exposure of government budgets to increases in fossil fuel prices and fossil fuel use.

4. Potential Green Pricing Reforms in the Asia Pacific

4.1 Carbon Pricing

The largest emitters in the Asia Pacific have committed to greenhouse gas emission reductions under the Copenhagen Accord. China has a target to lower emissions per unit of gross domestic product by 40-45% by 2020 compared to 2005; India's target is for a reduction in its emissions intensity of GDP of 20-25% over the same period. Indonesia, Japan, the Republic of Korea, Singapore, Taiwan, Thailand, Australia, and New Zealand are among others to have taken on emissions targets, although in loosening its target in November 2013 Japan demonstrated that these are not set in stone.³

It is widely recognised that greenhouse gas (“carbon”) pricing offers the least-cost approach to achieving any emissions reduction target. The cost advantages of emissions pricing can be substantial: the OECD (2013) examined country experiences and found that the cost of reducing greenhouse gas emissions using subsidies or feed-in tariffs can be an order of magnitude larger than using price-based approaches.

³ Japan's initial Copenhagen target was a 25% reduction in emissions from 1990 levels by 2020. In November 2013 Japan moved to the much easier target of a 3.8% reduction in emissions from 2005 levels by 2020, which equals a 3.1% *increase* in emissions from 1990 levels by 2020 (Climate Action Tracker 2013).

Of the variety of ways in which carbon pricing can be implemented, emissions trading schemes – set a cap and then allow trading of emissions permits at a market-determined price – have been the most popular. China is currently establishing emissions trading pilot schemes, and a proposal for the introduction of a nationwide carbon tax is also being considered. Australia, New Zealand, and the Japanese regions of Tokyo and Saitama have mandatory emissions trading schemes (see below for a discussion of Australia’s scheme). In November 2012 the Republic of Korea approved a mandatory emissions trading scheme to commence in 2015. Thailand (proposed voluntary scheme by 2014) and Vietnam (proposed mandatory scheme by 2020) have plans to follow suit, although delays should not be unexpected.

The world is only at the beginning of what will be a long road of climate change mitigation efforts. In this context, there is a high likelihood that there will be continued spread in the use of carbon pricing. The simplest approach to carbon pricing in any individual country is a carbon tax that increases along a smooth trajectory over time. This approach would provide the required signal to investors that low-carbon technologies will be increasingly profitable in the future, gently steering economies in a lower-carbon direction. The tax could be introduced as part of broader reforms, including the cutting of other taxes. There are benefits from the harmonisation of carbon tax rates across countries, although variation in other policies and taxes affecting the implicit price of carbon (OECD 2013) makes this a secondary issue.

Advantages of carbon taxes include that the transaction costs and price uncertainty of emissions trading can be avoided. Carbon taxes are also administratively simpler than emissions trading, which is attractive particularly for developing countries. On the other

hand, emissions trading schemes provide more certainty over emissions quantities and have a title that does not include the politically unpopular word “tax”. Over the long run, emissions trading schemes with tightening caps are capable of producing similar outcomes to a rising carbon tax.

4.2 Pricing Local Pollutants

Various pricing schemes for local pollutants have been used in the Asia Pacific. Japan introduced emission fees for atmospheric sulphur oxide emissions in 1974, with revenues used to compensate victims of air pollution. The tax reached a relatively high rate in the late 1980s before falling, and helped bring about a large fall in emissions (OECD 2010). Other examples include Malaysia’s charges for plantation effluent (since 1978) and the small pollution fees that have been applied in China since the 1980s (Stavins 2003). In 2010 India introduced a small tax on coal. Small taxes on coal, oil products, certain chemicals, HCFCs, and plastic bags came into effect in Vietnam in 2012, although implementation remains patchy. Some Asian countries have high taxes on certain emissions-intensive products (the motivation for which does not relate solely to pollution). Large gasoline taxes in Hong Kong, Japan, and the Republic of Korea, for example, have resulted in these countries having some of the world’s highest gasoline prices (World Bank 2013b).

Emissions trading schemes for local environmental problems in the Asia Pacific are rare. The world’s first salinity trading scheme, the Hunter River Salinity Trading Scheme in Australia, was introduced in 2002 and has been a success. Korea has operated a cap-and-trade scheme for emissions of nitrous oxide and sulphur oxide since 2007. A pilot of an emissions trading scheme for particulates has been announced for the Indian city of Surat (Bhatt 2013).

Australia and New Zealand have been among the international pioneers of “individual

transferable quotas” for fisheries, which are essentially cap-and-trade schemes for fish catches. Other countries in the region have yet to adopt this approach, despite its economic, environmental, and sustainability benefits.

While market-based instruments are becoming more common, the region’s principal approach to addressing pollution remains “command-and-control”. China uses mandates for the installation of desulphurisation equipment and the closure of inefficient power plants, for instance. India’s environmental management relies heavily on environmental standards for vehicles and industrial activities (Sawhney 2004). In short, the potential exists for almost all countries in the region to better harness the benefits of price-based approaches to addressing local pollution problems.

4.3 Congestion Pricing

Access to most roads in the Asia Pacific is free. As a result, the individual decisions of road users lead to highly sub-optimal road use. Imposing charges to reflect the congestion costs of using key roads at popular times is the most efficient means of reducing congestion. Results from the field of behavioural economics reveal that congestion pricing is likely to be particularly effective because it overcomes the power of “free”: moving from a zero price to a positive price typically results in a large reduction in quantity demanded (Lew & Leong 2009). If funds are used for road maintenance, congestion pricing is also advantageous from a user-pays perspective. Congestion pricing is much better for fiscal balances than the common alternative to dealing with road congestion: build more roads, and then perhaps prohibit certain uses of these roads via transit lanes, number plate restrictions, and other restrictions.

Singapore has the most sophisticated system of road pricing in the world (see below), an approach that has helped the country avoid the serious road congestion problems faced by some of its neighbours. Hong Kong piloted electronic road pricing in the 1980s, but did not proceed with the scheme after a variety of concerns – ranging from privacy to how revenue would be used – were raised by the public (Whittles 2003). Other cities in the region, including Beijing and Jakarta, are currently considering congestion pricing.

4.4 Eliminating Fossil Fuel Subsidies

Fossil fuel subsidies are, in effect, a negative or reverse environmental tax. In 2009, members of both the G20 and the Asia-Pacific Economic Cooperation (APEC) group committed to phase out fossil fuel subsidies over the medium term. The environmental benefits of the complete elimination of fossil fuel subsidies would be substantial: modelling suggests that phasing out global fossil fuel consumption subsidies would on its own contribute to a 6% reduction in annual greenhouse gas emissions by 2050 (IEA et al. 2011).

Once a subsidy is in place, its dismantling is politically challenging because those who benefit from the *status quo* can provide vocal opposition. Some progress is being made, with Indonesia, India, China, Malaysia, and Thailand all increasing subsidised energy prices during 2013 (IEA 2013b). As the case of Indonesia shows (see below), the smoothest reductions in fossil fuel subsidies have typically involved clear communication of the rationale for reform and a popular alternative use of public funds (Sterner 2012, Vagliasindi 2012, International Monetary Fund 2013a). In Indonesia, this alternative use of funds has included measures to help the poor adjust to price increases.

5. Hurdles for Green Pricing

The largest hurdles to environmental tax reform are political. Tax increases can be hard to sell, and an attractive target for attacks by political opponents. There is little doubt that energy price increases can be unpopular with the public: many countries – including China – have seen street protests in response. In countries such as Indonesia, memories of the role of commodity price increases in triggering political downfalls remain fresh (Burke 2012).

The political challenge exists because there are likely to be both winners and losers from any environmental pricing reform, and the losers have an interest in campaigning against change. In some instances entrenched interests are capable of spending substantial sums doing so. Australia's coal industry, for instance, was able to launch a well-funded advertising campaign against the introduction of a price on carbon (Lane 2011). The beneficiaries of pollution reductions are often less concentrated and less able to organise to apply political pressure. People also exhibit “loss aversion” (Kahneman 2011) – a tendency to be more aggrieved about losses (e.g. paying a new environmental tax) than gains (e.g. reductions in other taxes). Green pricing schemes can also be complicated and difficult to explain, and coordinating tax reform when tax instruments and revenues are shared across multiple levels of government is a daunting political and institutional challenge.

As a result of the above factors, tax systems often exhibit a high degree of stasis: old taxes are seen as good taxes, and tax reform as risky. Alternative approaches to reducing externalities, such as regulations, can be attractive politically, even if they involve higher economic cost. History shows that environmental pricing is possible, however. An important feature of successful schemes is effort to smooth the transition by providing alternative benefits, whether by tax reductions (personal or corporate) or targeted government spending

initiatives. Environmental pricing schemes can also be made more politically feasible by using tax thresholds or free permits to exempt inframarginal units (Pezzey & Jotzo 2013). These serve to reduce the total revenue take of any scheme without affecting marginal incentives to abate, although do forfeit much of the potential for a double dividend. Providing clear information on the motivation for and benefits of green pricing is also vital to achieving political acceptance (OECD 2006). Once established, environmental pricing schemes can benefit from the same *status quo* inertia that made their introduction so challenging in the first place, and so may fade away as issues of political debate (King et al. 2007).

While the technologies for pricing externalities (or close proxies of externalities) exist and are improving, institutional challenges to introducing green pricing can also be daunting. Institutional awareness of the benefits of green pricing may be low, and the weak tax, transfer, and environmental monitoring systems in developing countries make some schemes infeasible to establish and/or enforce (Blackman & Harrington 2000). In China, for example, many enterprises underreport their emissions, undermining the usefulness of emissions levy schemes (Cao 2010). In countries with particularly weak institutions, such as Myanmar and Pakistan, complex forms of environmental pricing – such as schemes that require monitoring the emissions of a large number of firms – are likely to be impractical. Institutional weaknesses strengthen the case for the use of upstream pricing initiatives, as these involve fewer taxpayers and monitoring requirements.

Improvements in government administrative capacities, together with continued technological advances, are likely to reduce scheme implementation difficulties over time. Improvements in road tolling technologies, for example, have vastly reduced the costs of administering congestion prices. Despite this, it is certainly more challenging to introduce

congestion pricing in low-income cities where registration of vehicles may be incomplete, exclusion from roads challenging, enforcement of rules inadequate, and installing and maintaining tolling devices still a relatively expensive exercise.⁴ Singapore, on the other hand, provided the ideal environment for road pricing (see case study below).

An additional challenge is that existing energy price regulation can blunt the full impact of green pricing reforms. Carbon pricing works best if price flow-through affects decisions on as many margins as possible. Yet in China, for example, coal price increases are not fully passed through to higher electricity prices due to rigidities in electricity pricing (Howes & Dobes 2010). In Indonesia, electricity price increases require the approval of Parliament. There are, however, various alternatives for facilitating price pass-through even without full energy price deregulation. Subsequent to the adoption of a carbon price, governments could approve increases in final electricity prices equal to estimates of the appropriate carbon price pass-through, for instance.

Ideally, environmental prices would be levied on the external damage caused by emissions and congestion rather than on more distantly-related dimensions such as vehicle registration, size, and emission ratings (Parry et al. 2012). Levies on these other dimensions – while common – do not lead to an equalisation of marginal abatement costs across different abatement opportunities, and so do not offer least-cost reductions of an externality. Sizeable efficiency improvements and reductions in negative externalities could be achieved by moving toward fees more closely related to externality damage itself.

⁴ An example of an “upstream pricing initiative” in the case of congestion pricing is to instead rely on the taxation of gasoline and diesel. While fuel use is not perfectly correlated with congestion, reduced use of gasoline and diesel will flow through to some reduction in congestion.

6. Lessons from Regional Experiences

Recent experiences in green pricing provide lessons for future reform efforts. This section explores three case studies.

6.1 Australia's Carbon Price

In 2011 Australia's Parliament passed legislation for a national emissions trading scheme for greenhouse gases, exempting road transport and agriculture. The scheme became operational on 1 July 2012, with an initial plan for three years of fixed prices before moving to a floating price. The fixed price has meant that the scheme has commonly been referred to as a carbon "tax". The price was \$23/tonne carbon dioxide in fiscal year 2012-2013, increasing to \$24 in 2013-2014. The reform package included a reduction in income taxes and an increase in welfare transfers, leaving most households better off in net terms (Phillips & Taylor 2012).

On its merits alone, it is hard not to conclude that the scheme has to date been a success. Inflation has remained within the Reserve Bank of Australia's target range, and a 6% reduction in electricity-sector carbon dioxide emissions was witnessed in the first year of operation (not solely due to carbon pricing; Saddler 2013). The scheme was born with fatal political flaws, however: a lack of bipartisan support, and a perceived broken commitment by then Prime Minister Julia Gillard to not introduce a carbon "tax". The then-Opposition ran a relentless campaign focused on the allegedly high impact of the carbon price on Australians' "cost of living" and pledged to repeal the scheme if elected. They proposed an alternative approach to emissions reductions involving subsidies for discrete emission reduction projects (known as "direct action"), despite advice from economists that this approach would involve

higher economic costs. Australia's change of government in September 2013 means that the country's brief experiment with carbon pricing looks set to be coming to an end.

The main lesson from the Australian experience is that the politics of environmental pricing can be delicate, although the same holds for reforms in other contentious policy areas also.⁵ Policies for which there is a strong political consensus and that are well communicated to the public stand a much better chance of success. A particular lesson is the need for careful choice of language in communicating reform. The Government's acceptance of the term "carbon tax" proved unwise given the Prime Minister's earlier commitment. In future contexts, terms such as "carbon permit charge" or "carbon emission fee" might meet more welcoming ears. The Government also commonly referred to the revenue recycling component of the reform as "compensation", a term that evokes injury; more focus on "tax cuts" would have better directed attention to gains rather than pains. The case also highlights that divergences between pre-election announcements and post-election policy decisions can greatly undermine the political sustainability of any reform.

6.2 Singapore's Congestion Pricing

Singapore's Area License Scheme (ALS), introduced in 1975, was the world's first congestion pricing programme. The scheme required drivers entering a 6 kilometre squared area in the central business district during peak hours to purchase and display a paper certificate. Upon implementation, traffic into Singapore's restricted zone during morning peak hours fell by around 45%, average speeds increased, and many people switched to public transport (Phang & Toh 1997). The ALS was replaced by an electronic version called

⁵ The goods and services tax, minerals rent taxation, education and health are examples of other reform areas that have received intense political debate in Australia.

Electronic Road Pricing (ERP) in 1998, with charges varying by time, location, and vehicle type.

In 1990 Singapore adopted a Vehicle Quota System (VQS) to supplement congestion pricing. Monthly auctions are held under the VQS for Certificates of Entitlement (COE) to own and operate a vehicle for a period of 10 years. The justification for the VQS was in part that, with the congestion pricing technologies in use at the time, a vehicle quota was administratively cheaper than extending congestion pricing throughout the island (Christainsen 2006). The city-state also administers parking fees and a number of additional vehicle fees and taxes.

A measure of the success of Singapore's congestion pricing is that peak-hour traffic volume to the central business district remains below what it was in 1975, despite large increases in population, economic activity, and vehicle numbers (Land Transport Authority 2012).

Average speeds during peak hours equal 63 kilometres per hour on freeways and 29 kilometres per hour in the central business district and on arterial roads (Land Transport Authority 2013), much faster than Jakarta's reported 13 kilometres per hour (Oxford Business Group 2012). The benefits of efficiently-flowing transport have likely contributed to Singapore's stellar economic performance, with the country now having a GDP per capita among the highest in the world (in purchasing power parity terms; World Bank 2013b).

There are several ingredients to the success of road pricing in Singapore. Singapore has strong institutions, a geography conducive to congestion pricing, and a public transport system that has received sizeable public investment and offers an attractive alternative to private vehicles. The government has also used marketing and information campaigns to communicate the scheme, which analysts consider important for public understanding and

acceptance (Vonk Noordegraaf et al. 2014). The lack of strong political opposition in Singapore also undoubtedly makes it easier to implement reform. Singapore's early adoption of congestion pricing was also important, as the system was in place before congestion got out of hand. Adopting congestion pricing once a population has grown accustomed to private vehicle travel and inefficient time usage is surely more difficult.

A contributor to the effectiveness of Singapore's congestion pricing is its visibility. When drivers pass under an ERP gantry at a time of day when a congestion charge applies, the charge is immediately deducted from their smart card and the dollar value of the charge is flashed up on an in-vehicle electronic device. It is believed that drivers are more sensitive to prices when they are regularly reminded of what they are paying (Christainsen 2006). The lesson is that to be effective in inducing behavioural change, green prices are supposed to hurt. The alternative is living with an excess of negative externalities: in this case traffic jams.

Another lesson from Singapore's experience with congestion pricing is the importance of reviewing and improving externality pricing schemes over time. Singapore has continued to expand its scheme, including with new ERP gantries installed on semi-major roads that had started to clog. Congestion prices are reviewed quarterly, and changes to the system are implemented to adapt to circumstances. For example, since 2003 the ERP has implemented more gradual phase-ins of high-fee time slots to reduce the incentive for vehicles to speed up to beat the clock. Singapore is considering adopting distance-based electronic congestion pricing rather than the current system of point-specific tolls, a move that may allow congestion pricing to be further expanded.

6.3 Indonesia's 2013 Fuel Subsidy Reductions

Fuel subsidies have been a feature of Indonesia's fiscal landscape since the country's independence, and have ballooned in size over recent years as both fuel demand and the international price of oil have risen. The most recent of several reforms to Indonesia's fuel subsidies was in June 2013, when subsidised prices of gasoline and diesel were increased by 44% and 22%, respectively. The price increases were coupled with unconditional cash transfers to 15.5 million poor households over a period of four months, community infrastructure initiatives, conditional cash transfers, scholarships for the poor, and temporary increases in allocations of subsidised rice. Similar approaches were used in recent rounds of subsidy reform in 2005 and 2008. Indonesia's provision of targeted benefits to the poor has been generally successful, although there are some implementation issues such as the leaking of benefits to people outside the targeted population (Nehru 2013).

While some street protests are witnessed whenever fuel prices are increased in Indonesia, recent episodes have seen much less opposition than earlier attempts. The coupling of benefits for the poor to fuel price reform packages has played an important role in this change, as has improved communication of the need for reform. As the poor are not large beneficiaries from fuel subsidies, transfers to the poor are perhaps more important in nullifying political arguments against reform than in actually addressing equity implications.

There is a long way to go in reducing Indonesia's fuel subsidies. Prices for subsidised gasoline and diesel remain fixed, which means that increasing demand for fuel will see spending on fuel subsidies continue to rise without further action (assuming world oil prices do not fall substantially). The best way to address this particular aspect of the problem would

be to move to a per-litre subsidy rather than maintaining a guaranteed subsidised price, even if it takes time for the per-litre subsidy to be completely eliminated.

A 2012 Jakarta-based survey (Burke & Resosudarmo 2012) found that further reductions in fuel subsidies, coupled with spending on alternative priorities, might be popular.

Nevertheless, the common assessment in Indonesia is that fuel price reform remains politically risky, and is unlikely in the election year of 2014. This is unfortunate, as the costs of the current arrangements are large. Nevertheless, Indonesia's recent experience of subsidy reductions, and in particular the use of cash transfers and other initiatives to win broad support, serves as a useful example for environmental pricing reforms elsewhere.

7. Conclusion

There is substantial scope for increasing the use of environmental pricing in the Asia Pacific. If well designed, green pricing can reduce a variety of "tragedy of the commons"-type problems, be pro-poor, and improve the fiscal capacities of cash-strapped governments. China's 12th Five-Year Plan requires the reform of environmental taxation, and there is growing momentum for the introduction a variety of green pricing schemes elsewhere. Not all countries are moving in the same direction, however, as Australia's likely repeal of its carbon price demonstrates.

Green pricing is just one of many potential reforms to improve the efficiency and equity of tax systems in the Asia Pacific. Expansion of the coverage of consumption and income taxes are also priorities in many economies. Environmental prices will never provide a particularly large share of government revenues, and if they did there is a danger that governments would have a perverse incentive to become reliant on pollution. Asia-Pacific countries are far from

such a situation, however. It is also important to note that the revenues from instruments such as a rising carbon price should be expected to eventually decrease as emissions fall.

Green pricing offers the opportunity for countries at an early stage of the development process, such as Myanmar, to follow greener development trajectories than those followed by China, India, and the rest of the region. As shown by Singapore's experience with congestion pricing, early introduction of pricing schemes can prevent externality problems from getting out of hand in the first place. Political challenges are sizeable, but sweeteners in the form of cuts to other taxes or targeted government expenditures, coupled with clear communication of the benefits of green pricing, can help to overcome these. Institutional constraints also often loom large, and point towards upstream pricing initiatives that minimise administrative burdens. If designed and implemented effectively, charges on emissions and congestion need not mean slower economic growth, but would help to avoid the severe pollution and congestion problems that have marred so many Asian development experiences.

References

- Arze del Granado FJ, Coady D, Gillingham R (2012) The Unequal Benefits of Fuel Subsidies: A Review of Evidence for Developing Countries. *World Development* 40(11), 2234–2248.
- Asian Development Bank (2013) *Low-Carbon Green Growth in Asia Policies and Practices*. Asian Development Bank, Manila.
- Australian Government (2014) *Budget 2014-2015*, viewed 19 May 2014, <<http://www.budget.gov.au/2014-15/index.htm>>.
- Besley T, Persson T (2013) Taxation and Development. In: Auerbach AJ, Chetty R, Feldstein M, Saez E (eds) *Handbook of Public Economics*, Volume 5, pp. 51–110.
- Bhatt H (2013) In a First, Surat to Run Emission Trading Scheme. *Times of India*. 6 June.
- Blackman A, Harrington W (2000) The Use of Economic Incentives in Developing Countries: Lessons from International Experience with Industrial Air Pollution. *Journal of Environment & Development* 9(5), 5–44.
- Bovenberg AL, de Mooij RA (1994) Environmental Levies and Distortionary Taxation. *American Economic Review* 84(4), 1085–1089.
- Burke PJ (2012) Economic Growth and Political Survival. *B.E. Journal of Macroeconomics* 12(1).

Burke PJ, Nishitatenno S (2013) Gasoline Prices, Gasoline Consumption, and New-Vehicle Fuel Economy: Evidence for a Large Sample of Countries. *Energy Economics* 36, 363–370.

Burke PJ, Nishitatenno S (2014) Gasoline Prices and Road Fatalities: International Evidence. Mimeo.

Burke PJ, Resosudarmo BP (2012) Survey of Recent Developments. *Bulletin of Indonesian Economic Studies* 48(3), 299–324.

Cao J (2010) Reconciling Economic Growth and Carbon Mitigation: Challenges and Policy Options in China. *Asian Economic Policy Review* 5(1), 110–129.

Christainsen GB (2006) Road Pricing in Singapore After 30 Years. *Cato Journal* 26(1), 71–88.

Climate Action Tracker (2013) *Japan: From Frontrunner to Laggard*, viewed 2 December 2013, <<http://climateactiontracker.org/publications/briefing/149/Japan-from-frontrunner-to-laggard.html>>.

Cochrane J (2013), Hours to Go, Just to Get to Work. *New York Times*, 4 August.

Datta A (2010) The Incidence of Fuel Taxation in India. *Energy Economics* 32 (S1) S26–S33.

Dollar D, Kleineberg T, Kraay A (2013) Growth Still Is Good for the Poor. World Bank Policy Research Working Paper 6568.

Henry K, Harmer J, Piggott J, Ridout H, Smith G (2009) *Australia's Future Tax System Review: Report to the Treasurer*. Commonwealth of Australia, Canberra.

Heritage Foundation (2013) *Index of Economic Freedom*, viewed 21 November 2013, <<http://www.heritage.org/index/>>.

Howes S, Dobes L (2010) *Climate Change and Fiscal Policy: A Report for APEC*. World Bank.

International Energy Agency (2013a) *IEA Estimates of Fossil Fuel Consumption Subsidies*, viewed 21 November 2013, <<http://www.oecd.org/site/tadffss/>>.

International Energy Agency (2013b) *World Energy Outlook 2013*. International Energy Agency, Paris.

International Energy Agency, Organization of the Petroleum Exporting Countries, Organisation for Economic Co-operation and Development, World Bank (2011) *Joint Report by IEA, OPEC, OECD and World Bank on Fossil-Fuel and other Energy Subsidies: An Update of the G20 Pittsburgh and Toronto Commitments*.

International Monetary Fund (2013a) *Energy Subsidy Reform: Lessons and Implications*. International Monetary Fund, Washington DC.

International Monetary Fund (2013b) *World Economic Outlook Database*, April 2013 edition, viewed 21 November 2013, <<http://www.imf.org/external/pubs/ft/weo/2013/01/weodata/index.aspx>>.

Jotzo F (2013) Emissions Trading in China: Principles, Design Options and Lessons from International Practice. CCEP Working Paper 1303.

Kahneman D (2011) *Thinking Fast and Slow*. Farrar, Straus and Giroux, New York.

Keen M (2012) Taxation and Development – Again. IMF Working Paper WP/12/220.

King D, Manville M, Shoup D (2007) The Political Calculus of Congestion Pricing. *Transport Policy* 14(2), 111–123.

Kutzbach MJ (2009) Motorization in Developing Countries: Causes, Consequences, and Effectiveness of Policy Options. *Journal of Urban Economics* 65(2), 154–166.

Land Transport Authority (2012) Singapore Land Transport Statistics as at end 2011. *JOURNEYS* 8, 58–59.

Land Transport Authority (2013) *Average Speed on Roads (Peak Hours)*, viewed 26 November 2013, <<http://www.lta.gov.sg/content/ltaweb/en/publications-and-research.html>>.

Lane, S (2011) Industry Launches Anti-Carbon Tax Campaign. ABC News, 21 July, <<http://www.abc.net.au/news/2011-07-21/industry-group-steps-up-carbon-ads/2803794>>.

Lew YD, Leong WY (2009) Managing Congestion in Singapore – A Behavioural Economics Perspective. *JOURNEYS* 2, 15–22.

Mankiw NG (2009) Smart Taxes: An Open Invitation to Join the Pigou Club. *Eastern Economic Journal* 35, 14–23.

Marshall, A (1890) *Principles of Economics*. Macmillan and Co, London.

Nehru V (2013) Survey of Recent Developments. *Bulletin of Indonesian Economic Studies* 49(2), 139–166.

Organisation for Economic Co-operation and Development (2006) *The Political Economy of Environmentally Related Taxes*. OECD Publishing.

Organisation for Economic Co-operation and Development (2010) *Taxation, Innovation and the Environment*. OECD Publishing.

Organisation for Economic Co-operation and Development (2013) Climate and Carbon: Aligning Prices and Policies. OECD Environment Policy Paper 1, October.

Oxford Business Group (2012) *The Report: Indonesia 2012*. Oxford Business Group, London.

Parry IWH, Norregaard J, Heine D (2012) Environmental Tax Reform: Principles from Theory and Practice. *Annual Review of Resource Economics* 4, 101–125.

Pezzey JCV, Jotzo F (2013) Carbon Tax Needs Thresholds to Reach its Full Potential. *Nature Climate Change* 3, 1008–1011.

Phang S-Y, Toh RS (1997) From Manual to Electronic Road Congestion Pricing: The Singapore Experience and Experiment. *Transportation Research Part E: Logistics and Transportation Review* 33(2), 97–106.

Phillips B, Taylor C (2012) *An Independent Analysis of the Carbon Pricing Household Assistance Package*. National Centre for Social and Economic Modelling (NATSEM), January 31 presentation.

Pigou AC (1920) *The Economics of Welfare*. Macmillan and Co, London.

Saddler H. (2013) Electricity Demand's in Free-Fall, But What Happened to the Peak? *Climate Spectator*, 8 August, <<http://www.businessspectator.com.au/article/2013/8/8/energy-markets/electricity-demands-free-fall-what-happened-peak>>.

Sawhney A (2004) *The New Face of Environmental Management in India*. Ashgate Publishing, Hants UK.

Stavins, RN (2003) Experience with Market-Based Environmental Policy Instruments. In Mäler K-G, Vincent JR (eds) *Handbook of Environmental Economics*, 1, pp. 355–435.

Stern, T (ed) (2012) *Fuel Taxes and the Poor: The Distributional Effects of Gasoline Taxation and Their Implications for Climate Policy*. RFF Press, Washington DC.

United Nations (2011) *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*. United Nations Environment Programme.

Vagliasindi M (2012) *Implementing Energy Subsidy Reforms: Evidence from Developing Countries*. World Bank, Washington DC.

Vonk Noordegraaf D, Annema JA, van Wee B (2014) Policy Implementation Lessons from Six Road Pricing Cases. *Transportation Research Part A* 59, 172–191.

Whittles MJ (2003) *Urban Road Pricing: Public and Political Acceptability*. Ashgate Publishing, Hants UK.

Wong E (2013) Air Pollution Linked to 1.2 Million Premature Deaths in China. *New York Times*, 1 April.

World Bank (2012) *Inclusive Green Growth: The Pathway to Sustainable Development*. World Bank, Washington DC.

World Bank (2013a) *The State of the Poor: Where are the Poor and Where Are they Poorest?* World Bank, Washington DC.

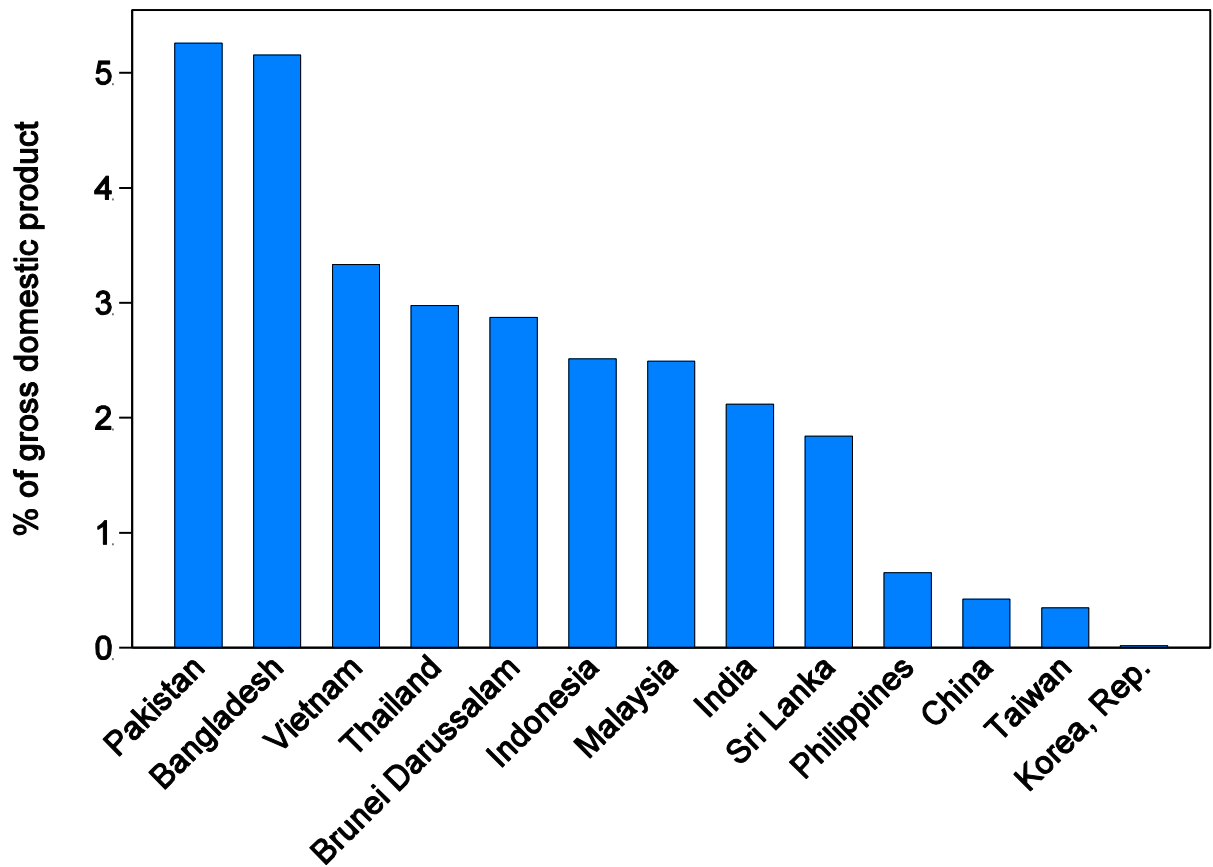
World Bank (2013b) *World Development Indicators*, viewed 21 November 2013, <data.worldbank.org/indicator>.

World Health Organization (2011) *Urban Outdoor Air Pollution Database*. World Health Organization, Geneva.

World Resources Institute (2013) *CAIT 2.0*, viewed 21 November 2013, <<http://cait2.wri.org>>.

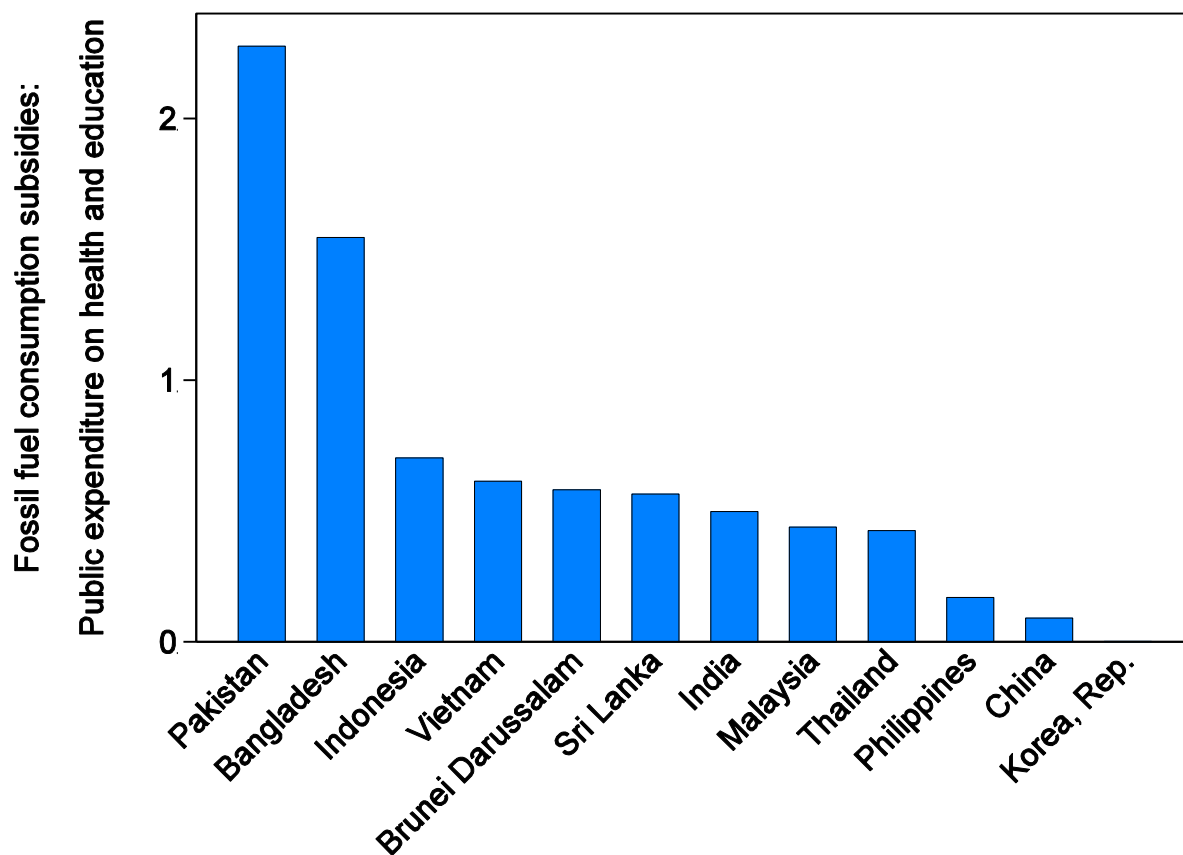
Yee A (2013) The Air That Kills in India. *New York Times*, 14 February.

Figure 1 Fossil Fuel Consumption Subsidies as a Share of GDP: Selected Asia Pacific Countries, 2011



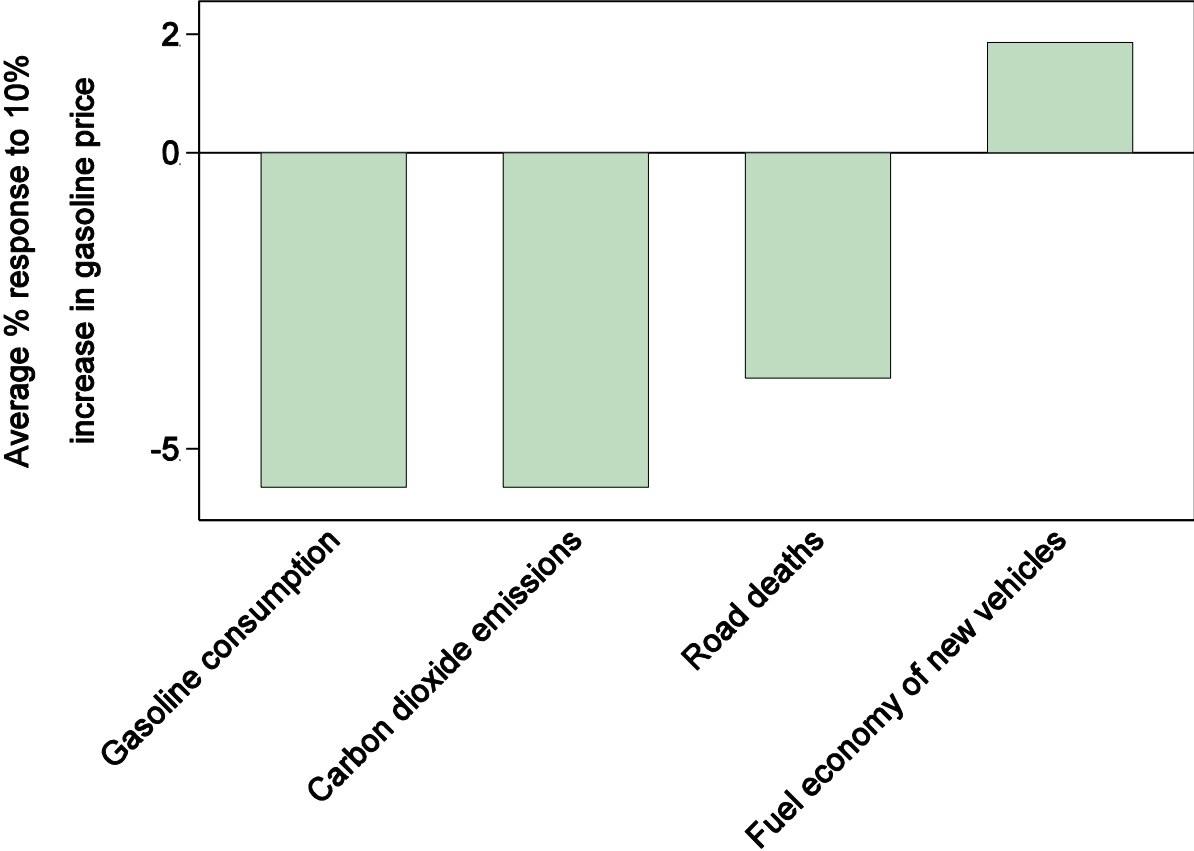
Notes: IEA (2013a). GDP data from World Bank (2013b) and International Monetary Fund (2013b).

Figure 2 Fossil Fuel Consumption Subsidies Relative to Public Expenditure on Health and Education: Selected Asia Pacific Countries, 2011



Notes: IEA (2013a). Data on health and education expenditure are from the World Bank (2013b) and cover expenditure by both central and local governments. The y-axis is a ratio; 1 means that fossil fuel consumption subsidies are equal to public expenditure on health and education.

Figure 3 Estimated Long-Run Impacts of a 10% Increase in Gasoline Prices



Notes: Estimates use the between estimator for available road-sector data for 1991-2010 à la Burke and Nishitateno (2013, 2014). Carbon dioxide emissions are those from, and assumed to be proportional to, road-sector gasoline use.