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Structural adjustment: the climate change dimension

To remain successful, economies need continually to adapt to evolving forces, including climate change

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Authors' note

Llewellyn Consulting was engaged by the *Global Commission on the Economy and Climate* chaired by former President of Mexico Felipe Calderón and Lord Stern to act as a *strategic partner* to *The New Climate Economy Project*. Working as part of the project team directed by Jeremy Oppenheim, Llewellyn Consulting was tasked with providing *"… intellectual macroeconomic leadership…"* and with *"…framing the key questions and propositions and integrating this narrative into the wider project."*

Our contribution, in large part, took the form of three top-down, concise, forward-looking 'main issues'-type papers addressing the climate change dimensions of: structural change, infrastructure, and international cooperation.

This first paper in the series, *Structural adjustment: the climate change dimension*, shows how the process of continued structural change is integral to achieving the simultaneous objectives of sustainable economic growth and climate risk reduction.

This paper was commissioned by *The New Climate Economy Project* as part of the research conducted for the *Global Commission on the Economy and Climate*. However, neither the Project nor the Commission should be taken as endorsing the paper or the conclusions it reaches. The views expressed are those of the authors.

The content of this paper was submitted to the project on 9 May 2014.

The *Better Growth, Better Climate* report, premiered in New York on 16 September 2014 and thereafter presented in Addis Ababa, Oslo, Beijing, and Johannesburg.

Our principal messages: first, economic growth and low carbon emissions are not trade-offs, but rather can, with appropriate policies, be complementary; second, tackling climate change should be framed within requirements for structural change and reform, both featured prominently.

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Structural adjustment: the climate change dimension

Sustaining economic growth while also reducing climate risk will involve continual structural change

- Successful economies undergo continual, and cumulatively extensive, structural change.
- Good structural adjustment policies do much to facilitate change and to promote economic growth.
- Climate change is one – albeit big – factor to which economies have continually to adjust.
- Policy is always involved in the change process: markets have their limits.
- Governments are not able to avoid taking decisions: taking no action is itself a policy decision.
- Moreover, there are certain things that only governments can do.
- Investment is central to effecting change, and decarbonisation will likely be heavily investment-intensive.
- Infrastructure investment can contribute to decarbonisation, climate resilience, and economic growth.

Definitions

Structural adjustment is used in a technical sense

Structural adjustment. The term 'structural adjustment' is used in economic commentary in a variety of contexts with a range of (somewhat different) meanings. In some usages it has acquired political connotations. Use of the term throughout this paper, however, is purely technical e.g. in the manner in which it has been used in supply-side analysis by the OECD, and is taken to be:

> *"The process whereby economies continually reallocate resources according to: evolving patterns of demand, advance of technology, and emergence of new competitors."*

Economies in which the process stalls very often get stuck in the so-called 'middle-income trap'. Many countries in Latin America have become trapped; but in Asia many have fared better.

Structural policies are taken to be:

> *"Policies that encourage, or at least do not inhibit, the processes of structural adjustment. These processes involve the flow of resources from declining and less productive activities to growing and more productive activities and leave economies better able to absorb shocks."*

Climate change in a structural adjustment context

Avoiding dangerous climate change calls for major change

If the world is to avoid dangerous climate change it is likely that economies and societies will need to undertake a set of measures to reduce significantly the flow of greenhouse gas emissions into the atmosphere. In economic terms this implies moving to a progressively less-carbon-intensive form of GDP. Over time economies will see progressive change in structure in respect of: demand; supply; relative prices of inputs; relative prices of outputs.

Such significant change raises questions:

- How is the movement to be started, and thereafter kept going?
  - By policy changing explicit prices? Or;
  - By directly changing volumes and thereby changing implicit prices? Or;
  - By new technologies, which may require upfront investment, or policy and regulation to induce them?
- Most likely a combination of these approaches will be needed:
  - Countries' starting circumstances differ; and
  - Institutions and behaviours will likely change over time.

There is a desire to achieve change at least possible cost

There is a general desire to achieve change at lowest possible cost. This can be depicted using a 'Production Possibility Frontier' (figure 1). Transition to low-carbon GDP involves moving from (carbon-intensive) point A to (less-carbon-intensive) point B. If this is achieved by moving along the Production Possibility Frontier (dotted green line), no output is foregone. To the extent, however, that the transition path lies inside the frontier (the curved grey line), some output is lost.

- Example: many propeller planes were permanently mothballed after the quadrupling of the oil price in 1973/74 as they were no longer economically viable.

The policy challenge is to achieve a path that minimises the area between the grey line and dotted green line.

Policy can help transition

There are two basic options to effect the transition to low-carbon demand and output:

1. Set new (relative) prices explicitly e.g. by taxing carbon; and then:
   - Wait for the pattern of demand and the structure of production to adjust to these prices, or;
2. Set new regulations e.g. by establishing new efficiency standards; and then:
   - Wait for the economy to adjust to the resulting new implicit prices.

In some circumstances, explicit price changes are the more efficient mechanism; in others, regulations may be the better policy. In either case the cost, i.e. output forgone as the economy adjusts, may be reduced to the extent that economic agents believe adjustment will inevitably take place:

- The more credibly that expectations point to B, the more cost-effective the adjustment process is likely to be i.e.:
  - The more likely that production and consumption will move along the frontier than trace some (sub-optimal) path inside it.

The shaping of expectations is paramount

A transition that is perceived as inevitable not only reduces uncertainty, but also can spur innovation and investment. Expectations play an important role in the costs of transition regardless of whether prices or regulations are the policy instrument.

Structural adjustment: A broad description of the development process

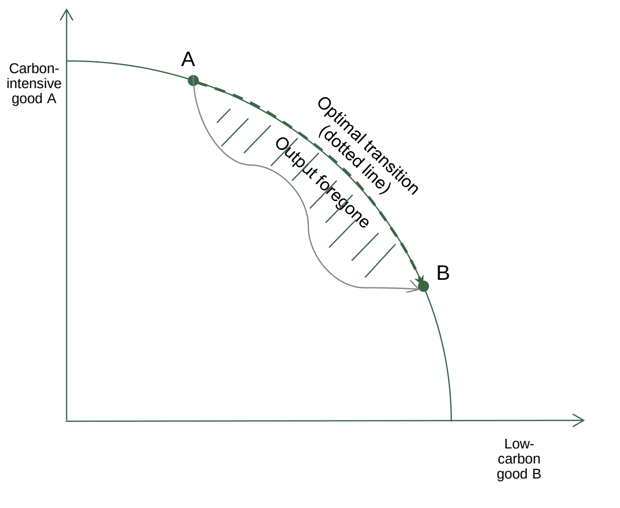
All economies face structural challenges

All economies face structural challenges over the medium term. Major parts of the world, especially the West, currently face a range of near-term issues, largely the result of the Global Financial Crisis. Once economic growth rates have returned to 'normal', however, the primary challenge that economies always face over the medium term will again come to the fore.

The challenge will be to sustain economic growth in the face of continual change arising from, *inter alia*:

- Evolving patterns of supply, including from advances of technology;

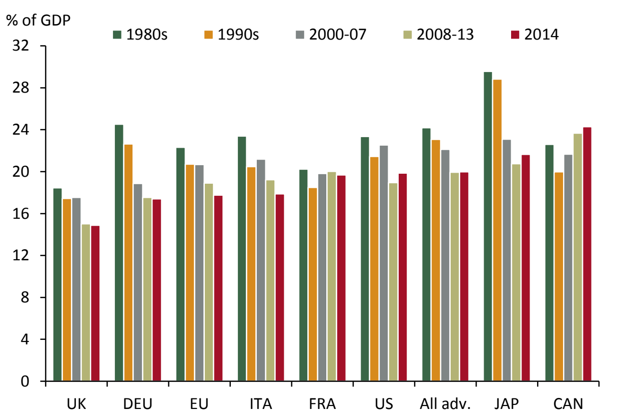
Figure 1: Production Possibility Frontier



Source: Llewellyn Consulting

Notes: The maximum volume of output that can be produced at a given time, all resources being fully employed.

Figure 2: Investment/GDP ratios, selected economies, 1980-2014



Source: IMF World Economic Outlook, April 2014

Notes: Averages over periods indicated.

- Evolving patterns of demand, including from demographic developments;
- Emergence of new competitors; and
- Climate change.

Some of these challenges will arise from domestic developments, others from developments abroad.

Structural change has been going on for centuries ...

Economies have changed in structure over the centuries, evolving in the face of new challenges and emerging opportunities. Two historical examples:

... responding to major technological advances ...

... such as oil and the Industrial Revolution ...

1. **The rise of the petroleum industry** in the late 19th C and early 20th C, which included:
   - Major technological advances that transformed Western economies, and reshaped the oil market;
   - Associated inventions, notably: electric lighting, automobiles, and planes which transformed the length of the working day, transportation, and communication:
     - In 1900 petroleum made up only 2% of US primary energy consumption, by 1950 this had risen to almost 40%.
2. **The Industrial Revolution** itself, which involved:
   - An increasing proportion of the labour force moving into towns and cities:
     - UK urbanisation increased from 15% in 1750, to 50% in 1850, and then rose rapidly to 80% by 1880;
     - Global urbanisation increased from just 3% in 1800, to 30% in 1950, and is now over 50%.
   - The UK manufacturing sector growing from almost nothing to become a key, and driving, sector of the economy:
     - In 1801 one-fifth of the UK population worked in manufacturing, by 1871 this proportion had risen to two-thirds.
   - The creation of a new middle class.

Decarbonisation, if it is to happen, will be a process comparable with previous carbonisation epochs.

... as well as to many shorter episodes

There have been many short episodes of significant structural change too, a number of which have occurred in recent memory. Examples include:

- Countries gearing up to and down from a world-war footing:
  - The size of the British army decreased from its peak of around 4m in 1918 to under 400k in 1920 i.e. in just two years; and
  - Grew from around 900k in September 1939 to 2.9m in June 1945.
- Post WWII reconstruction and the house building boom:
  - Blitzed-Britain built over 5m houses in the 1950s and 1960s.
- The reforms of Australia and New Zealand:
  - Post-1980s reform, included liberalisation of the exchange rate, capital markets, labour markets, privatisation, and tariffs.
- German reunification:
  - Germany's construction sector grew to 8% of GDP and then dropped to 3%.

The importance of policy

Policy is always involved

Good economic performance over the medium term will not come about by accident. Rather it stands to be the product of a complex interaction between market mechanisms and policy. The market, in combination with effective competition, is recognised in almost all societies today as the most efficient method for allocating resources. At the same time, society does not accept pure market outcomes. For various reasons – some good, some less so – governments will be obliged continually to take policy decisions, and the quality of policy (particularly of structural adjustment) stands to be a key determinant of economic performance over the coming decades.

Governments are not able to avoid taking decisions

Governments are not able to avoid taking decisions; not least because no action is itself a policy decision. Nor will lack of certainty be a reason for not taking policy decisions – decisions perforce have to be taken on the basis of less than perfect information:

- In practice, few decision-makers, whether in the public or private sector, can or do expect certainty when taking decisions;
- Decisions are generally taken on a basis of perceived, most-likely, costs and benefits;
- A common approach is to focus on no regrets moves. In most countries, however, even only a fraction of these are pursued.

There are certain things that only government can do

Moreover, there are certain things that only government can do, such as:

- **Setting frameworks** in which the private sector can operate – e.g.:
  - Property laws; enforceable contracts; and structural adjustment policies.
- **Offsetting market failure** – e.g.:
  - Internalising externalities – such as via the 'Polluter Pays' principle;
  - Taking co-benefits into account – such as air quality; energy efficiency; energy security; reduced transit times and road accidents; better soil management;
  - Removing policy distortions – such as subsidies which cause fossil fuel innovation to outpace clean-tech innovation, widening the gap between dirty and clean technology;
  - Compensating for market myopia; and
  - Overcoming institutional inertia.
- **Compensating for private sector inaction**: sometimes when the private sector ceases to function in its customary way, governments have to step in to compensate, e.g.:
  - When a crisis of confidence leads to aggregate private expenditure falling significantly below the full-capacity, high employment, level. In such circumstances a particular risk is that long-term investors are put off by uncertainty.

Structural policies extend across a number of areas …

Structural policies extend across a large number of areas, but three broad categories are key:

- The functioning of labour markets;
- The functioning of social policies; and
- The functioning of product markets.

Within these three areas, reform can extend to:

- Education and training; technology, research and development, and innovation; entrepreneurship; infrastructure; trade and protection; foreign direct investment; tax and benefit systems; employment protection; active labour market policies.

… and operate at many levels

Structural policies operate at many levels, but many objectives are complementary:

- **Competition policy**, vital in the operation of factor and product markets, takes various forms:
  - Imposing rules to minimise collusion and cartelisation;
  - Reducing trade barriers;
  - Encouraging foreign direct investment, which:
    - Directly creates jobs; and
    - Brings new technology and management techniques.
- **Education policy** has a range of aims:
  - Providing more than a decent basic education;
  - Strengthening vocational training; and
  - Extending education to incorporate life-time learning.
- **Active labour market policies** seek to equip the unemployed to work again by:
  - Directing resources away from passive income support; and towards
  - Developing job-related skills – including vocational and on-the-job training.
- **Tax and benefit systems** can reinforce these processes by:
  - Providing incentives to encourage job search; albeit
  - Balancing such incentives with the need to reduce, or prevent, poverty.

Climate change will impinge, to a greater or lesser extent, on all these areas of structural policy.

Infrastructure investment

Investment is central to effecting change

Investment is central to effecting structural change. The deployment of virtually every new technology requires at least some new investment, and the scale of investment can depend importantly on the type of technology. For example:

- The Industrial Revolution involved large-scale investment e.g. to build factories and houses in cities on a massive scale; and new railways to connect urban areas;
- The IT Revolution seems to be less investment-intensive e.g. the replacing of typewriters with computers, phones by smart phones, and the development of broadband and wifi networks.

Decarbonisation stands to be investment intensive

Decarbonisation would probably be heavily investment-intensive, including importantly in infrastructure:

- Low-carbon power plants would need to be built, as well as new distribution and transmission networks; and
- New types of low-carbon vehicles are likely to be required over the long-term, on a global scale.

Infrastructure is a global issue

Within investment, building and maintaining infrastructure is an issue worldwide. McKinsey estimates[1] that between 2013 and 2030 around $57 trillion in global infrastructure investment will be needed – purely to keep pace with global GDP growth. This includes infrastructure for transport (roads, rail, ports, and airports), power, water, and telecommunications; and is almost 60% higher than the $36 trillion spent globally over the past 18 years.

Funding such investment, however, is a significant challenge. Over recent years, investment/GDP ratios have typically fallen from pre-crisis levels in advanced economies (figure 2):

- Sharply so in a number of cases; and
- They are now well below historical norms.

Such investment can absorb savings and labour ...

The world is suffering from a deficiency of investment relative to potential savings – the result of weak animal spirits. One hope could be that a new invention will come along that would absorb a lot of savings and, ideally, a lot of employment as well. The IT revolution may well be having important effects on productivity; but the associated investment is not absorbing a lot of savings, or labour. An infrastructure programme, not least a green infrastructure programme, could absorb significant amounts of both savings and employment, and along with the innovations it often facilitates, drive and make easier the change process.

... and be a catalyst for new technology

Indeed some countries – South Korea for example – view innovation policy itself as a driver of growth. The US has shown that well-targeted public policy and spending can accelerate innovation, creating rather than merely picking 'winners'.

There is potential therefore for the shift to low-carbon economies to become a catalyst for a major wave of technological change. Harnessing and deploying technological potential will likely be central to the success of structural policy, particularly for climate change where energy costs and competitiveness concerns are potential barriers.

Overlapping reinforcing initiatives

Overlapping initiatives can realise further benefits

Previous episodes of structural change suggest that overlapping, reinforcing, initiatives can realise further benefits. Absorbing new technologies takes time, and typically involves organisational change, requiring:

- Research and development spending;
- Investment in education and training systems;
- Firms being incentivised to innovate;
- Elimination of subsidies that slow change; and
- Removal of uncertainties by macro stability, creation of infrastructure standards, protocols, and protection of rights and data.

Encouraging entrepreneurship can help too

Encouraging entrepreneurship can help too and has many dimensions to it, including:

- Lowering regulation and controls that discourage new firms;
- Reducing subsidies, particularly to larger firms;
- Improving access of small firms to government R&D, job creation, and training schemes;
- Producing a highly skilled workforce with good infrastructure;

- Broadening access to export credit schemes; and
- Encouraging equity capital, in particular developing venture capital markets.

Failure to adjust harms growth

It is perhaps unsurprising, given the above, that failure to adjust to evolving circumstances harms growth. Many rapidly-growing economies have tended towards stagnation at middle-income levels (figure 3). Of 101 middle-income economies in 1960, only 13 became high income by 2008.[2] Of those that have made it all the way to high-income status, Japan, Hong Kong, Singapore, and South Korea are perhaps those most often cited. Middle-income status, therefore, does not automatically result in economic slowdown.

Structural policies explain differences in performance

Structural policies are an important part of the explanation of differences in performance. The quality of countries' structural policies differs considerably: some have a wide range of structural policies, others do not. Looking at a range of large and influential economies (figure 4):

- Hong Kong and Singapore rank as having the best structural policies overall;
- The US, UK, Australia, Netherlands, and Germany too score highly across a range of policy areas;
- Argentina, Nigeria, Brazil, India, and Indonesia, are at the other end of the spectrum, scoring low in almost all areas; and
- Greece ranks low relative even to many developing economies.

Effecting climate change structural adjustment

Managing risk and uncertainty

Climate change policy action can be viewed as risk management

Climate change policy action can be viewed as a branch of risk management, both at the public and at the private sector level. For example, if the costs are potentially large it is rational to devote resources to reducing the risks. Attempting to reduce the likelihood of high-impact events and to reduce the consequences should they occur is common practice in other fields; and with unmanaged climate change the risks are certainly of high-impact events becoming more common. Particularly as over the coming 5-10 years at least, global greenhouse gas emissions are likely to rise, even if there is a progressive reduction in the carbon-intensity of growth.

Parallels are drawn between climate and defence risks

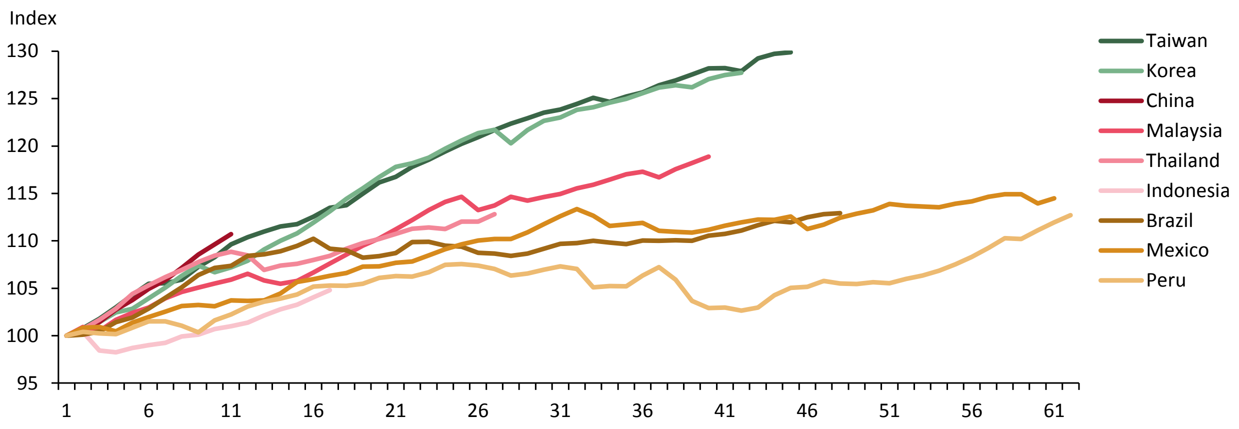
Parallels are drawn between climate and defence spending, as both are analysed as an exercise in reducing risks:

- Defence spending reduces the risk of war;
- Climate change spending reduces the risk of climate damage.

There are, however, also important differences:

- Defence is about deterring people in another country by raising the spectre of their being hurt if they attack;

Figure 3: Past growth trajectories, selected economies



Source: IMF Asia and Pacific Regional Outlook 2013

Notes: GDP per capita is in 2005 PPP adjusted terms. Log scale indexed. The slope of each series reflects the growth rate. Period 1 is defined as the year when GDP per capita for the country considered reached US$ 3,000 in PPP terms.

- Climate change investment however does not seek to deter other people's activities: rather it seeks to reduce the likelihood of physical phenomena and / or reduce the consequences.

Moreover, at least within broad limits, the more a country invests in defence the less likely it is to be attacked, even though diminishing returns set in. With climate change, by contrast, more investment does not necessarily decrease the damage to which a country will be exposed: this is in major part a function of global, rather than national, emissions. The biggest emitters, notably the US and China, are likely the only exceptions.

Risk and uncertainty are not synonyms

There are important differences between risk and uncertainty: the two words are not synonyms. Frank Knight distinguished between the two in *Risk, uncertainty, and profit* (1921):

- Risk applies to situations where the various possible outcomes are known, and so are the odds (probability) of each:
  - For example, there are six numbers on a dice and the odds ('risk') of throwing say a two is one-sixth.
- Uncertainty applies to situations where the possible outcomes are not known, and hence it is impossible to establish odds:

> *"There is a fundamental distinction between the reward for taking a known risk and that for assuming a risk whose value itself is not known."*[3]

Executives and policymakers often analyse risk as though all factors are known. Before the Global Financial Crisis, for instance, firms treated systemic risks as 'one in ten-thousand year events' even though the modern global financial system had been in operation for less than 30 years. Thus risk can be managed to the extent that enough relevant information is known: but there are many situations where decision-makers are dealing with true Knightian uncertainty. Climate change may have elements of such uncertainty.

Aspects of the political economy

Political economy is intrinsic to change

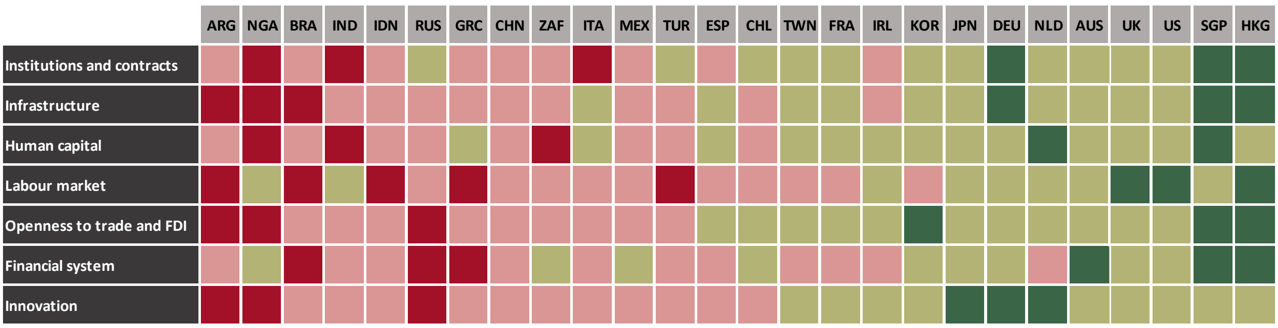
The political economy is intrinsic to dealing with any issues of change, and the implementation of major structural reform is particularly complex and challenging. Prerequisites for successful reform include sound macroeconomic policies and a satisfactory economic performance:

- Fiscal and monetary policy need to act in tandem to sustain overall stability, and in particular investment spending, both public and private;
- Post-2008 developments have shown, for example, that good climate policy cannot be layered on top of poor economic policy and performance.

Change, and certainly structural change, creates both winners and losers. It is necessary to:

- Compensate losers; while at the same time

Figure 4: Structural policy heat map, selected economies



Source: IMF 2012; The Fraser Institute Index of Economic Freedom 2013; WEF Global Competitiveness Report 2013-14; WB Doing Business 2014
Notes: The worst three performers are coloured red. Pink cells = average or below-average performance. The top three performers are coloured dark green. Light green = above-average performance. NGA = Nigeria; GRC = Greece; IDN = Indonesia; IND = India; CHN = China; ZAF = South Africa.

- Not eliminate the gains from change.

Politically, the moment for reform never seems right:

- Structural policy reform can deepen a cyclical downturn; while
- During an upswing the need for reform does not seem pressing.

These considerations apply to climate change with equal or even greater force.

Vested interests may well seek to scupper policy intentions

Vested interests can affect the efficiency of the overall outcome. They generally resist change, particularly if that change will affect firms' profitability. Incumbents also usually have strong lobbying powers, and are often practiced in resisting policy.

Vested interests with respect to climate change will differ from country to country. Fossil-fuel-exporting countries will likely have different incumbent companies from those less reliant on commodity exports.

At a sectoral level, the energy- and trade- intensive sectors are likely to be most adversely affected from a carbon price unless it is introduced in other countries simultaneously. These sectors are exposed both to:

- Higher absolute energy prices in the domestic market if an explicit or implicit carbon price were introduced; and
- Relative price concerns due to competing internationally with firms not subject to a carbon price.

There are many pre-requisites for success

Evidence shows that successful structural adjustment policies, including climate change policy, share a number of common features. These include:

- Simplicity of purpose – an easily-understood agenda;
- The support of the head of state;
- Broad support across the cabinet;
- An opposition that is supportive, or at least insufficiently strong to make a difference;
- Points of light across society that provide vocal and credible support;
- Ability to assess progress – both quantitatively and qualitatively;
- Initiatives to at least temporarily temper the costs and compensate losers; and
- Sustained positive momentum: sequencing, while in principle desirable, is often impractical.

While it is not essential to cover everything in this list, the more areas that are addressed the more successful structural change is likely to be.■

Endnotes

[1] McKinsey & Company, 2013. *Infrastructure productivity: how to save $1 trillion a year*.
[2] World Bank, 2013. *China 2030*
[3] Knight, F. K., 1921. *Risk, Uncertainty, and Profit*

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