



Australian Davos  
Connection

# AUSTRALIA REPORT 2010

---

## Risks and Opportunities





# Contents

---

Foreword	1
Executive summary	2
Economic risks	6
Political risks	9
Environmental risks	12
Societal risks	15
Technological risks	18
About the report	21
Risk categories and explanations	22
Contributors and acknowledgements	25

# Foreword

---

The *Australia Report: Risks and Opportunities*, the first of what will become an annual publication, is designed to assist leaders across business, government and the wider community face the future with a clear-eyed appreciation of the threats and opportunities that await us. It is a landmark report in risk analysis for Australia because it addresses the risks and opportunities facing the nation over the next decade and explicitly acknowledges their interconnectedness with each other and the global forces at play. The world is complex and volatile, and a piecemeal or sectoral approach is no longer enough. Threats to our future do not fit neatly into categories or stop and start at the border.

*The Australia Report* addresses risks and opportunities across economic, political, environmental, societal and technological boundaries. It is a qualitative and quantitative report built on surveys and discussions with key leaders in each of these respective fields. It is not designed for easy answers or quick fixes. The aim is to provoke a public debate on key risks and opportunities, and inspire action to address them. It will help determine public policy, inform business decisions, and bring risk management nearer to the top of the national agenda. The report was written out of the firm belief that Australia must endeavour to shape its future, not simply be shaped by it.

Future reports will allow us to keep track of evolving perceptions of the threats facing Australia. Risks, both perceived and real, are in constant flux. Many of the key issues that emerge here – water scarcity, climate change, terrorism – would have barely warranted a mention just a decade ago. Similarly, the risk landscape is likely to be unrecognisable 10 years from now. *The Australia Report* will chart this evolving landscape and, in so doing, help develop a richer, more vibrant national debate about the strategic challenges ahead.

## Acknowledgements

The report has drawn inspiration from the research, round-table discussions and peer-review methodologies typically applied by the World Economic Forum (WEF) in the preparation of its risk reports. We thank the WEF for its assistance in that regard. The contents and findings of the report drew upon the insights of mainly – but not exclusively – Australian political, academic, business, community and interest group leaders. The peer reviews were performed by Goldman Sachs JB Were, University of Melbourne, Australian National University and National Australia Bank. The input and insights from all contributors are greatly valued and appreciated.

Being the first report covering quite disparate subject matter, we request readers' indulgence. We see this report as a way to engage the type of thinking we believe needs to be incorporated into national dialogue. Much has already been learnt along the way, and we expect unfolding discussions will continue to yield value.

Thank you to KPMG, their actuaries and economists and, in particular, Andries Terblanché for collaborating with the ADC on this report, and thank you to the Australia Report Advisory Board and ADC team for their input into the inaugural Australia report. Our gratitude also extends to the survey participants and discussion groups – many notable experts have enhanced our collective understanding of risks and opportunities in the Australian context.



Michael Roux  
Chairman  
ADC

# Executive summary

---



## Overarching themes and key messages

Of the risks confronting Australia in 2009, those emerging from our natural environment are of the greatest consequence. That is the message from the business leaders, academics and policymakers consulted for this report, who broadly agree that climate change related risks – water scarcity, droughts, heatwaves, bushfires, extreme storms – are of more profound consequence than any other threat facing the country today. Such a finding indicates the need for urgent policy imperatives, especially in the context of an increasing population, depleting water supplies and a growing consensus around the need for new sources of energy.

While the focus on environmental risk is arresting, the central, inescapable theme of this report is interconnectedness. Environmental considerations may be the most urgent concern for Australian leaders, but they do not exist in isolation from other aspects of Australian life. The economic, political and social ramifications of environmental catastrophes are obvious and immediate, as the recent Victorian bushfires and Sydney dust storm vividly demonstrated. In particular, the issue of

water scarcity interacts with economic productivity, population policy, regional development, agriculture and urban planning, as well as a myriad of other downstream environmental problems. Likewise, social and economic risks are heavily interconnected, as are both international and nationally driven risk factors.

## Critical risk factors for Australia

- Inadequate research, development and design is a standout risk, viewed as very high in severity and almost certain to occur. The interconnectedness of this risk makes this finding particularly concerning since many of the challenges facing Australia – whether climate change, the ageing population or water scarcity – could be mitigated through innovations in technology, processes and human capital.
- The risk of subdued Asian economies has a much higher severity than other economic risks, emphasising the dependence of Australia's economic prosperity on Asia's ongoing economic fortunes and the importance of strong inter-country relationships.





## Risk interconnectivity

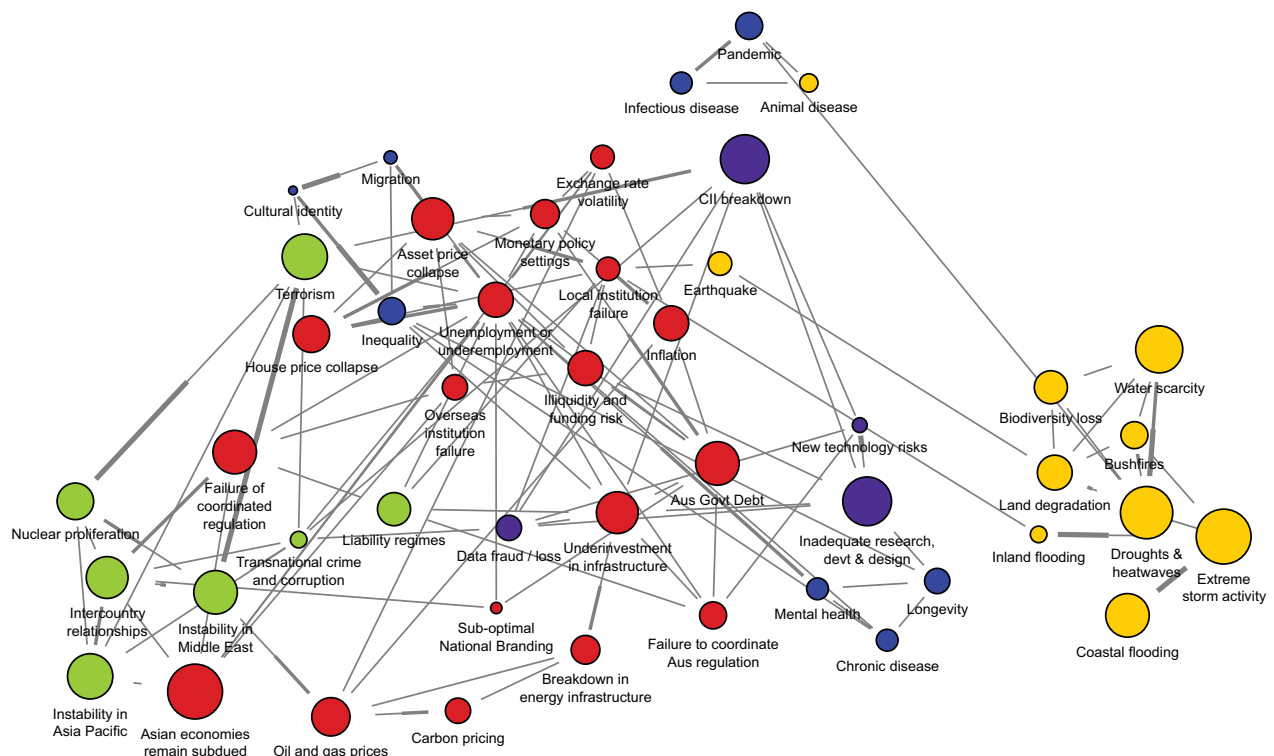
The following graph provides a visual portrayal of the relationships indicated by the survey. The size of each node represents the severity of that risk, its proximity to other risks indicates that the risks tend to be closely interlinked, and the thickness of the connecting lines signals the strength of the linkages between the risks. The direction of a thicker line segment indicates where one risk is stronger in the relationship.

In broad terms, the graph shows that relationships within each risk category are viewed as stronger than relationships

between categories. Unemployment or underemployment is, not surprisingly, the most interrelated risk. This risk is more than twice as interrelated as any other risk. It is particularly strongly linked to a host of economic, political and societal risks. Most of the societal links (chronic disease, mental health and longevity) contain strong bi-directional links to unemployment or underemployment.

Few, if any, individual risks materialise in isolation. The consequences of a single adverse development may compound rapidly and exponentially as it interlinks with other risks.

## 2. Risk linkages



---

## Implications for policy

Respondents believe that our democratic institutions and system of government work well to mitigate risk, and ought to be enhanced. However, specific policy decisions, in areas such as infrastructure and research, development and design, can have a significant impact, both positive and negative, on the likelihood and severity of risks facing Australia.

- Research, development and design, which is central to Australia's aspirational goals and future competitiveness, is vital to mitigate a number of severe risks. Smart and targeted research, development and design, supported by a range of policy interventions, will be central to Australia continuing to realise its security and prosperity objectives. Australia possesses significant unrealised potential in an increasingly sophisticated and connected global economy, which can be tapped if technology, knowledge and skills remain up-to-date and relevant. A new wave of innovation built on leading-edge research, development and design can provide a range of technological solutions for application at home as well as for export.
- Increased research, development and design addressing the twin impacts of climate change and a growing population is a particularly urgent priority in the area of water and food security. New technologies for the preservation and processing of water and generation of energy are also critical.
- To manage the risks of a population set to double by 2056, Australian governments must commit to appropriate and carefully planned investment in hard and soft infrastructure. The projected rapid growth in city populations, in particular, makes such investment critical and urgent.

Australia is the lucky country, but we will need more than luck to withstand the complex and profound challenges that confront us today. This report outlines these risks and opportunities, offering guidance and insights for today's leaders, in the hope that the risks can be managed or averted and the opportunities seized.

# Economic risks

---



## Highlights

Australia has a significant economic exposure in the Asia-Pacific region with strong linkages existing between *subdued Asian economies, failure to coordinate regulation/protectionism and inter-country relationships*.

*Unemployment or underemployment* is the most interconnected risk with various economic and social risks, illustrating the importance of a stable economy and a strong fabric of Australian society to reduce the level of *unemployment or underemployment*.

Sensitivity to the global financial crisis has abated, leaving us with a greater appreciation of the contribution of market confidence, endogenous risks and factor interdependence in economic stability. This is shown through the high degree of faith in, and the perceived resilience of, the Australian economy and its supporting institutions.

Greater investment in both hard and soft infrastructure is needed to unlock dividend efficiencies amid an expanding population and economy, and underpin the broader aspirational goal of remaining a competitive knowledge economy.

Economic risks vary widely in both likelihood and severity. Economic risks had the lowest likelihood compared with other categories, with only a few exceptions. The more likely risks comprise those stemming from the vicissitudes of the international market, such as *oil and gas prices* and *exchange rate volatility*. The other likely risks include *carbon pricing*, *failure to coordinate Australian regulation* and *underinvestment in infrastructure*, over which Australia has some control.

The risk of subdued *Asian economies* was the second-highest overall risk in terms of severity; however, it was relatively low in terms of likelihood, indicating that respondents believe that the internal resilience of the Australian economy is highly contingent on certain external factors. This dependency on the robustness and growth of the Asian economies has significant political ramifications, and would compound other economic risks such as capital allocation via the *illiquidity and funding* risk. The importance of *inter-country relationships* (see section on political risks on page 9), reliance on multilateral bodies such as the G20 to prevent *failure of coordinated regulation/protectionism*, and the interaction between economic risks and political risks, will need to be considered in terms of the overall autonomy, resilience and sustainability of the Australian economy.

Obverse to the risk of *subdued Asian economies* are the currency and inflationary pressures from the resource demands of Asian economies. The risk is that these pressures will function to inhibit the speed of economic diversification. This is particularly important in a world where ongoing demand for resources is uncertain and where further development will likely be curtailed by local and international imperatives. Sustainable investment in infrastructure and intellectual capital is needed to support the requisite economic diversification. For example, resource-rich countries have successfully navigated this challenge through the development of offshore resource funds to create a macroeconomic buffer and fund the necessary investments. Australia's strategic imperative is to move further and faster up the economic value chain. This will be an organic process involving feedback loops between the growth of new knowledge-intensive industries and the human capacity requirements to support them.

The perceived low likelihood of *local institutional failure* indicates a high degree of faith and an expectation of resilience in the functioning of the Australian economy. It was interesting to note that *house price collapse* was considered a remote possibility, despite OECD data suggesting Australian housing stock has been overpriced for nearly a decade, as well as being one of the few buoyant developed-economy-housing markets since the financial crisis. There was a link between this risk and *unemployment or underemployment*, potentially related to

average purchase-price-to-income ratios and house-price-to-rent ratios. Survey participants considered this linkage strong and severe in both directions, potentially reflecting a belief in the systemic importance of house prices to the broader Australian economy. This raises an obvious question – is the belief that Australian house prices are likely to continue to rise a result of fundamental structural features of the Australian housing market, or does this constitute a local extension of the “irrational exuberance” that ultimately led to some of the severe housing market falls experienced overseas in recent years?

The risk of *Australian government debt* was considered plausible in likelihood and severe should the negative consequences eventuate. However, the debt-to-GDP ratio is a dynamic one, indicating that debt is of serious concern in two scenarios: first, if it cannot be sustained through global capital flows from *illiquidity and funding* risk, and second, if the GDP part of the equation lacks impetus. Given that both *underinvestment in infrastructure* and *inadequate research, development and design* (see section on technology risks on page 18) are clear and present risks, there are longer-term implications including what credit rating might be given in the event of increased *Australian government debt*.

*Unemployment or underemployment* constitutes by far the most interconnected risk. It relates to more than one-third of the risks surveyed and a number of the societal risks. Directionally, the societal risks tend to link more strongly towards *unemployment or underemployment*, indicating that the strength and stability of the Australian economy relies heavily on the strong social fabric of Australian society. This interrelationship needs to be considered in the context of future economic and population growth.

*Underinvestment in infrastructure* also represents a highly linked economic risk, displaying strong connections to a *breakdown in energy infrastructure*, the potential for *data fraud/loss*, a *breakdown in critical information infrastructure*, and the risks of increasing *inequality*, and *inadequate research, development and design*. Considerable potential for dividend efficiencies can be unlocked through traditional infrastructure projects, such as improved and coordinated railways, designed to underpin the achievement of broader aspirational goals.

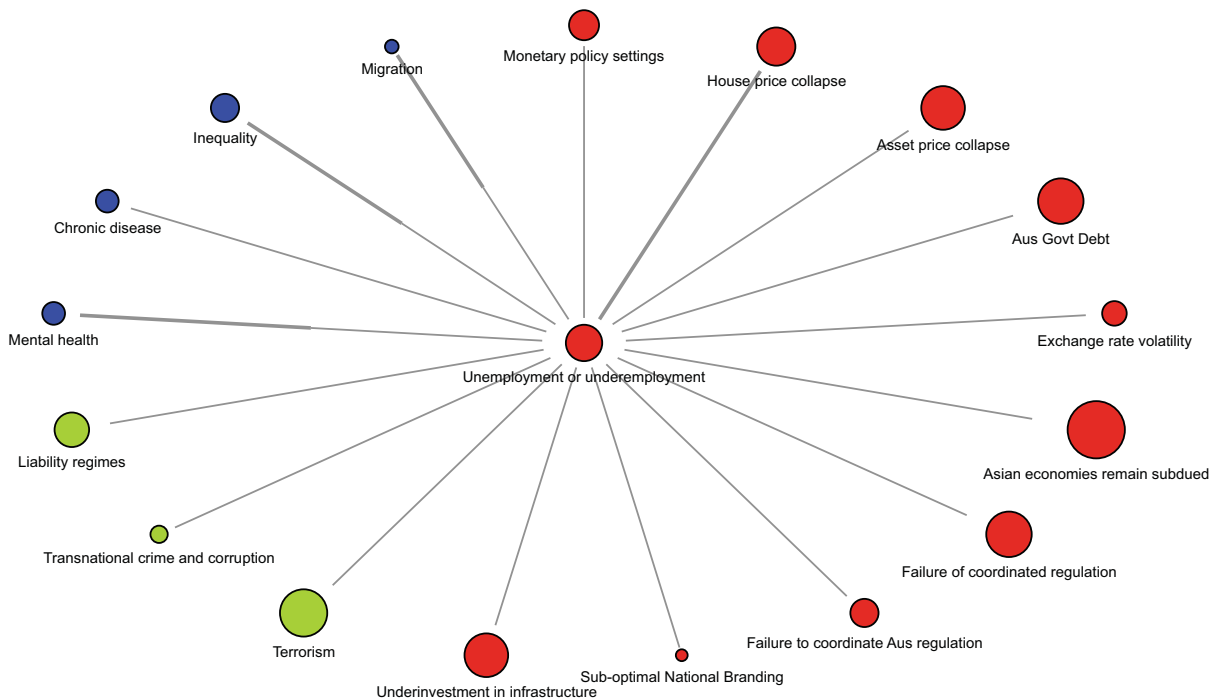
Infrastructure increasingly needs to be seen as intangible as well as tangible, soft as well as hard. With the projected rapid growth in city populations, investment is critical for Australia to maintain its standing as a competitive knowledge economy among advanced economies. The combination of *underinvestment in infrastructure*, and rapid urban population growth, puts downward pressure on productivity, affluence and social cohesion.

Despite being classified as a technology risk, *inadequate research, development and design* has links to economic risks that indicate it is fundamental to Australia's future competitiveness. A profound revenue upside can be realised in an increasingly sophisticated and connected global economy, provided technology, knowledge and skills remain up-to-date and relevant. Research, development and design represents the single most observed opportunity for Australia's current and future leadership.

On the policy front, appropriate investment in research, development and design combined with an appropriate investment in infrastructure and coordinated regulation,

provides an opportunity for Australia to address inequalities and raise productivity. It is vital that Australia continues working towards reduced volatility in the post financial crisis world. This is not about more or less regulation, but having proportionate regulation that enables the market to operate most efficiently. This should lead to a reduction in economic risks, which will be further reduced if Australia continues to strengthen trade and investment relationships and actively engages in global economic reforms.

### 3. Unemployment or underemployment



# Political risks

---



## Highlights

*Asia-Pacific instability* rates highly in both severity and likelihood, suggesting concern about the likelihood of instability occurring and the effect of that instability on Australia.

There seems to be significant interdependence between political and social risks, including *unemployment or underemployment*, *Asian economies subdued* and *Asia-Pacific instability*, indicating the importance of Australia playing a strong and successful diplomatic role in the region.

The connections between *terrorism* and *critical information infrastructure breakdown* and *nuclear proliferation* indicate perceptions that security risks are influenced by a range of technological and political factors.

Policy-wise, the results suggest that Australia must remain a consistent and respected regional player, positively influencing stability. Supporting research and the links to a range of social risk factors also indicate the need for trust-building at home. The research suggests that building internal trust (i.e. domestically with populations) enhances trust-building externally (i.e. with other nations).



Across the political category, the risks tend to be viewed as high in severity and low in likelihood, although *instability in Asia Pacific*, *instability in the Middle East* and *terrorism* are all viewed as more likely to occur. The high interaction between these risks and *inter-country relationships* underlines the catalytic role of diplomatic capital, trust and a respected international presence. The risks of conflict can be materially more costly than dollar terms – be that the loss of life, impact on sovereignty, or damage to society or the environment. The occurrence and fallout from serious longer-term risks, political or otherwise, remains difficult to assess due to hyperbolic discounting. The human bias to temporal myopia means that individual perceptions of events, past or future, reduce in significance the more distant they are from the present.

There is a significant interdependency between economic and political risks, including factors such as *unemployment or underemployment* and the economic prosperity of the Asia-Pacific region. Australia needs to play a strong diplomatic role in the region to construct a regional architecture for cooperation and transparency.

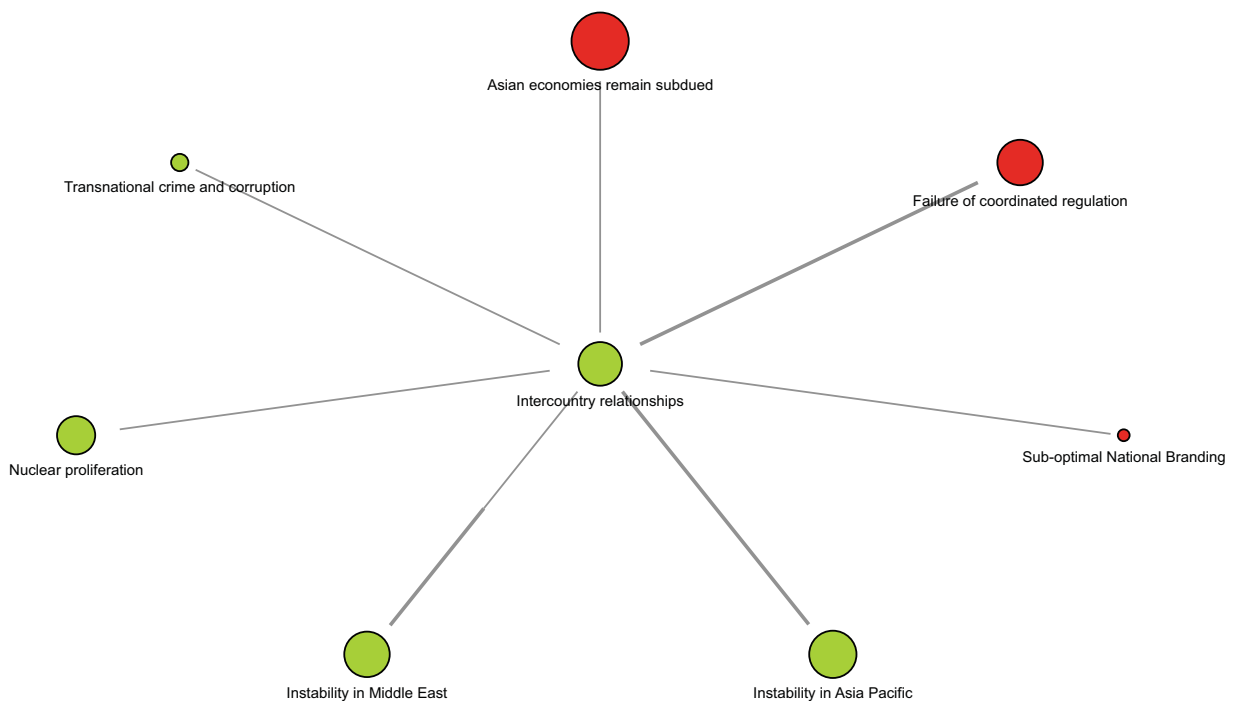
As the balance of global power shifts to Asia Pacific, the world is moving from a simple, stable unipolar US model to a multipolar landscape. There will be benefits in a redistribution of power, but more complex management of that power will be required. In recent times we have been blessed by common support for

peace and cooperation among political leaders across most of the region. This support includes an appreciation of the real, tangible benefits that can be achieved through capitalistic economic growth as a key component of the grand strategy of individual nations.

*Inter-country relationships* is perceived as a key risk for Australia, with strong economic and political linkages. The insight from this meta-risk, and its contribution to consequential risks such as *instability in Asia Pacific* and *instability in Middle East*, suggests that Australia should remain a consistent and respected regional player and not become an observer hoping for stability. The quality of future diplomatic relationships will be determined, in part, by the underlying economic resilience of the region.

That said, it is worth elucidating a point of historical understanding. Despite the protestations of many political leaders to the contrary, increasing trade relations between countries cannot be considered a panacea against war. Increasing and decreasing trade between countries have historically both contributed to military conflict. Accordingly, strong multilateral frameworks, combined with bilateral arrangements, will greatly assist in the mitigation of poor inter-country relationships. As a traditional point of diplomatic leverage and security adjunct to excessive resource or other demands on Australia, the policy of a strong defence force will continue to hedge against the extremely remote and unforeseen

#### 4. Inter-country relationships



downside consequences from regional development. Additionally, the movement towards regional military transparency will remain as important as economic transparency alongside regional militarisation. In this context, appropriate coordination of national regulation will also be essential.

One of the strongest individual relationships across all the risk categories is the link between *Middle East instability* and *terrorism*. *Unemployment or underemployment*, as well as a number of societal risks such as *cultural identity*, *migration* and *inequality*, contribute to the risk of *terrorism*. These risks are also connected to a swathe of economic risks. There is evidence at the organisational level to suggest that in-group trust-building (i.e. domestically with populations) makes trust-building externally (i.e. with other nations) easier – adding weight to the argument that social fixes at home benefit relationships with the region.

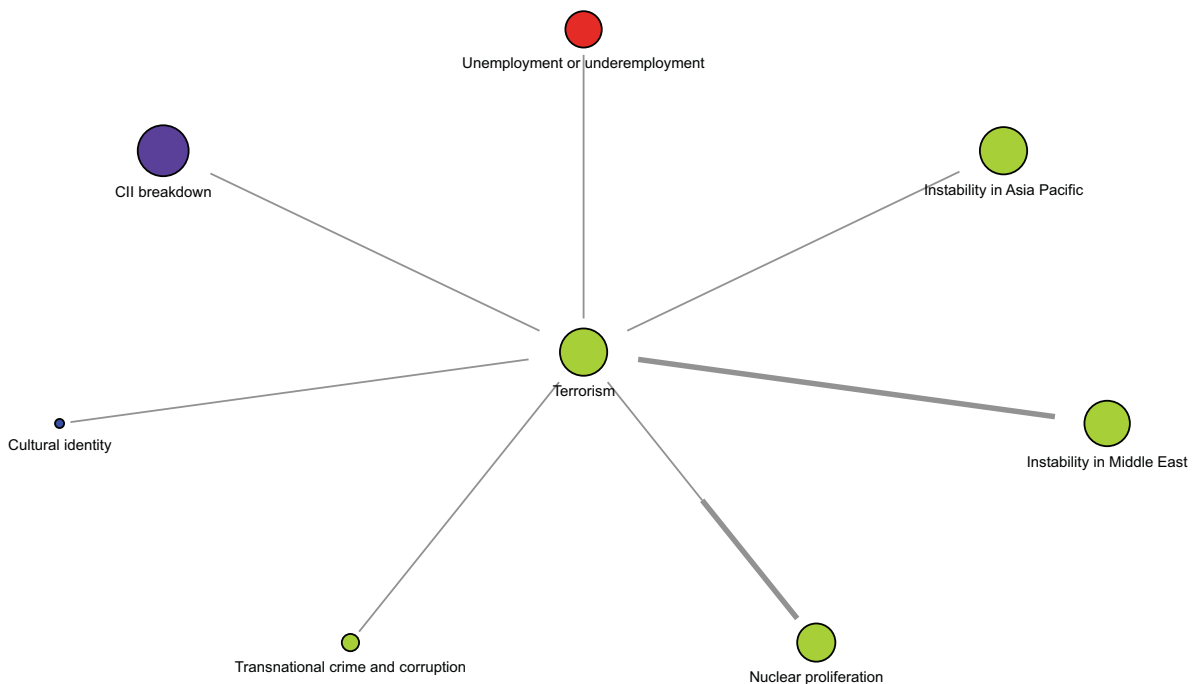
The connections between two particular risks, namely *critical information infrastructure breakdown* and *nuclear proliferation*, indicate particular types of *terrorism* either being caused or derived from those risks. Better investment in infrastructure would certainly be one way to mitigate those risks. The stronger link is to *nuclear proliferation*, and the effect of nuclear terrorism is likely to be more catastrophic, in terms of loss of life and nuclear fallout, than forms of terrorism witnessed to date. The link to *transnational crime and corruption* indicates

that the means of organised crime and the use of *terrorism* go beyond ideological causes and that a multidimensional approach is needed to fight *terrorism*.

The prevalence of low probability/high consequence political risks highlights the need to plan around the severity concerns. Regional cooperation and exchange, at a time when the Asia-Pacific region has untold opportunities, presents a potential solution to those concerns. In the same way that the G20 is emerging as a key multilateral forum for global economic coordination, with the G7/8 to tackle global security concerns, among the myriad of Asian regional forums, the East Asian Summit which now includes the United States may be the best platform to address the security concerns of the region. A key realisation is that Australia cannot simply be an observer waiting for stability to occur or instability to unravel. Political stability depends on both domestic goodwill and strong foreign relations. Australia should be a strong multilateral, as well as a bilateral, player, using its diplomatic leverage to build political capital, strong and inclusive institutions, and trust in the region.

Australia's sense of agency in the region will contribute to real security and facilitate the development of the enormous economic and societal potential of the region. To be a credible player in the region, Australia needs to ensure the fabric of its own society is intact. Building social cohesion and trust in the domestic context will have benefits beyond ameliorating any specific societal risks. The country's diplomatic capital will benefit and its economy will be more resilient.

## 5. Terrorism



# Environmental risks

---



## Highlights

As a category, environmental risks are of the highest severity and consequence, with water scarcity rated particularly strongly in both severity and likelihood.

The environmental risks are isolated from the other risk categories and closely linked, indicating both high visibility and interdependence. However, while the strongest-indicated interconnections are internal to the group, these risks also have a significant impact on both economic and social risks.

Compared to earlier global assessments of climate change, Australian leaders perceive the severity and probability of climate change to Australia to be particularly high, indicating they expect high social and economic costs as a result.

New evidence suggests that the costs of mitigating and adapting to climate change will be significantly higher than previously expected. Moving from a static-cost basis to a dynamic-cost analysis means this could be much higher again.

Policy-wise, the severity and likelihood of these results indicate that urgent, transformational government and business action is required for mitigation of, and adaptation to, the changing environment. Such strategies include new breakthrough technologies, as well as the possibility of low-technology interventions in the natural environment.

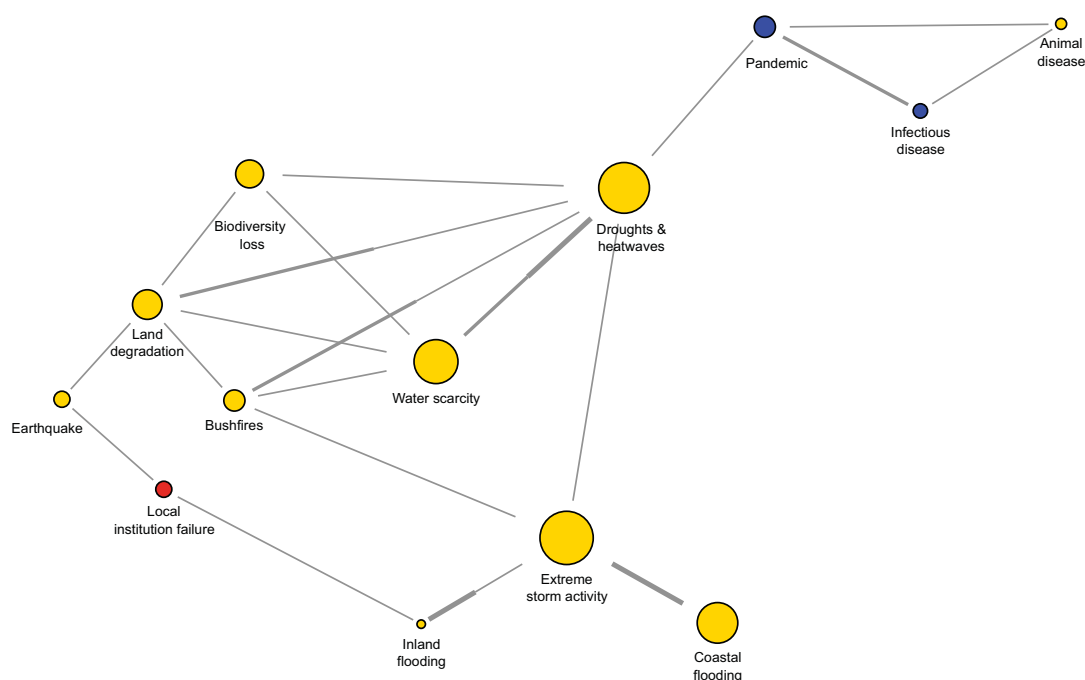
It came as little surprise that environmental risks were rated amongst the highest likelihood and consequence risks. From the drought in Victoria, through to wind storms in NSW and Queensland, and the bushfires in Victoria and NSW, climate change is both anticipated and real in Australia. It is commonly known that an already dry continent will become drier. This was clearly evident from the survey, with *water scarcity* rated as a critical risk in both likelihood and severity. *Droughts and heatwaves*, which was linked to the increasing risk and frequency of major climate events, including *bushfire, storms, coastal flooding and land degradation*, ranked highest in respect of likelihood.

There are considerable implications for Australia in managing the economic and social cost of increasing weather events. Urgent government and business action is required in developing both mitigation and adaptation strategies to build Australia's economic, social and environmental resilience to the changing climate. This is particularly relevant for decisions relating to long-lived assets. There are sizeable risks and compound effects in both over and under-estimating these risks and their full impact is hard to quantify.

*Water scarcity* remains one of the most significant challenges facing the Australian community because Australia's population is set to double by 2056. Notwithstanding the unprecedented investment in water infrastructure in Australia's capital cities, it is forecast that within the next 30 years, Australian capital cities will still source 80 percent of their water from climate-dependent sources. There is an urgent need to develop a national urban water security strategy so that Australia can grow its economy and population without placing an unsustainable demand on water and other scarce natural resources. Moreover, there is a clear challenge for government and the business community to ensure that concerns over *water scarcity* do not impede economic growth.

A joint parliamentary committee of the Australian Government recently reported on the likely impact on coastal communities of forecast rising sea levels. It is clear that the Australian community needs to plan now for the significant impacts of coastal inundation and flooding. The question arises whether it even makes sense for so much of Australia's population to be concentrated on the eastern seaboard, and whether this is sustainable given the current land-use practices of these heavily populated areas.

## 6. Environmental risks



There is a surprising lack of strong linkage between environmental and economic risks. In some respects it appears as if they are “isolated” from economic impacts. This could be for several reasons. It may be a function of the survey design which limited linkages to only three other risks. It may also be the result of a greater degree of confidence in economic theory, modelling and consequences compared to the current modelling of environmental risks. Alternatively, respondents might be indicating that environmental risks are important, but perhaps not strongly linked to major economic impacts in the short-term. The situation may have been different if a 20 year instead of a 10 year time horizon had been posed. If this is a correct assessment, it raises the economics of intertemporal tradeoffs – investing now to save cost in the long-term.

The level of concern about weather events and *water scarcity* is significantly greater in Australia than elsewhere because Australia will be relatively more affected, and affected earlier, by climate change than other developed nations. Given the unprecedented growth in population and the importance of the resources industry and agriculture in the Australian economy, climate change deserves significant research and investment.

New thinking suggests that economists and policy makers have to date failed to focus on the dynamic costs of climate change.<sup>1</sup> The current emphasis on climate change mitigation and adaptation depends partly on earlier reports that the static costs will amount to around 1 percent of global GDP. More recent scientific appraisal considers the extent and acceleration of climate change to be greater, and recent evidence on the cost of adapting to future climate change suggests that costs will be several times higher on a static-cost basis. A dynamic-cost analysis over time would lead to the costs of mitigation alone being in orders of magnitude greater.

This evidence suggests that the respondents’ higher rating of the severity of environmental risks in this report reflects the increasing gravity of the cost scenario, as much as it reflects Australia’s more fragile ecosystem and climate change predicament. Any chance of a cost blowout in dealing with climate change should be an incentive to cast a wider strategic net in dealing with climate change.

Not only is climate change a global problem requiring global solutions, but in defining human existence as exogenous to the rest of nature in causing climate change, society is now missing the opportunity to see itself as part of nature and a powerful and necessarily responsible agent in the broader ecosystem. Low-technology interventions in the earth system (e.g. large-scale land rehabilitation and reforestation projects to increase average rainfall and improve habitability and food security), have already been tested in other parts of the world and present a viable, emerging concept that offers a new, accompanying dimension in climate change policy.<sup>2</sup> Although this is technically defined as geoengineering, it differs from some of the more radical, untested examples of this paradigm (e.g. delivery of sulphur aerosols into the upper atmosphere or dissolving mined calcium hydroxide throughout the Great Barrier Reef to prevent ocean acidification and coral dissolution).

A wider strategy in dealing with climate change will require a structural shift in the Australian economy which may lead to more substantial and sustainable new investments in breakthrough, adaptive and mitigation technologies, such as future forms of renewable energy. It will also require a structural alteration in thinking about the problem. We have been economically quite interventionist in discussing carbon reduction schemes, focusing on mitigation and adaptation to a less-hospitable climate and world. How do we shift the debate to also focus on retaining our capacity and inclination to remain expansive, to use other frameworks such as engineering rather than a pure conservation framework, and to focus on long-term solutions and transformation? A driving aspect of this culture of expansion and transformation also demands that significant levels of research be conducted in pursuit of further solutions not available to the world today.

1 Snooks, G.D. 2009. *Climate Mitigation or Technological Revolution? A Critical Choice of Futures*. Global Dynamic Systems Centre, ANU, Working Paper No. 10 (February 2009) <http://econrssh.anu.edu.au/pdf/GDSC/WP010.pdf>

2 A number of earth system interventions have been successfully conducted including the JP Morgan backed Las Gaviotas reforestation project in Columbia and Willie Smit’s rainforest restoration in Borneo, both recording significant increases in rainfall precipitation. The former Governor General of Australia Major General Michael Jeffery AC AO (Mil) CVO MC (Retd) has recently launched a national campaign based on the concepts of Peter Andrews to restore Australia’s degraded landscape.

# Societal risks

---



## Highlights

While lower in impact, social risks are both highly interdependent and linked to the other risk categories. In a world of interconnected risks, social risks are therefore more important than their individual severity ratings may imply.

Health-related risks, such as *longevity*, *chronic disease* and *mental health*, will place enormous pressures on the healthcare system, creating pressure for corresponding improvements in productivity, earning capacity and quality of life amongst Australians.

Australia's population is expected to double in size over the next 50 years, which will have significant implications for Australian society – unless commensurate opportunities are realised this could lead to reduced productivity, inadequate infrastructure, increased healthcare costs and increased inequalities.

Policy-wise, a number of the social risks could be mitigated through increased research, development and design efforts.



The societal risks appear generally lower in severity, although they vary widely in likelihood. Notably, they interact with all the other categories – economic, political, environmental and technological – potentially compounding their impact.

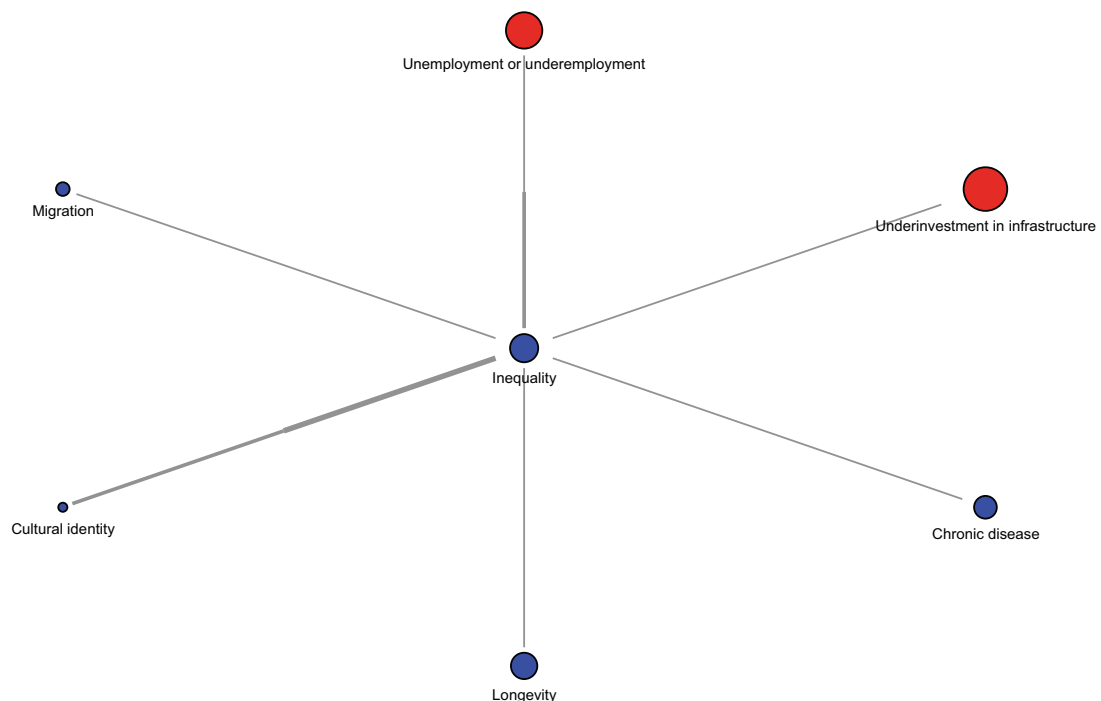
Australia is forecast to grow from 20.7 million people in 2006 to 35 million by 2041 and 42.6 million by 2056. The age profile is set for structural change with increases in the population over 60 as well as an increase in the age-dependency-ratio (the ratio of the pre and post-working age population to the working age population). Australia's capital cities are forecast to grow from 13.2 million to 28.0 million (66 percent of Australia's population) by 2056. Within the next decade, it is projected that Melbourne and Sydney will each be equivalent in population to Singapore, which has 4.8 million people.

Unless action, such as investment in infrastructure and research, development and design, is taken, an increase in population will have significant negative implications for Australian society (e.g. reduced productivity and increased healthcare, social security and retirement funding).

As well as being the most interconnected, *inequality* ranks as the highest social risk in severity with a very high likelihood of occurrence. It has strong linkages to a number of the other social and economic risks, in particular, *cultural identity*, which combines with *migration* to influence both political and economic risks. *Inequality* also links strongly to both the economic risks of *unemployment or underemployment* and *underinvestment in infrastructure*. The combination of *cultural identity* and *underinvestment in infrastructure* indicates how the risk of *inequality* can be mitigated through the intangible or soft infrastructure of education.

The values and aspirations of individual Australians contribute to the fabric of Australian society. If Australia is going to meet its aspirations for success on the international stage across all the categories of risk and opportunity, there is a cultural imperative to reframe what it means to be a “hero” in the Australian narrative. It needs to become as desirable for young people to dream of scientific, entrepreneurial, artistic or political success as it does for them to dream about sporting fame and accolades. Most importantly, there needs to be the commensurate public recognition and acclaim.

## 7. Inequality



Australians continue to enjoy one of the highest life expectancies in the world, living to 81.4 years on average. This is second only to Japan. The risk of *longevity* imposes a social-welfare-to-income-tax-ratio burden. One of the challenges is that although people live longer, they are doing so with increased *chronic disease* and *mental health* issues. *Chronic disease* (especially arthritis, asthma, diabetes and cardiovascular) and mental illness are also more common amongst disadvantaged communities (economically and geographically) including many Indigenous communities, and some minority groups.

The health cluster splits into two sub-groupings: *mental health* and *chronic disease* combine with *inequality* and *longevity*; and *infectious disease* combines with *animal disease*, feeding into the environmental risk cluster. It is interesting to note that the often-reported tricausality between *inequality*, *longevity* and general physical and *mental health* was identified by the survey. The general physical and *mental health* risk groupings feed into both the risk of *inequality* as well as *unemployment* or *underemployment*.

*Pandemic* risks, although rated as relatively benign, nevertheless deserve attention. On average, a major pandemic can be expected to occur every 25 years, and its manifestation is often associated with three six-week economic shut-down periods in an 18-month time span.

Australia currently spends nearly 10 percent of its GDP on health. Spending has increased substantially over the past 20 years and, given the strong linkage between *chronic disease* and *mental health*, spending will increase further if inequalities are not reduced. However, there is an opportunity to increase research, development and design efforts to find leading, cost-effective solutions, broaden education, increase our knowledge about wellness and prevention, and use our strong base in the arts and humanities as much as our lauded medical research capability.

The interrelationship between *migration* and *unemployment* or *underemployment* brings into focus the sensitivity and criticality of our migration policy. *Migration* continues to enable Australia to increase its population in a sustainable and globally cooperative manner. However, given the expected population growth, considerable innovation in the redevelopment of infrastructure and living spaces will be required in urban areas to accommodate the larger populations. At the same time, Australia must preserve and enhance societal health measures, such as our wellness index levels, social cohesion and ecosystem sustainability.

There is a paradox in Australian education. A sector which originally carried responsibility for educating the nation seems increasingly focused on revenue incentives from overseas students. While this expands Australia's education industry and its connectivity to the region, it presents an increasing future vulnerability if academic competitiveness, and research, development and design fall behind the significant investments being made in surrounding countries.

The sciences seem to have become more valued than the humanities in recent years, presumably due to an evidence-based policy culture that recognises more quickly the downstream economic benefits of investment in scientific research. This is in contrast to more speculative, "blue sky" scientific research which is often undervalued for the same reason the humanities are, though the products of their research are entirely different.

Research and endeavour in the arts and humanities can be a powerful healing and facilitating force for cultural change, capacity building, aspiration and connection – critical enabling elements for a strong economy and responsive political culture. Education, from primary to tertiary, in all disciplines needs to be considered a critical piece of infrastructure. Maintaining a strong social fabric should be a core concern, being the great connector of all the other risk categories.

# Technological risks

---



## Highlights

*Inadequate research, development and design* is the standout technological risk both in terms of likelihood and severity. Its high level of interconnectedness implies that many of the challenges that will face Australia over the next decade could be mitigated in a large part through innovation in technology, processes and people.

*Critical information infrastructure breakdown, data fraud/loss* and *new technology* risks are all rated as low in likelihood; however, *critical information infrastructure breakdown* has links to political risks that imply a need to focus on risk management in these areas for security reasons.

Policy-wise, it is critical that leaders address the fact that Australia's business investment in research, development and design lags behind other OECD countries by approximately 35 percent. It is particularly important that we balance measureable, outcome-orientated research with "blue-sky" speculative research to increase the pursuit of discovery and invention.

Technological risks appear as the most widely distributed risk category, with *inadequate research, development and design* cited as a stand-out risk in both severity and likelihood, not only for the category but for the entire survey.

Many of the challenges facing Australia over the next decade in terms of *climate change, ageing population and water scarcity* will be addressed in large part through innovation in technology, processes or human capital. Innovation needs fostering and increased investment in research, development and design is critical if innovation is to flourish. This means that technological development should be pursued in all fields, whether we are considering “blue sky” discovery and invention, applied biological or materials science, information technologies, human capital technologies, environmental technologies, political, social, cultural, or economic and financial technologies.

Both *critical information infrastructure breakdown* and *inadequate research, development and design* rate amongst the highest overall risks in terms of severity. Except for *inadequate research, development and design*, the other technology risks are rated much lower in likelihood. It is worth noting that *critical information infrastructure breakdown* involves both onshore and offshore risk. When it is considered that the internet does not really exist in the ether or the “cloud”, it becomes apparent there are very real points of physical vulnerability. As some of these points on a scaleable non-linear network are massively interconnected (e.g. Google), various forms of telecommunications infrastructure can bring access down completely.

*Data fraud/loss* and *new technology risks* are related to both of the above risks. The low severity of *new technology risks* might indicate adequate regulation and prudence in the introduction of new and untested technologies. Both *critical information infrastructure breakdown* and *inadequate research, development and design* are linked to the highly connected risk of *underinvestment in infrastructure*, while *critical information infrastructure breakdown* also links to the criminal risks grouping of *terrorism, data fraud/loss, and transnational crime and corruption*.

Australian businesses’ investment in research, development and design lags those of other OECD countries, on average by 35 percent. Businesses alone need to invest more than \$4 billion per annum for Australia to compare favourably with the average OECD performance.

It is estimated that Australia spent US\$14.9 billion on research, development and design in 2008. In contrast, China spent US\$102.3 billion, Korea US\$41.7 billion and Japan US\$147.8 billion. Businesses contributed some 57 percent of the research, development and design investment in Australia, compared with China at 70 percent, Korea at 74 percent and Japan at 78 percent. This suggests that Australian businesses need to increase their focus on research, development and design, and that government should pursue incentives in encouraging this outcome.

That said, business investment in research, development and design constitutes generally only one aspect of a nation’s research spending. A significant and neglected element of research spending is the “blue sky” speculative research that lies economically upstream of the research spending typically made by business. This neglect applies in increasing measure to universities which, to counteract declining pools of government grant funding, increasingly need to justify their research spending in measurable, outcome-oriented ways. The problem with much of this applied or derivative research spending is that it often borrows from previous spending on pure, “blue sky” research that might have been conducted decades earlier; the latter having been unfettered from a linear burden of demonstrable, immediate application and benefit. This is not to say that pure research should be aimless; it is the grand aspirations of the best minds that create the downstream economic and derivative research opportunities for more applied purposes. As a nation, Australia needs to increase the importance of the pursuit of discovery and invention to unlock the blockbuster value inherent in properly invested, new scientific discoveries, inventions and technologies.

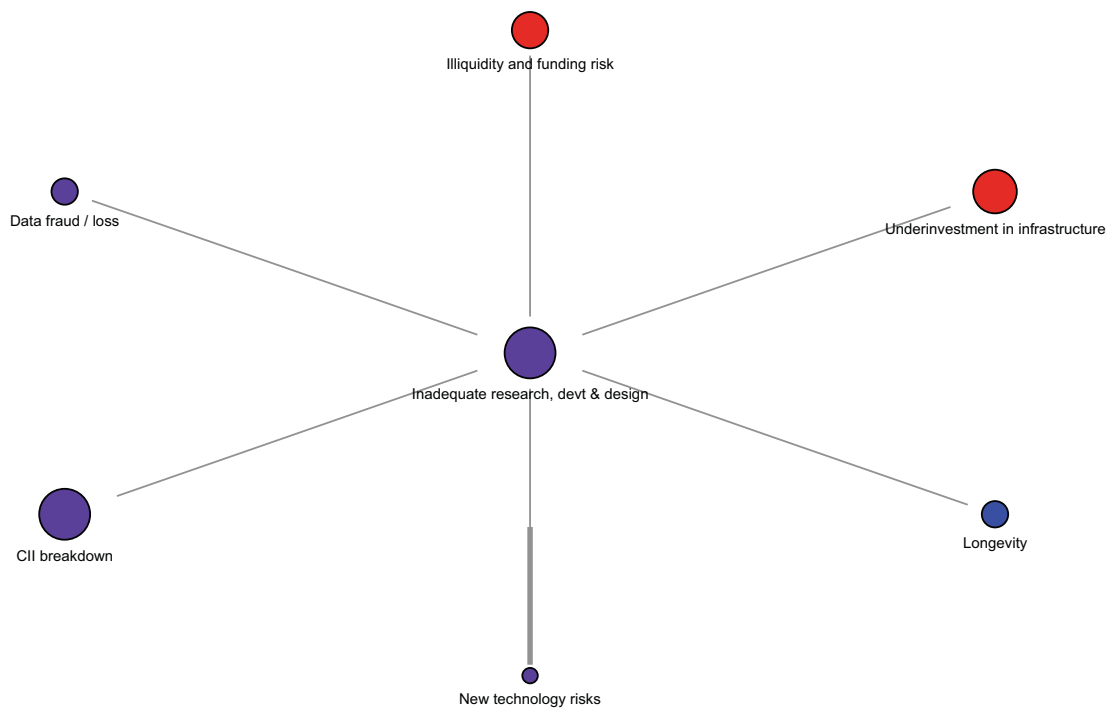
Australia has, in the last two years, significantly increased its commitments to infrastructure spending with the proposed National Broadband Network (NBN) being one example. Industry discussions in recent months have moved from

“will this happen?” to “what will we do with it?”. The level of interest in the development of new products, services and technologies to be delivered via the NBN is high. There is a growing expectation that the roll-out of NBN will foster a period of significant innovation in Australia in the media, telecommunications and technology sectors. Some industries have struggled to operate without it. NBN is expected to be a transformational technology and form of infrastructure. Follow-on benefits are expected to flow through to education,

healthcare and aged care. The significant investment being made in broadband infrastructure may also contribute to increased investment in research, development and design, delivering longer-term economic benefits to the country.

Overall, research, development and design encompasses the catalytic enabler for creating opportunities across risk categories, as well as mitigating a large canvas of Australian-specific risks.

## 8. Inadequate research, development and design



## About the report

---

This report is based on both quantitative and qualitative analyses. It commenced with the articulation of risks in an Australian context through discussions with risk management professionals, economists and actuaries. Risks were grouped according to five categories: economic, political, environmental, societal and technological. This process was followed by a survey of influential leaders from government as well as the academic, business and Non Government Organisation sectors about their views of the likelihood and impact to the Australian economy of the 47 key risk areas (see page 22 – 24). The results of the survey then formed the subject of a number of discussion groups and workshops to critically evaluate the risk landscape and discuss key opportunities. Respondents could focus on their specific area of expertise, or address all risks. In total, 115 respondents provided data to the survey.

The survey follows, in broad terms, the structure of the “global risks” assessment carried out each year by the World Economic Forum. Respondents were requested to provide their estimate on a five-point scale of the likelihood of each risk occurring, and an estimate of the severity of that risk to the Australian economy, as measured by the cumulative economic impact over the next 10 years.

Each respondent ranked three other risks they considered to be most “linked” to that risk. This facilitated an analysis of the perceived relationship between risks, including the identification of the strongest dependencies and “directional” relationships between key risks. Actuarial principles were then used to analyse the results.

In terms of survey design, there were difficulties in determining the appropriate degree of risk resolution and granularity: the number of risks that could be practically included, the number of factors that each risk could accommodate, and which risks to omit. For example, the consequences of the risk of *terrorism* differ markedly, depending on whether nuclear terrorism is contemplated; and risks such as overpopulation and intellectual property theft could be implied within the risks of *migration* and *transnational crime and corruption* respectively.

Care is therefore needed in interpreting the survey results which are not intended to reflect a statistically accurate estimate of the “true” risks to the Australian economy. The sheer scale and difficulty in estimating the myriad of macro risks renders such a scientific approach somewhat spurious. Instead, the survey provides a reflection of the perception of influential thinkers and leaders of the various risks facing us over the coming decade.

The linkages should, furthermore, not be interpreted as evidence of cause or effect. The survey was designed to provide an illustration of the interdependence of key risks, not the identification of root cause.

Finally, the severity of each risk focuses on the economic impact of that risk. The authors readily acknowledge the imperfections in using such a narrow measure. Clearly, each of the risks will have numerous and equally important non-financial consequences to Australia’s people, environment, governmental and societal structures, and other aspects of life. At the very least, the financial focus of the survey provides a quantitative focal point common to all. It is hoped that the survey results will provoke debate on the various risks and opportunities facing Australia; the non-financial impact of these risks will undoubtedly constitute a fundamental part of this discussion.

# Risk categories and explanations

Economic	
Oil and gas prices	Sharp or sustained oil price increases putting cost pressures on oil and gas dependent industries and consumers.
Carbon pricing	Introduction of the Emissions Trading Scheme or other carbon tax resulting in unforeseen economic structural reforms, during which time economic growth is adversely affected.
Monetary policy	Adjustments to official interest rates mistimed in relation to developments in the domestic economy, adversely impacting growth.
House price collapse	House prices experience sharp or sustained declines, reducing consumer wealth and spending.
Asset price collapse (excluding house prices)	A sharp, sustained decline in equity and other non-housing asset values, leading to the destruction of wealth, deleveraging, and reduced demand.
Local institutional failure	A significant institution fails, resulting in a systemic loss of confidence or destruction of wealth.
Overseas institution failure	A significant (overseas) institution fails, resulting in a systemic loss of confidence or destruction of wealth.
Breakdown in critical energy infrastructure or supply	A breakdown in the infrastructure supporting electricity or gas supplies, compromising economic activity.
Inflation	Significant and sustained inflationary risk as a result of capacity constraints, leading to wage growth or real interest increases.
Unemployment or underemployment	Significant and sustained increases in unemployment or a structural shift towards underemployment (e.g. a reduction in working hours).
Australian government debt (State and Commonwealth)	High levels of government debt adversely impacting the delivery of key services due to the cost of servicing debt. This includes the possibility of credit rating downgrades, or the inability to reduce government debt to pre global financial crisis levels.
Illiquidity and funding risk	Lack of credit availability or sharp, sustained increases in the cost of funds, resulting in an adverse impact on the financing of new and existing investments.
Exchange rate volatility	Volatile fluctuations in the A\$ exchange rates, adversely impacting importers, exporters and other industries.
Asian economies subdued	Major trading economies in Asia fail to deliver trend economic growth, reducing demand for Australian exports and other economic activities.
Failure to coordinate regulation/protectionism	Countries adopt policies that create barriers to the flow of goods, capital or labour. This includes the failure to engage with multilateral governance structures to address global challenges.
Failure(s) to coordinate Australian (domestic) regulation	Failure to coordinate regulation, policy or projects between and within local, state and federal governments, impacting Australian productivity, growth and development.
Suboptimal national branding	Sub-optimal national branding curtailing Australia's comparative global competitiveness and influence.
Underinvestment in infrastructure	Failure to invest in ageing or inadequate infrastructure, hindering growth and development.

<b>Political</b>	
Inter-country relationships	Degradation of Australia's diplomatic relationships with another country. This includes defence, trade or other political relationships.
Instability in Asia Pacific	Instability in Asia-Pacific nation(s), including political tension, militarisation, armed conflict, population displacement or fragile state deterioration.
Instability in Middle East	Instability in the broader Middle East region, involving conflict or fragile state deterioration.
Terrorism	Terrorism causing significant economic or human loss.
Nuclear proliferation	Multiple states or non-state actors pursue nuclear armament or threats.
Transnational crime and corruption	Penetration of organised crime and weakening national authority, worsening the investment climate or deteriorating the social fabric.
Liability regimes	The spread of US-style liability regimes and litigious culture, reducing personal accountability, insurance capacity or costs, and undermining investment and growth.
<b>Environmental</b>	
Extreme storms	Continuation or increasing severity of extreme storm activity resulting in greater damage to the environment, infrastructure and property, or causing loss of life.
Droughts and heatwaves	Increased frequency of droughts and heatwaves, leading to population, ecological and land stresses.
Water scarcity	Declining quality and quantity of water leading to water shortages and associated follow-on effects.
Bushfires	Increased frequency or severity of bushfires resulting in economic loss, displacement and potentially loss of life.
Coastal flooding	Rising sea levels, and the resulting coastal flooding and erosion leading to economic loss, displacement and potentially, loss of life.
Inland flooding	Construction of property below floodlines resulting in economic loss, displacement and, potentially, loss of life.
Earthquake	A strong earthquake hits an economic centre or densely populated area resulting in economic loss, displacement and, potentially, loss of life.
Land degradation	Available arable land diminished through unsustainable agricultural practices, deforestation, urban sprawl, erosion, desertification, and inappropriate management of all forms of waste including toxic and nuclear waste.
Biodiversity loss	Degradation of biodiversity from the consequences of ecological disruption and ocean acidification, resulting in severely depleted fauna and flora and affecting reliant industries (including fisheries, tourism, forestry and other bioservices).
Animal disease	A disease outbreak that threatens the viability of dependent industries or public health.

<b>Societal</b>	
Pandemic	The risk of high rates of infection or mortality, potentially leading to a breakdown of essential systems or periods of economic inactivity.
Infectious disease	Increasing trend in known infectious diseases (e.g. TB, HIV/AIDS, whooping cough, meningococcal etc.), including an increase in resistance to historical medical treatments.
Mental health	Inadequate responses to mental health issues adversely impacting productivity, communities and family constructs.
Chronic disease	Chronic diseases (cardio-vascular, cancer, diabetes, obesity and chronic respiratory diseases) driving up health costs, and reducing productivity and economic growth.
Longevity	Increased life expectancy leading to greater pressure on government services, state pensions and other retirement fundings, as well as increasing health costs.
Cultural identity	Cultural behaviours, habits, practices, modes of thinking, ideologies, beliefs and values that compromise Australia's social order, aspirations or global standing. For example, racism, lack of openness to change, attitudes to risk, media sensationalism and a drinking culture.
Inequality	The risk of widening disparities in society, including educational, economic, social or cultural inequalities, and any exclusionary practices (including indigenous poverty).
Migration	Migration being too low or inappropriate to meet economic and cultural needs, resulting in social tensions and increased economic costs.
<b>Technological</b>	
Inadequate research, development and design	Lack of investment in research, development and design hinders innovation and economic growth, jeopardising responses to Australia's changing needs and objectives.
New technology risks	Unforeseen human or environmental consequences from the use of new technologies, such as nanotechnology, geoengineering and genetically modified organisms.
Critical Information Infrastructure (CII) breakdown	Susceptibility of CII and the internet to attacks or system failures creates a domino effect, shutting down IT-dependent applications across industries including power, water, transport, banking and finance and emergency management.
Data fraud/loss	Major loss of data or data fraud jeopardising assets or triggering a backlash against the organisation/body/individual holding that data as well as causing a broader loss of confidence in data sharing and accumulation.

# Contributors and Acknowledgements

---

This report was prepared by the Australian Davos Connection in collaboration with KPMG. We thank KPMG, and in particular Andries Terblanché, for their significant contribution. Thanks are also extended to Kate Lang, Brendan Twining, Nicola Hassan and Rebecca Hanson.

## Editorial Team

Anton Roux – Co-Chair and Director of Programs, Australian Davos Connection

Prof Andries B. Terblanché – Co-Chair and Chair of Financial Services, KPMG

Claire Sime – Senior Manager, Programs, Australian Davos Connection

Craig McCulloch – Senior Manager, KPMG Actuaries

Dr Gareth Shepherd – Fellow, World Economic Forum

Nicholas Davis – PhD Student, Oxford University

Phil Quin – Communications Specialist

## Advisory Board

Australian National University – represented by Professor Hugh White

Goldman Sachs JB Were – represented by Ian Ward-Ambler

National Australia Bank – represented by Michael Ullmer

University of Melbourne – represented by Professor Susan Elliott

## Focus Group Participants and Contributors

Saul Eslake – Program Director – Productivity Growth, Grattan Institute

Martin Fahy – CEO, Finsia

Greg Medcraft – Commissioner, Australian Securities Investment Commission

Ken Reid – Partner in Charge, Information, Communication & Entertainment, KPMG

Brendan Rynne – Partner, Economics Infrastructure & Policy, KPMG

Julianne Schultz – Professor, Centre for Public Culture and Ideas, Griffith University

Jennifer Westacott – Partner in Charge, Sustainability, Climate Change & Water, KPMG

Robyn Williams – Science Journalist and Broadcaster, ABC

Hugh White – Director, Strategic and Defence Studies Centre, ANU

David Whittle – Deputy Managing Director, KPMG Actuaries



Australian Davos  
Connection



Published by ADC (Australian Davos Connection)  
PO Box 18058  
Collin Street East VIC 8003

Copyright © ADC. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher.

ISBN 978-0-9806574-2-5



9 780980 657425

© 2009 KPMG, an Australian partnership and a member firm of the KPMG network of independent member firms affiliated with KPMG International, a Swiss cooperative. All rights reserved.

KPMG and the KPMG logo are registered trademarks of KPMG International.

Liability limited by a scheme approved under Professional Standards Legislation.

November 2009. VICN04718MKT.