

**Deloitte.**

Setting aside the burdens of the past  
The possibilities of technology-driven  
change in Australia





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# Preface

Deloitte created the Center for the Edge to inspect trends in economics, business strategy, IT and other fields, to build a holistic view of how markets are changing over the longer term. In stepping back and considering the broader view, we hope to provide organisations with the information they need to respond to long-term market shifts currently underway.

The Australian Centre for the Edge is based on the successful model established by the US practice, led by John Hagel and John Seely Brown. Since 2009, the US Center has published a yearly Shift Index that tracks 25 metrics over more than 40 years as a means of quantifying long-term transformations in the global business environment. These metrics illustrate the evolution and impact of digital technologies and changes in public policy over that period. Our goal with the Australian Shift Index was to take the framework created by our colleagues in the US Center for the Edge and build a comparable index for Australia, allowing us to take the lessons learned from the US index and translate them to a local context. At the same time, we have tailored the index – tweaking or changing some of the metrics used – to create a version that is uniquely Australian and which can provide us with insight into the particular challenges we face here.

# Foreword

Over eighty years ago, a young Friedrich Hayek issued an historic challenge to economists who'd argued that a socialist central planner could replicate the utopian efficiency of a 'perfect market'. Hayek argued that even if central planners were well motivated, they could not replicate a perfect market without perfect information – which they could never have. He was vindicated as an old man when the Soviet Union collapsed. Hayek was the first and most successful champion for 'the edge'.

Since then, the economic dynamics of the Internet have increasingly demonstrated the importance of the edge. The distributed intelligence of peer production on platforms like Wikipedia and open-source software projects challenge more hierarchical forms of production.

But, as this report documents, a new mode of production is growing in importance. In this mode the centre provides a platform of services to the edge, usually 'in the cloud', with an ongoing data stream between the platform and the edge.

This vastly enriched data flow means the centre can be better informed about circumstances at the edge than was ever dreamt of in Hayek's philosophy. This doesn't justify throwing the switch back to central planning, though it is, as this report documents, already inspiring new departures in business and elsewhere.

This first Australian version of the Shift Index seeks to delve beneath the immediacy of quarterly gross domestic product numbers to uncover deeper drivers in our economic life in order to depict how we are making this, and other incredibly exciting technical and social transitions.

The report's major take-outs for me are framed by the age-old theme of Australian history – the tyranny of distance from major markets. The index shows how this plays out in our high market concentration and less vigorous competition.

It also shows how we're improving market competitiveness through economic reform and by applying information-amplifying technology, such as social media, for which our appetite seems boundless! And despite all our complaining – or because of it – the index suggests that we govern ourselves better than the unwieldy leviathans of European and American federation. Furthermore, cities are where people are most productive. Being the most urbanised large country on earth juices our Net-Bohemian Score within the index – which measures the proportion of 'creatives' in the population.

I commend Deloitte for the ambition of its aspirations and look forward both to the debate engendered by this report and to its future iterations.



**Dr Nicholas Gruen**

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# Executive summary

The world is changing faster than ever. However, we can only respond to and manage a change if we can measure and understand it. If we want to respond as a community, then we need to find a way to quantify the change. We need to ask ourselves whether the perceived change is real, and if it is, how we can capitalise on it.

The Shift Index uses three indices to measure the change in our nation's economy, as shown in Figure 1 on page 9. This change is founded on the penetration and permeation of cost-effective computer and communication technology into Australian society together with consistent improvements in economic freedom, as illustrated in the Foundation Index. Citizens and businesses are empowered by the new technology, using it to shop, research and work in new ways, creating complex new knowledge flows as a result. The Flow Index gauges the magnitude of this increase in terms of changing information and capital flows. Finally, the Impact Index measures how the developments mapped in the previous two indices have affected the Australian market, and the citizens and businesses within it.

The Shift Index shows Australia is indeed changing. Though the effects of the 2008 global financial crisis (GFC) were felt by many local businesses, the downturn was more of a pause than a roadblock in Australia's economic development. Our history of steady economic reform has allowed us the freedom to adapt to the ongoing rate of technological innovation, and use it to our advantage.

Digital computation, communications and storage technologies are behind Australia's shift from an agricultural economy to a creative, service-based economy. Many industries that traditionally relied on physical assets – labour and machinery – are in the process of shifting their investment to the creation of new workflows and partner communities. This will enable these industries to effectively leverage the rising seas of information to improve productivity and cost-efficiency, resulting in more agile and adaptable businesses that can create new opportunities. While manual workers have traditionally been the economy's engine room, our future prosperity depends on creative knowledge workers adept at using new knowledge flows to improve productivity and profitability.

We can see that the core technologies tracked by the Foundation Index have already penetrated our society. In fact, the Firms and People components of the Impact Index (shown in Figure 16 on page 30) show that individuals are absorbing and adapting to the shift much faster than organisations. Our country's consistent track record on policy reform has resulted in a high level of economic freedom and a steady increase in the volume, diversity and complexity of our knowledge flows. The gradient of the Australian Impact Index is higher than that of the US, showing us that Australian society is currently adapting to new technologies and knowledge flows more quickly than our peers in the US.

Regardless, the trend set by the Australian Impact Index lags behind trends for technology adoption and knowledge flows, indicating we have yet to realise the full economic potential of technological advances.

In short, the shift is well underway in this country. While Australia is well prepared, the nation's continued prosperity hinges on our ability to use technological prowess to find new solutions to old problems.

# Ten key findings

1. **Fast adopters:** Australians have a good track record for adopting new technology. Our challenge is to continue adapting, and to find opportunities to leverage these technologies within our institutions.
2. **Tech-driven change:** The permeation of cheap, powerful computing, communications and storage technologies is driving change and will continue to do so into the foreseeable future.
3. **Knowledge flows:** New technology has resulted in new flows of information at unprecedented volumes.
4. **Higher competition:** The Australian market has become more competitive as a result of new technology and knowledge flows.
5. **Capital over labour:** Australia's focus has shifted away from labour and towards investment in new technologies for more efficient workflows.
6. **Knowledge economy:** Australia has shifted from an industrial and agricultural economy to a creative, service-based economy.
7. **Unrealised potential:** There is a big gap between our technological capabilities and the way we currently use technology to solve problems.
8. **Economic strength:** Australia's economy is strong and demonstrates better asset profitability than the US.
9. **Recession-proof:** The global downturn in 2008 was only a pause in our progress and has not halted Australia's transformation.
10. **Future success:** Our continued prosperity depends on how well our knowledge workers can find new ways of using technology to solve problems.

# Introduction: What is the Shift Index?

The rate of technological innovation today is staggering. It seems that new markets can be created overnight on the strength of a compelling service or product, while established markets can disappear just as quickly for want of adaptation.

But is this an example of more change, more often? Or is it just a side-effect of a more pervasive media presence creating false impressions of change? In the same way that greater crime coverage in the news can lead to unfounded fears of increasing criminal activity, have we been led to believe that markets are changing faster than they actually are?

We believe the change is real. The relentless development of digital computing, communication and storage technologies is driving fundamental changes in how we – as businesses and individuals – engage with the world. Gone are the days when we kept reference books such as the Yellow Pages on our desk; today, we just Google the information we need. The carefully curated record or movie collection is also rapidly becoming a thing of the past. Thanks to the Internet, a passing interest in Jane Campion or Frank Zappa is easily sated over a weekend in which we download and consume all their significant work in one sitting.

The shift in how individuals engage with the world accompanies a shift in what it takes to be successful in business. Success was once a question of scale; of building a store of assets and best practices to provide a better product to more customers.

However, being big no longer conveys the benefits it used to. Now, agile companies such as Apple and Zara are taking over markets, while companies that are wedded to tradition are suffering. Success today is a question of tapping into and leveraging knowledge flows. Those that fail or refuse to do so will be left behind.

It can be challenging for businesses to identify and act on long-term, gradual changes in a competitive and ever-evolving business environment. The purpose of the Shift Index is to help quantify these changes in how the market operates. We hope to provide organisations with the information they need to respond to these long-term shifts, so they can avoid falling victim to small, incremental changes that could eventually overwhelm them.



# The Australian Shift Index

The Shift Index is built on the hypothesis that, in the long term, incremental improvements in the cost-to-performance ratio of digital computation, communications and storage technologies have resulted in a greater flow of knowledge. Information has been transformed from a rare resource to be collected and hoarded – the merchant’s notebook that once contained the price of goods in various ports, for example – into a freely available public resource.

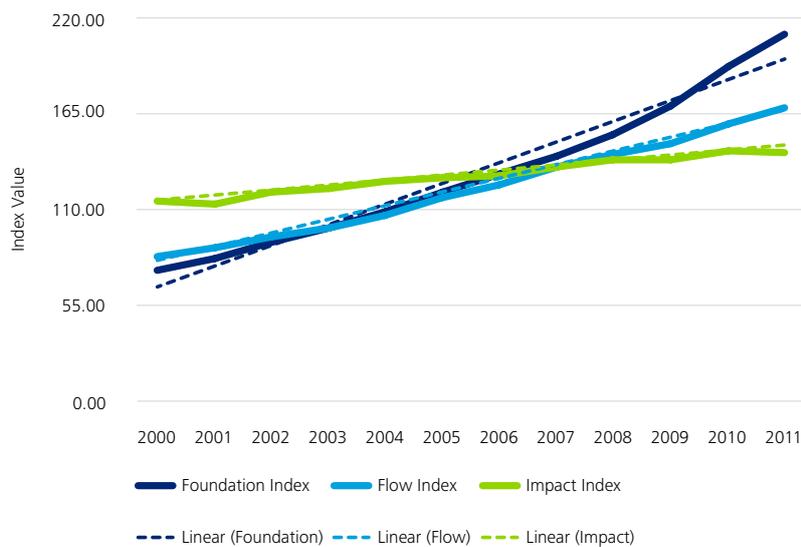
These knowledge flows enable globalisation, allow companies to transform products into services, and fundamentally change how individuals and organisations think about and interact with the world.

The Australian Shift Index has three separate sub-indices composed of a total 24 metrics, and is based on a framework developed for the US Shift Index by the US Center for the Edge.

Impact index	Markets	<b>Competitive Intensity:</b> Herfindahl-Hirschman Index <b>Labour Productivity:</b> Gross value added per hour worked <b>Stock Price Volatility:</b> Average standard deviation of daily stock price returns over one year.
	Firms	<b>Asset Profitability:</b> Total return on assets (ROA) for all Australian firms <b>ROA Performance Gap:</b> Gap in ROA between firms in the top and bottom quartiles <b>Shareholder Value Gap:</b> Gap in the total return to shareholders (TRS) between firms in the tops and bottom quartiles.
	People	<b>Consumer Power:</b> Index of six Consumer Power measures <b>Brand Disloyalty:</b> Index of six Brand Disloyalty measures <b>Returns to Talent:</b> Compensation gap between more and less creative occupational groupings <b>Executive Turnover:</b> Number of top management personnel terminated, retired or otherwise leaving companies.
Flow index	Virtual flows	<b>Inter-Firm Knowledge Flows:</b> Extent of employee participation in knowledge flows across firms <b>Wireless Activity:</b> Total annual volume of mobile minutes and short message services (SMS) messages <b>Internet Activity:</b> Total net international Internet traffic.
	Physical flows	<b>NetBohemian Score:</b> Propensity of creative individuals to cluster <b>Travel Volume:</b> Total volume of passenger air transportation <b>Movement of Capital:</b> Value of foreign direct investment (FDI) inflows and outflows
	Amplifiers	<b>Worker Passion:</b> Percentage of employees most passionate about their jobs <b>Social Media Activity:</b> Time spent on social media as a percentage of total Internet time.
Foundation index	Technology performance	<b>Computing:</b> Computing power per unit of cost <b>Digital Storage:</b> Digital storage capacity per unit of cost <b>Bandwidth:</b> Bandwidth capacity per unit of cost.
	Infrastructure	<b>Internet Users:</b> Number of people actively using the Internet as compared to the Australian population <b>Wireless Subscriptions:</b> Percentage of active wireless subscriptions compared to the Australian population.
	Public policy	<b>Economic Freedom:</b> Index of 10 freedom components as defined by the Heritage Foundation.

**Figure 1** An overview of the indices, sub-indices and metrics comprising the Australian Shift Index. For further detail, please refer to the Appendix: Quantifying the Shift

Each of the three sub-indices is designed to show one wave of the changes discussed, as follows:

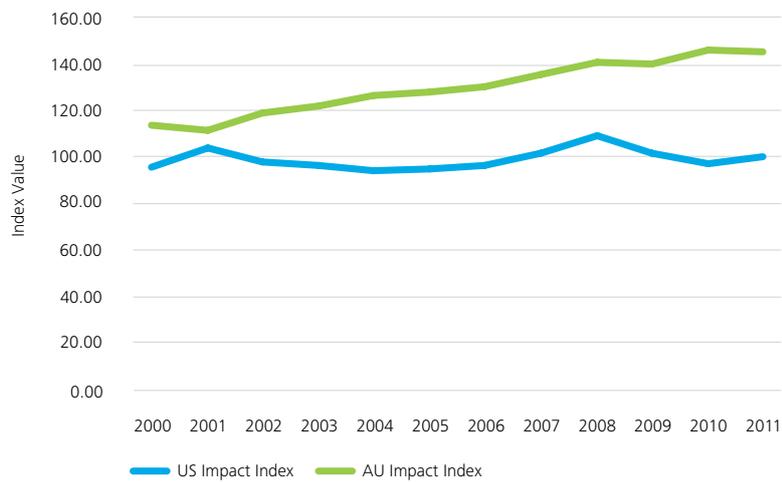


**Figure: 2** The Australian Shift Index. Australia's digital infrastructure has seen rapid growth, increasing the flow of information and capital, and changing the structure of our economy.

**The Foundation Index** captures the relentless growth of digital computation, communications and storage technologies, and how these have penetrated society. It also quantifies Australia's progress in adapting the nation's policy and regulatory environment to enable individuals and businesses to capitalise on the opportunities created. The Foundation Index is the lead indicator for the Shift Index.

**The Flow Index** quantifies the anticipated increase in virtual knowledge flows due to the availability and near-ubiquity of cheap digital technology. It also quantifies the change in the physical flow of information, such as that embodied in business travel to support face-to-face meetings. Finally, it quantifies factors that accelerate the flow of information, such as the use of social media.

**The Impact Index** quantifies the impact on the Australian market as a whole, and on the firms and individuals within the market. Markets are expected to become more competitive and more volatile as the free flow of knowledge reduces barriers to entry. A new generation of winning and losing firms is expected to emerge, as companies that adapt to the shift surpass more traditional businesses. The balance of power is expected to tip from merchants to consumers, reducing brand loyalty among customers. Finally, the nature of the Australian workforce is expected to change. 'Creative' knowledge workers who can integrate themselves into new knowledge flows and identify value will become increasingly important, while a faster moving, less predictable world will make senior management jobs more difficult. The Impact Index indicates where firms may be lagging behind, according to the Shift Index. Note the Australian Impact Index shows a higher upward trend than that of the US Impact Index, driven largely by the 'people' metric. This indicates that Australian consumers are currently faster to adopt and adapt to new technologies and knowledge flows than their US peers.



**Figure: 3** Australian and US Impact Indices. Australia continues to adapt to the shift.

The data compiled for the Australian Shift Index shows that the Australian market is indeed changing. This change stems from the long-term improvement in the cost-to-performance ratio for key digital technologies tracked in the index. The Foundation Index has increased rapidly as technology has improved and been introduced to the Australian market. The Flow Index shows a corresponding rise in knowledge flows as individuals and organisations respond to cheap and widely accessible digital communication technology. But the Impact Index shows that Australia has a way to go before the effects of its technological adoption and evolving knowledge flow begin to affect change on a major scale.

# Understanding ‘the Edge’: The rationale behind the Shift Index

To measure the shift, we must first decide what we’re measuring. We need to form a hypothesis on how the shift has changed the Australian market and the businesses that inhabit it, and then quantify this change.

Our hypothesis is that there has been a shift in the nature of the Australian economy and the businesses operating within it, driven by changes in how information is distributed and used. The focus of activity for many businesses has moved from the centre of the organisation to its edge; from tending the operation of the boiler room that powers the enterprise to navigating the tempest of technology and information now surrounding it. The shift has been driven by a continual reduction in the cost of communication and information processing technologies, and the uptake of these technologies within society.

It used to be that a business’s inherent value lay in its collection of resources, and its skill in organising and applying them efficiently to deliver a better product to customers. However, a number of factors have shifted many organisations’ focus from the challenge of collecting and managing assets to the question of how they engage the market.

The automation of manual tasks has reconfigured many industries and slashed operating costs. Globalisation, enabled by cheap and ubiquitous communications, has rearranged markets by allowing businesses to reach across the globe for solutions to problems they were previously forced to solve for themselves. Many increasingly complex and expensive products have been transformed into services, allowing customers that can’t afford an outright purchase – or who don’t have the skills to maintain the asset – to access them via pay-as-you-go models. Cheap and ubiquitous computation and communications technologies have fundamentally changed how individuals and organisations think about and interact with the world.

Today, success is determined by the way an organisation engages with the market around it. The focus for many executives is managing the firm’s relationship with the consumers, suppliers, partners and competitors at its edges. A firm’s competitive advantage is now defined by the ability of its knowledge workers to use these knowledge flows to capitalise on opportunities and solve problems, and thereby navigate the firm’s path toward future success.

# Automation – trading labour for capital

Automation is gradually replacing labour with machines. From the initial division of labour to the creation of the modern, automated production line, firms have sought ways of using capital to reconfigure workflows and create more efficient processes<sup>1</sup>.

Successful examples of this approach abound throughout industrial history. In the textiles industry, weaving frames were replaced by power looms, and weavers with workers who operated the machines. In the same way, legal discovery has seen the manual review of paper documents by an army of qualified lawyers replaced with e-discovery solutions tended by a significantly smaller number of IT staff members.

In many instances, supplanting labour with capital has revolutionised industries. In shipping, stevedores were replaced by containers, container ships and container terminals. This change relied on three prior technological shifts. The manual labour required to move each package was replaced by cranes specially designed to lift containers, operated by trained crane operators. The process of storing and transferring goods between ship and pier-side warehouse, and between pier-side warehouse and trucks, was replaced by a direct truck-to-ship process in which goods are lifted directly from an arriving container ship onto a waiting truck, or vice versa. Infrastructure across shipping, trains and trucks was also standardised to allow containers to flow more seamlessly between them. The efficiencies this created greatly increased the volume of information generated as well as the logistical complexities, as shipping capacity and the numbers of shipments increased. Shipping companies invested in computers to help manage these new informational challenges.

The introduction of the end-to-end container-based process slashed the cost of cargo handling, which in turn pushed down the average cost of shipping one cubic metre of freight by more than 50%<sup>2</sup>. Today, most manual jobs can be replaced by machines – or networks of machines – that perform the same task at a fraction of the cost. We've traded labour for capital to realise lower costs.



# Globalisation – communications technology enables international outsourcing

The reduction in transportation and communication costs drove a shift from local sourcing to off-shore manufacturing and global sourcing.

Historically, shipping finished goods was such a significant challenge that firms located their operations as close as feasible to their customer base. Long-distance trade was dominated by a small number of high-value but compact goods – such as silk passing along the eponymous Silk Road, or spices and incense on their various trade routes. However, most goods were manufactured close to where they were consumed.

The introduction of railways across continents opened up many inland countries to trade, allowing sellers to peddle their wares to a much larger audience. The appearance of the steamship in the course of the 19th century had a similar effect on international trade. However, it was the rise of container shipping from the 1960s, followed closely by the development of the full inter-modal container system – where containerised goods move easily between sea, rail and road transport – that slashed the cost of long-distance transport.

At the same time, we saw the development of the international communications network. The telegraph separated the transmission of information from the transport of goods for the first time. This gave birth to Reuter's Telegram Company – a news service built on electric telegraphy (though still with the support of carrier pigeons) that transmitted commercial news between Paris and London. The global telephone network brought mass person-to-person voice – and eventually video – communications before it too was replaced by the Internet.

It now costs roughly the same to send a box across the country as it does to send the same parcel across the world (when shipping en masse), and the same to call someone around the corner as it does to call someone on the other side of the planet (which may even be free, via Skype, Line and other Internet-based services).

These developments have allowed firms to reinvent their supply chains. With low-cost transport and effective communications, many back-office or manufacturing processes could be moved to wherever the labour was cheapest. In some instances, even front-office processes could be similarly transformed; a fast-food restaurant, for example, could move the service personnel taking orders at the drive-through window in the restaurant to a call centre across town, across the country or even in another continent<sup>3</sup>. Manual processes – from managing the back office in a bank to manufacturing t-shirts – are being transferred to geographies that offer lower wages and costs.

This has opened up the world to a global market. With ubiquitous communication and low-cost shipping, anyone can sell anything anywhere, creating an environment in which companies are “competing with everyone from everywhere for everything<sup>4</sup>”.

# The need for products as services

As the capability of automation and communication technologies has increased, so has their complexity and cost. This has forced many firms to invest their limited resources in inflexible, capital-intensive, automated processes. While this kind of investment can dramatically reduce costs, the result is often a rigid organisation trapped in a boom-or-bust cycle.

Containerisation, for example, reduced shipping costs by more than 50%, by swapping expensive (but flexible) manual processes for cheap (but inflexible) automated processes built on expensive assets, such as fleets of containers and ships, and the container facilities required at every port, including very expensive cranes. As a result, supply also became inflexible.

A dip in demand once meant making a change in supply – parking ships, and laying off seamen and dock workers – to protect shipping rates and ensure that the industry remained profitable. After the advent of containerisation, supply could not be scaled back to meet demand. Each company needed to keep the ships moving and revenue coming in so it could service loans (if the assets were leveraged) or ensure returns on invested capital (if they were not). Often, a dip in demand meant dropping rates to unprofitable levels. This has led many companies to acquire assets as a service rather than owning them outright, so they pay for what they use and avoid up-front capital expenditure.

Rolls Royce and the development of the modern aircraft turbofan engine is a great example. Caught in the highly competitive global aircraft engine industry toward the end of the 1960s – and with the company's competitors enjoying a stronger domestic market that also had no patent protection – Rolls Royce needed to develop a more capable engine that would help it stand out from the crowd and which would require a significant effort from its competitors to copy. The result was the RB211, the first three-spool turbofan, which entered service in 1972.

The turbofan was more efficient (it had lower operating costs) and more flexible, because it could be scaled up and down to suit a wider range of aircraft, lowering development costs and time. However, its level of sophistication drove purchasing costs up and required customers to invest in new maintenance capabilities (such as new facilities with new tools), as well as either hiring or training suitably qualified staff.

Rolls Royce overcame these barriers by selling the new turbofans as a service rather than an asset. The company decided to charge for the hours that the engine operated, rather than for the engine itself. To support this transformation, Rolls Royce invested in a global operations centre that received real-time data feeds from all the engines that the firm was responsible for. The insights gained from this data allowed Rolls Royce to realise more savings by managing the engines more intelligently. This useful data also helped eliminate problems in the engine design phase. Similar service-based models are now being used for the US-led Joint Strike Fighter program and by all other major engine manufacturers.

We've seen something similar in how consumers buy smartphones. Many people are choosing to buy an expensive smartphone and data service on a plan, rather than buying the phone outright and buying a service separately. Similarly, the emergence of car-sharing businesses such as GoGet and music streaming services such as Spotify and Rdio demonstrate many individuals' desire to consume products as services rather than outright purchases.

# Business models shift from ‘push’ to ‘pull’

The shift from products to services means that companies now have more regular contact with their customers. Previously, companies would rarely have contact with the customer other than at the point of sale. Now they interact with customers regularly over the life of the service.

This is both a blessing and a curse. Regular contact with the customer is an opportunity to build a long-term relationship and an enduring revenue stream. However, products as services make it easier for customers to take their money elsewhere, leaving the vendor holding the expensive assets and exposed to the boom-or-bust cycle. Consequently, companies now focus on becoming more responsive to customer needs and wants, for the sake of aligning more closely with the demand cycle.

Zara’s low-cost, fast-fashion business model is a good example. Fashion used to be a ‘push’ model based on an annual cycle. A company would develop a range of clothing, promote it with fashion shows and marketing to build demand, send the range to shops, and hope it sold. Items left unsold were returned to manufacturers and (more recently) sent on to discount malls.

Zara developed a ‘pull’ model that avoided many of the old cycle’s risks. The company’s designers pay careful attention to catwalks and competitors to gauge what consumers are likely to buy, and develop new products quickly based on emerging trends. Zara then produces garments in small runs and delivers them to stores. Unsuccessful products are quickly removed from the range and successful products enjoy expanded production and distribution.

The entire process from catwalk to store can take less than two weeks. A direct data feed from stores allows Zara to quickly determine what is and isn’t selling, allowing the company to rapidly drop under-performing lines and invest in hits. This strategy has allowed Zara to become one of the largest retailers in the world.

To do this, Zara had to think about organising its operations in a new way. The company swapped yearly cycles and offshore manufacturing for weekly updates and manufacturing closer to the customer. Decisions are now based on almost real-time field data. Zara created new business processes to support this new model, and invested in IT to support the new processes and business model. IT moved from being a tool to support the business – a means for automating an existing task, such as computing a payroll or sending a message – to being intimately interwoven with the business itself.

The business as a whole shifted from pushing products out on a regular cycle and trying to build demand for them, to following consumer trends and quickly creating new products in response – allowing consumer needs to ‘pull’ products in.

The shift from a push-based model to a pull-based model is a general trend across a range of industries, and companies are once again reconfiguring supply chains in response.

Today’s highly automated manufacturing process might be capital-intensive, but the requirements for manual labour are fairly light, making the cost of labour a much less significant factor when deciding where to locate operations. Products with time-sensitive values are being produced closer to the customer, minimising the time from assembly to consumer. An example of this is Apple’s recent announcement to move assembly of the Mac Pro line of desktop computers to the US. This reduces working capital requirements and the time needed to move product updates through the supply chain, and avoids stores being caught with outdated inventory. Manufacturing locations will soon start to drift toward the assembly locations to minimise the transport time between component manufacture and assembly, reducing working capital requirements and the time required for component updates to work their way through the supply chain.

# The shift in focus from the centre to the edge

The result of these trends – automation, globalisation, products as services, and push to pull – has resulted in value moving from the centre to the edges of organisations.

A business's value used to be determined by the assets under its control. Skilful management of assets such as stocks, labour and capital goods – and innovations in how these assets were deployed – enabled pre-industrial cottage industries to transform into the global phenomena we know today. From the emergence of the division of labour to the introduction of interchangeable parts, the automation of many manual tasks during the industrial revolution, the introduction of steam, the rise of electric power and finally the invention of the assembly line, the focus for many organisations has been internal, concentrated on improving the scale at which assets can be collected and deployed. The challenge in business has been to collect enough assets – including materials, workers, machines and best practices – to allow the organisation to create a product and push it out to the customer. Organisations concentrated on designing and then optimising the mechanism of business, and value was defined internally.

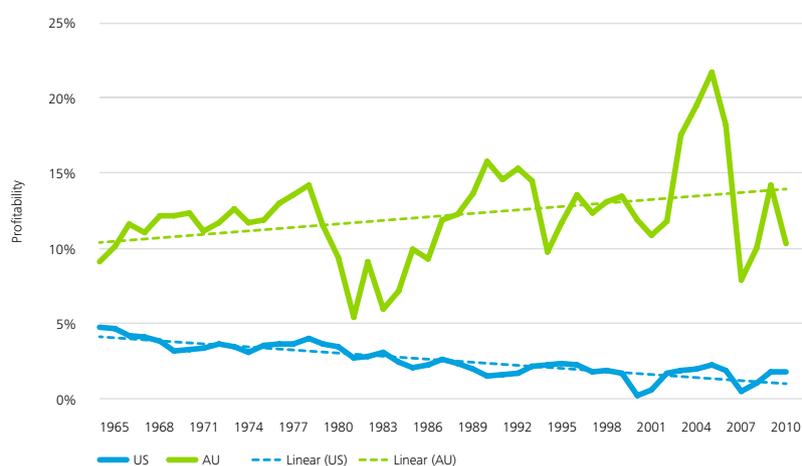
However, the shift from push to pull is drawing our focus away from the engine room altogether. The same technologies that enabled the emergence of global organisations – and which slashed the costs of many products and services – have created a more turbulent environment and tipped the balance of power from the company to the consumer.

Consumers used to be information-poor, reliant on what nearby businesses offered. With personal communications now cheap and ubiquitous, consumers are often better informed and equipped than firms and their employees. Today the consumer is information-rich, capable of searching the globe via their smartphone to purchase what they need from wherever they please.

The move to pull-based models is forcing businesses to look externally – to understand what customers are doing and to knit together a collection of stakeholders, suppliers and partners that will enable the company to identify and respond to demand. In some instances, the consumer is even involved in designing the final product. Value is now defined on the edge of the organisation, where the firm touches the market.

# Implications for Australia

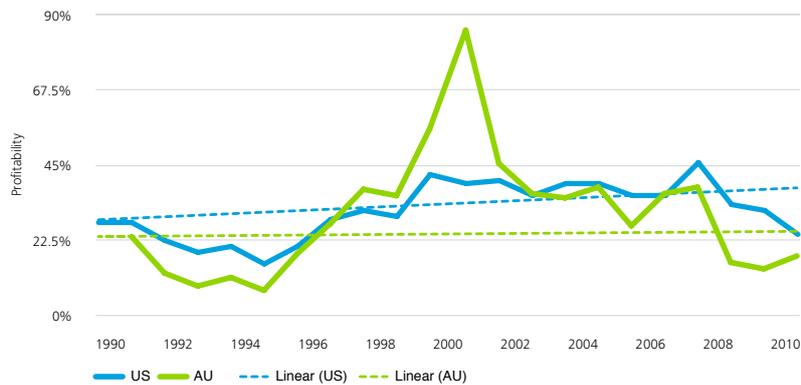
Australia has performed well over the last 22 years. The nation as a whole has maintained a high standard of living and eluded the recessions that have troubled the majority of other economies. Australian businesses have also done well, and the country has enjoyed an irregular but consistent increase in asset profitability over the last 40 years. This contrasts with the US, which has seen a long-term decline in asset profitability of roughly 75% over the same period.



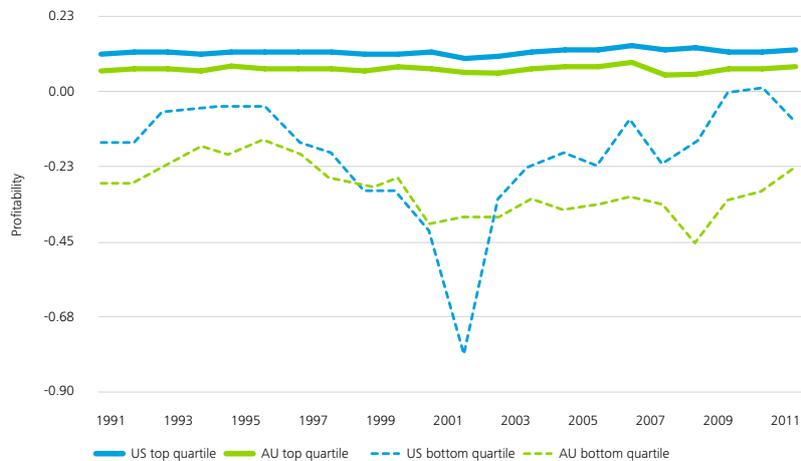
**Figure: 4** Asset profitability in Australia and the US.

The increase in Australia's return on assets (ROA) could be driven by a number of factors. Firms may have become more sophisticated at deploying the assets under their control. The increase could also mark a broad shift from product-driven, push-based business models to services-driven, pull-based business models that are less asset-intensive, reducing the denominator of the ROA equation. (The long-term decline in ROA in the US has been a focus of the US Center for the Edge<sup>5</sup>.)

During this time we've also seen the separation between winners and losers grow as the ROA performance gap increases. This has been largely driven by a decrease in the average ROA of the firms in the bottom quartile.



**Figure: 5** ROA performance gap in the Australia and the US. Other than for the period from 1997–2000, covering the dot-com crash and the investment bubble leading up to it, Australia has had consistently larger ROA performance gap than the US.

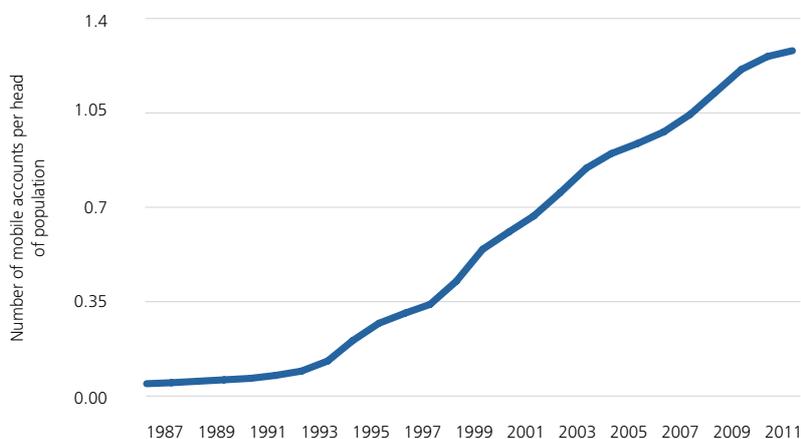


**Figure: 6** ROA performance in the top and bottom quartile.

The majority of this disparity in ROA between Australia and the US is driven by differences between the bottom quartiles of the asset profitability figures. The top quartiles for Australia and the US are similar, with the US averaging roughly three percentage points higher than Australia. The story for the bottom quartiles of each country is quite different though, with the Australian bottom quartile consistently 10 or more points lower than the US bottom quartile, aside from the period around the 2001 dot-com stock market crash in the US.

# Technology is driving new knowledge flows

The penetration of communication and computing technology into society has fundamentally changed how we engage with the world. Wireless communications, for example, have rapidly grown from a luxury (or the exclusive tool of the mobile tradesperson) to become all but ubiquitous; currently there are more than 1.3 mobile subscriptions per inhabitant in Australia.



**Figure: 7** Mobile account adoption in the Australian population. Australian consumers' tendency to have multiple accounts per capita (one person owning a phone and a 3G-connected tablet, for example) and use mobiles to communicate with devices (such as drinks machines that send an SMS to the supplier when they need to be refilled) accounts for the adoption rate of over 100%.

Telephone numbers used to be tied to locations. We planned our days in advance, understanding that once we left the safety of the office or home, we would most likely be uncontactable. Now, telephone numbers are often tied to individuals; we can be contacted wherever we are. More importantly, we can now also reach out from wherever we are to contact others. And this increasingly means connecting with online services and communities.

Australia is often near the top of the list in tables that show the global adoption of social media, smartphones and broadband. Not all industries have adapted quickly to the shift in consumer preferences, although Australia's financial service industry certainly stands out.

Australian banks have supported online banking for many years and customers have moved away from branches and ATMs for most everyday banking that doesn't include cash or cheques. This has also filtered through to credit unions and more recently superannuation funds. Customers certainly like this development – satisfaction with internet banking at the Big Four banks currently sits at 91%.

In recent years, banks have increasingly provided mobile banking apps for their customers. In the 6 months prior to December 2013, 5.198 million Australians conducted Internet banking using an app on a mobile phone or tablet, which is equivalent to 27% of the Australian population aged over 14.

Online banks such as ING Direct, which experienced a 280% rise in mobile transactions in 2012, have launched new apps as mobile is poised to overtake web-based banking. Commonwealth Bank has already experienced the tipping point – more than half of the bank's customers access its online platform NetBank with a mobile device or use one of its applications such as Kaching or the CommBank mobile application.

In superannuation, Australian Super recently upgraded its web and mobile platforms and saw the percentage of transactions carried out online move from 15% to more than 50% within a year.

Organisations are also rapidly introducing new payment technologies. Consumers and businesses have enthusiastically adopted contactless payments using near-field communication. Consumers have also been keen to take up mobile banking apps such as Kaching, which enables users to pay one another by 'bumping' phones together and allows payments via email or Facebook. US payments startup Square is coming to Australia soon, according to a tweet posted by the Federal Minister for Communications, Malcolm Turnbull, on 14 January 2014. Square will enable millions of Australian smartphone users to take card payments from each other. The potential reach of Square dwarfs the current national network of approximately 750,000 EFTPOS terminals.

Another development that will speed the flow of funds through the payments network is the new payments platform (NPP) – an infrastructure for low-value payments in Australia. It will provide Australian businesses and consumers with a fast, versatile, data-rich system for making everyday

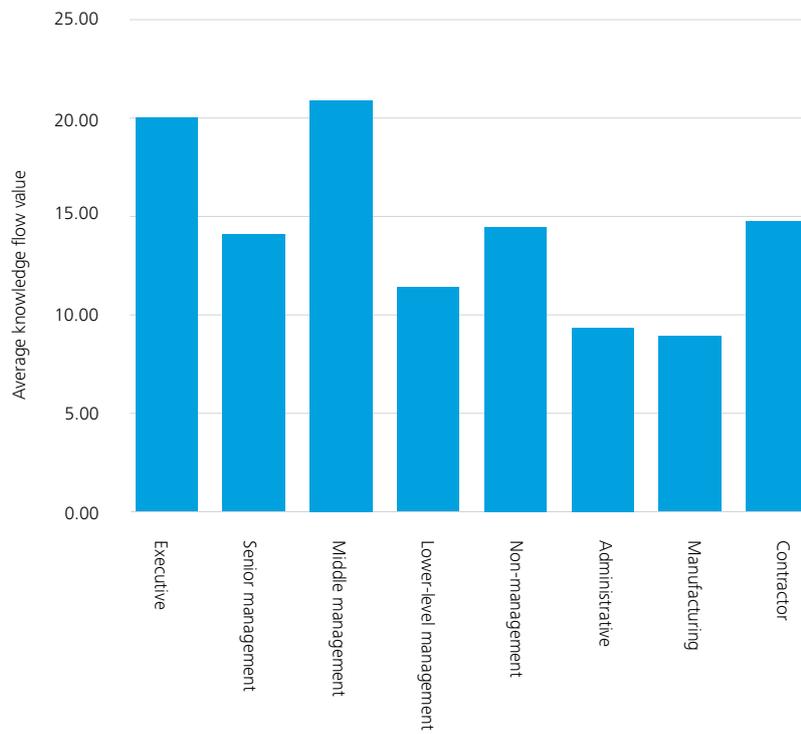
payments. The system will allow funds to be accessible almost as soon as payment is received – even when the payer and payee have accounts at different financial institutions. The basic infrastructure will support various tailored 'overlay' services that financial institutions can choose to offer their customers. This multi-layered infrastructure has been designed to promote competition and drive innovation in payment services.

Alternative currencies also fare well in our country. Australia is ranked 11th in the world in terms of Bitcoin adoption per capita, again highlighting the willingness of Australian individuals to adopt new technologies.

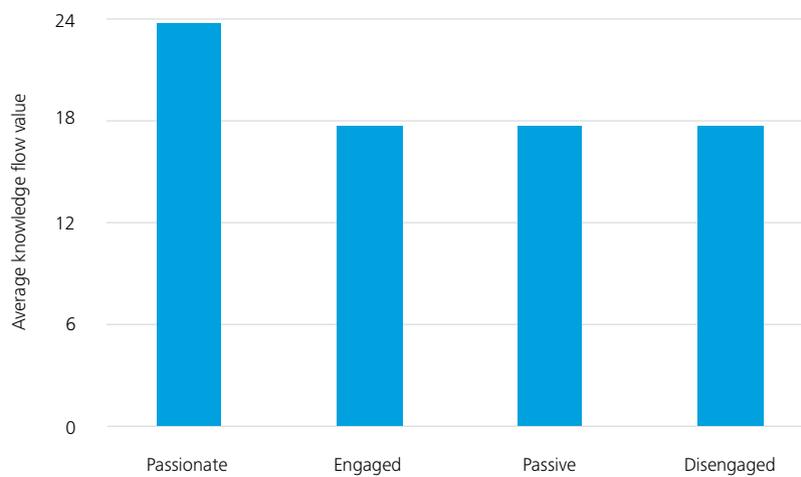
The key lesson from the financial services industry is that Australians are keen to adopt new technologies and digital transactions, if given the opportunity.

Australia's use of social media has also grown dramatically in recent years, leading even the US, where many social media services such as Twitter and Facebook (including their corporate variants such as Yammer) originated. In 2011, the social media activity metric (the percentage of minutes Internet users spend on social media websites relative to the total minutes they spend on the Internet) was 32% in Australia, compared to 17% in the US.

We're using these services to stay in contact with old friends, find new friends and plan our lives. Increasingly, these social knowledge flows are also overflowing into our professional lives, and many organisational roles depend on engaging in both virtual and physical (face-to-face) knowledge-sharing activities.



**Figure: 8** Knowledge flows by position. Workers in positions that involve extensive collection and synthesis of knowledge participate in the most knowledge flows.



**Figure: 9** Passion vs. inter-firm knowledge flows. Passion correlates with increased participation in knowledge flows.

Deloitte Private's shift to cloud accounting systems is a good example of how technology is shaping knowledge-sharing activities for the better.

Deloitte Private is a private accounting division of Deloitte Australia that provides clients with advice and assistance regarding regulatory compliance and reporting during major financial events, such as the sale of a business. Historically, many of the division's clients saw their adviser only once a year to transfer accounting information to Deloitte Private's system and chase up compliance-related documentation.

Cloud-based accounting software has allowed Deloitte Private to fundamentally change its service model. Instead of maintaining information internally and transferring it on a yearly basis, clients now work with their adviser in a single shared online ledger. This gives clients access to real-time financial information, helping identify risks and opportunities as they arise throughout the year, while automated notifications remind them of key performance indicators. As the data can now be aggregated, clients can also opt in to benchmarking services to compare their performance against similar businesses.

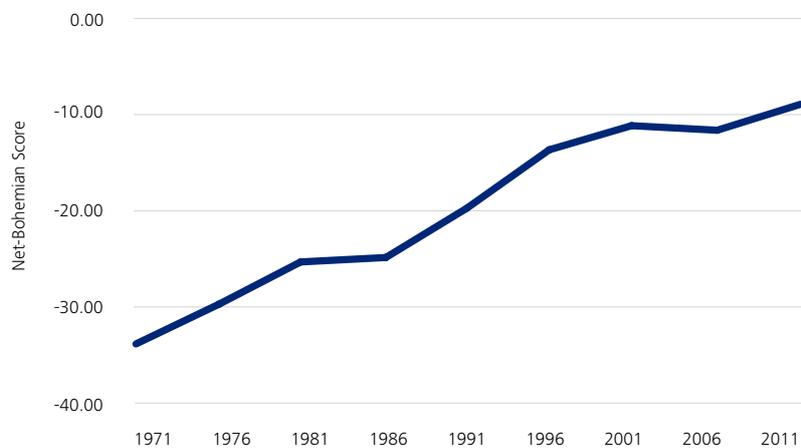
This change is an example of how knowledge stocks are shifting to knowledge flows. Instead of transferring information from one database to another on an annual basis, both parties can now access up-to-date information as required, and assess progress on a monthly, weekly or daily basis.

It also demonstrates how a product can be used to commoditise a service. By taking accountancy into the cloud, Deloitte Private's regulatory compliance advice has become a commodity rather than a value-added service, allowing us to achieve greater operational efficiency.

Most importantly, real-time alerts and data visibility have shifted the focus of the client–adviser relationship from organising information and meeting compliance obligations to using knowledge to resolve key business issues and realise new opportunities.

# The shift to a creative economy

A significant long-term effect of digital computation, communications and storage technologies is that Australia has shifted from an agricultural economy to a creative, service-based economy. The whole-of-country net-bohemian score for Australia has increased steadily since the early 1970s.

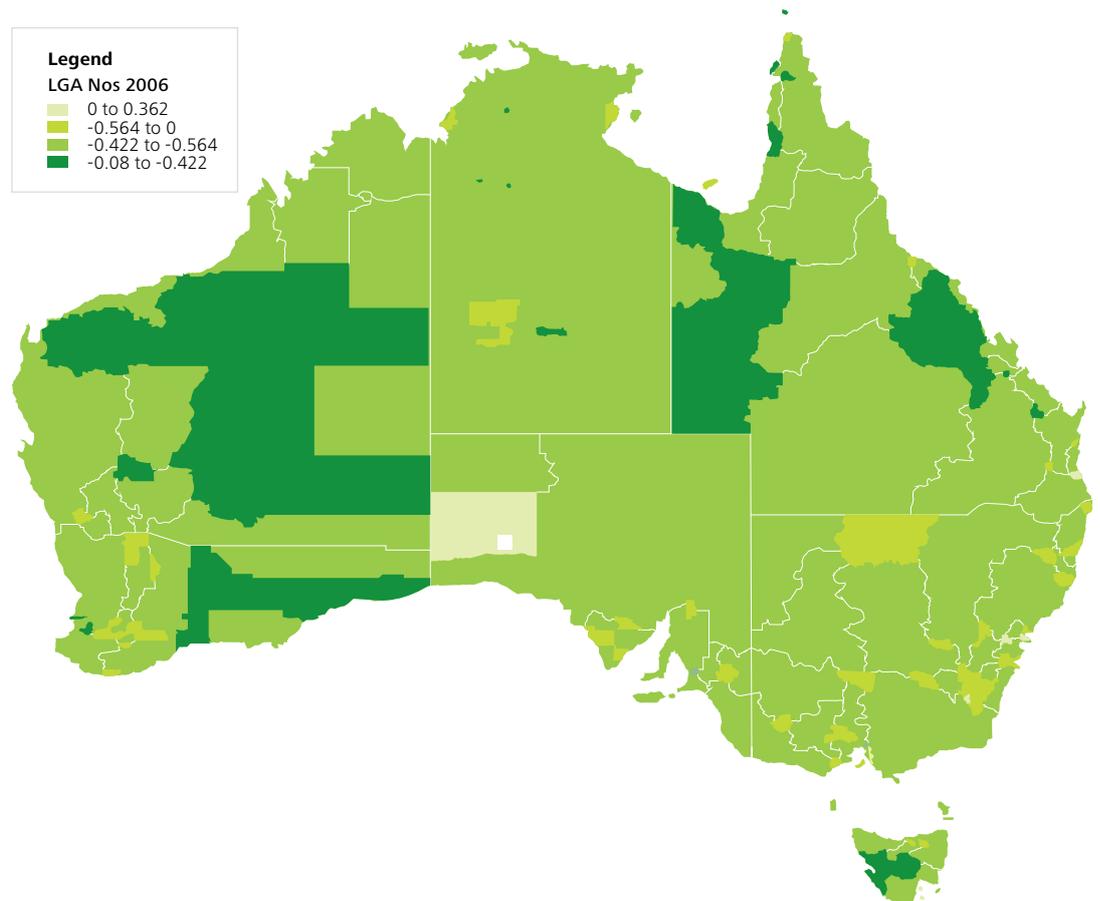


**Figure: 10** The whole-of-Australia net-bohemian score, based on Deloitte analysis of census occupation data from the Australian Bureau of Statistics. Australia has seen a steady increase in creative jobs and a decrease in agricultural and industrial jobs.

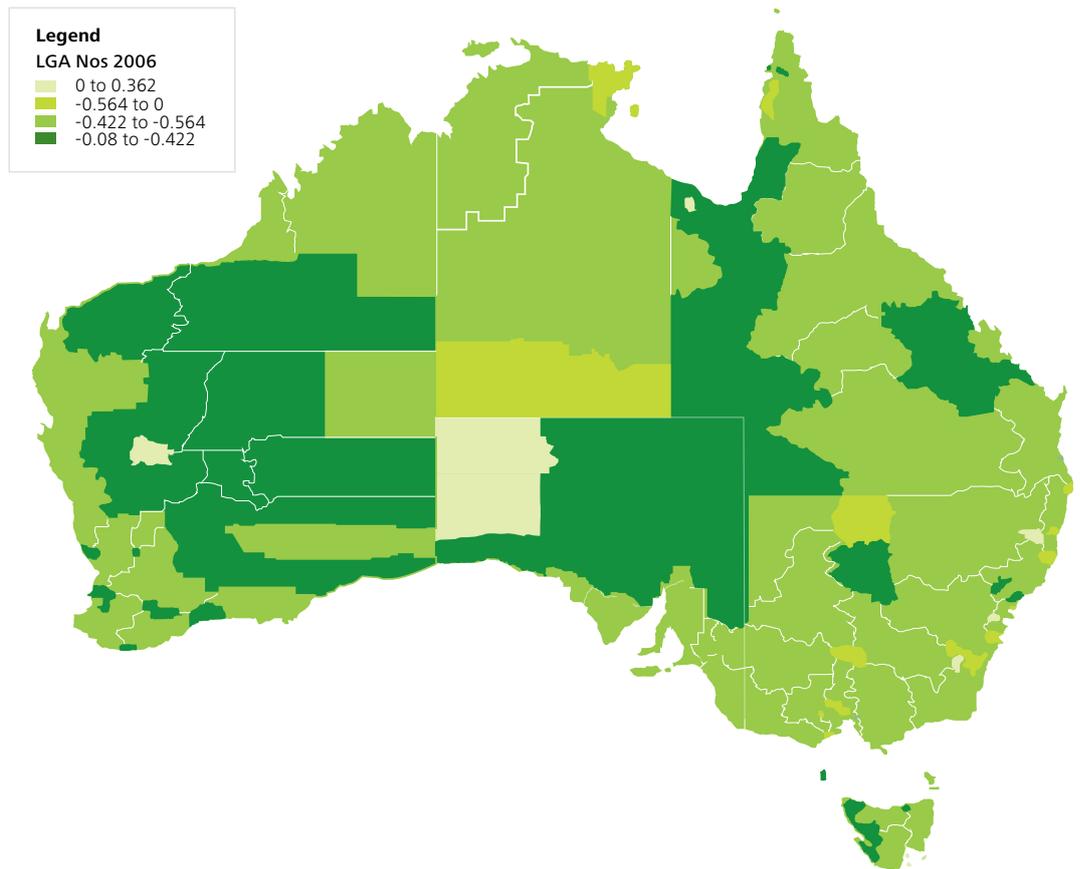
Australia's creative-class workers comprise 44.5% of its workforce, giving the country the fourth highest ranking in the world<sup>6</sup>. This compares favourably with other leading nations, such as Singapore (47.3%), the Netherlands (46.2%) and Switzerland (44.8%). The proportion of creative workers in Australia's workforce is also significantly higher than some comparable nations including Canada (40.8%) and the United States, which is ranked 27th in the world, with creative-class workers making up roughly 35% of its workforce.

Many manual jobs are being automated, and new jobs are being created to design and manage the machines involved. Bakers, for example, have been replaced by automated ovens in some instances, with a team of engineers hired to install and maintain the new technology. This is a continuing trend as we can see from developments such as factory-built housing<sup>7</sup>, where mid-rise apartments (2–4 stories) are built on production lines and assembled on site, swapping traditional construction labour for an automated process tended by a team of engineers and assembly-line workers.

This shift can also be seen at the local level.



**Figure: 11** NBS by local government area, 2006, based on Deloitte analysis of census occupation data from the Australian Bureau of Statistics. Sydney, Melbourne, Brisbane and Canberra are the some of the most creative areas in the country.



**Figure: 12** NBS by local government area, 2011, based on Deloitte analysis of census occupation data from the Australian Bureau of Statistics.

Australians are discovering new ways of working and new things to work on as our economy and our firms shift to the edge.

# We're becoming more competitive

Australia has seen an increase in its competitive intensity metric (and a decrease in the whole-of-economy Herfindahl–Hirschman Index, or HHI<sup>9</sup>) over the period covered in the Shift Index. This aligns with the experience in the US, which has seen a long-term increase in competitive intensity (decrease in HHI) that levelled out at roughly 0.05 since 1989.

Recent experience in the Australian retail industry, which overall has been slow to adapt to the shift, is indicative of the increase competitive pressure felt by Australian businesses.

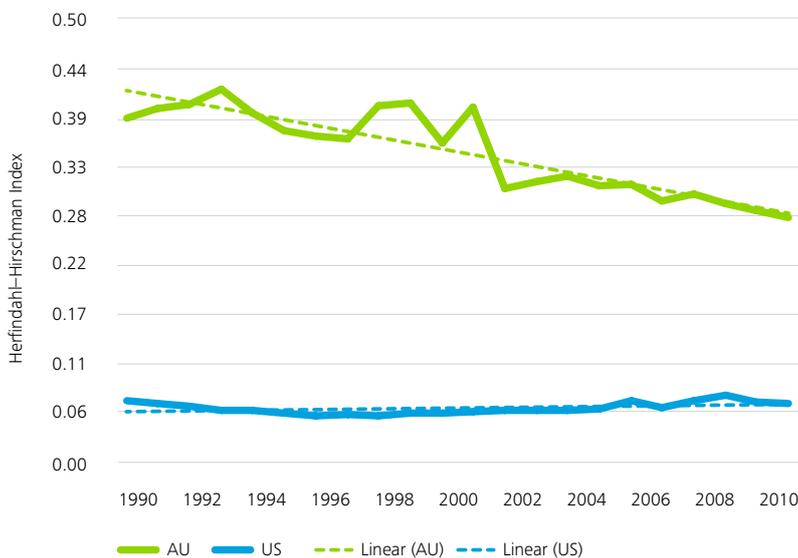
In Australia, only 6.3% of sales are online<sup>9</sup> compared to 9% in the US<sup>10</sup>. It is well recorded that CEOs of some of our major retailers have openly dismissed the importance of the online channel and it is only in the last two to three years that some of the major retailers have provided the facility for customers to shop online. Unlike financial services firms, few Australian retailers have developed mobile applications.

The slow response of local retailers is in stark contrast to their overseas counterparts. The lack of quality online offerings in Australia has seen Australian consumers become important to overseas retailers. The strength of the Australian dollar, combined with a digitally savvy population, has led many Australians to buy online from overseas retailers. Many overseas retailers have established online stores specifically focused on the Australian consumer and we have recently seen a massive influx of overseas retailers setting up bricks-and-mortar stores to service their Australian customers. Apple, Zara, H&M, Uniqlo, Topshop and Samsung, to name a few, have all opened stores in Australia and there are more on the way<sup>11</sup>.

As Australia becomes an increasingly important online market, retailers that have a multi-channel strategy are being pulled in by the nation's connected consumers.

This is increasing competitive intensity in the retail landscape and putting pressure on local retailers that do not have experience in successfully executing multi-channel strategies.

While the whole-of-economy HHI for Australia is still higher than that in the US, we can expect to see the same trend, with Australia becoming significantly more competitive in the medium term, as discussed below.



**Figure: 13** HHI for Australia and the US. Australia continues to trend toward the same level of competitive intensity as the US.

It appears that the difference in results between Australia and the US is driven largely by the difference in size of the two markets. Australia is a much smaller market, and a number of its economic sectors have far fewer competitors than similar sectors in the US.

HHI is defined as sum of the squares of the market shares of the 50 largest firms (or summed over all the firms if there are fewer than 50) within the industry, where the market shares are expressed as fractions. The result is proportional to the average market share weighted by market share, which means firms with a larger market share have more weight in the calculation. This means that the value for HHI can range from 1 (a perfect monopoly where one firm has control of 100% of the market) to  $1/n$  (where  $n$  is the number of firms in the market).

Most sectors in Australia have significantly fewer than 50 companies. This results in a high minimum possible HHI value.

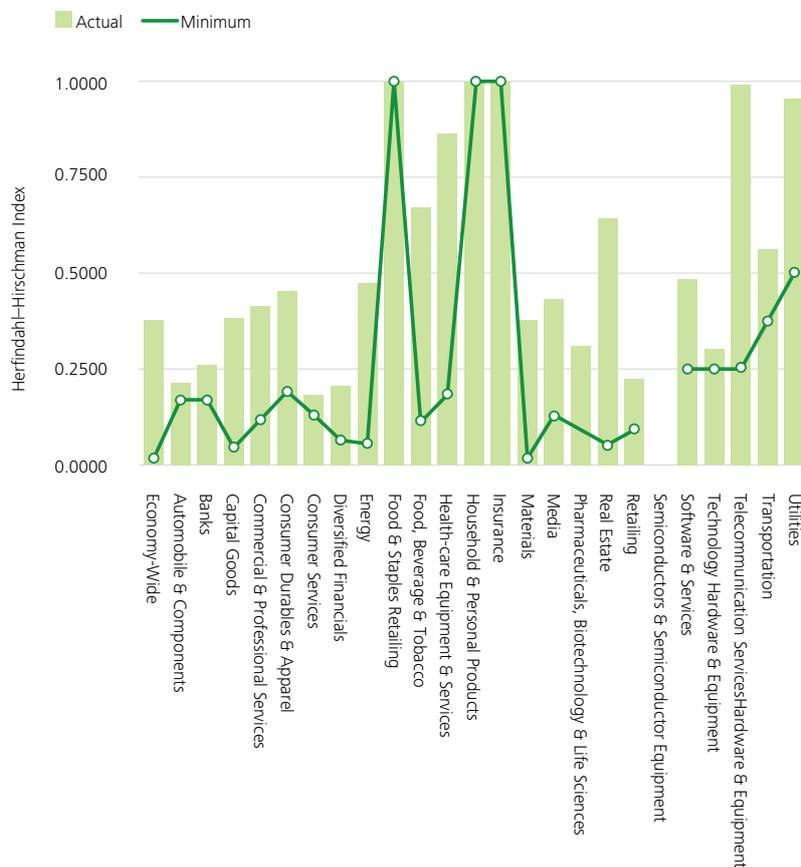
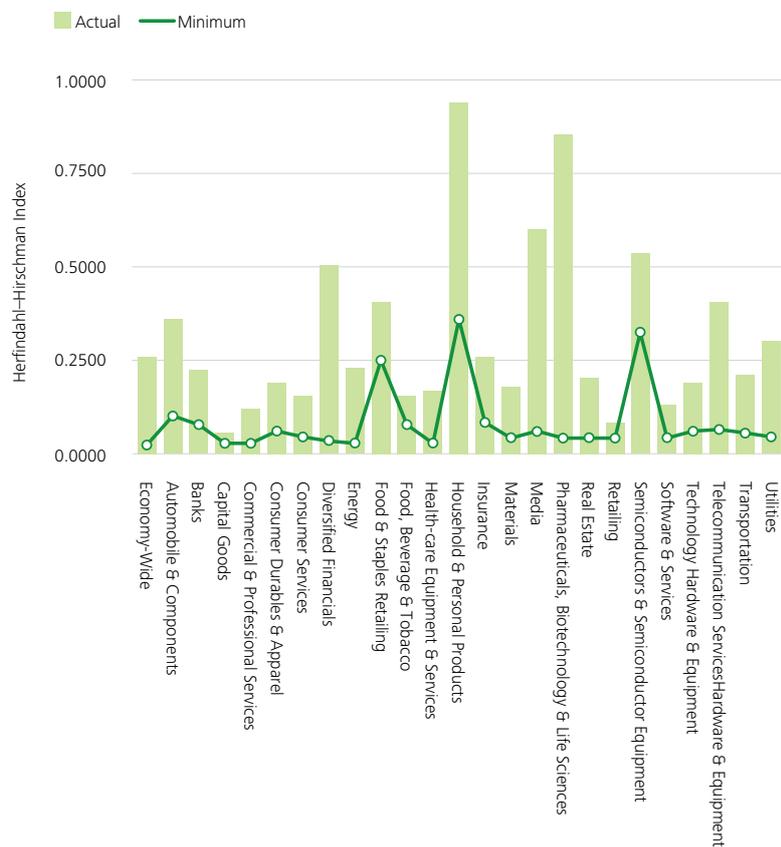


Figure: 14 HHI for the Australian market across a range of sectors in 1990.

If we compare the HHI for the various sectors with the minimum possible value for the sector, we can see that several sectors are close to their theoretical maximum value. These sectors include automotive components; banks; food retailing; household and personal products; insurance; and technology, hardware and equipment.

However, as the Australian market has grown, the minimum value for HHI has dropped significantly, with the actual value for HHI dropping in response.

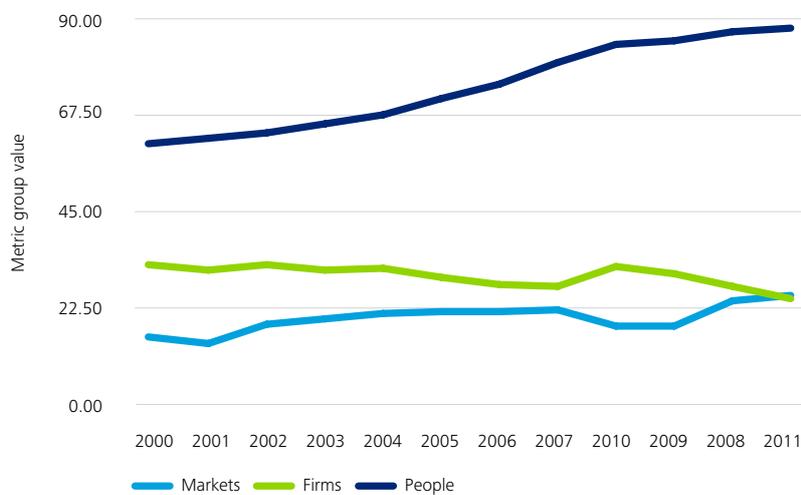


**Figure: 15** HHI for the Australian Market across a range of sectors in 2011. Competitive intensity has increased as the Australian market has grown.

Although the Australian market is significantly less competitive than that of the US (as measured by HHI), we can expect increased competition across all sectors as the market broadens. Significantly, the Australian market does not show the easing in competitive intensity that the US has experienced since 2000, so we can also expect competitive intensity to continue over the long term before it exhibits some relative competitive easing, if at all.

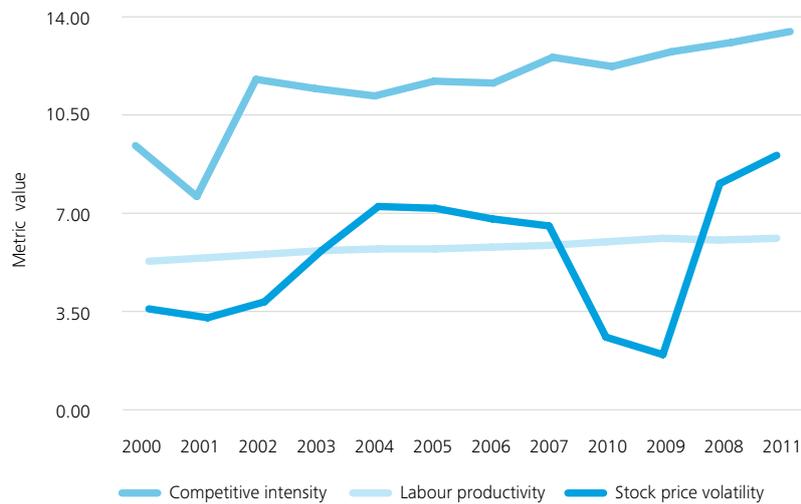
# The GFC hurt, but it was only a pause

As a country, Australia emerged from the 2008 GFC relatively unscathed. However, the downturn had a significant effect on local business. This resulted in discontinuity across the 'markets', 'firms' and 'people' groups of metrics, despite a long-term upward trend.



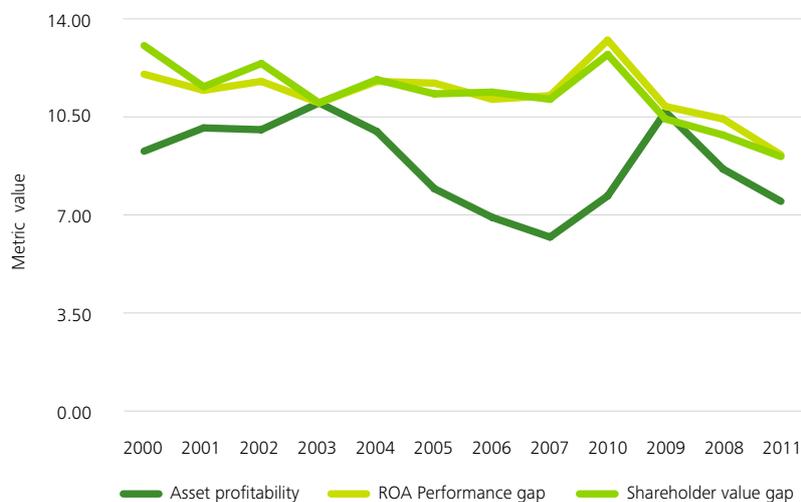
**Figure: 16** Groups in the Australian Impact Index. The 'people' group of metrics is the main driver behind the increase in the Impact Index.

The 'people' group of metrics saw the smallest disruption during the GFC, before quickly recovering. The 'markets' group, on the other hand, seemed to recover quickly before flattening out. If we look at the individual metrics in the 'markets' group, we can see that the current trend is largely due to continuing below-trend volatility in stock prices – a cycle that is in line with global trends. On the other hand, competitive intensity and labour productivity only experienced minor disruptions due to the GFC. In contrast, the 'firms' group of metrics has experienced a persistent decline.

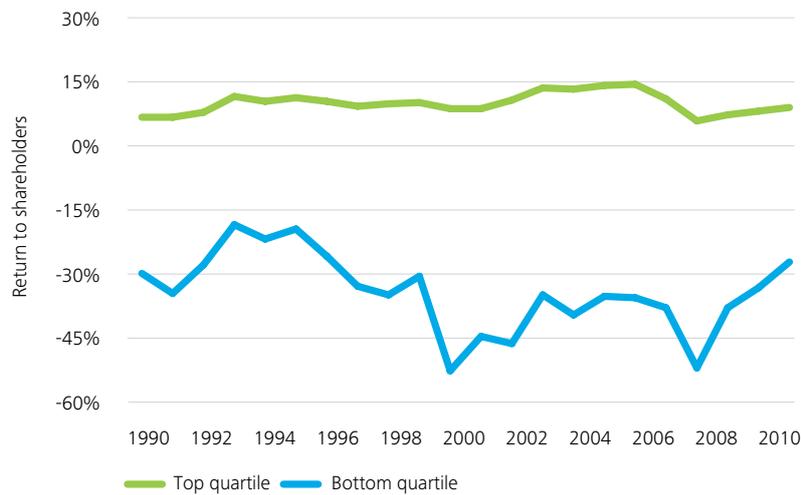


**Figure: 17** The three metrics comprising the 'markets' group. The impact of the 2008 GFC can be clearly seen in stock price volatility.

All three metrics in the 'firms' group remain significantly below the long-term trend. Asset profitability saw its lowest point in 2008 and has started to creep up. The ROA performance gap and shareholder value gap both spiked in 2008 (corresponding to a bottom-quartile ROA performance of -44%) as the under-performing companies were cleared out of the market, but since then have remained below trend and are at their lowest levels for the 13 years covered by the Shift Index.



**Figure: 18** The three metrics comprising the 'firms' group. The impact of the 2008 GFC can be clearly seen in all three metrics. Note that asset profitability has been inverted, in line with the methodology used for the US Shift Index.



**Figure: 19** The shareholder value gap over time. The impact of the 2008 GFC can be clearly seen in the bottom quartile.

We can, however, assume that the GFC represented a pause rather than a persistent problem for Australia. The downturn had a demonstrable effect on the Australian Shift Index. While the Impact Index – and the ‘firms’ group of metrics in particular – are still down on their historical trend, the long-term forces captured by the Foundation Index are still at work. This continues to drive improvements in the knowledge flows measured by the Flow Index, while key elements of the Impact Index (such as competitive intensity) are rapidly returning to their historical trends.

The top quartile of the ROA performance gap also continues to slowly improve, as does the top quartile of the shareholder value gap. The big shift continues at pace in Australia.

# What this means in the context of the Shift Index

Compiling the individual Foundation, Flow and Impact indices, we find that all three have steadily increased in Australia from 2000–12, as the country has identified and adapted to the changes driven by new technologies.

As expected, the Foundation Index has shown a fairly constant increase, and has the highest gradient of all three indices, befitting its role as the lead indicator in the Shift Index. The Foundation Index can be expected to continue rising at the current rate into the foreseeable future, due to continuing improvements in the price and performance of the underlying technologies. However, continued improvement in the Foundation Index assumes that our regulatory environment will continue evolving to facilitate the penetration of these technologies, enabling individuals and businesses to capitalise on the related opportunities.

The Flow Index also shows a consistent increase, though with a lower gradient than the Foundation Index, as expected. The growth of knowledge flows lags behind the introduction of the new digital computation and communication technologies captured in the Foundation Index. We expect the Flow Index to increase along with the Foundation Index, as new communication solutions are created in response to increases in the price-to-performance ratio of technology, and regulatory and policy frameworks are updated to allow widespread adoption across society and the business community.

The Impact Index clearly has the lowest gradient of the three sub-indices, showing that our ability – both as individuals and organisations – to leverage new knowledge flows lags behind our ability to create these flows. Improving the Impact Index depends on how well Australian businesses utilise the increased knowledge flows captured in the Flow Index.



# An opportunity or a challenge?

The differences in the gradients of the Foundation and Impact indices indicate the range of unrealised opportunities created by today's rapidly evolving digital environment. It illustrates the discrepancy between the gradual improvement of current best practices and the possibilities offered by new technology. The size of the gap between the Foundation and Impact indices represents our success at pulling apart problems to find new solutions – the narrower the gap, the more successful we've become at capitalising on new technology.

For example, the development of the multi-model container network and the consequent slashing of shipping costs incorporated technologies that already existed and had been in use for some time. Containers had been used intermittently prior to this – craned in and out of traditional break-bulk ships – but they had never been used as part of an integrated solution.

The challenge is to recognise that existing technologies can be reconfigured to solve old problems in new ways, allowing us to move beyond the incremental improvements of existing processes and workflows to deliver a significant change in performance. In the instance of the multi-model container network, it wasn't until American entrepreneur Malcom McLean – who came from trucking rather than sea freight – founded Sea-Land Service, Inc. in 1960 that containerisation reached critical mass and become an industry-wide phenomenon.

This is something that strategy theorist John Boyd called 'building snowmobiles'. He postulated that the designer of the snowmobile was likely given free rein to consider the various merits of a number of different machines, combining the concepts of a boat's outboard motor, a set of skis, a bicycle's handlebars and a tractor's caterpillar treads to create a completely new vehicle.

As Boyd points out, there are two distinct processes at work here. First we need to pull ideas apart and understand how they will work in different contexts (analyse), building a library of interesting tactics we can use to solve future problems. Second, we need to put these ideas back together in new combinations (synthesise), giving us the opportunity to understand how apparently unrelated ideas and actions can be connected to one another. Boyd believed that allowing individuals to tap into a diverse range of knowledge flows was the key to this process. As he put it:

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Expose individuals, with different skills and abilities, against a variety of situations – whereby each individual can observe and orient himself simultaneously to the others and to the variety of changing situations<sup>12</sup>.

The opportunity represented by the gap between the Foundation and Impact indices is the chance to find creative ways of harnessing the new communications and computation infrastructure pervading our society today. This will lead us to realise that dramatic changes in our foundation have enabled us to solve old – and new – problems.

Given the continued technological development we anticipate, it is unlikely that a decrease in the pace of change will allow us to catch up and narrow the gap between the Foundation and Impact indices. However, we can narrow the gap if we significantly increase the rate at which we – as businesses and individuals – find new ways to use technology to solve problems.

The challenge is to create an environment that fosters knowledge flows within Australia and with our collaborators overseas. This environment should provide us with a cultural and regulatory setting that encourages experimentation – one in which we feel secure enough to take chances.

This implies that we need to maintain our level regulatory playing field, ensuring that everyone has a fair go, so that good ideas and innovation are not the exclusive domain of any single group or individual in our community. We also need to ensure that our social safety net remains robust so that we feel empowered to take a chance, safe in the knowledge that those who don't win the quadrella of luck, timing, skill and opportunity – as Malcom McLean did – will be taken care of. And finally, we need to reduce the cost of innovation by making sure cheap and effective computation, communication and storage technologies are available to all, so that those who do happen across the luck, timing, skill and opportunity have the resources required to be successful.

# We have a good track record for reform, but do we have the will to continue?

The results from the Australian Shift Index show that Australia has a good track record for adapting to market changes. A consistently pragmatic approach to public policy has been a key enabler of this reform.

Over the period covered by the Shift Index, we can see a constant increase in technology performance and infrastructure penetration as improvements in communication and computation technologies have permeated Australian society.

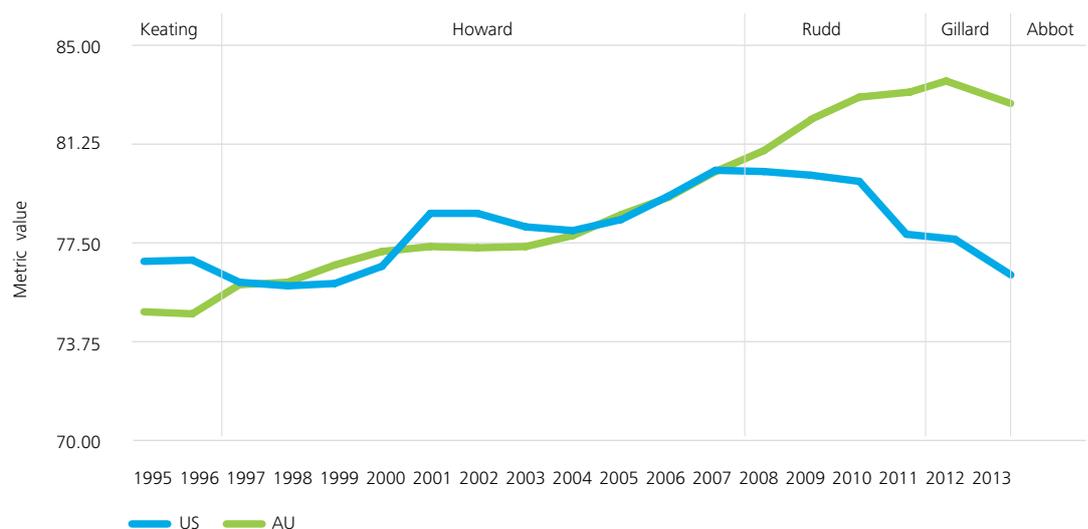
However, without a favourable regulatory environment, these technologies will see limited use, and many businesses or individuals will not be in a position to capitalise on the opportunities they present. We must constantly review the regulatory environment in Australia to ensure that the regulations in place encourage the uptake of technology. Otherwise, we risk creating unnecessary barriers that prevent good ideas from being successfully implemented.

While technology might be a driver for the change we're seeing, public policy is the main tool for determining how it will alter our society. Public policy ensures we have a robust social safety net, and it enables – and even encourages – the development of the ubiquitous digital infrastructure needed to support

the creation of new knowledge flows. Public policy also enables individuals and firms to capitalise on the opportunities technology presents, by creating a regulatory environment that supports innovation rather than inhibiting it.

The Shift Index shows us that during the last 20 or so years, Australia has seen continual improvement in the public policy metric as policies have been progressively introduced in response to the changing needs of the Australian population and economy.

From the Hawke and Keating governments' 'recession that we had to have', through the Howard government era from 1996 to 2007, Australia consistently introduced the technological policy reforms required to put us in the position we're in today. These policies spanned party lines, aligning with the observation of Albert Méтин in 1901 that Australia generally has a pragmatic rather than an ideological approach to public policy<sup>13</sup>. In contrast, the US Shift Index's public policy metric, which uses the same dataset and methodology as the Australian Shift Index, has had a more uncertain time over the last 20 years.



**Figure: 20** Economic freedom, as measured by the Shift Index, in Australia and the US. Australia has seen a consistent improvement in economic freedom over the time period studied.

During this time, Australian industries have worked to position themselves for future success, and must continue to do so if our prosperity is to continue. The current decline in Australian automotive manufacturing – with General Motors’ announcement that it would follow Ford, Mitsubishi and Nissan in ceasing to manufacture cars in Australia – must be offset by the rapid growth of local automotive aftermarket manufacturing, which has been estimated at 3% year on year<sup>14</sup>. Many traditional parts suppliers are struggling, as is the auto industry as a whole. However, the nimble manufacturers that have focused on short-run, innovative products are finding that Australia still has a significant competitive advantage. Although it is small, Australia ranks among Japan, the United States, China and South Korea in producing and innovating around aftermarket products.

General Motors’ recent challenges are symptomatic of those facing many other traditional industries. As the value firms create shifts from the centre of the organisation to the edge, the firms most able to respond to changes in the market are best positioned to capitalise on opportunities as they arise. Older industries and the regulatory regimes surrounding them are often poorly suited to this new environment. The automotive industry, for example, is struggling globally, suffering from softening demand and an excess in manufacturing capacity. As demand becomes more volatile, it becomes more challenging to manage the asset-intensive industries we’ve developed over the last few generations, such as traditional automotive manufacturing. While many of these have historically been symbols of national pride, it may be time to explore new models, rather than investing all our energy in those that are no longer suited to the current environment.



# Our ability to respond to the shift

The relative difference in gradients between the Foundation and Flow indices – and between the Flow and Impact indices – can provide us with a measure of our ability to leverage the opportunities presented by existing technologies.

Zara is a useful model to demonstrate the relationship between the relative Foundation and Flow gradients, and between the Flow and Impact gradients. Zara's development of a pull-based retail model forced the fashion industry to move from an annual to a six-monthly cycle and kickstarted the 'fast fashion' movement. An investment in improving computation, communications and storage created new knowledge flows – the direct feed from the runways and tills – and enabled the industry-changing pull-based retail model. In other words, an increase in the Foundation improved Flow, which consequentially pulled up the Impact. However, an over investment in developing knowledge flows would have pushed up Flow without a corresponding change in Impact, as the value in some of the knowledge flows would not have been realised. Similarly, under-investing in Flow would have resulted in a lower Impact, because a failure to create new knowledge flows would lead to a failure to realise the full potential of core technologies.

If the Foundation–Flow gap is smaller than the Flow–Impact gap, we have been more successful at creating knowledge flows than realising their value. If the Flow–Impact gap is smaller than that Foundation–Flow gap, the opposite is true: we're more successful at leveraging knowledge flows than creating them. We can see from the figure above that the current gap between the Foundation and Flow indices is slightly smaller than the gap between the Flow and Impact indices. From this, we can conclude that Australia is currently more effective at creating knowledge flows than we are at realising their value.

Ideally, we want a balanced result, so we are creating new knowledge flows and successfully tapping into the value they contain. If there is an imbalance – if the Foundation–Flow and Flow–Impact gaps are not roughly equivalent – we can assume that there is untapped value, or waste. This implies that the Impact Index must be depressed if the Foundation–Flow and Flow–Impact gaps are out of balance. It also implies that taking action to balance the Foundation–Flow and Flow–Impact gaps should in turn increase the gradient of the Impact Index.

Finding the balance between the Foundation–Flow and Flow–Impact gradients is challenging at a whole-of-economy level. Most of the metrics in the Shift Index are beyond our direct control. In some instances – such as the 'technology performance' group of metrics in the Foundation Index – we have little, if any, influence. The only significant factor under our control is public policy, which directly influences the economic freedom metric and indirectly influences many of the other metrics in the Shift Index. If we want to be successful as businesses and individuals, we need to work together to adapt the right infrastructure and public policy, to create an environment that fosters success for knowledge workers.

While Australia has successfully adapted to the changes driven by the core computation, communication and storage technologies tracked in the Shift Index, there is room for improvement.

# Conclusions

The Australian Shift Index shows that the nature of the Australian market – and the individuals and businesses that inhabit it – has changed over the last 20 years. Digital computing and communications technologies were introduced and then rapidly became near-ubiquitous across the country. Firms and individuals used this technology to create new information flows, which in turn have been used to create new value. The Australian market has become more competitive and more turbulent as a result, and new winners and losers have emerged. The GFC in 2008 might have paused our progress, but Australia's transformation has certainly not stopped.



The challenge for Australia is to continue adapting. We have a good track record for adopting new technology and implementing the policy reforms required to make the most of it, but this journey is not over. The country faces a number of hard decisions – for example, should we let go of the old, struggling manufacturing industries so we can invest in the next wave of industry? Rather than a cause for pessimism, these junctures should be viewed as an opportunity to build our current institutional and policy environment. Corporations in the early 20th century learned to exploit the benefits of scale in response to developments in energy, transportation and communications. Today's companies must focus their energies on exploiting this era's emerging digital infrastructure, to unlock powerful new modes of economic growth.

This raises a number of interesting questions that warrant further investigation. Has capital won over labour? If so, how does that affect Australia? If digital communications have changed the way individuals engage with the world, what does this mean for consumers and the companies trying to serve them? And finally, how we should we gauge the productivity of our knowledge workers?

Deloitte intends to continue refining the current Australia Shift Index – improving the dataset on which it is based and its alignment with the US Shift Index, as well as updating the index every year.

# Appendix: Quantifying the shift

To quantify Australia's shift to the edge, we have developed a model that breaks the changes in the market into three waves, as noted above. A separate sub-index represents each wave of the change: the Foundation Index, the Flow Index and the Impact Index.

Each of these sub-indices comprises a number of individual metrics organised into three groups, as outlined in Figure 1, above. The Impact Index, for example, contains the 'markets', 'firms' and 'people' groups. In turn, the people group contains the consumer power, brand disloyalty, returns to talent and executive turnover metrics.

The metrics themselves were compiled from a range of public and private data sources, including data from the Australian Bureau of Statistics and comScore. Four metrics – consumer power, brand disloyalty, inter-firm knowledge flows and worker passion – were derived from surveys conducted by Deloitte Australia, based on survey methodologies established as part of the US Shift Index. We also directly incorporated data from the US Shift Index, where appropriate. Please note that we will be refining these indices as we improve our database and align more closely with the methodology used by the US Shift Index.

We smoothed all metrics to ensure that the Shift Index showed long-term trends and not short-term volatility. Metrics were classified as either 'non-exponential' (any non-exponential metric with a long-term trend) or 'exponential' (metrics such as computing and wireless activity that demonstrated clear exponential growth). Exponential metrics were smoothed via a Box-Cox transformation (a commonly accepted technique for normalising exponential functions), which uses a transformation coefficient to dampen the growth rate of each metric without making the metrics linear. We used the same coefficient for all exponential metrics to preserve the relative differences between them. For each non-exponential metric, we calculated a 'deviation score', which represents how much (on average) it deviates from its long-term trend line. This score set the threshold for how much volatility would be allowed through to the final index.

We then indexed each metric to a base year (2003). This artificial inflation or deflation had no impact on the index; rather, it minimised or preserved volatility in the underlying data. This process refocused the Shift Index from magnitudes to rates of change, because we were trying to measure flows rather than stocks.

The final step before calculating the Foundation Index, Flow Index and Impact Index was to properly weigh each metric to ensure that each driver – the key concept represented by a group of metrics – contributed equally to the Shift Index. The process is summarised in the figure below. As you can see, we have given equal weight to each group in constructing its sub-index, and given equal weight to each metric within a group.

	Metrics groups (Drivers)	Metrics
Impact index	1/3 x Markets	1/3 x Competitive Intensity
		1/3 x Labour Productivity
		1/3 x Stock Price Volatility
	1/3 x Firms	1/3 x Asset Profitability
		1/3 x ROA Performance Gap
		1/3 x Shareholder Value Gap
1/3 x People	1/4 x Consumer Power	
	1/4 x Brand Disloyalty	
	1/4 x Returns to Talent	
	1/4 x Executive Turnover	
Flow index	1/3 x Virtual Flows	1/3 x Inter-Firm Knowledge Flows
		1/3 x Wireless Activity
		1/3 x Internet Activity
	1/3 x Physical Flows	1/3 x NetBohemian Score
		1/3 x Travel Volume
	1/3 x Amplifiers	1/3 x Movement of Capital
1/2 x Worker Passion		
Foundation index	1/3 x Technology Performance	1/2 x Social Media Activity
		1/3 x Computing
		1/3 x Digital Storage
	1/3 x Infrastructure Penetration	1/3 x Bandwidth
		1/2 x Internet Users
1/3 x Public Policy	1/2 x Wireless Subscriptions	
		1 x Economic Freedom

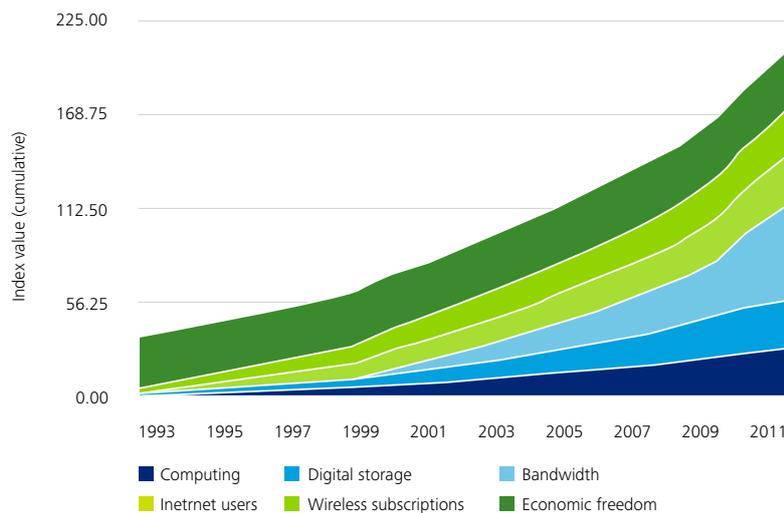
**Figure 21:** Sub-index construction

A complete definition of the methodology, and further exploration of the differences between the Australian and US indices, will be presented later in 2014.

# The Foundation Index

Drops in the cost of technology and increases in performance create new opportunities for businesses and consumers. These become more pervasive as technology becomes a commodity and part of our everyday infrastructure. Finally, advances in public policy remove economic and regulatory barriers to realising the potential of this new technology.

The Foundation Index – shown in the figure below – quantifies these trends. The Foundation Index is built from three groups of metrics.



**Figure: 22** Each metric's contribution to the Foundation Index.

As we can see from the figure above, all metrics show consistent increases from 2000 to the present day. The cost of the core communication and computation technologies continues to drop, the technologies themselves are permeating society, and economic policy has been revised to ensure that Australia and Australian businesses are in a position to capitalise on the opportunities these technologies provide.

'Technology performance', the first group of metrics in the Foundation Index, captures the price and performance increases of competing infrastructure elements. It contains three metrics.

- **Computing** is defined here as the vendor cost associated with putting 1 million transistors on a semiconductor. It also captures the influence of Moore's Law, a term coined by Gordon Moore – co-founder and Chairman Emeritus of Intel Corporation. In 1965, Moore predicted that the number of transistors on an integrated circuit would double every 24 months and the cost would decrease by half. Moore's Law, as the phrase came to be known, has proven to be one of the most enduring technology predictions ever made

- **Digital storage** is defined as the vendor cost associated with producing 1GB of digital storage, this metric captures the cost-to-performance improvements in digital storage. These improvements are described by Kryder's Law, which predicts that storage capacity (on a unit basis) doubles every 12 to 18 months
- **Bandwidth** is defined as the vendor cost associated with producing the gigabit Ethernet fibre connections deployed in data centres. Bandwidth captures the cost-to-performance improvements in core networking technologies.

The second group of metrics is 'infrastructure penetration', which measures the penetration of computing infrastructure into Australian society. It contains two metrics.

- **Internet users** captures the penetration of the Internet into society, and is defined as the number of active Internet users in Australia as a percentage of the total population. Active users are those who access the Internet at least once a month

- **Wireless subscriptions** captures the penetration of mobile technology into society, and is defined as the number of wireless service subscriptions in Australia as a percentage of the total population.

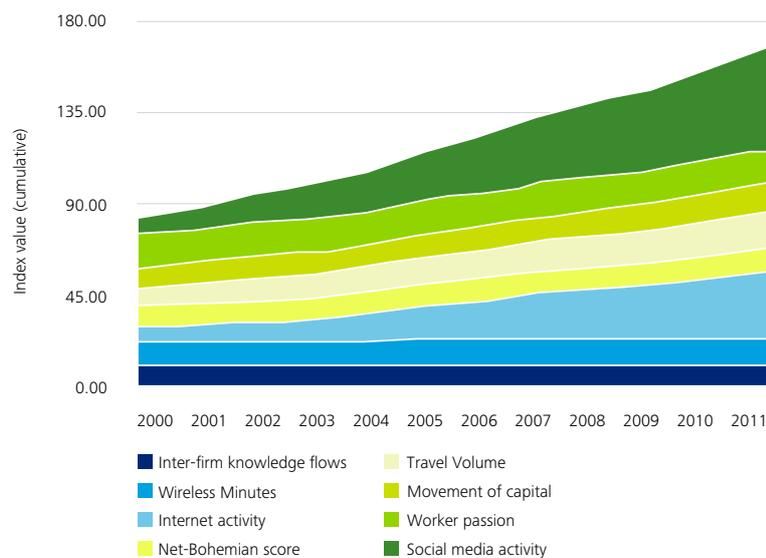
The third and final group is 'public policy', which measures advances in public policy that enable the penetration of new technologies and their adoption by individuals and organisations. Public policy contains a single metric.

- **Economic freedom** is drawn from the Index of Economic Freedom<sup>15</sup>, produced by the Heritage Foundation and co-published with The Wall Street Journal. The Foundation Index measures 10 components of economic freedom, assigning a grade in each using a scale from 0 to 100, where 100 represents the maximum freedom. The 10 economic freedoms are grouped into four broad categories or pillars of economic freedom: Rule of Law (property rights, freedom from corruption), limited government (fiscal freedom, government spending), regulatory efficiency (business freedom, labour freedom, monetary freedom) and open markets (trade freedom, investment freedom, and financial freedom). A country's overall<sup>16</sup> economic freedom score is simply an average of its scores on the 10 individual freedoms.

# The Flow Index

The second index quantifies the increase in the flow of information. As technology becomes cheaper and more pervasive, and barriers to adoption are removed (or incentives for adoption are created), we expect use of these new technologies to increase.

The Flow Index – shown in the figure below – quantifies changes in social and working practices that are emerging in response to the new digital infrastructure. The Flow Index is based on three groups of metrics. Again, each of the groups has been designed to capture one of the drivers of knowledge flows that are expected to increase as more people adopt practices that use the new digital infrastructure.



**Figure: 23** Each metric's contribution to the Flow Index.

As we can see from the figure, most metrics show a fairly consistent increase from 2000 to the present day, though at a shallower rate than with the Foundation Index.

'Virtual flows', the first group of metrics in the Flow Index, measures the expected increase in virtual information flows as the communication and computing infrastructure quantified in the Foundation Index becomes more widespread. It contains three metrics.

- **Inter-firm knowledge flows** captures the increase in knowledge flows between individuals and across firms. The metric is a normalised measure of how frequently workers participate in eight categories of activity in their professional lives, ranging from the use of social media to connect with other professionals, to attendance at conferences
- **Internet activity** captures the flow of information via the Internet as a proxy for the growth of virtual knowledge via online tools and services. The metric is defined as the total international bandwidth that connects Australia to the rest of the world

- **Wireless activity** captures the increasing flow of information between individuals (rather than between locations). The metric is defined as the total number of wireless minutes and the total number of SMS messages sent and received in Australia per year.

The second group of metrics is 'physical flows', which measures the physical transfer of information that is expected to increase in line with virtual flows. As people become more and more connected virtually, tacit knowledge exchange through physical, face-to-face interactions will become more important. A chance meeting in the virtual world, for example, can lead to an arranged meeting in the physical world as people find the time to catch up and put a name to a face. Physical flows contains three metrics.

- **Net-bohemian score** captures the tendency for creative individuals (including professionals such as computer engineers, health-care professionals and architects) to gather in one place<sup>17</sup>. Our assumption is that these individuals will have more face-to-face interactions with each other, and more new knowledge will likely be created as a result. The net-bohemian score is a proxy for the level of tacit knowledge in areas most likely to have rich knowledge flows. As individuals migrate to creative centres, we expect the 'spikiness' – the relative populations of creative individuals compared to other occupations – of urban areas to increase. We have developed the net-bohemian score<sup>18</sup> to gauge the relative spikiness of any given geographic area. The net-bohemian score metric is defined as:

$$\% \text{ creative population} - \% \text{ industrial population}$$

In this equation:

- **% creative population** is the percentage of the population in a geographic area that has a 'creative' occupation
- **% industrial population** is the percentage of the population in a geographic area that has an 'industrial' occupation
- **% other population** is the percentage of the population in a geographic area that has an occupation that is neither creative nor industrial.

These categories are defined in terms of the Australian and New Zealand Standard Classification of Occupations (ANZSCO), allowing us to use census data from the Australian Bureau of Statistics to calculate the Net-bohemian score at all levels, from national to local.

- **Travel volume** captures the increase in physical travel – the physical flows of people – to support the face-to-face interactions that are more likely to drive the most valuable, tactical knowledge flows. Travel volume is a result of individuals and firms that have connected in the virtual world travelling to connect face to face to cement the relationship. The metric is defined as the total volume of domestic air passenger travel and the total volume of international air passenger travel
- **Movement of capital** is the total flow of capital across geographic and institutional boundaries. This can be viewed as a metric that trails the knowledge flows across the broader economy, as investment usually only follows the knowledge flows that drove the decision to invest. The measure is defined as the total volume of foreign direct investment into and out of Australia, without netting the two, to focus on volume rather than direction of flow.

The third and final group of metrics is 'flow amplifiers'. Information only blooms into knowledge and insight when individuals invest the time to internalise the information and make connections between what they know and what they have learned – the connection between what is happening and what is possible. An individual's engagement with their profession amplifies the knowledge flows that they participate in, making them proactive contributors rather than passive participants, while the new technological capabilities provide them with additional opportunities to collaborate and communicate with their peers. The 'flow amplifiers' group contains two metrics.

- **Worker passion** captures how passionate Australian workers are about their jobs. This metric is based on a Deloitte survey that tested different attitudes and behaviour relating to worker passion: excitement about work, fulfilment from work and willingness to work extra hours

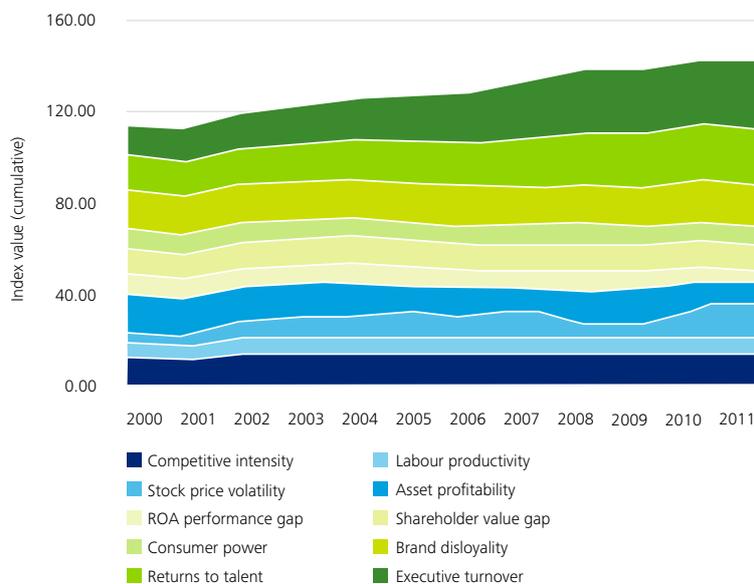
- **Social media activity** captures individual engagement with the new generation of digital communication services that facilitate collaboration and two-and multiple-way communication. The metric is defined as the number of minutes Internet users spend on social media websites relative to the total minutes they spend on the Internet generally.



# The Impact Index

The third and final index quantifies the impact of the shift at a whole-economy level, the impact on businesses and the impact on individuals.

The Impact Index is an indicator of how foundational shifts and new knowledge flows are tangibly changing the way companies and consumers operate and comprises three groups of metrics. Each of the groups captures the impact on one aspect of the economy: the market as a whole, firms and individuals.



**Figure: 24** Each metric's contribution to the Impact Index

As we can see from the figure, the 'market' and 'people' groups show fairly consistent gains from 2000 to the present day. The exception is the 'firms' group, which dips after the 2008 financial crisis and has not yet fully recovered. Overall, the Impact Index has the shallowest gradient of the three sub-indices, and this holds true even if we only consider the period from 2000 to 2008.

The first group in the Impact Index is 'markets', which captures the impact of the shift on the Australian economy as a whole. This group contains three metrics.

- **Competitive intensity** captures changes in the competitive dynamics of the Australian market over time. The market is expected to become more competitive as the increase in knowledge flows removes friction and barriers to competition, driven by improvements in our digital infrastructure, as measured by the Foundation Index. The metric is based on the HHI, which tracks changes in industry concentration by measuring the market share held by the top 50 firms in each sector, and is used as a proxy for how aggressively firms compete in a given market sector. We used market capitalisation as the weighting factor to calculate a value-weighted whole-of-economy value for competitive intensity

- **Labour productivity** captures Australia’s economic efficiency, showing how effectively economic inputs are converted into output. One of our central hypotheses is that digital technology, because it permeates business and social domains, holds the potential to substantially increase productivity growth. We calculated labour productivity by computing gross value added per hour worked in the industry, using raw data obtained from the Australian Bureau of Statistics<sup>19</sup>.
- **Stock price volatility** captures the expected increase in short-term stock price volatility as increase knowledge flows create a more competitive market, where firms find it more challenging to maintain a competitive advantage. We used the standard deviation in stock prices over the year to measure volatility, and market capitalisation as the weighting to calculate a value-weighted stock price volatility average.

‘Firms’, the second group of metrics, captures the impact on firms in the Australian market. We used three metrics here.

- **Asset profitability** (return on assets, or ROA) is a measure used to evaluate corporate performance. This metric is a proxy for the value captured by firms relative to the size of the firm. ROA can be expected to increase as firms improve their ability to leverage the knowledge flows around them, shifting from a product focus to a service focus. Note that asset profitability is inverted when integrated into the Impact Index, in line with the methodology used for the US Shift Index.
- **ROA performance gap** captures the tendency for the market to create winners and losers as firms respond (or fail to respond) to the shift in the economy. The ROA performance gap metric measures the percentage difference in ROA between the top and bottom quartiles, and reflects how value flows between winners and losers in an increasingly competitive environment

- **Shareholder value gap** captures how hard it is for companies to generate sustained returns to shareholders. It is another assessment of the bifurcation between winners and losers. The metric is defined in terms of the reported return on equity (ROE), which is the percentage difference between the top and bottom quartiles in the economy.

‘People’ is the third and final group of metrics. People captures the impact of technology, open public policy, and knowledge flows on consumers and talent, including executives. This group contains four metrics:

- **Consumer power** captures the increase in consumer power as consumers tap into knowledge flows and use their increased knowledge to improve their bargaining position. Consumer power measures the value consumers gained based on the degree to which they perceive they have choices, access to information about those choices, access to customised offerings, the ability to avoid marketing efforts, and minimal switching costs. The metric was derived from a Deloitte survey using a methodology developed for the US Shift Index. The survey solicited consumer responses to a set of six statements measuring different aspects, attributes, and behaviours involving consumer power:
  - There are a lot more choices now in the [consumer category] than there used to be
  - I have convenient access to choices in the [consumer category]
  - There is a lot of information about brands in the [consumer category]
  - It is easy for me to avoid marketing efforts
  - I have access to customised offerings in the [consumer category]
  - There isn’t much cost associated with switching away from this brand.

- **Brand disloyalty** is another measure of consumer power. Brand disloyalty focuses on capturing the result of increased consumer power and a generational shift in reliance on brands. The metric was derived from a Deloitte survey, again using a methodology developed for the US Shift Index, where consumers were asked questions across 26 consumer categories in response to a set of six statements measuring different aspects, attributes and behaviours involving brand disloyalty:
  - I would consider switching to a different brand
  - I compare prices for this brand with other brands
  - I seek out information about other brands
  - I ask friends about the brands they use
  - I switch to the brand with the lowest price
  - I pay attention to advertising from other brands.
- **Returns to talent** captures the increased returns to the creative professionals who are best positioned to leverage increased knowledge flows and create additional value. The metric measures the gap in compensation between creative professions and other professions, using the same occupation categorisation as the Net-bohemian metric
- **Executive turnover** captures executive attrition rates – voluntary or involuntary – based on the number of executive management changes (from Vice President to Board of Directors) at public companies. A faster moving, less predictable world has made it more difficult to perform senior management roles, even though it also means better remuneration for those who hold these positions.

# Endnotes

1. The invention of the assembly line is commonly attributed to Ransom Olds, who used it to build the first mass-produced automobile, the Oldsmobile Curved Dash. It was later perfected by Henry Ford when he installed motor-driven conveyor belts, enabling the Ford Motor Company to produce a Model T automobile in 93 minutes.
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15. The Heritage Foundation & The Wall Street Journal, 2011 Index of Economic Freedom.
16. Ibid.
17. Richard Florida, (2004), "The Rise of the Creative Class", Basic Books, New York.
18. The Net-bohemian score has a structure similar to the net promoter score.
19. Gross value added, or GVA, is a value for the amount of goods and services produced, less the cost of all inputs and raw materials that are directly attributable to that production)

# About the authors



## Peter Williams

Peter Williams is an innovator and thought leader in the digital world.

Peter founded the eBusiness Consulting group in Deloitte in 1996 and was CEO of The Eclipse Group, one of Australia's largest web development companies, from 2003 to 2008. He was also the founder of Deloitte Digital, a business pioneering the delivery of professional services online.

Peter is a sought after speaker and media commentator both locally and internationally and has worked with boards and senior executives of many companies helping them understand and adapt to the rapidly changing digital environment.



## Peter Evans-Greenwood

Peter has spent 20 years working at the intersection between business and technology. During his career he has worked in Asia, Australia, Europe and the US, lived in Silicon Valley through boom and bust, and held leadership roles in global organisations such as Deutsche Post DHL, as well as startups and research and development labs.

These days he works as a consultant and advisor on both business and technology sides of the fence. An avid writer, blogger and public speaker, music lover and coffee addict, his biggest thrills are his family and that buzz one gets from helping clients to achieve the impossible.



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