



Response to Professor Hazledine's Critique on Confidence Effects

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1 Summary

1.1 Background and overview of the arguments

The Castalia Report 2006 argued that visibly stronger transmission infrastructure into Auckland may benefit New Zealand through increasing foreign direct investment (FDI). The linkage postulated was:

1. Large, visible investments in the security of Auckland's electricity supply would improve investor confidence in New Zealand as an investment destination, given existing international concern about energy insecurity and infrastructure deficiencies in New Zealand
2. Greater investor confidence would increase inward FDI.
3. Increased inward FDI would bring substantial returns in terms of GDP and welfare.
4. The size of the increase in FDI from greater investor confidence cannot be estimated. But if a \$100 million increase in welfare was required, then an increase of only \$2.3 million in FDI per year would deliver the required benefits.

1.2 Professor Hazledine's critique

Professor Tim Hazledine was engaged by the Electricity Commission to critically review Castalia's report. Hazledine's report made the following criticisms of the report:

1. Hazledine's report doubted whether indirect effects should be admitted at all.
2. Hazledine's report argued that the evidence and analysis set out in the Castalia report does not support steps 1 to 3 of its arguments above.
 - a. The relationship assumed between FDI and GDP growth is far too high. Hazledine refers to a paper by Carkovic and Levine (2002) and UNCTAD's *Trade and Development Report, 2006*.
 - b. The Castalia Report does not distinguish between greenfields and merger and acquisitions (M&A) FDI.
 - c. The Castalia Report implies that selling Trademe to the Australians for \$700 million would generate, in perpetuity, an additional \$420 million of GDP.

1.3 Castalia's response

If there are large indirect effects to a transmission investment Castalia believes they should be included at some stage in the decision making process. We have not been asked to consider when these benefits should be included, but we are sure that policy and regulatory decision-makers would not want to entirely ignore important benefits when making major investment decisions. See section 5.1 for further explanation.

Hazledine does not provide evidence that Castalia's first two steps are wrong but Castalia does agree that the literature is incomplete on this topic. In the circumstances Castalia believes it is appropriate to present what evidence there is and leave decision-makers to assess the evidence's reliability (section 5.2).

A more thorough survey of the link between FDI and GDP growth indicates a wide range of possible values for the linkage between the two. The 0.6 figure used in the Castalia report is supported by some studies, but we acknowledge that other studies find a weaker link. However, it would be wrong to suggest that the literature shows no impact of GDP on FDI. The key points are that:

- There is research that finds a link after seeking to control for endogeneity. The literature appears to be trending towards a result that FDI is not a panacea for economic growth but is likely to be more effective in host countries with positive characteristics that New Zealand shares. The Carkovic and Levine 2002 study relied on by Hazledine is not the final word on the topic (sections 5.3.1 and 5.3.5)
- Hazledine relies on a quote from an UNCTAD 2006 report to give the impression that there is consensus that FDI does not cause growth. However, the quote is selective and misleading. A complete reading of the passage reveals significant support for the view that FDI can cause growth (section 5.3.2).
- After a more thorough review of the literature, Castalia finds that, depending on the strength of the link between the FDI/GDP ratio and GDP growth, the change in FDI required to generate \$100m in welfare gains may be only \$1.7 million (for a link of 0.8) or \$52.8 million (for a link of 0.026). That this range is large is not surprising. What is clear is that quite plausible levels of FDI response to visibly strong infrastructure can have significant welfare benefits (section 5.3.3).

Hazledine's scepticism about a significant link between FDI and GDP growth on the basis that it implies massive market failures in capital ignores that FDI is believed to create GDP growth by spillover effects, which of course capital markets do not take account of (sections 5.4.1 to 5.4.3). There are also reasons to doubt that greenfields FDI creates all the spillover benefits while merger & acquisitions (M&A) FDI does not create spillovers (section 5.4.4.)

We believe that the example of the Trademe sale is unrepresentative. Of course, FDI projects vary in their scope for spillovers but the literature is assessing the average effect of all types of projects. Hazledine's calculations are wrong because the literature relates to sustained periods of changes in FDI flows, not one-off payments. (section 5.4.5).

Hazledine's report also states, as an aside to his critique of the Castalia Report, that if peak demand appears likely to exceed supply systematically in Auckland then peak pricing will compensate. From the point of view of the overseas investor, this is still an unattractive feature in a prospective host market but more importantly, peak supply constraints can easily become peak-time power **cuts** and it is the unreliability of the system that is of most concern to investors. (section 5.5).

2 Introduction

At the request of Transpower, Castalia prepared a report titled “Foreign Direct Investment Effects” (the Castalia report). This report argued that a new transmission line in Auckland may cause an increase in FDI that would bring benefits to New Zealand. The Castalia report was sent to the Electricity Commission (the Commission). The Commission hired Professor Tim Hazledine to objectively and critically review the Castalia report.

Hazledine prepared a report that criticises several aspects of the Castalia report. However, Castalia believes that Hazledine has not reviewed the full range of literature on FDI and has misunderstood several of the Castalia Report’s arguments.

Consequently Castalia has prepared this paper in response. The structure of the paper is as follows:

- Section 3 summarises the arguments in the Castalia report.
- Section 4 summaries Hazledine’s critique of the Castalia report.
- Section 5 contains Castalia’s response to the critique, including:
 1. Whether indirect effects should be included in the decision-making process
 2. The limitations of academic literature in this area.
 3. A more extensive literature survey than has been previously carried out.
 4. Discussion of the reasons why FDI is regarded as a potentially important source of economic growth.
 5. A discussion of the Trademe example Hazledine introduced and how it may lead to spillover benefits.
- Section 6 concludes Castalia’s response.

3 Relationship between Infrastructure and FDI

In the paper titled “Foreign Direct Investment Effects” prepared by Castalia for Transpower, Castalia argued that infrastructure affects FDI, and FDI affects welfare, in the following way:

- Visibly stronger infrastructure will increase investor confidence, especially the confidence of foreign investors who don’t have a detailed appreciation of infrastructure quality in New Zealand and may be worried by our electricity security of supply.
- This will increase investment, especially foreign direct investment.
- Foreign direct investment has strong growth effects because of all kinds of spillovers and linkages that lead to benefits for the host country beyond those captured by the investor.
- We can’t say how big the FDI effects are, but we can say, given various plausible levels of FDI increase, what the increase in welfare for the country would be.

4 Summary of Hazledine's Criticisms

The Electricity Commission requested Professor Tim Hazledine to objectively and critically review Castalia's paper. Hazledine made the following comments on the paper:

- Hazledine raises the possibility that indirect macroeconomic effects should not be admitted at all, due to the difficulties in estimating them accurately enough. Hazledine considers the rules under which the Commission and the industry operate seem to be drafted so as to rule out such indirect or macro considerations.
- The Castalia Report does not contain convincing evidence that an investment in earlier infrastructure would make a difference.
- The Castalia Report does not offer convincing evidence that specifically the security of electricity supply has been shown to be an active constraint on FDI into developed countries such as New Zealand.
- The Castalia Report does not consider the difference between different types of FDI, for example Hazledine argues that greenfield investments are different to other sorts of FDI investments. Most FDI in New Zealand is buying existing companies, not greenfield investment. The lack of greenfield FDI is a worry, Hazledine says, but it's not clear that non-greenfield FDI would increase because of security of supply improvements, since asset prices of the companies being bought would adjust.
- The relationship Castalia posited between FDI and growth is far too strong, because:
 - It's just not plausible given illustrative (brownfields) FDI examples, such as the purchase of Trademe
 - The studies we relied on were subject to endogeneity problems, and a more recent study which corrects for this problem finds no causal link from FDI to growth
 - Other studies did find a link, but a weaker one, and we did not use these studies
- Transmission scarcity in Auckland will first manifest itself in higher electricity prices in Auckland, prompting a rational allocation of investment away from Auckland
- Castalia should have considered domestic as well as foreign investor confidence effects

5 Castalia's Response to Critique

This section responds to Hazledine's critique of the Castalia paper and discusses:

- Whether indirect effects should be included in making decisions on large transmission assets.
- A more thorough review of the literature than either Castalia or Hazledine have made.
- A discussion of how FDI is expected to contribute to economic growth, including a review of the theoretical arguments and responses to Hazledine's arguments.
- Hazledine's Trademe example.

5.1 Inclusion of Indirect Effects

Hazledine's report argues that indirect effects should not be included in the grid investment test. Castalia considers that:

- There may indeed be reason to conclude that indirect effects are not included in the GIT as currently drafted.
- The Commission is currently considering whether indirect effects should be considered. Hazledine has written a separate paper on that, titled *Confidence Issues Related to the Timing of Transmission Investments* which presents the issues to be considered in including indirect effects. This paper does not come to a clear conclusion, but notes that the ACCC deliberately excludes indirect effects from its rules on assessing the costs and benefits of transmission augmentations, while in New Zealand the Treasury's *Cost Benefit Analysis Primer* states that analysts should consider the impacts across all sectors of the economy.
- Castalia considers that if there is a clearly large and important benefit to the nation from an investment, that benefit needs to be considered at some stage in the national decision-making process. Castalia's report simply tried to estimate the benefit, in the belief that if it is large then there will be a way to consider it in making a decision.

5.2 Limitations of the Literature

Castalia agrees that clear evidence of a link between international investors' perceptions of the security of electricity supply and FDI flows is not available. This specific topic does not appear to have attracted any academic interest. We note that while criticising Castalia's evidence of a link, Hazledine has not provided any academic research refuting the existence of such a link. In an ideal world the Commission would have the time and funds to carry out research of its own; in this world we must rely on already existing research.

Castalia, in its report did cite evidence that:

- Infrastructure quality is an important determinant of FDI location decisions. Examples of this evidence include the Boston Consulting Report finding that infrastructure is of high importance, or Wheeler and Mody's 1992 report into determinants of FDI of foreign firms. While this evidence does not expressly address the security of electricity supply, it is surely likely that investors would be

affected by the security of electricity supply, as they are by the quality of infrastructure generally

- There is reason to believe that there is an international perception that New Zealand has electricity security of supply problems, especially in Auckland. (Examples being John Kay's discussion of Auckland's blackout, Graeme Hunt's reporting of concerns about infrastructure quality in Auckland, and anecdotal evidence from the CEO of the Employers and Manufacturers Association (Northern).

We have not provided definitive evidence of a link between perceptions of the security of the electricity supply and FDI. Hazledine has not refuted what evidence we do supply. The linkage posited strikes Castalia as plausible.

5.3 Literature on the Link between FDI and Growth

Hazledine considers that the most remarkable claim in the Castalia Report is that an additional annual flow of just \$2.3 million in FDI would be worth as much as a \$100 million present value to the NZ economy.

This link followed from:

- An assumption derived from the literature that a 1% increase in the ratio of FDI to GDP causes a 0.6% increase in the growth rate of GDP
- The compounding effects that an initial faster growth rate has on GDP levels in future years, and the leverage created by taking the net present value of the future GDP differentials.

Hazledine's critique did not question the calculation of compounding growth and net present values but strenuously challenged the link posited between FDI and growth, arguing that more likely there was no such link at all. This is the question we address in the next sections.

5.3.1 Literature survey

A summary of the literature on the effect of FDI on growth finds a more complicated picture—certainly not supporting the simple portrait of no relationship. Many studies find a relationship between FDI and economic growth.

Hansen and Rand (2006) find that a 1% increase in the FDI ratio causes a 2.25% increase in the GDP level. Chowdhury & Mavrotas (2006) find an increase in the investment rate by 1% causes a 0.09% increase in the growth rate., Nunnenkamp and Spatz (2004) find the link varies considerably depending on host countries' characteristics, with some poor host countries actually having a negative growth effect from increased FDI.

The picture is brighter for countries with favourable characteristics, but the paper concludes it seems to be much easier to attract FDI than to derive macroeconomic benefits from FDI. Alfaro (2003) finds a coefficient of about 0.1 between FDI and GDP growth, with manufacturing sector investments having a positive effect, while primary sector investments have a negative effect and evidence from the service sector being ambiguous.

Madariaga and Poncet (2006) find a relationship between local FDI and income per capita in Chinese cities. Bung Vu, Gangnes, Noy (2006) finds an impact of FDI on growth using sectoral data for FDI inflows to China and Vietnam, with all the impact coming from manufacturing. Derus (2005) finds in Malaysia that the interaction term between FDI and human capital has an impact on growth. Sánchez-Robles and Bengoa-Calvo 2002 find a

positive relationship in Latin American countries. Also finds that a certain level of social capacity is needed for the host country to benefit. Lia and Liua (2005) find both that FDI and growth have an endogenous relationship but FDI does promote economic growth by itself and also indirectly via interaction terms. Khawar (2005), a paper already cited in the Castalia Report, finds FDI promotes GDP growth. Makki and Somwaru (2004) find that FDI and trade promote economic growth for developing countries. Tondl and Vuksic (2003) find that FDI was paramount for growth for 1995-2000 in Eastern Europe. Reisen & Soto's (2001) findings suggest that developing countries should encourage FDI and portfolio equity inflows. Lall and Narula (2004) discuss the importance of host country characteristics for FDI to be effective. Asheghian (2004) finds a 0.02% effect of FDI on US GDP.

Townsend (2003) finds conflicting results are not accounted for by disparate findings. Eugenio-Martin, Pack and Sinclair (2004) found FDI did not have a positive effect, but the interaction term with human capital did have a small positive impact. Lim (2001) finds that while substantial support exists for positive spillovers from FDI there is no consensus on causality. Lipsey & Sjöholm (2004) consider the main lesson is that the search for universal relationships is futile. Mayer-Foulkes and Nunnenkamp (2005) find that the FDI dimensions for the results are significant have a positive effect on the growth of relative income of fairly advanced host countries, therefore contributing to their convergence to US income levels, while FDI could contribute negatively for middle and low-income countries. Xu (2000) finds technology transfer by US MNEs contributes to their productivity growth in developed countries (DCs) but not in low-income developing countries (LDCs).

The extent to which these papers control for endogeneity is not always clear and time constraints has prevented investigating all of them for that detail.

Papers rejecting a link include Carkovic and Levine (2002) (relied on by Hazledine's report), Edison et al (2002) which look at capital stocks including FDI, and Jensen (2006), which finds any link is quite fragile for transition countries. De Mello (1999) finds mixed evidence depending on the model. Chakraborty and Basu (2002) find (using a structural cointegration) model that in India causality runs from GDP to FDI. Moran, Graham and Blomström (2005) find that FDI does not exert an independent and robust influence on growth once other factors such as trade openness are accounted for. Mencinger (2003) finds a negative link between FDI and GDP growth for eight EU candidate countries.

5.3.2 UNCTAD report and summary of the literature

The literature on the relationship between FDI and GDP is complicated and has not yet reached a consensus, despite the claim in Hazledine's critique. Some papers find a link between FDI and GDP, others do not. The ones that do not may appear to be few in number, but it is not clear to what extent the papers that do find a link are all controlling for endogeneity.

Castalia agrees that the UNCTAD's "Trade and Development Report, 2006" is a fair discussion of recent evidence on the value of FDI for developing countries. However, the quote from the UNCTAD report in Hazledine's critique is highly misleading. The quote implies that the UNCTAD report finds that FDI has very little impact on growth. However, on reading the full report, it becomes apparent that the UNCTAD report is far more in favour of FDI than reported in the Hazledine critique. The fuller section is quoted here, with the parts Hazledine quoted in italics for readers' convenience:

However, *macroeconomic studies on the relationship between FDI and growth have yielded diverging results*, and empirical evidence points to considerable variation in the benefits that host countries actually reap from FDI inflows (UNCTAD, 1999, Part Two;

Moran et al., 2005). According to Kumar (2005: 179–186), *a multitude of recent empirical studies show that knowledge spillovers from FDI have been rare, and in some cases FDI may have the negative effect of crowding out domestic investment*. While the crowding out of the least efficient firms from an industry may not matter if incoming FDI raises average productivity and domestic value added across foreign-owned and domestic firms, crowding out of most of the competitors (and suppliers linked to them) as a result of the overwhelming market power of the incoming TNC may severely compromise the opportunities for favourable effects and externalities. Moreover, there is a tendency for TNC affiliates to acquire the bulk of their inputs from their parent companies or other already associated suppliers, and hence generate few domestic linkages. One study suggests that the effectiveness of FDI depends on the stock of human capital in the host country (Borensztein, De Gregorio and Lee, 1998, the Borensztein et al study). Significant positive effects of FDI on growth have been found in samples of countries with higher skill levels (Xu, 2000).

Other studies have concluded that FDI does not exert an independent and robust influence on growth once other factors such as trade openness are accounted for (Moran et al., 2005). A major problem for empirical research on the contribution of FDI to growth, and thus a reason for the mixed results, may be the difficulty of capturing, in multi-country macroeconomic studies, the different factors that influence the impact of FDI, such as the type of FDI, firm characteristics, as well as host countries' economic conditions and policies. While the evidence for the impact of FDI on income growth is mixed, there are strong indications that high and stable income growth based on high rates of domestic investment attracts FDI.

A varied picture also emerges from studies based on firm-level data (Lipsey and Sjöholm, 2005; Blalock and Gertler, 2005). A number of analyses have concluded that productivity and wages in foreign firms are higher than in domestic firms, and that these have positive spillover effects on domestic firms. Spillovers are found to be highest in sectors where there is vigorous competition, and to be greater when the technological gap between foreign and domestic firms is not too wide. On the other hand, some studies have found that productivity growth in domestic firms is lower than it would have been without the presence of foreign firms, suggesting the absence of positive spillovers. More generally, it is clear that FDI alone cannot provide opportunities for sustained growth unless there is a minimum level of domestic industrial capabilities and the technological capacity necessary to benefit from eventual externalities of TNC activity (Narula and Lall, 2004). (pages 112--113).”

Castalia's findings from the literature echo the UNCTAD report. The connection between FDI and its impact on GDP appears to be highly dependent on the characteristics of the host country. Current GDP per capita levels, human capital, openness to trade, all affect how FDI affects the GDP growth rate. Luckily, New Zealand performs well on all those factors that are identified as being correlated with FDI having a positive impact on the growth rate of GDP. After considering the literature, we think that it is reasonable to assume that FDI would have a positive impact on economic growth in New Zealand.

5.3.3 Range of FDI impact on GDP growth from the literature

The Castalia report relied on the Borensztein et al study's estimate of the link between FDI and GDP. It did this because the Borensztein et al study:

- Appeared to offer the closest match to New Zealand, since it provided a way of conditioning the relation to the stock of human capital. Since New Zealand does has a greater human capital stock than most of the countries covered in the cross-country studies, this seemed important
- Was the basis of the Government's FDI strategy¹
- Is widely cited in the literature, used a relatively extensive dataset, and a variety of econometric techniques, including techniques designed to control for endogeneity in the relationship.

We agree, however, that the relationship found in the Borensztein et al study is toward the top end of the range supported by the literature. Given the potential importance of these indirect effects, and the opportunity we have now had to review the literature more exhaustively, we consider that it is reasonable to use a range of assumptions about the strength of the linkage from FDI to growth.

Table 1 below cites all papers we are aware of that found a link between the FDI/GDP ratio and the growth rate of GDP. The table shows the change in FDI required to produce \$100 million in NPV of welfare, given the relationship found in the study (other assumptions remain the same as in the Castalia Report). The table excludes studies that found a link between FDI and GDP using some other measure (such as FDI stock or GDP levels) as comparing these to figures using the FDI/GDP ratio and growth rate of GDP is difficult.

Table 1: Estimates of FDI's impact on FDI growth

Citation	Data and Type of Study	Link	Implied change in FDI	Possible flaws and other comments	Reliability level
Boston Consulting Group 2001	Literature-based, relied on Borensztein et al 1988	0.8	\$1.7 million	Result may have been reached by applying an 'education level' adjustment into Borensztein et al 1998. Not original research.	Low
Borensztein et al 1988	Panel data from 69 developing countries from 1970 to 1989	0.6	\$2.3 million	Endogeneity. But contrary to what Hazledine implies, did seek control for endogeneity in various ways, including lagging FDI in the estimation, and got similar results.	Medium

¹ Boston Consulting Group, 2001. *Building the future: Using foreign direct investment to help find New Zealand's economic prosperity*. Castalia did not use this report's 0.8 figure as we were not certain how they had derived it, instead we returned to the source information.

Citation	Data and Type of Study	Link	Implied change in FDI	Possible flaws and other comments	Reliability level
Khawar	OLS for the period 1970-1992, from 59 countries.	0.37	\$3.7 million	Endogeneity is a problem. Unlike Borensztein et al, did not restrict the study to looking at flows from OCED countries to LDCs but looked at all FDI flows.	Medium.
Alfaro 2003	FDI by sector over OECD and non-OECD countries from 1981 to 1999.	0.1	\$13.7 million	Finds that manufacturing sector FDI has a positive impact while primary sector FDI has a negative impact.	Low-Medium
Chowdury and Mavrotas 2006	Causality in Chile, Malaysia and Thailand using the Toda-Yamamoto test for causality.	0.09	\$15.3 million	Finds GDP causes FDI in Chile, while the link is bidirectional in Thailand and Malaysia.	Low-Medium
de Mello 1999	Uses panel-data from 1970-1990.	0.026	\$52.8 million	The relationship appears to be insignificant, although the discussion concludes there is a relationship.	Medium
Carkovic and Levine 2002	Uses OLS and panel-data from 72 countries between 1960 and 1995	0	-	Discussed in section 5.3.5.	Medium

Table 1 shows that the increase in FDI caused by an improvement to perceptions about electricity supply in New Zealand that would provide \$100 million in NPV would vary between \$1.7 million and \$52.8 million, depending on the strength of the link. (Of course, if there is no link between FDI and GDP, then increased FDI would not have any economic benefit.)

To put these figures in context, between 2002 and 2006 FDI flows into New Zealand averaged \$2.4 billion per annum (with a minimum of -\$2.7 billion in 2002 and a maximum of \$4.5 billion in 2005). In other words, taking the evidence of the studies reviewed as a

whole, the increase in FDI required to yield a significant welfare benefit is an insignificant fraction of current levels of FDI.

Castalia agrees with Hazledine's point that business confidence effects are likely to apply to domestic investment as well. We only used FDI in the report because of the level of academic research into the question. Therefore any estimates from FDI should only be taken as a *minimum* level of impact. Domestic investment effects would provide additional benefits.

5.3.4 Response to specific criticisms

Hazledine notes that the difficulty with interpreting the coefficient on FDI in GDP growth regressions is endogeneity. Endogeneity is when a variable is caused by something in the system rather than having an independent effect. For example, there is a positive association between years of schooling and wages. But if people with good work habits are both more likely to get more years of schooling and more likely to earn high wages even if they didn't have more schooling, then there is an endogeneity problem. This is important because if it is true it means that increasing the average population's years of schooling would not increase earnings.

In the case of FDI and GDP, FDI may be attracted to countries that are growing quickly and offer lots of opportunities for profitable investments. In that case observers will see high FDI and high GDP growth, but that does not mean that increasing the rate of FDI will cause an increase in GDP growth.

Hazledine's report asserts that the Borensztein et al study was unreliable, because it did not account for this endogeneity problem. In fact, Borensztein et al did seek to correct for endogeneity (section 4.3, page 131-133) by using instrumental variables. An instrumental variable is a variable that is correlated with the variable we are concerned is contaminated by endogeneity, but is uncorrelated with what we are trying to explain. For example, Angrist and Krueger (1991) found an instrumental variable for schooling. In the USA, most states require students to enter school in the calendar year in which they turn six. Those born late in the year are young for their grade. Therefore students are compelled to attend schools for different lengths of time depending on their birthday (which is presumed to be uncorrelated with personal characteristics that affect schooling and wages) Generally students are required to stay in school until their 16th birthdays. They found that men who had less schooling due to these rules almost always earned less than those born later in the year.

The Borensztein et al study used instrumental variables consisting of lagged FDI, log value of total GDP, a log value of area, continental dummies for East Asia and South Asia, and the measures of political stability and quality of institutions. After using these techniques, Borensztein et al concluded there was a strong causal link from FDI to GDP growth.

The Carkovic and Levine paper uses more recent econometrics techniques and does not find a linkage between the FDI ratio and GDP growth. However, this paper is not the final word on FDI and GDP. Later papers that cite Carkovic and use techniques to correct for endogeneity still find a causal link in many cases. For example Chowdhury & Mavrotas (2006) consider Chile, Malaysia and Thailand and find a bi-directional causal link between FDI and economic growth for Malaysia and Thailand, though they also find that GDP causes FDI in the case of Chile. Nunnenkamp and Spatz (2004) find that the link between FDI and subsequent growth is stronger when a host country has favourable characteristics such as GDP per capita, schooling, institutional development or openness to trade. Lia and Liua (2004) find a significant endogenous relationship between FDI and economic growth from the mid-1980s onwards.

5.3.5 Critique of Carkovic-Levine paper

The Carkovic & Levine 2002 paper provides strong evidence that FDI does not exert a robust, independent impact on economic growth when other factors are taken into account. Castalia has no criticism to make of the econometric techniques they use and regrets not finding their work in our earlier literature review.

However Hazledine's report did not mention that the book by Moran *et al* (2005) which the Carkovic & Levine work was in, has another chapter that comes to a different conclusion from Carkovic & Levine. In chapter 9 of the book, Blonigen and Wang find that:

“inappropriate pooling of data from developed and developing countries is responsible for estimating insignificant effects of FDI on per capita GDP growth. When mixing of the different bodies of evidence is avoided, they find that FDI does have a significant impact on per capita growth in less developed countries, in a pattern similar to the one found by Borensztein, De Gregorio and Lee (1998), once a threshold in educational levels has been exceeded.”²

Marc Melitz, in his commentary in the book on the two chapters' contradictory findings argues that they can be reconciled. Melitz notes that Carkovic and Levine only can dismiss links between FDI and growth once they introduce controls for trade openness and domestic financial credit. Melitz argues that:

“the results reported by both Carkovic and Levine and Blonigen and Wang seem to point in the same direction. Joint changes in FDI and trade are significantly correlated with growth – increases in FDI that come along with increases in trade lead to higher rates of increase in host country GDP. Indeed, in this light, Melitz concludes it could actually be argued that Carkovic and Levine provide a new underpinning to the FDI-trade-growth relationship by showing that this correlation is not driven by unobserved country characteristics”.³

Melitz notes that the finding that changes in FDI that are not accompanied by changes in trade may fail to contribute independently to economic growth may be because some countries apply restrictive policies towards FDI. These policies are not likely to be linked with increases in trade.

Clearly a fair reading of the literature, including those works the Hazledine report relied on most heavily, shows a weight of evidence for a casual relationship between FDI and growth. The relationship is complex and hard to quantify, but it is there, and it is probably quite important.

5.4 Foreign Direct Investment

The micro-economic foundations of this econometrically observed relationship are that FDI will increase economic growth through technology spillovers and competition benefits. This section discusses the nature of the benefits, the differences between greenfields and merger & acquisition investments and, why prices cannot catch all the effects.

5.4.1 Technological spillovers

Foreign firms may demonstrate new technologies, provide technological assistance to their local suppliers and customers and train workers who may subsequently move to local firms. Local firms may also learn just by watching.

² Moran, Graham and Blomstrom, “Introduction and Overview”, page 12.

³ Ibid, page 13.

For example, when the Lord of the Rings trilogy was made in New Zealand New Line Cinema hired not only local New Zealand experts in film-making but brought experts around the world to New Zealand. The NZIER published a paper titled *Scoping the Lasting Effects of the Lord of the Rings* (2002)⁴ which found that the New Zealand production-skill base and capacity has been broadened and deepened, and industry capability has been lifted to new levels, especially in terms of managing large and complex production processes, solving problems in complicated technical and creative areas, and enhancing networks with skilled New Zealand technical and production teams.

The NZIER report also found spin-off industries arising from the Lord of the Rings. For example, Weta Physical gained significant skills producing miniatures for use in the production of the film. It then moved on to creating memorabilia associated with the film. This work was recognised and now Weta Physical is collaborating with the group that owns the rights to the Muppet characters.

The Lord of the Rings is of course an exceptional case of investment. However, less dramatic examples can still bring substantial benefits. For example, if an expert chocolate-maker starts operations in New Zealand, perhaps to gain access to New Zealand's dairy production, it can also be expected to create spillover benefits. A chocolate-maker may up-skill New Zealand staff who then may go on to start their own companies. They can bring in new equipment. Their quest for superior ingredients may improve the skills of the New Zealand suppliers. The chocolate-maker may introduce New Zealand staff to contacts in foreign markets.

Hazledine's report argues that FDI is unlikely to have substantial benefits because high figures of the FDI ratio's impact on GDP growth, such as Kawar's 0.37 coefficient, implies a ridiculously high rate of return that, if true, would imply massive failure in the world's long-term capital markets. However, New Line Cinema at most gains very indirectly from the spillover benefits NZIER recognised in its study. Neither New Line Cinema nor any other company would take these spillovers into account in making its investment decisions. It is the strength of such spillover benefits that led the Government to allow tax incentives to the Lord of the Rings venture.

5.4.2 Competition benefits

The competitive pressure from foreign investment may spur local firms to operate more efficiently and introduce new technologies earlier than would otherwise have been the case. For example, Vodafone's entry into New Zealand probably caused Telecom to introduce text messaging earlier than it otherwise would have.

5.4.3 Foreign direct investment and domestic investment

The discussion above focuses on the reasons normally given for policy actions to attract FDI. However, FDI may also increase GDP in the same way that domestic investment does. An investment that improves the productivity of businesses should have an impact on economic growth above that of the gains to the investor regardless of where the investor lives. For example, railways, cars, computers, and cell phones can create benefits for

⁴ Available at http://www.nzier.org.nz/SITE_Default/SITE_Publications/x-files/181.pdf. This scoping study also found various reputation and tourism benefits from the Lord of the Rings that are probably exceptional due to the profile of the movie and cannot be expected from every FDI. Therefore we will not discuss the reputation and tourism benefits further in this section.

customers that increase economic growth regardless of whether it was a foreign or a local firm that supplied the technology. These gains are not special to FDI but would be expected to result from increased FDI.

5.4.4 Greenfields versus M&A/brownfields investment

Greenfields investments are investment in new facilities or the expansion of existing facilities. So for example the Lord of the Rings can be regarded as a greenfields investment.

Mergers and acquisitions (M&A) transfer existing assets from local firms to foreign firms. These may also be referred to as 'brownfields' investments. For example, the purchase of Trademe by an Australian company was an M&A or brownfields investment.

Hazledine's report implies that M&A investments are less likely to cause spillover effects than greenfields FDI.

At a first consideration it is plausible that greenfields FDI would offer more opportunities for spillover effects than M&A. However the Hazledine critique does not quote any research as to whether it does or not.

Our review of the literature found that while there has been considerable research on why firms, when making a foreign investment, would chose to do it by greenfields investments or by M&A, there has very little research as to the impact of the greenfields or M&A on the host country. However, Zemplerová and Jarolím (2001) find that Czech firms with foreign investment from M&A achieve higher, but not statistically significant, growth rates of productivity than greenfield enterprises during the studied period. Karpaty and Merten (2005) find that foreign acquisitions of Swedish firms increase productivity by between 3 and 11 percent, and this starts about three years post acquisition. Foreign ownership also boosts productivity growth. Meyer and Estrin find that many acquisitions of firms by foreign owners actually merge into "greenfields", with the acquiring company replacing significant amounts of equipment.

This research is not clear evidence that M&A FDI does contribute as much to economic growth as greenfields investment does. However, it does imply that M&A FDI brings benefits to a country. There are many ways in which M&A FDI may improve productivity, from replacing equipment to giving New Zealand staff access to wider skill sets and knowledge bases.

For example, imagine that a New Zealand merino producer is brought by foreigners from the fashion industry. The foreigners may bring valuable information about how to turn merino wool into fashionable fabrics that appeal to overseas designers, and may bring valuable market contacts. People working in the New Zealand company can be expected to gain from this information. The company's New Zealand competitors may also benefit, learning to emulate the foreign investor's marketing approach.

To summarise, while it appears plausible at first that greenfields investments are more likely to produce spillover benefits than M&A, in practice the differences between them are not so clear.

Hazledine's report also argues that any M&A investments in Auckland would only be affected by security of supply concerns to the extent of adjusting the price of the company. Therefore concerns about security of supply in Auckland would only reduce greenfields FDI. This argument does not take account of Castalia's focus on international investors' *perceptions* of New Zealand. If an international investor—rightly or wrongly—believes that Auckland's security of electricity supply is risky then they may not offer a price sufficient for the owner to sell, and therefore the productivity gains will be missed.

5.4.5 Trademe example

Hazledine's report introduced the example of Trademe's sale to the Australians. At this stage it is probably worthwhile considering the example again in light of the evidence presented in section 5.

Hazledine's report stated that Castalia's figure of 0.6 implies that the recent \$700 million Australian purchase of Trademe would generate, in perpetuity, an additional \$420 million of annual GDP, with a present value of \$6 billion. This does sound implausibly large for an almost instantaneous investment.

The first point to make in response is that the estimates of the relationship between FDI and GDP growth are at a national level and average over all investments. At a micro-level, the spillover benefits to any particular investment will vary considerably. We don't believe that the Trademe example is representative.

Quantitatively, the Hazledine report neglects the fact that the figure of 0.6 is clearly for a **sustained** increase in the FDI-to-GDP ratio. The literature relates to sustained periods of increased FDI activity and it is not appropriate to extrapolate the model backwards to a single one-off payment. The formula used in our original paper could have alerted Hazledine to this potential error. As the length of the period of enhanced FDI flows is reduced from the five years modelled to very small fractions of one year for a single one-off payment, the required FDI amount becomes very large (for the \$100m spillover gain).

5.5 Prices and demand-supply imbalances

At the end of his report, Hazledine raises the possibility that remote foreign investors would not be too concerned about inadequate transmission because they would be confident that peak pricing would moderate demand at peak times and preserve security of supply. This approach appears to suggest that inadequate transmission causes no material inconvenience to industry.

In our view the prospect of being priced out of the market at peak times is almost as unattractive to investors as power cuts, but even with extensive peak pricing, the possibility of unexpected outages remains.

The reason is that not all risks of demand-supply imbalances can be adjusted by prices. Sometimes, particularly over short periods, prices may not be able to rise enough to cause demand to drop. For example, imagine a sudden change to cold weather in Auckland in a period in which demand is normally high. If the lines leading into Auckland are already nearly at maximum flows, they may reach maximum flows within a ½ hour pricing period, giving no scope for prices to rise to respond until the ½ hour period is over. In other words, peak pricing is not a substitute for security of supply.

6 Conclusion

The Hazledine critique of Castalia's argument covered three different points:

1. Castalia did not provide sufficient evidence that a decision to build visibly strong transmission infrastructure now rather than later would increase investor confidence
2. Castalia did not establish that insecurity about energy supply is a factor limiting inward FDI to New Zealand or other developed economies.
3. Castalia did not establish an empirically robust link between increased FDI and an increase in the welfare of New Zealanders.

Clearly there is no definitive evidence for points 1 or 2. This is due to a lack of specific research on the topic. However, in the absence of specific evidence, Castalia found indirect evidence that supports this view. The Hazledine critique did not provide any evidence to refute it. Our approach is to let the reader decide on what relationship seems reasonable between visibly strong infrastructure and increased business confidence and investment.

Our approach is to provide the reader with a kind of ready-reckoner. For any given link between strong transmission and increased investment, what would the welfare effect be? Or, to put it another way, how strong a link would it take to yield \$100 million in additional welfare for New Zealanders? This calculation hinges on the relationship between FDI and GDP growth, which was the third major criticism of the Castalia report.

Hazledine's arguments on point 3 are not persuasive. While Castalia's initial figure for the impact of the FDI ratio on GDP growth appears, after a more thorough review of the literature, to be at the high end, the arguments that there is no link depend on one study and selective reporting of a UNCTAD report.

Castalia has re-estimated the relationship for a range of figures for the impact of the FDI ratio on GDP growth. The FDI change ranges between \$1.7 million (for a link of 0.8) to \$52.8 million (for a link of 0.026). Average FDI flows into New Zealand between 2002 and 2006 were \$2.4 billion per annum. From the range of studies, the increase in FDI required to yield a significant welfare benefit is small compared to the current levels of FDI.

Castalia has provided plausible reasons to believe:

1. There are perceptions that the electricity supply into Auckland is insecure.
2. Infrastructure quality is a concern for international investors.
3. FDI may well cause an increase in economic growth for countries with the right institutions.

Castalia believes it is important for readers to determine for themselves whether the differences between the two transmission options would be enough to cause a difference in the level of FDI.

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⁵ <http://www.oru.se/oru-upload/Institutioner/Ekonomi%20statistik%20och%20informatik/Dokument/Forskning/Nationalekonomi/ThesisPK.pdf>

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