

New Zealand's innovation ecosystem – emerging conclusions

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SUMMARY

1. Lifting innovation ecosystem performance would provide valuable economic benefits
2. New Zealand is making efforts to lift innovation ecosystem performance but there is a long way to go
3. The New Zealand Institute proposes directions for development of the innovation ecosystem that would improve outcomes

LIFTING INNOVATION ECOSYSTEM PERFORMANCE WOULD PROVIDE VALUABLE ECONOMIC BENEFITS

New Zealand needs higher productivity and a stronger current account

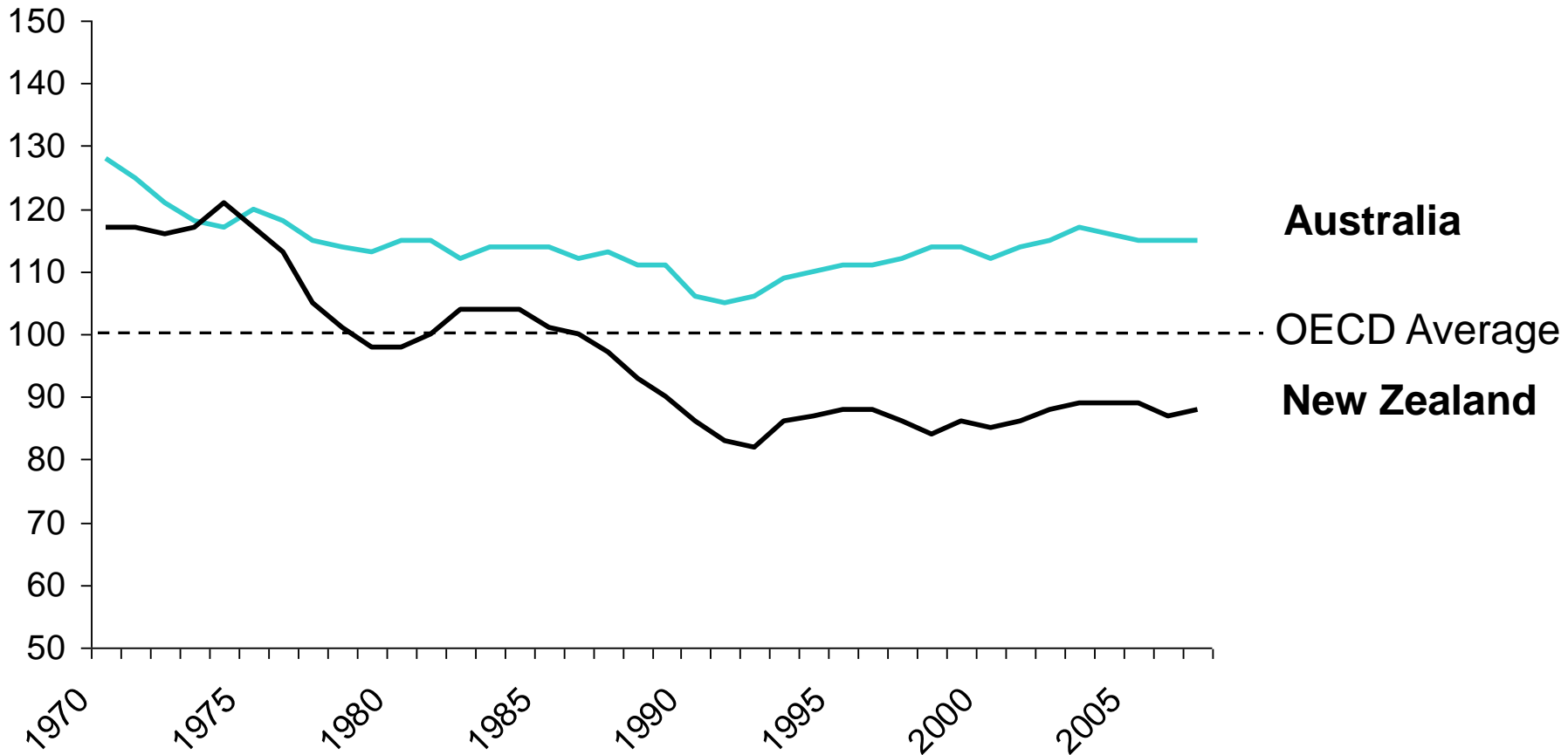
Recent sources of economic growth should not be relied on

Innovation provides opportunities to lift productivity and exports

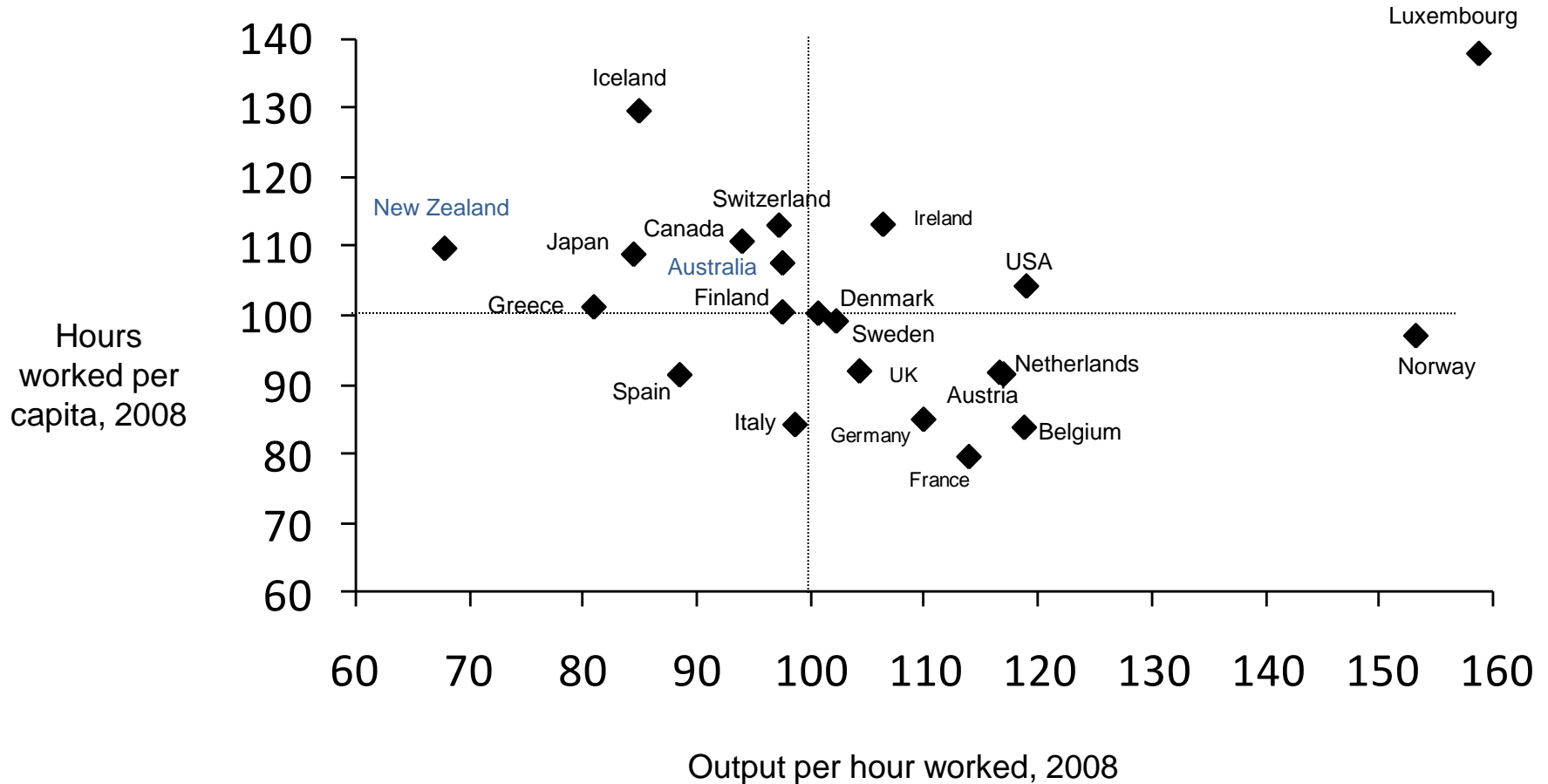
Innovation ecosystem performance is important for success of advanced economies

NEW ZEALAND'S INCOME IS LOW RELATIVE TO OTHER ADVANCED ECONOMIES

Real per Capita GDP (OECD average = 100)



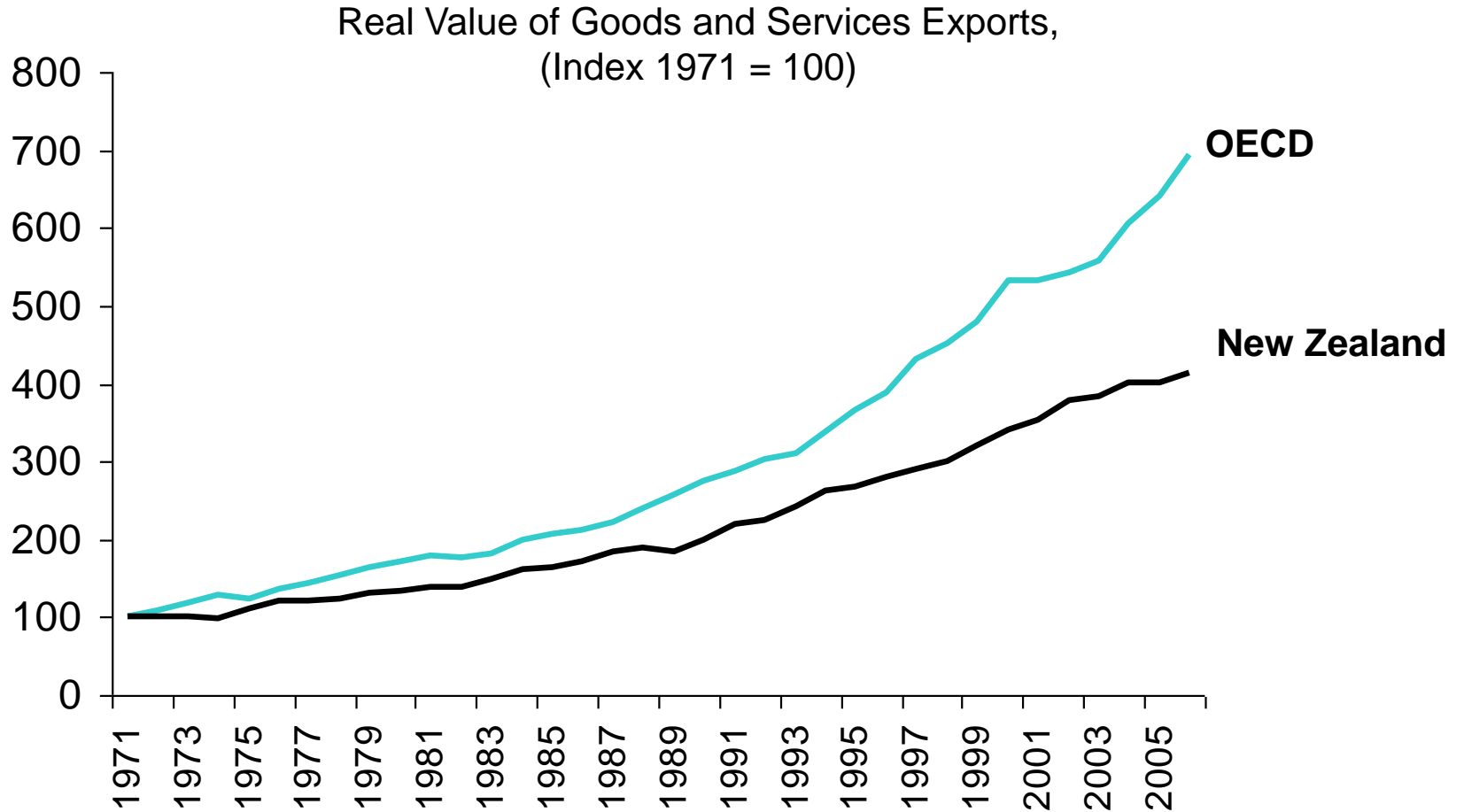
IMPROVING LABOUR PRODUCTIVITY IS A PRIORITY



Note: OECD average is 100.

Source: Groningen Growth and Development Centre and the Conference Board, Total Economy Database, April 2009.

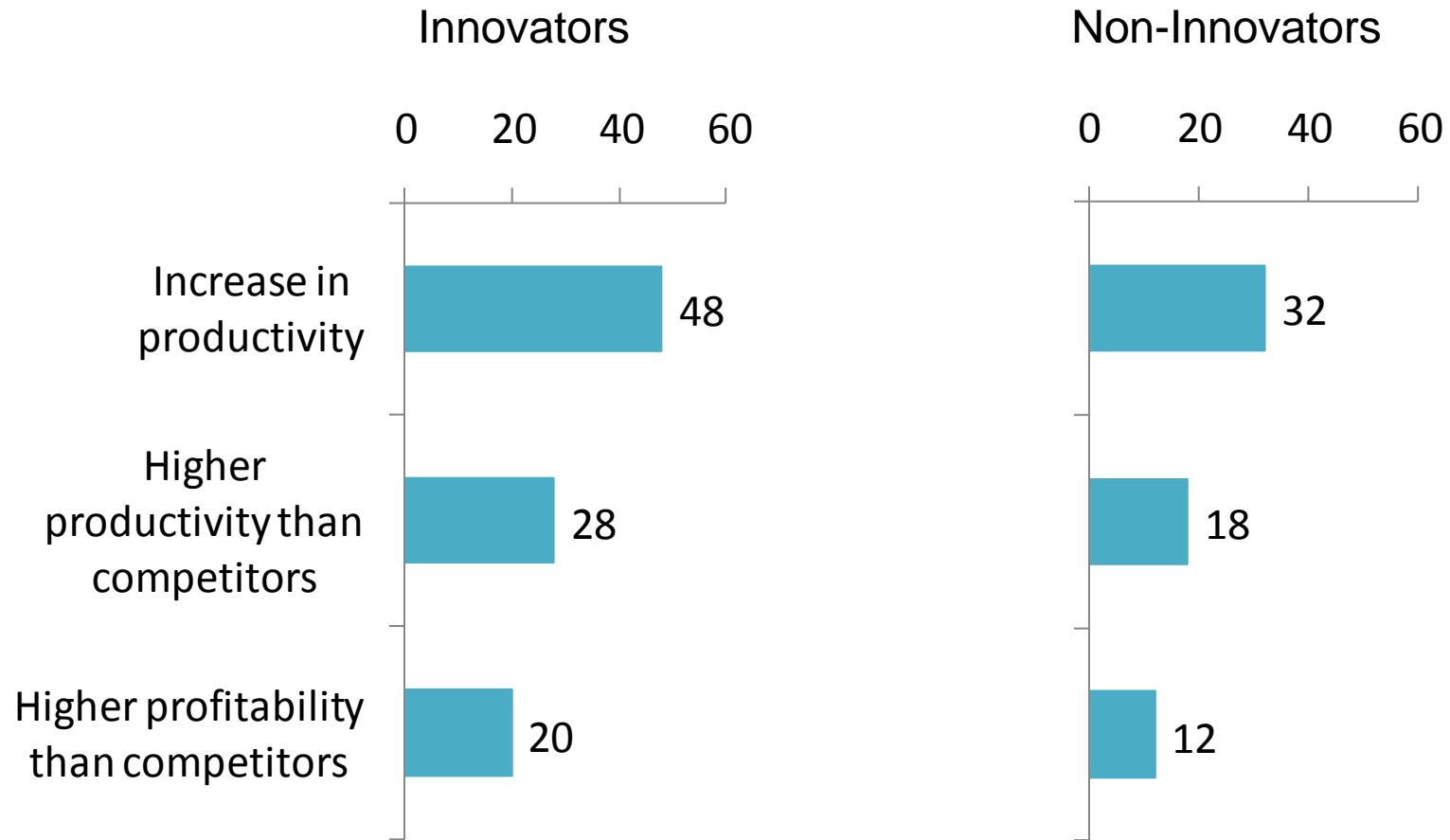
NEW ZEALAND HAS NOT KEPT UP WITH OECD EXPORT GROWTH



RECENT SOURCES OF ECONOMIC GROWTH SHOULD NOT BE RELIED ON

Source	Potential	Comment
Working harder	X	Working hours already 10% higher than OECD average
Property boom	X	Debt level high
Agriculture	?	Prices may increase again if/when economy grows Little available land and environmental constraints
Tourism	?	Limited by emerging emissions constraints and changing values Local environmental pressure limits also emerging

INNOVATION LIFTS PRODUCTIVITY AND PROFITS



SCIENCE PROVIDES AN IMPORTANT FOUNDATION FOR INNOVATION

- Scientific capacity provides graduates, contract research, discoveries, intellectual property and new businesses
- “With science exerting a more important and direct influence on innovation, especially in fast-growing new industries, the intensity and quality of industry-science linkages play an increasing role in determining returns on investment”
 - OECD Work on Innovation: A stocktake of existing work
- “Innovation is a key driver of economic growth. In the last couple of decades, new technologies, new industries and new business models have powered impressive gains in productivity and GDP growth”
 - OECD Making innovation strategy succeed in a globalised world
- Many studies have round that R&D – the most narrow construct of innovation – has a significant effect on growth in real per capita GDP

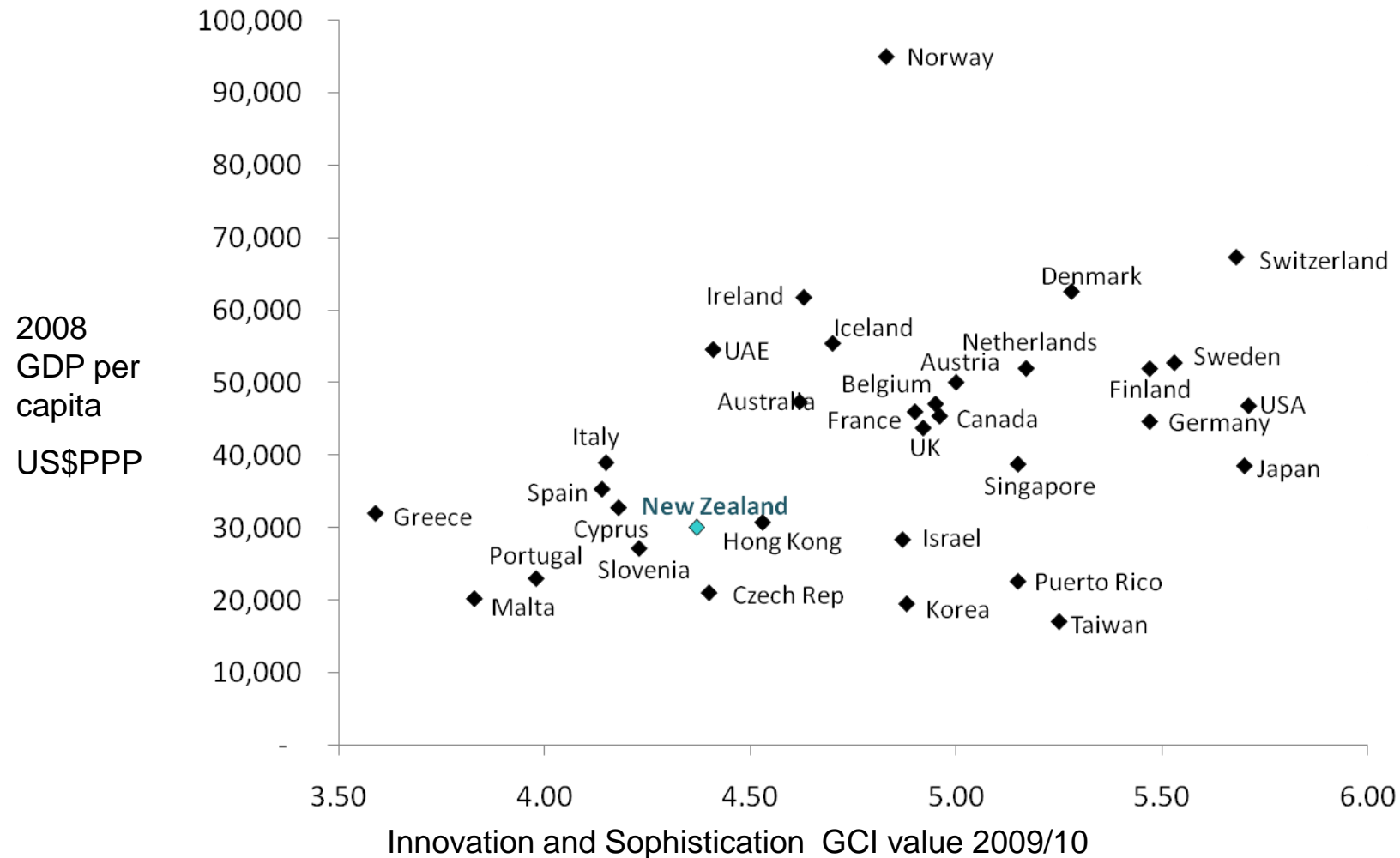
GO-GLOBAL BUSINESSES PROVIDE THE GREATEST BENEFIT

Go-global businesses are those that are formed to target international markets

Go-global businesses provide valuable benefits

- Value-added costs of the science and business development contributing to GDP
- High value jobs
- Export revenues and dividend income contribute to improve current account balance
- Wealth from sale of stakes in the businesses
- Networks and experienced talent for the next venture

THE MORE INNOVATIVE ADVANCED ECONOMIES TEND TO PRODUCE HIGHER LEVELS OF INCOME



NEW ZEALAND HAS PUT INCREASED EFFORT INTO THE INNOVATION ECOSYSTEM AND MADE PROGRESS

New Zealand has increased the resources applied to innovation

- Increased the number of researchers
- Increased the Gross Expenditure on Research and Development (GERD) by 5% per annum for the decade to 2005, when GERD was \$1.1 billion

There have been changes and adjustments made to how research is funded and which organisations conduct the research

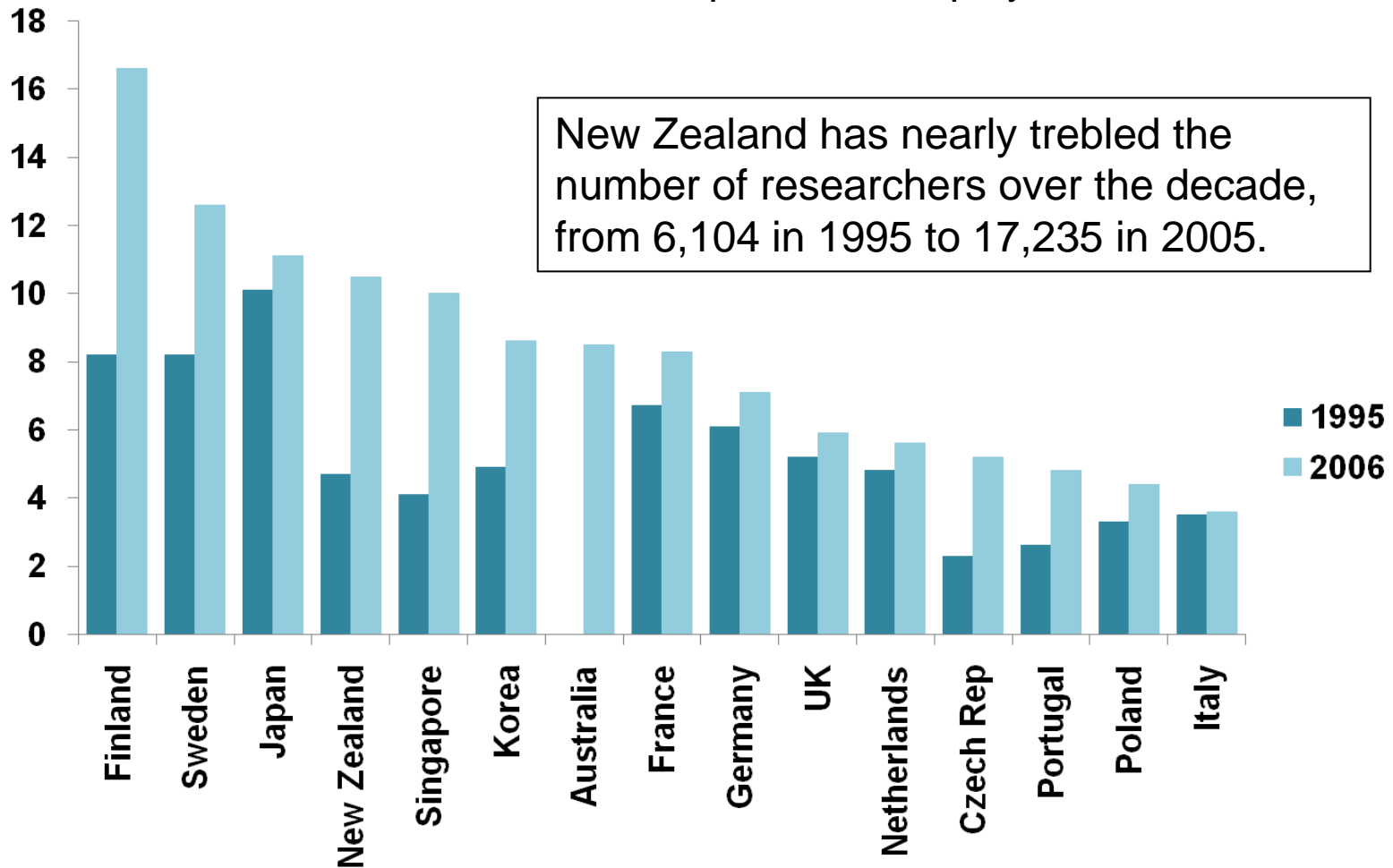
- Business incubators
- New Zealand Venture Investment Fund (NZVIF)
- Seed Co-Investment Fund (SCIF)
- Angel investment clubs

These efforts have had an impact

- Trebled the number of researchers and maintained the patents per researcher
- Increased the GERD per capita (PPP) from US\$165 in 1995 to 290 in 2005

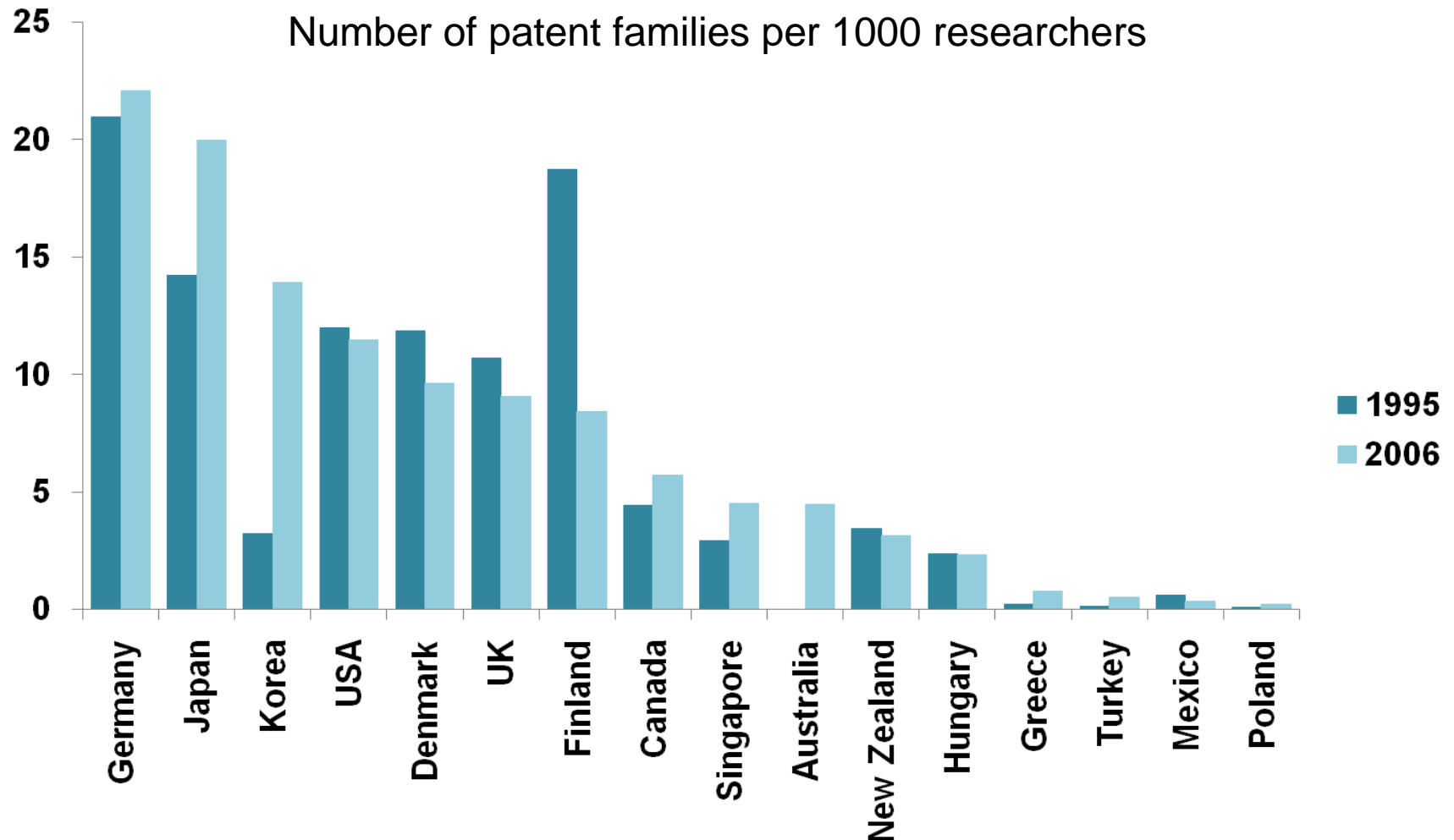
NEW ZEALAND HAS INCREASED THE NUMBER OF RESEARCHERS

Number of researchers per 1000 employees



Note: New Zealand values are for 1995 and 2005. Australia 2006 only.
 Source: OECD Main Science and Technology Indicators, 2008.

NEW ZEALAND HAS ALMOST MAINTAINED LEVEL OF OUTPUT PER RESEARCHER



Note: New Zealand values are for 1995 and 2005. Australia 2006 only. The OECD tracks patent family unit ,which is defined as a set of patents taken in various countries to protect a single invention or discovery.

Source: OECD Main Science and Technology Indicators, 2008.

YET NEW ZEALAND REQUIRES FURTHER IMPROVEMENT FROM THE INNOVATION ECOSYSTEM

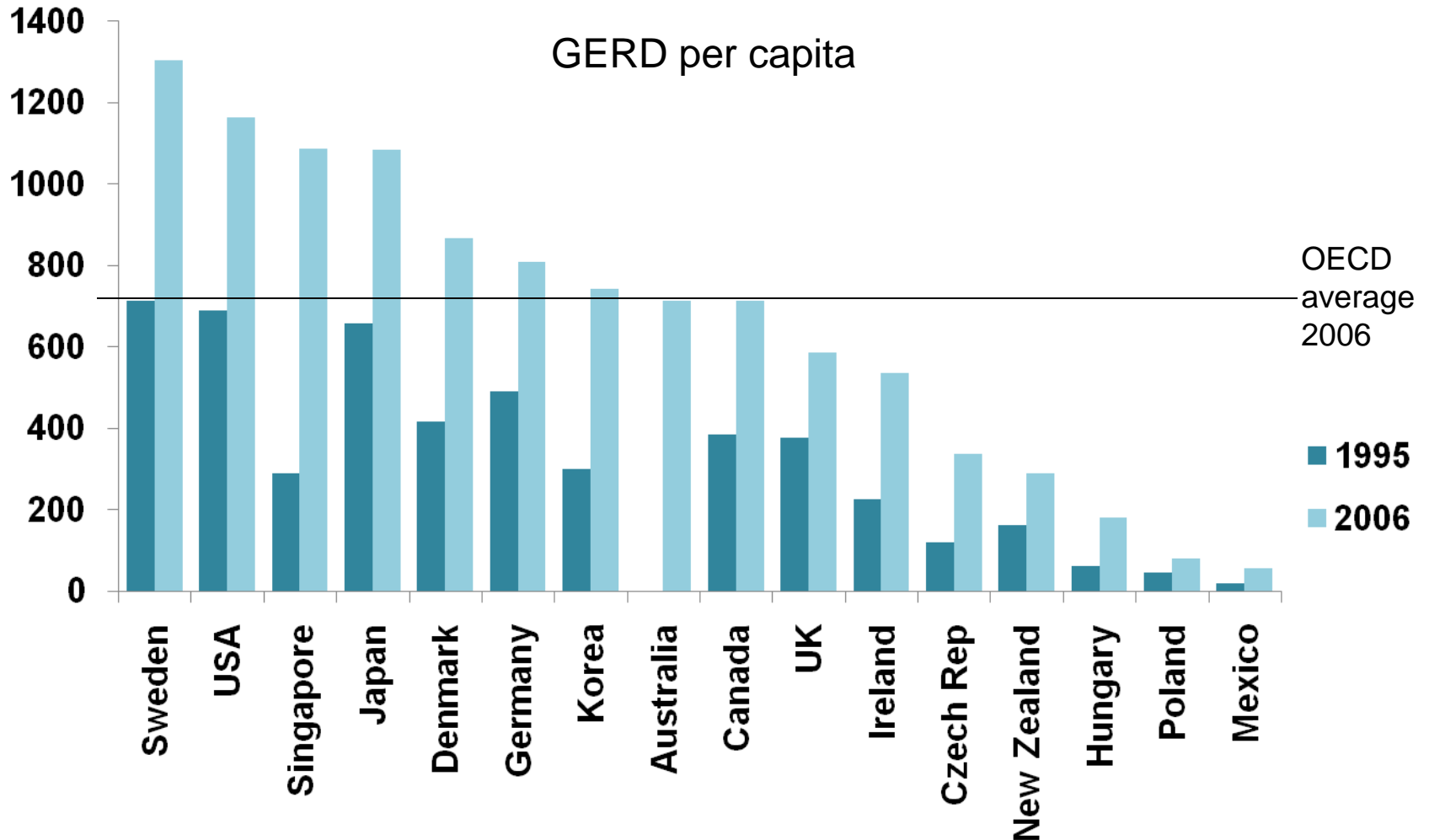
The improvements have not been enough

- New Zealand's GERD per capita remains low relative to other OECD countries, indicating that we are not investing as much as other countries
- New Zealand's Business Expenditure on Research and Development (BERD) is particularly low
- New Zealand achieves about half as many patents as the leading countries, per \$ spent on R&D

One of the areas that has been identified as a challenge for New Zealand is the commercialisation process

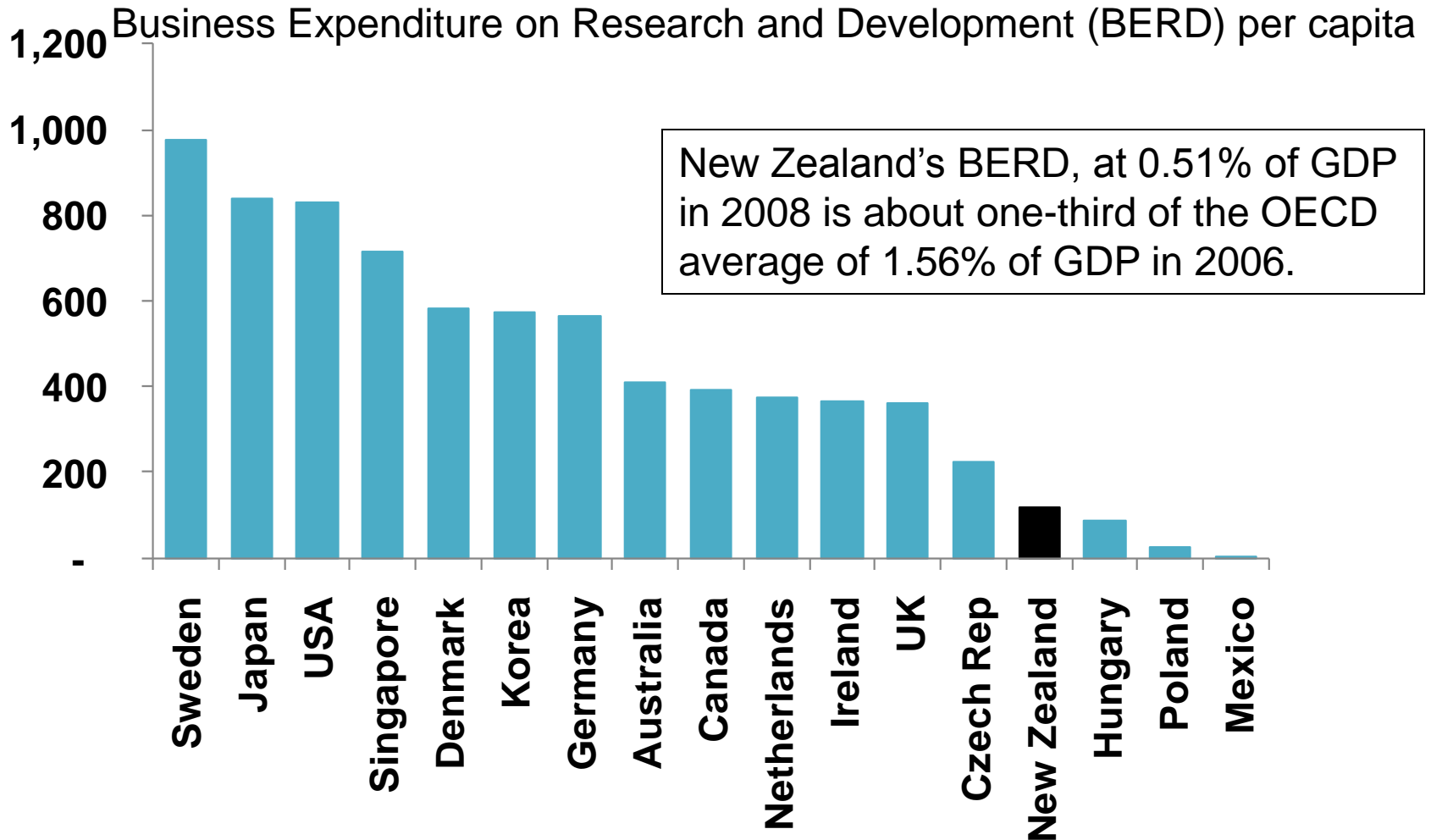
- A simplified typology of how to generate income from research and development activities presents three distinct forms of income
- All three of these means of generating income are used in an effective innovation ecosystem, but a mature and highly productive system will include significant income from business formation

NEW ZEALAND'S GERD EXPENDITURE ON RESEARCH AND DEVELOPMENT IS WELL BELOW THE OECD AVERAGE



Note: Gross Expenditure on Research and Development (GERD). New Zealand, Mexico values are for 1995 and 2005. Australia 2006 only.
 Source: OECD Main Science and Technology Indicators, 2008.

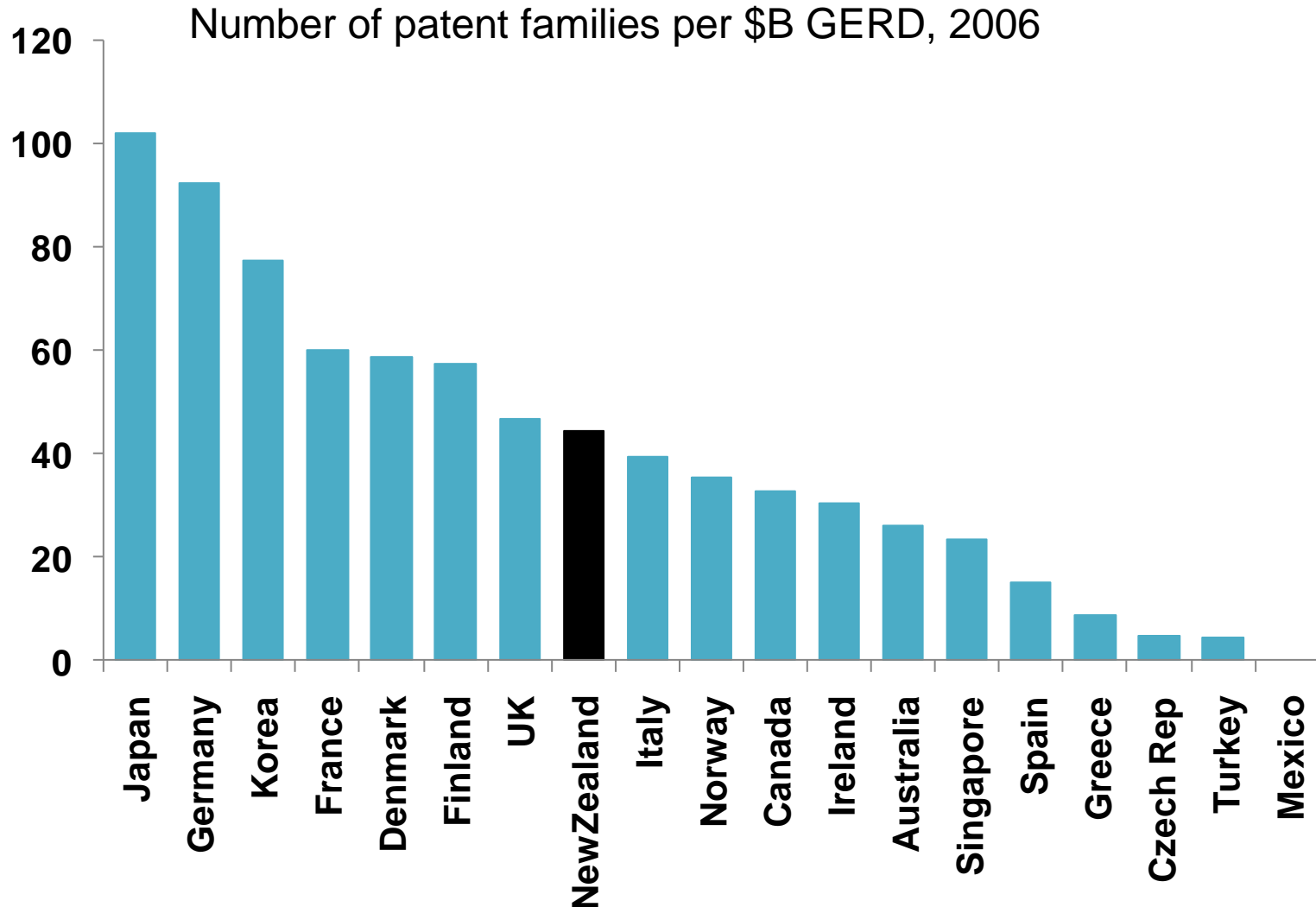
LACK OF BUSINESS INVESTMENT CREATES A SUBSTANTIAL GAP



Note: New Zealand values is for 2005.

Source: OECD Main Science and Technology Indicators, 2008.

OTHER COUNTRIES ACHIEVE MORE WITH EACH GERD DOLLAR



Note: Gross Expenditure on Research and Development (GERD). The OECD tracks patent family unit, which is defined as a set of patents taken in various countries to protect a single invention or discovery. New Zealand value is for 1995.

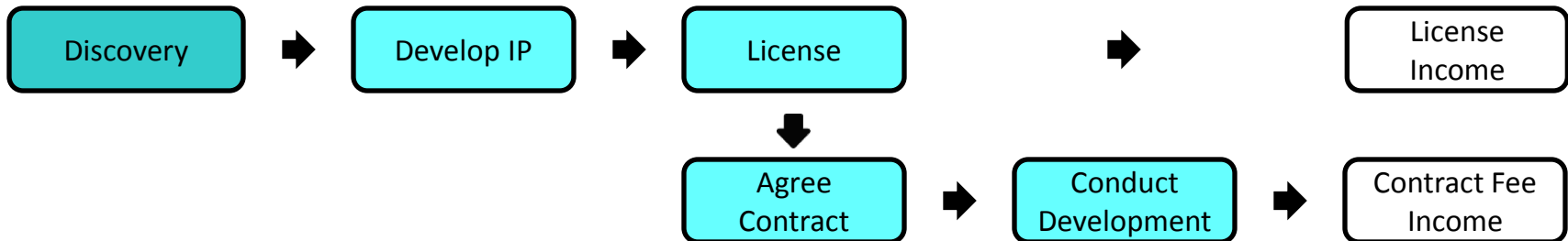
Source: OECD Main Science and Technology Indicators, 2008.

THREE WAYS TO COMMERCIALISE SCIENCE

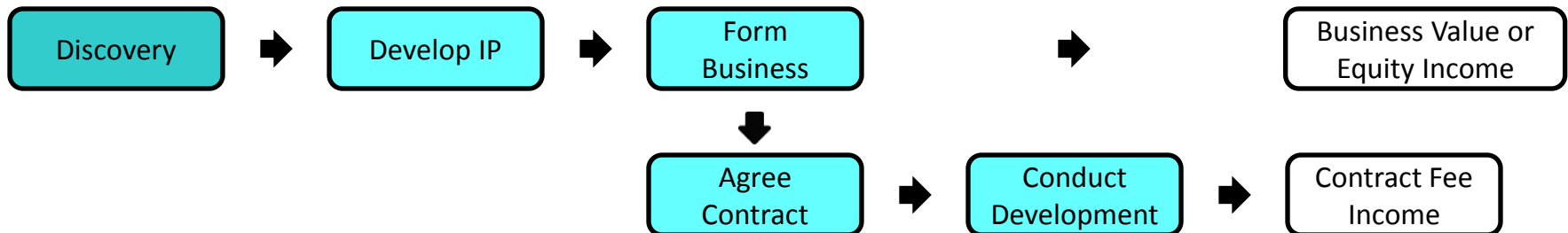
Contract fees for specified research



License fees and (likely) contract fee income



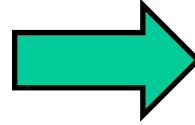
Business formation



BENEFITS DIFFER DEPENDING ON THE TYPE OF INCOME

Research income	Benefits
Contract fees	<ul style="list-style-type: none"> • Quick and relatively low investment cashflow • Supports establishment of larger scale infrastructure • Provides experience
License fees	<ul style="list-style-type: none"> • Capture value from IP without additional investment • Leverage business infrastructure and customer relationships of others
Business formation	<ul style="list-style-type: none"> • Capture greater share of profit • Develop customer relationships • Control over IP application and extension

GO-GLOBAL BUSINESS & INNOVATION ECOSYSTEM CHARACTERISTICS



IMPLICATIONS FOR ECOSYSTEM SUCCESS REQUIREMENTS

- Diverse inputs required
- Many steps from research to international commercial success
- High risk
- Specialised skills required
- Speed is important
- Many opportunity development options
- Increasing returns for the innovation ecosystem

- Each kind of resource must be available in the required quantity, when needed
- Highly skilled talent required
- Important to get product-market strategy right first time
- Strong governance needed with appropriate performance metrics
- Focus effort where critical mass can be achieved
- Invest sufficiently to be world-class

OPPORTUNITIES TO IMPROVE NEW ZEALAND'S INNOVATION ECOSYSTEM – EMERGING CONCLUSIONS

- Evolve towards at-scale research institutes
- Aggregate commercialisation units so all are at-scale
- Ensure effective links between research units and commercialisation units
- Ensure performance incentives for commercialisation units and institutes provide sufficient incentive for go-global business formation
- Ensure sufficient supply of talented people
- Bring stronger voice-of-market to research and to business and offer development
- Increase the availability of capital for expansion
- Develop cultural attributes that will better support innovation ecosystem success

EVOLVE TOWARDS AT-SCALE RESEARCH INSTITUTES

Why?

Larger organisations can better afford and retain world-class leadership

Stronger internal and external networks

More sustainable based on resources to address succession issues and establish positive internal cultures

Can attract and afford more specialist support

How?

Focus where New Zealand can have economic strength

Base where New Zealand already has strength

Connect smaller, related units to access scale

Target >200 people at maturity

Build around or attract world-class leadership

Assess performance via international peer review teams

Fund for long term: 5 – 6 years

Adjust funding based on peer review and potential

Expect institutes to develop revenue streams

AGGREGATE COMMERCIALISATION UNITS SO ALL ARE AT-SCALE

Why?

Diverse range of skills required for success

- Science
- Commercialisation
- Market understanding

Critical mass needed for succession without loss of key skills and relationships

How?

Aggregate units to ensure all are at scale

At-scale means at least 8 – 10 people

Larger units may be better but keep several New Zealand units

Where possible, combine units in related fields to gain benefits from networking and specialisation

ENSURE EFFECTIVE LINKS BETWEEN RESEARCH UNITS AND COMMERCIALISATION UNITS

Why?

Scientists are not often interested in commercialisation, nor do they have the required skills

Further development is usually required before research results can be considered for commercialisation

Relationships between researchers, commercialisation unit staff and potential commercial clients are important for success

Strong relationships provide the foundation for effective networks

How?

Ensure local presence of commercialisation units at research units

Use a hub-and-spoke structure when research units served are not co-located

Ensure sufficient resources to develop commercialisation opportunities with potential

Describe research results in a standard way and make results available more widely

ENSURE PERFORMANCE INCENTIVES PROVIDE SUFFICIENT INCENTIVE FOR GO-GLOBAL BUSINESS FORMATION

Why?

Formal performance measures for commercialisation units emphasise short term revenue and profitability but not long term value creation

Therefore commercialisation units lack incentives to form businesses that would provide returns

Despite this, commercialisation units do form businesses, but they should have explicit incentives to encourage them to develop equity participation opportunities

How?

Ensure commercialisation units are resourced sufficiently

People and funding to identify and develop research results so they are ready for commercialisation

Capital for business formation

Ensure commercialisation units have long term value-growth metrics that encourage the go-global option when it has worthwhile potential

ENSURE SUFFICIENT SUPPLY OF TALENTED PEOPLE – GENERAL SKILLS

Why?

The market does not supply sufficient skilled talent for go-global business because the innovation ecosystem is growing

Entrepreneurship/leadership, international market entry and go-global governance skills are in short supply

Efforts have been made to increase the supply but these have not yet been sufficient to overcome the shortage

How?

Monitor key skills demand and supply via linkages with go-global leaders and agencies and continue to add supply until gap is closed

Review immigration strategy and policy to encourage world-class scientists, entrepreneurs and marketers to move to New Zealand

Systematically connect successful New Zealand based and returning entrepreneurs with networks that can leverage their skills

Expand internship opportunities for science and business students to work in go-global companies

ENSURE SUFFICIENT SUPPLY OF TALENTED PEOPLE – SPECIFIC SKILLS

Skill area	How
Scientist skills	Accelerate the inclusion of business studies opportunities in science courses; subjects and joint degrees
	Provide structured opportunities for scientists to learn business formation, offer development and market entry
Director skills	Establish formal learning opportunities for go-global directors
	Establish a broking activity to connect aspiring go-global directors with companies that need them
Entrepreneur and go-global leader skills	Increase training opportunities for current and aspiring entrepreneurs and go-global business leaders Ensure focus on practical aspects
Marketing and market entry skills	Develop and disseminate understanding of go-global go-to-market strategy
	Establish specialised opportunities for business leaders and marketing and sales professionals to learn about launching new products into new markets

BRING STRONGER VOICE-OF-MARKET TO RESEARCH AND TO BUSINESS AND OFFER DEVELOPMENT

Why?

Understanding market needs is critical for success of go-global ventures

Newly formed ventures usually have limited cash, production-oriented staff, and want to get to market quickly

Many develop their offers without sufficient voice-of-market

The result is the offer does not fit with market needs and the business needs to complete another round of development

How?

Ensure participants in the innovation ecosystem in New Zealand understand the importance of voice-of-market early in research and development

Require governance sign-off that a market opportunity has been identified before committing funds

Research projects with a commercial purpose

Ensure governance of public funding includes input from practitioners bringing the market perspective

Refocus NZTE efforts so international connections are made earlier to guide offer development and channel identification

Build networks with overseas New Zealanders, including via KEA, to allow commercialisation units to extend their voice-of-market reach

Develop for market input and as source of international directors

INCREASE THE AVAILABILITY OF CAPITAL FOR EXPANSION

Why?

New Zealanders have relatively low wealth overall and it is concentrated in housing investments

There is limited supply of expansion capital for go-global ventures

- Equity investors usually limited to a few million dollars maximum
- Debt funding is hard to source given high risk of the sector and security available

The result is that the investment opportunity is not retained in New Zealand

How?

Ensure macroeconomic settings encourage investment in productive assets

Consider further encouraging investment in go-global opportunities

Focus on reducing the losses from failure; the upside is already there

Facilitate expansion of equity investment funds that allow individual investors to invest in the go-global sector

Create opportunities for unskilled passive investors to co-invest with skilled investors who have skin in the game

Encourage financial institutions to offer working capital funding products for expanding businesses

Consider sharing risk if the line-of-business is not viable on a standalone basis

DEVELOP CULTURAL ATTRIBUTES THAT WILL BETTER SUPPORT INNOVATION ECOSYSTEM SUCCESS

Why?

Culture has a powerful effect on economic development

Some New Zealand cultural characteristics impede the success of our go-global companies

- Lack of aspiration and sizzle around entrepreneurship
- Production mindset prevents us from being customer oriented
- Poor preparation and presentation of our proposals
- Independent style preference that inhibits working together and networking

How?

Create excitement around go-global companies and motivate talented people to join the sector

Ensure participants in the innovation ecosystem understand the importance of early voice of market and of marketing, and are encouraged to improve our performance

Renew effort and increase investment in building networks

Emphasise focused commercial introductions, not meet and greet

Expand opportunities for go-global leaders to learn how to develop and present commercial proposals

Test of sufficiency based on skill levels of leaders making their first international foray

REQUIREMENTS FOR INNOVATION ECOSYSTEM STRATEGY SUCCESS

- Ensure the institutional structure provides for a single agency responsible for managing the innovation ecosystem as a whole
- Improve performance and grow the innovation ecosystem
- Pay as much attention to ensuring sufficient resources for commercialisation as to increasing the availability and flow of science that can be commercialised
- Measure and manage the quantity and quality of supply of key inputs, especially skills and capital
- Review innovation ecosystem measurement more generally and ensure appropriate measures are defined, collected and monitored
- Close gaps between desired and actual performance; avoid a ‘tick-the-boxes’ approach
- Deploy a long term strategy, recognise that success will take time and be patient
- Invest sufficiently to move New Zealand, over time, from disadvantaged to at least world class