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Experience

2013-23 Ross School of Business, The University of Michigan (Lecturer in Finance)
2008 Ross School of Business, The University of Michigan (Visiting Assistant Professor in Finance)
2017-23 Cardinal Economics and Finance (Owner)
2020-23 Hamilton12 (Co-Founder)
2015-18 Frontier Economics (Director)
2000-14 SFG Consulting (Director)
2000-12 University of Queensland Business School, The University of Queensland (Senior Lecturer)
1997-99 Credit Suisse First Boston (Equities analyst)

Education

2005 PhD in finance from The University of Queensland
2003 Chartered Financial Analyst designation by the CFA Institute
1996 Bachelor of Commerce with First Class Honours from The University of Queensland

Research

Journal articles

Sampling error and the joint estimation of imputation credit value and cash dividend value, with Damien Cannavan and Stephen Gray, *Accounting and Finance*, 2023, 63, 1029–1068, first published 6 February 2022, <https://doi.org/10.1111/acfi.12922>.

The public private partnership valuation paradox, with Stephen Gray, Grant Pollard and Damien Cannavan, *Accounting Research Journal*, 2021, 34 (6), 546 – 579.

Impact of sector versus security choice on equity portfolios, with Ben McVicar, *Applied Financial Economics*, 2013, 23 (12), 991 – 1004.

Unconstrained estimates of the equity risk premium, with Stephen Gray, Tristan Fitzgerald and Ravi Jeyaraj, *Review of Accounting Studies*, 2013, 18 (2), 560 – 639.

Market risk exposure of merger arbitrage in Australia, with Matthew Pinnuck and Matthew Thorne, *Accounting and Finance*, 2013, 53 (1), 185 – 215.

The value of imputation credits on hybrid securities, with Clinton Feuerherdt and Stephen Gray, *International Review of Finance*, 2010, 10 (3), 365 – 401.

Forecast accuracy and stock recommendations, with Paul Tacon, *Journal of Contemporary Accounting and Economics*, 2010, 6 (1), 18 – 33.

Speculation and e-commerce: The long and the short of IT, with Colin Ferguson, Matthew Pinnuck and Frank Finn, *International Journal of Accounting Information Systems*, 2010, 11 (2), 79 – 104.

Bias, stability and predictive ability in the measurement of systematic risk, with Stephen Gray, Drew Klease and Alan McCrystal, *Accounting Research Journal*, 2009, 22 (3), 220 – 236.

Leveraged superannuation, with Peter Dunn and Scott Francis, *Accounting and Finance*, 2009, 49 (3), 505 – 529.

Persistence in growth versus market expectations, with Matthew Tochterman, *Australian Journal of Management*, 2008, 33 (1), 169 – 199.

Relationship between franking credits and the market risk premium: A reply, with Stephen Gray, *Accounting and Finance*, 2008, 48 (1), 133 – 142.

Comment on ‘Regulation and the term of the risk free rate: Implications of corporate debt’, *Accounting Research Journal*, 2007, 20 (2), 81 – 86.

Valuation of mining projects using option pricing techniques, with Shannon Nicholls, *JASSA*, 2007, Issue 4 (Summer), 22 – 29.

Relationship between franking credits and the market risk premium, with Stephen Gray, *Accounting and Finance*, 2006, 46 (3), 405 – 428.

Electronic commerce investments, the resource-based view of the firm, and firm market value, with Colin Ferguson and Frank Finn, *International Journal of Accounting Information Systems*, 2005, 6 (1), 5 – 29.

Auditor conservatism and voluntary disclosure: Evidence from the Year 2000 systems issue, with Peter Clarkson and Colin Ferguson, *Accounting and Finance*, 2003, 43 (1), 21 – 40.

Presentations

Accounting and Finance Association of Australia and New Zealand Conference (5) 2005, 2007, 2009-10, 2012

Asian Finance Association Conference 2009

Asset Allocation and Performance Management Conference, presented by IBR Conferences 2022

Australasian Finance and Banking Conference (3) 2008, 2010, 2017

Australian National University Seminar Series 2012

Coal Trade, hosted by AIC Worldwide 1999

Coaltrans Asia, hosted by Coaltrans Conference Limited 1999

Contemporary Accounting Research/Journal of Contemporary Accounting and Economics Joint Symposium 2009

CPA Mining and Energy Conference 2006

Financial Management Association 2012

First Annual Private Equity Conference, hosted by Television Education Network 2007

JBWere Family Business Conference 2010

Licensing Executives Society of the U.S.A. and Canada 2018

Melbourne Centre for Consumer Finance Investment & Regulatory Symposium 2008

PhD Conference in Economics and Business, hosted by University of Western Australia 2003

Southern Finance Association 2012

University of Melbourne Seminar Series (2) 2005, 2010

University of Queensland Seminar Series 2008

Referee activity

Accounting and Finance (8 reviews) 2003, 2005, 2009-13

Accounting Research Journal (3 reviews) 2002, 2006, 2010

Applied Financial Economics (3 reviews) 2012-13

Australian Journal of Management 2012

Contemporary Economic Policy 2011

European Financial Management 2014

Financial Review 2013

International Journal of Emerging Markets 2013

International Review of Finance 2012

MIS Quarterly 2003

Quarterly Journal of Finance and Accounting 2010

Quarterly Review of Economics and Finance (2 reviews) 2012, 2015

Research grants

PricewaterhouseCoopers/Accounting and Finance Association of Australia and New Zealand 2006: Returns, tax and volatility – Superannuation choice with a complete information set (\$8,500)

Australian Research Council Discovery Grant 2002-4: Quantification issues in corporate valuation, the cost of capital and optimal capital structure (\$126,000)

UQ New Staff Research Start-up Fund: The competitive advantage of investments in electronic commerce (\$10,000)

Research students

PhD (1 student)

2012 – Paul Tacon

Honours (20 students)

2012 – Edward Parslow (Carnegie Wylie)

2011 – James Lamb (Port Jackson Partners)

2010 – Jeremy Evans (JP Morgan), Sarah Thorne (JP Morgan), Alexandra Dwyer (Reserve Bank of Australia)

2009 – Tristan Fitzgerald (UNSW), David Costello (National Australia Bank), William Toe (Ernst & Young)

2008 – Ben McVicar (Credit Suisse), Matthew Thorne (Credit Suisse)

2007 – Sam Turner (ABN Amro Morgans)

2006 – Paul Tacon (PhD, UQ), Ravi Jeyaraj (Navis Capital), Thomas Green (Crescent Capital), Alexander Pascal-Bossy (Macquarie)

2005 – Angela Gill (Wilson HTM), Andrew Wagner (Macquarie)

2004 – Matthew Tochtermann (M. Fin. Eng., UC Berkeley), Justyna Lewandowska (JP Morgan), An Pham (UBS)

Masters (2 students)

2003 – Scott Francis (A Clear Direction Financial Planning), Hernando Barrero (PricewaterhouseCoopers)

PhD reader

Damien Cannavan 2012

Teaching

Ross School of Business, The University of Michigan

Awarded the Neary Teaching Excellence Award for the Weekend MBA program 2020

Corporate Investment Decisions (2014-22; BBA students)

Financial Management (2016-23; BBA students)

Valuation (2014-2015, 2017-22; MBA students)

Big Data in Finance (2020-22; BBA students)

Options and Futures in Financial Decision-Making (2022-23; BBA students)

Artificial Intelligence and Machine Learning in Investment Strategies (2023; BBA students)

Financial Derivatives in Corporate Finance (2019-22; MBA students)

Corporate Financing Decisions (2015; BBA students)

Corporate Financial Policy (2008; MBA students)

UQ Business School, The University of Queensland

Awarded undergraduate teaching prize 2009

Empirical Finance Honours (2009-12; PhD and Honours students)

Corporate Finance Honours (2005 & 2011; PhD and Honours students)

Investments & Portfolio Management (2002-7, 2009-10 & 2012; B.Com, MBA & M.Com students)

Corporate Finance (2002-4, 2006-10 & 2012; B.Com, MBA and M.Com students)

Finance (2005-6; M.Com students)

Corporate Finance and Investments (Mt Eliza Business School, Beijing 2003; MBA students)

Technology Valuation and Project Evaluation (Singapore 2004; Masters of Technology Management students)

Auditing (Summer 2000/1-2001/2; B.Com, MBA and M.Com students)

Executive education

Presentation to the Michigan State Bar on behalf of the Institute of Continuing Legal Education (2018)

Risk Management and Financial Analysis (Rabobank 2000-10)

Financial Analysis of Innovative Investments (UQ Business School 2007)

Credit Analysis (Queensland Treasury Corporation 2005)

Capital Management (UQ Business School 2004)

Making Critical Financial Decisions (UQ Business School 2003)

Business Valuation and Analysis (UQ Business School 2003)

Cost of Capital Estimation (UQ Business School 2003)

Analysis of Real Options (Queensland Treasury 2003)

Student competitions

CFA Institute Research Challenge hosted by the CFA Society of Western Michigan

Faculty advisor for the team from The University of Michigan in 2020-2023.

Industry mentor for the teams from Western Michigan University and Calvin College in 2019.

Rotman International Trading Competition

Manager of the UQ Business School trading team (2007 & 2009-12) which competes annually at the University of Toronto amongst 50 teams. UQ is the 9th most successful entrant from 66 schools which have competed in any of the same years, finishing 3rd in 2010, 6th in 2007, 11th in 2009, 14th in 2011 and 18th in 2012.

University of Michigan Ross School of Business Alternative Investments Club

Judge for the competitions held in winter 2017 and 2018.

UBS Investment Banking Competition

Judge for the UQ section 2006-7 & 2009-12. Faculty representative at the national section 2008.

JP Morgan Deal Competition

Judge for the UQ section 2007-8.

Wilson HTM Research Report Competition

Delivered two workshops as part of the 2006 competition and was one of three judges.

Portfolio management

I am the co-founder of Hamilton12, a start-up investment strategy firm, which in 2020 launched the Hamilton12 Australian Diversified Yield Index. This custom index, calculated by Standard and Poor's, contains 100 Australian-listed stocks (rebalanced 6 times per year) selected to generate high after-tax returns to Australian pension funds, charities, foundations and endowments. In 2022 Hamilton12 opened the Australian Shares Income Fund, an Australian unit trust for wholesale investors. The broader goal of the company is to implement a suite of investment ideas using a systematic, rules-based approach.

Consulting

From 2000-23, I have provided consulting services as a director of SFG Consulting, Frontier Economics (from November 2014 to 2018) and Cardinal Economics and Finance (from 2017 to 2023). A selection of projects in which I had a substantial role is listed below. Projects are grouped according to valuation, litigation support, risk & return, and regulation.

Valuation

Valuation of equity interests in highly leveraged investments in property (Confidential clients, 2021).

The client owns the equity interest in highly leveraged property assets, leased to the General Services Administration. The property is offices used by the FBI, National Archives and Records Administration (NARA) and the Social Security Administration (SSA). I valued the equity interest using option pricing analysis, in which the equity has value if the value of the asset at the end of the lease term is above the amount required to repay the debt. This involved determination of an asset with comparable risk and return prospects (proxied by corporate debt on listed real estate trusts) and simulation of potential payoffs on the asset, and discounting to present value.

Valuation of the common stock in an early-stage U.S. private company in the insurance industry (Confidential client, 2021)

The client has an equity interest in a private insurance company, funded by two different preferences shares, common stock and employee stock options. The company will need cash injections over the course of several years in order to grow prior to becoming profitable. My valuation of common stock included consideration of cash flow projections as the company becomes a mature insurance company, consideration of the specific terms associated with preference shares and the impact of issuing additional capital at a discount to fair value.

Valuation of the carried interest in a private equity fund (Confidential client, 2021)

The client had exposure to the carried interest in a potential future private equity fund. There was no guarantee that the fund would come to fruition. I valued the exposure to the carried interest in the private equity fund, which included consideration of the probability of raising capital and the distribution of possible payoffs at the end of the fund life.

Valuation of the ordinary shares in Toast Inc. prior to its listing on the New York Stock Exchange (Confidential client, 2021)

The client owned shares in the then private company, Toast Inc. I valued the equity interest in Toast after accounting for an initial asset value based upon prior capital raising, and an estimate of the volatility of other early-stage companies. The valuation approach relied upon an option pricing framework.

Valuation of a mining project using real options analysis (Confidential client, 2019)

The client owns a mining project in Australia that requires investment of around US\$500 million to US\$1,000 million. The project has multiple, alternative development sites and transport options, whose technical viability is uncertain, and there is uncertainty over whether environmental approval will be given by the state government. We advised the client on project value using a real options framework. We modelled the probability of different outcomes for technical success and environmental approval, and different outcomes for capital expenditure. This allowed us to make definitive statements on the value from a staged approach to investment, which keeps alternative pathways open as long as possible. A key issue is that a low cost approach can also be a risky approach, because low cost typically comes from economies of scale resulting from a large up-front capital commitment. The modelling allowed the company to quantify this risk-return trade-off.

Valuation of a metallurgical coal mine using real options analysis (Corsa Coal, 2017)

Corsa Coal is a coal mining company located in Pennsylvania, USA, and listed on the Toronto Stock Exchange. We were engaged to perform a real options valuation of a coal mine. Real options analysis was applicable to the project because cash costs of production are close to long run average coal prices. This means that at high coal prices an operating mine would generate positive cash flows and at low coal prices an operating mine would generate negative cash flows. This means that the option to shut down and re-state production is valuable. The option does come at a cost, however, because there is a cash outflow associated with a mine being idled and a cost associated with re-starting production.

Valuation of medical devices and pharmaceutical products using real options analysis (Licensing Executives Society (U.S.A. and Canada), Inc. 2017)

R&D into medical devices and drugs proceeds along multiple stages at which valuable information is generated. The information gleaned at each stage leads to substantial changes in project value. Value increases dramatically following a successful clinical trial and can collapse in the event of failure. This means that investments are risky bets, but risk in valuation is often overstated leading to valuations that are too low. Why? Because the analyst treats the large dispersion in payoffs in the same manner, regardless of the degree of flexibility in the project. The more the executive has the ability to change the nature of the project in response to new information, the lower the risk of the project. So for an irreversible investment, like a toll bridge, dispersion in payoffs is simply a risk which lowers project value. But for a project with embedded options, dispersion in payoffs increases value because the owner of the R&D benefits from the upside potential without the downside exposure. We cannot account for projects with embedded options by performing a typical scenario-based present value analysis. This won't help us work out the expected cash flows from the project (which are different from the cash flows in any one scenario) and won't help us account for the risk reduction associated with embedded options. However, we can value projects with embedded options using binomial trees which fully account for expected cash flows and risk reduction. For our example R&D project, an otherwise unattractive investment became valuable once we accounted for the fact that we only commit to further R&D expenditure upon success at intermediate stages.

Advice on royalty rates (Dayco, 2016)

Dayco is a privately owned firm involved in the research, design, manufacture and distribution of engine products and drive systems. We were engaged to provide advice on appropriate royalty rates for trademarks in the auto parts industry, for both original equipment manufacturers and aftermarket products.

Real options valuation of a copper and gold project (PanAust, 2016)

PanAust is a copper and gold mining company based in Brisbane, Australia, and owned by Guandong Rising Assets Management, a Chinese state-owned investment company. PanAust has an 80% interest in the Frieda River copper & gold project in Papua New Guinea. The remaining 20% interest in the project is owned by Highlands Pacific, a company incorporated in Papua New Guinea and listed on the Australian Securities Exchange. Our task was to provide a real options valuation of the project. This involved analysis of project value under alternative copper price assumptions and the exercise of options to expand production and extend the mine life. As intermediate steps, we quantified the mean-reversion of commodity price indices and the copper price, and estimated the break-even copper price that would determine whether an expansion or extension was economically viable. Our report was incorporated into the feasibility study which formed the basis for an application to the Government of Papua New Guinea for a special mining lease.

Trademark valuation (PILA Group, 2016)

PILA Group acquired ACE Flagpoles in 2014. We were engaged by PILA Group to provide an independent valuation of the ACE Flagpoles trademark. The valuation was required in order for PILA Group to acquire the trademark from the Australian Securities & Investments Commission. We performed our valuation by allocating goodwill from the transaction into components relating to customer recognition and business efficiency.

Valuation of intangible assets and management performance shares (Collins Foods 2006-11, 2015)

Collins Foods Limited is the operator of KFC restaurants in Queensland, Western Australia and the Northern Territory, and Sizzler restaurants in Australia and Asia. In 2015, I provided advice in relation to the valuation of the Sizzler Asia operation and the performance shares issued to executives, which vest according to earnings per share (EPS) growth achieved over a three year period. This follows on from valuations we performed on Collins Foods ordinary shares and tracking stock over the period from 2006 to 2011 when the company was privately held.

Analysis of risk, expected return and performance of an investment portfolio (Friday Investments 2010 to 2013)

Friday Investments provides portfolio management advice to high net wealth individuals and families in Brisbane. From 2010 to 2013 I acted as part of a team to perform analysis of a portfolio on a half-yearly basis, benchmarking the performance of the portfolio against a weighted index of listed shares, debt and property investments.

Analysis of risk, expected return and performance of an investment portfolio (Zupp Property Group 2012)

Zupp Property Group is an investor and lessor in property located in South East Queensland. Its board comprises members of the Zupp family, which built a large, successful network of property dealerships now owned by the listed company Automotive Holdings Group. In 2012 we analysed the risks and expected returns of alternative portfolios with different allocations to listed and unlisted equity, debt and property investments.

Valuation of an early stage oil and gas project (Senex Energy 2012)

Senex Energy Limited is an oil and gas producer and explorer with assets in Queensland and Western Australia. We were engaged by Senex to assist in its valuation of an early stage gas development. This was a multi-stage development with significant uncertainty over whether each stage would be successful. Hence, we developed a binomial tree valuation framework, which accounted for the probability of success at each stage. We determined a

value for the project, conditional upon success at each stage of development, which allowed us to estimate project value in 2012.

Valuation of shares and executive stock options (Groundprobe (2008-2009))

Groundprobe is a privately owned mining services company, operating in 23 countries, that uses radar technology to monitor the stability of mines. From 2008 to 2009, I acted as part of a team to value shares and executive stock options in Groundprobe, in order for the company to meet its reporting requirements under accounting standards.

Valuation of ordinary shares (Auscript 2007-2008)

Auscript is a privately owned recording and transcription company which provides services to courts, legal firms, corporations, government entities and law enforcement agencies. To help the company develop its employee share plan, we perform a valuation of ordinary shares which accounted for the illiquidity of the shares, potential dilution associated with future share issues, and the valuation discount that employees place on share based compensation relative to cash.

Valuation of mining rights and development agreements (Chalco Australia 2007)

The Aluminium Corporation of China (Chalco) is an alumina and aluminium producer. Its NYSE-listed shares have market value of US\$9 billion and the company has assets of US\$33 billion. We estimated the value of rights and obligations under mining development agreements signed with the Queensland government, and the value of drilling samples versus the value of the analysis resulting from those drilling samples. The analysis was conducted as part of Chalco's evaluation of a potential bauxite mine and alumina refining operation in Queensland.

Valuation of intangible assets (Inbartec 2007)

Inbartec Limited was a privately held company in Australia that developed and owned the rights to technology for wine closures that mitigated deficiencies associated with cork (contamination) and synthetic closures (which do not allow the wine to breathe). Technology developed by Inbartec is now used in ProCork wine closures. Prior to the company issuing an information memorandum to raise additional equity, we assisted the company to perform a directors' valuation of the technology. We performed analysis of projected production targets, royalty rates, and discount rates in performing the valuation, and liaised with auditors subsequent to the analysis being performed.

Valuation of an exploration lease (Bank of Queensland 2007)

Bank of Queensland is a regional bank listed in the Australian Securities Exchange with net interest income of \$1 billion and market capitalisation of \$4 billion. We valued an exploration lease held by a mining company in financial distress. Our analysis was presented to the bank, and the bank's legal and accounting advisors.

Valuation of a pharmaceutical company (Venture capital fund 2007)

An Australian venture capital firm required an independent valuation of a proposed acquisition target. The target was a biotechnology company with a research and development portfolio comprised of four programs. I acted as part of a team to estimate the present value of expected future cash flows of each research program under the assumption that the target would pursue a deal with a large pharmaceutical company in order to progress these programs to market. Hence, the anticipated cash flows were milestone payments, conditional upon progression to various stages of development, and payments conditional upon meeting sales targets. To estimate the value of the target, we estimated the present value of expected cash flows, incorporating the probability the cash flows would be received. This valuation approach implicitly accounted for the option to abandon a research program at any stage. In assigning the probability of success and the estimated time to registration, we justified the use of probabilities that differed from published estimates to account for the upward bias in reported estimates of the probability of success, due to under-reporting of unsuccessful drugs. We used finance theory and evidence to justify the use of an additional 25% discount to the deal-based valuation in relation to three of the four research streams. This accounts for outside investors placing lower values of projects than managers in complex firms because of information asymmetry.

Litigation support

Appeal against the Australian Energy Regulator's allowed return on equity for energy networks (Energy networks 2014-2016)

In December 2014 the Australian Energy Regulator (AER) released a set of draft determinations for electricity and gas networks. This was the first set of draft determinations since the publication of the AER's rate of return guidelines in December 2013. It was also the first set of draft determinations since the publication of new rules by the Australian Energy Market Commission (AEMC). From April 2015 to June 2015 the AER released its final determinations for the respective networks. Appeals were made to the Australian Competition Tribunal (the Tribunal) by Ausgrid, ActewAGL Distribution, Endeavour Energy, Essential Energy and Jemena Gas Networks. The appeals were heard by the Tribunal in September 2015 to October 2015. I co-authored a series of expert reports addressing almost all aspects of the regulated rate of return. The reports related to (1) estimation of the cost of equity using the Black Capital Asset Pricing Model (CAPM), (2) interpretation of empirical evidence on the beta estimate for use in the Sharpe-Lintner CAPM, (3) the merits of estimating the cost of equity using the Fama-French model, (4) the application of the

dividend discount model for estimating the cost of equity, both at the firm and market levels, (5) the distinction between the redemption rate and the market value of imputation credits, and (6) the manner in which the AER has evaluated evidence in reaching conclusions on the allowed return on equity. The reports were commissioned by Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, APA, Ausgrid, Ausnet Services, CitiPower, Endeavour, Energex, Ergon, Essential Energy, Powercor, SA PowerNetworks and United Energy. The Tribunal did not overturn the AER's decision on the allowed return. The Tribunal agreed that evidence on the allowed return on equity could lead to a different conclusion than that reached by the AER, but the Tribunal did not consider the AER's final decision to be an unreasonable exercise of discretion.

Utilities' asymmetric risk exposure to market returns (Icon Water 2015)

In 2014 the Industry Panel of the Australian Capital Territory (the panel) made a draft determination in relation to Icon Water. The panel made substantial changes to the regulated rate of return for Icon Water set by the Independent Competition and Regulatory Commission (the ICRC). We were asked by Icon Water to assist in responding to the panel's draft determination, by providing a letter addressed to the panel. We were asked to address whether assets with an asymmetric exposure to market returns (that is, high market exposure during periods of low market returns and low market exposure during periods of high market returns) have a higher cost of equity than assets with symmetric market exposure. There is evidence that U.S.-listed utilities exhibit an asymmetric exposure to market risk. This implies that the cost of capital for utilities would be higher than we would observe if the market exposure was symmetric. Our letter outlined the reasons why asymmetric exposure to market returns leads to a higher required return for equity holders, and stated that Icon Water's view is consistent with the evidence from U.S. returns for utilities.

Valuation of ordinary shares in a privately held mining company (2012)

We were retained to by lawyers acting for a privately held mining company to estimate market values of shares at different points in time. We performed our valuation on the basis of share prices for comparable listed companies, after applying valuation discounts for the illiquidity and size of the private company in question.

Expert evidence relating to regulated rates of return (Electricity network businesses 2011)

In April 2011 the Australian Competition Tribunal heard an appeal by electricity networks on the regulated rate of return set by the Australian Energy Regulator. The issue was the value of dividend imputation tax credits. The Tribunal directed us to perform a dividend drop-off study to estimate the value of a distributed credit. Largely on the basis of our evidence the Tribunal determined that an appropriate value for a distributed credit was 35 per cent of face value. The Tribunal determination is available on its website and our expert report is available on request.

Litigation support relating to asset valuation (Alcan 2006-7)

Alcan is a supplier of bauxite, alumina and aluminium, owned by the listed company Rio Tinto. In *ANTA v Commissioner of Taxes*, we were retained by Alcan to review numerous valuations prepared by alternative experts to determine the value of land for stamp duty purposes. Our advice focussed on identifying relevant issues and developing case strategy. As part of our advice, we provided legal counsel with a financial model to easily assess the impact of various concessions made by the respondent's expert. Our evidence was reviewed and accepted by the court, resulting in a favourable outcome for Alcan. This case involved issues relating to transfer pricing (how is value allocated between land and other assets as the transfer price changes?), the value of intangible assets (how much value is there in an asset itself and the ability of a skilled operator in using the asset?), and the value of options to renew leases (how much is a lease worth compared to an option to renew a lease?).

Valuation and contractual rights associated with contributed assets (Comalco 2004-2005)

Comalco is an Australian company involved in the production of bauxite, alumina and aluminium, which was acquired by Rio Tinto in 2000. We advised Comalco on a dispute with the Ports Corporation of Queensland. The issue related to the development of the port and channel used to export bauxite from Comalco's mine at Weipa. Legal title to the asset vested with the Ports Corporation of Queensland but Comalco had contributed money to develop the assets over a period of time. The initial agreement between Comalco and the State Government had been struck four decades prior to the dispute. The question was whether asset owner was entitled to earn a return on the asset base from the user of the asset which had funded the development of the asset.

Analysis of a pyramid investment scheme (Queensland Dept of Fair Trading 2001)

The Queensland Department of Fair Trading is the government department with a mandate to protect consumers. In February 2001 I acted as part of a team advising the Queensland Department of Fair Trading on whether an investment scheme could be classified as a pyramid investment scheme. This involved an analysis of the number of investors required to contribute to the scheme before a loan is available to any given member, and the expected time before this occurs.

Other litigation support

Insolvency proceedings relating to the collapse of Octaviar (Public Trustee of Queensland 2008-9)

Valuation of resource assets (Compass Resources 2007-8, Westpac Banking Corporation 2007)

Appeals against regulatory determinations (Envestra 2007-8, Telstra 2008)

Advice on whether loan repayments correspond to contract terms (Qld Dept. of Fair Trading 2005)

Risk & return

Economic analysis (Uniqco 2022)

I provided independent advice on economic assumptions that underpin analysis provided to Australian city councils. The advice was in relation to: (1) government bond yields and implied inflation based upon data from the Reserve Bank of Australia (RBA), (2) petrol and diesel prices based upon historical prices for petrol, diesel, oil and the Australian dollar/U.S. dollar exchange rate, and forward prices for oil and the Australia dollar/U.S. dollar exchange rate, (3) LPG prices based upon historical prices, and (4) electricity prices using information from the Australian Energy Market Commission and published tariffs from Ergon Energy, and (5) carbon prices reported by the Clean Energy Regulator.

Risk of trading electricity forward contracts (Sydney Desalination Plant 2017)

Frontier Economics was retained by the operator of the Sydney Desalination Plant (SDP) to prepare a report that quantifies the risk of various energy trading policies. SDP has a long-term power purchase agreement in place and sells surplus energy back into the market when it is not operating. Our role was to quantify the risk of various approaches to selling surplus energy via forward contracts. This work informed SDP's regulatory submission and the trading policy it put in place.

Risk and return of an investment portfolio concentrated in a family owned business (2016)

We were engaged by the investment managers of a \$100 million portfolio to analyse the risks and expected returns of the portfolio. The portfolio was concentrated in a family owned business, and the managers wanted to know the implications for annual distributions and terminal portfolio value over a 30 year investment horizon. We considered portfolios with different allocations to equities listed in the United States (U.S.) and Australia, U.S. and Australian corporate bonds, Australian government bonds, and Australian real estate. Our analysis provides estimates of the probability that annual distributions fall below a required distribution, the average distribution in the event of a distribution shortfall, the probability that terminal wealth in 30 years breaches particular thresholds, and the average terminal wealth in the event of shortfalls.

Compilation of an economic profit model (Synergy 2015).

Synergy is a vertically integrated energy generation and retail company, owned by the Government of Western Australia, with assets of \$3.3 billion and revenue of \$2.8 billion. We compiled a financial model to estimate the economic profit of Synergy over a five year forecast period, based upon Synergy's estimates of revenue, costs and investments. Economic profit is the difference in after-tax profit and the normal profit that reflects a return on assets equal to the cost of capital. Our model considers economic profit both including and excluding the payment for community service obligations received by Synergy. Our model also disaggregates economic profit into five components (margin, turnover, leverage, interest rate on debt, and the corporate tax rate).

Retail electricity and gas margins in New South Wales (Independent Pricing and Regulatory Tribunal 2006-13)

Prior to full retail competition for electricity and gas in New South Wales, the Independent Pricing and Regulatory Tribunal (IPART) set energy tariffs for customers that were not on market-based contracts (or in other words were serviced by the retailer of last resort). In 2006-7, 2009-10 and 2012-13 we were engaged to estimate electricity costs and margins for electricity and gas retailers in NSW. We estimated the profit margin which would allow the retailer to earn a return commensurate with its systematic risk. The approach developed was novel in that the margin was derived without reference to any pre-defined estimate of the asset base. Rather, the margin was a function of the potential increases or decreases in cash flows which would result from changes in economic conditions.

Value and risk of an electricity generation and trading portfolio (Stanwell Corporation 2011).

Stanwell Corporation is an electricity generation business in Queensland owned by the State Government. In 2011 we performed analysis of the impact on value, leverage and risk to the company associated with alternative portfolios of generation assets and trading strategies. We also performed empirical analysis of the relationship between energy futures prices and spot prices subsequently observed to quantify the magnitude and seasonality in the forward premium for energy prices.

Financial advice on value, risk and return (Plantic Technologies 2009 to 2011)

Plantic Technologies develops bioplastics, which are alternatives to conventional plastics based on corn, thereby creating packaging that is biodegradable and based upon a renewable input. From 2009 to 2011 we provided assistance to Plantic which included financial advice on value, risk and return, and development of financial modelling tools to assist in investment decision-making.

Estimation of risks associated with long-term generation contracts (New South Wales Treasury 2010)

In 2010 the NSW Government privatised a segment of its electricity industry, by selling three electricity retailers and entering into two generation agreements termed GenTrader contracts. The state-owned generators agreed to provide

generation capacity in exchange for a charge. The generators also agreed to pay penalties in the event that their availability was less than agreed. As part of a team, I provided advice to NSW Treasury on the risks associated with the contracts. The estimated penalties resulting from this analysis are used by NSW Treasury in their budgeting role and in providing forward-looking analysis to the Government.

Listed vs unlisted infrastructure funds across alternative European equity markets (ABN AMRO Rothschild 2007)

ABN Amro Rothschild was a venture between ABN Amro and Rothschild to provide services to the equity capital markets. The agreement ended when Royal Bank of Scotland acquired ABN Amro's investment banking business. In 2007 we provided advice to ABN Amro Rothschild on the impact of the cost of capital associated with listed versus unlisted infrastructure funds, across alternative European equity markets.

Methodology for evaluating public-private partnerships (Queensland Treasury Corporation 2005)

In 2005 I acted as part of a team which advised Queensland Treasury Corporation (QTC) on evaluating public-private partnerships, which typically require subsidies to appeal to the private sector. We rebutted the conventional wisdom, adopted in NSW and Victoria, that the standard valuation approach is flawed for negative-NPV projects. Furthermore, we developed a technique to incorporate systematic risk directly into expected cash flows, which are then discounted at the risk-free rate.

Advice on cost of capital for forestry assets (Queensland Department of Natural Resources 2004)

The Queensland Department of Natural Resources was the State Government Department with oversight for the development of forestry assets. We advised the department on the appropriate cost of capital for valuation of forestry assets.

Advice on corporate strategy (AGL 2003-2004)

AGL (now AGL Energy, an energy retailer) was an energy distribution and retail business listed on the Australian Securities Exchange. We provided advice to AGL on corporate strategy. The analysis included detailed financial modelling of individual business units, estimation of the effects of corporate strategy and development of a capital allocation framework. This analysis was performed using simulation techniques.

Review of the debt valuation model used by the Snowy Hydroelectric Authority (New South Wales Treasury 2002)

Snowy Hydro Limited (formerly the Snowy Hydro Electric Authority) is an energy generator and retailer owned by the governments of Australia, New South Wales (NSW), and Victoria. We performed a review of the authority's debt valuation model. This involved testing whether the valuation is reasonable, given the current yield curve, and whether the model exhibits the appropriate sensitivity to changes in interest rates, measured using duration and convexity.

Estimation of the optimal capital structure for electricity generation and distribution (New South Wales Treasury 2001-2002)

In 2001 to 2002, the electricity generation and distribution businesses of New South Wales (NSW) were owned by the State Government. We provided NSW Treasury with advice on the potential consequences for value, risk and dividends associated with alternative proportions of debt versus equity capital to fund the businesses. Using simulation techniques, we estimated the value of electricity generators and distributors under alternative capital structures. In addition, we estimated the probability of credit ratings falling below investment grade and the probability of other measures of financial risk falling below certain benchmarks. This resulted in the issue of an additional \$500 million of debt to electricity generators in NSW, included in the 2002 State budget.

Estimation of the optimal contract terms for coal sales to an electricity generator (New South Wales Treasury 2001-2)

In 2002 the New South Wales (NSW) government sold coal mines owned by Powercoal to Centennial Coal, which is now a subsidiary of Banpu Public Company Limited, a mining company listed in Thailand. We provided advice to NSW Treasury on the impact of alternative contract terms between the coal mines and government-owned electricity generation businesses. Using simulation techniques, we estimated the value of the generators and coal mines under various price, volume and optional tonnage assumptions. This allowed construction of 90% confidence intervals for the value of the enterprises and estimation of the probability of failing to meet certain benchmarks, such as minimum dividend payments, investment grade credit ratings and other measures of financial risk.

Other risk & return

Economic impact assessment of a proposed development of a retail shopping complex (Lend Lease 2006)

Regulation

Issues in estimating the regulated rate of return for an eConveyancing firm (Independent Pricing and Regulatory Tribunal of New South Wales 2022)

I prepared three notes on estimating the regulated rate of return for an eConveyancing firm that covered the following topics: equity beta and gearing, imputation credit and the risk-free rate. On equity beta and gearing, I analysed 8,000 companies listed in Australia, the United States, Canada, the United Kingdom and New Zealand, before ultimately reaching conclusions on the basis of 34 comparable stocks according to industry classifications of three data providers.

On imputation credits and the risk-free rate, I considered my earlier research in light of submissions made to the tribunal and the tribunal's draft report.

Issues in estimating the regulated rate of return (Independent Pricing and Regulatory Tribunal of New South Wales 2022)

I prepared a scoping study on selected issues in setting the regulated rate of return, addressing the following issues: cost of equity (Capital Asset Pricing Model, Beta estimation including the Vasicek adjustment, Market risk premium), risk-free rate (Term to maturity for the risk-free rate proxy and the market risk premium), imputation credits (estimation, frequency of revision) and other issues (Inflation, data availability and replication, financeability test, and uncertainty index).

Term to maturity of the risk free rate for setting regulated returns (Danish Energy Association 2015-16)

We were engaged by the Danish Energy Association to write a report on setting the regulated rate of return for an energy network. The specific issue we addressed was in relation to the term to maturity on government bonds used to estimate the risk free component of allowed returns. The regulator's view is that the term to maturity used in the government bond proxy needs to align with the frequency under which allowed returns are re-estimated (term matching). This means that if allowed returns are re-estimated every two years then a two year government bond is the risk free proxy; and if allowed returns are estimated every five years, then a five year government bond is the risk free proxy. We prepared two reports, which were submitted to the regulator prior to the draft decision, and in response to the draft decision. We motivated our first report by showing that the "term matching" approach is inconsistent with an objective to approximate competitive market outcomes. It cannot be the case that an estimate of competitive market outcomes would differ across jurisdictions or over time merely due to the administrative choice as to how frequently prices are reset. We went on to explain that (1) term matching only appears to hold because all risks, other than interest rate risk, that investors care about in buying and selling assets are simply assumed to be negligible or have zero systematic risk; (2) normal business practice for large, capital-intensive companies is to borrow with a long term to maturity because the companies have already made a trade-off between interest rate risk and refinancing risk; and (3) term matching only appears to hold because of an assumption that interest rate risk is lowered, but there is no offsetting increase in refinancing risk. The regulator's view is that all risks, other than interest rate risk, are already accounted for in the industry risk premium. Our response was that this theory does not appear to flow through to any actual parameter used to set allowed returns. Thus, the implementation of term matching simply means that the regulator lowers one part of allowed returns (the risk free rate) and sets everything else in the same manner as in any other corporate finance context for an unregulated firm. In short, our response is that the regulator is simply assuming that price setting at particular intervals is a material risk reduction technique.

Advice on the cost of capital for a gas pipeline (APA Group 2014-2016)

The Goldfields Gas Pipeline in Western Australia is, in part, regulated by the Economic Regulation Authority of Western Australia (ERA). In 2014 we were engaged by the owners of the pipeline to provide advice on the fair risk-adjusted return for an investment in the pipeline. The ultimate major owner is APA Group. A unique feature of the pipeline is that it has a small number of customers concentrated in the mining industry. This makes comparison to other pipelines with diverse customer bases, in terms of number of customers and industry dispersion, more challenging. In particular, there is the risk of asset stranding. This means there is relatively more downside risk for investors, than upside potential. We developed a quantitative approach to estimate the cost of equity that accounts for these potentially asymmetric payoffs to shareholders. This approach showed that the ERA's estimate of the cost of equity was too low compared to what was implied by corporate bond yields and the probability of default, and in addition did not account for the potential consequences of default amongst the pipeline's mining customers. In a draft decision in 2015 the ERA rejected our quantitative approach and instead used its judgement to estimate the cost of equity on a relative basis to other pipelines. In the current project in 2016 we were engaged to respond to the ERA's draft decision. The key issues are whether there is, in fact, an asymmetric risk exposure to equity holders and how this can be accounted for in a regulatory model (that is, a spread sheet used to set allowed revenue) that embeds a single scenario. We make the point that it is important to understand exactly what is accounted for in a regulatory model so that revenue can be set accordingly.

Estimation of the market risk premium (Independent Pricing and Regulatory Tribunal 2013-21)

The Independent Pricing and Regulatory Tribunal (IPART) is the regulator of retail electricity and gas, water and transport in New South Wales (NSW). Part of IPART's function is determining estimates of the cost of capital for different components of energy supply (generation, distribution and retail), water distribution and transport. From 2013-2021 I provided regular advice to IPART on estimation of the market risk premium, a material component of the cost of capital. This analysis involves consideration of analyst forecasts of dividends and earnings, market prices, yields on government and corporate bonds, and share market volatility.

Review of the New Zealand Commerce Commission method for setting allowed returns (Transpower 2015)

Frontier Economics was engaged by Transpower New Zealand to provide advice on priorities for the Commerce Commission's 2015-16 review of the Weighted Average Cost of Capital Input Methodologies (WACC IM). The

WACC IM is a set of rules established by the Commerce Commission that sets out in detail its approach to estimating the cost of capital for businesses regulated by the Commission under Part 4 of the Commerce Act 1986. The first WACC IM was published by the Commission in 2010. By law the Commission must review the IM at least every seven years. The Commission began consultation on its first IM review in 2015 and sought views from stakeholders on what the review should focus on. We reviewed the existing WACC IM and provided recommendations to Transpower on four key areas in which the Commission's WACC IM could be improved materially to deliver better regulatory outcomes for suppliers and consumers.

Advice on cost escalation rates for materials inputs (AusNet Services, Powerlink Queensland & TasNetworks 2015)

AusNet Services, Powerlink Queensland and TasNetworks are the owners of electricity infrastructure assets in Australia. Frontier Economics was engaged by these three businesses to assess the reasonableness of a decision by the Australian Energy Regulator (AER's) to adopt a materials real cost escalator of zero per cent in recent draft and final regulatory determinations. We critiqued the AER's decision based on the evidence provided in the draft decision for TransGrid, another owner of electricity infrastructure. We found that the AER's conclusions on the escalation rate for materials inputs did not follow from the evidence put before it.

Live issues in regulated rates of return (Australian Gas Networks 2015)

In October 2014, Envestra, a gas distribution company, was acquired by the Cheung Kong Consortium and Envestra became Australian Gas Networks (AGN). Frontier Economics was asked to provide a paper on live issues in regulated rates of return and a briefing to senior management. This involved a review of recent determinations by the Australian Energy Regulator (AER), and industry positions on several aspects of regulated rates of return. Issues of debate between the AER and energy networks include transitional arrangements towards a trailing average cost of debt allowance, the appropriate risk factors to account for in the cost of equity, and the manner in which imputation credits are incorporated into the regulated revenue stream for energy networks.

Evaluation of rate of return estimation approaches (Ergon Energy & AusNet Services 2015)

The Australian Energy Regulator (AER) determines, among other things, an allowed return on equity for regulated electricity networks. The AER's approach is to set the return on equity using a model in which a constant risk premium is added to the contemporaneous government bond yield. This results in volatility in the allowed return during periods where government bond yields are changing. In a series of reports for regulated energy networks, Frontier Economics has proposed an approach that estimates the return on equity using a number of models. In this project, Frontier Economics was retained by Ergon Energy and AusNet Services to investigate the historical performance of the AER approach against the multi-model approach. We demonstrated that the multi-model approach produced more stable estimates across a range of market conditions, which is more in keeping with the pattern of actual required returns among equity investors.

Advice on the regulated rate of return for a rail network (Brockman Mining 2015)

Brockman Mining was a potential access seeker to rail infrastructure in Western Australia, which is regulated by the Economic Regulation Authority (ERA) of Western Australia. We advised Brockman on its submission to the ERA in relation to the ERA's approach to estimating the cost of capital under the Railways (Access) Code 2000. Subsequently, the ERA released a Revised Draft Decision on its proposed cost of capital methodology. We were engaged again by Brockman to help develop its submission to the ERA on the Revised Draft Decision. The submissions focused on the appropriateness of the systematic risk estimates proposed by the ERA, the methodology used to estimate the market risk premium (and consistency between the methodologies used by the ERA in different sectors), and the appropriateness of the ERA's credit rating assumption for the benchmark efficient entity (which affects the cost of debt allowance under the ERA's methodology).

Advice on the regulated rate of return for a rail network (Aurizon 2012-2014)

Aurizon Holdings Limited is a rail freight operator and the owner of a rail network in Queensland, with assets of \$5.8 billion and revenue of \$1.1 billion. The Queensland Competition Authority (QCA) is the regulator of the rail network. Over the course of 2013 and 2014 we provided advice to Aurizon in relation to its cost of equity capital, and made submissions to the QCA in support of Aurizon's draft access undertaking. Issues of debate related to estimating approaches for the market risk premium, the term to maturity on government debt used to estimate the risk free rate, the relevance of U.S.-listed rail companies to estimate the risk of a rail network, and the value of imputation tax credits. The QCA released a draft report on Aurizon's maximum allowable revenue in September 2014.

Advice on the cost of capital for a water network (Unitywater 2013)

Unitywater provides water and sewerage services to residents in South East Queensland and is owned by the State Government. It is regulated by the Queensland Competition Authority (QCA). We prepared a report for Unitywater, for submission to the QCA, showing that three factors contributed to the QCA estimating a cost of equity capital that was implausibly low – placing exclusive reliance on the Capital Asset Pricing Model as the sole asset pricing model, holding the market risk premium constant at 6% regardless of the level of government bond yields, and estimating risk to equity holders purely with reference to past stock returns.

Advice on rules to determine regulated rates of return (Australian Energy Markets Commission 2011-2012)

The Australian Energy Market Commission (AEMC) is the rule-making body for the national electricity and gas markets. From 2011 to 2012 we provided advice to the AEMC on the development of new rules. Independent rule change proposals were forward by the Australian Energy Regulator (AER) and the Energy Users Association of Australia. Both groups argued that application of the existing rules by the regulator generate upwardly-biased estimates of the regulated rate of return. We provided advice to the commission on whether the rule change proposals provide evidence on an upward bias, and if so, whether the proposed amendments were likely to reduce the extent of any bias. The rules themselves did not create any bias, but did unnecessarily exacerbate the variation of electricity prices from one five year period to the next. The rules have now been amended to mitigate this variation. One aspect of the rule change was that the AER is now allowed to set the allowance for the return on debt on the basis of a trailing average approach, rather than estimating the cost of debt at the date of the regulatory determination. We analysed the likely impact on value and risk to debt and equity holders as a result of alternative ways in which the cost of debt allowance could be set.

Advice on the appropriate cost of capital and leverage in regulation of the Sydney Desalination Plant (Independent Pricing and Regulatory Tribunal 2011)

The Sydney Desalination Plant was constructed from 2007 to 2010 and supplied drinking water to Sydney residents over the following two years, in order to demonstrate reliability. The plant was then placed on care and maintenance as dam levels are sufficiently high the plant does not need to operate. The State Government of New South Wales entered into a 50 year lease with a private consortium of Hastings Funds Management and Ontario Teachers' Pension Plan. The plant is regulated by the Independent Pricing and Regulatory Tribunal (IPART). We provided advice to IPART on issues related to the regulated rate of return, specifically the estimate of systematic risk, the leverage the plant could sustain at different credit ratings, and the internal consistency of parameter estimates that form part of the cost of capital. This included specific analysis of contractual terms between the plant owner and operator relating to risk sharing (2011).

Advice on cost of capital for water networks (Yarra Valley Water, City West Water, Melbourne Water Corporation and South East Water 2004)

The businesses listed above are water networks regulated by the Essential Services Commission in Victoria. We advised the water networks on cost of capital issues as part of submissions to the commission on their regulated rate of return.

Advice on cost of capital for energy networks (Energex and Ergon Energy 2003-2004)

Energex and Ergon Energy are electricity network businesses owned by the Queensland State Government. In 2003-2004 the businesses were regulated by the Queensland Competition Authority (QCA). We provided cost of capital advice in order for the businesses to make submissions to the QCA on an appropriate method for determining the cost of capital for a regulated entity.

Estimation of the cost of capital for water distribution networks (Queensland Competition Authority 2002)

Water infrastructure assets in Queensland are owned by the State Government and regulated by the Queensland Competition Authority (QCA). We advised the QCA on the cost of capital for the Burdekin Haughton Water Supply Scheme and the Gladstone Area Water Board.

Other regulation

Transport (Qantas 2008, QR National 2005 & 2012)

Water (Essential Services Commission of South Australia 2012, ActewAGL 2012, IPART 2011, Metropolitan utilities in Victoria 2004 & 2006-7, QCA 2003)

Energy networks (Economic Regulation Authority in Western Australia 2009, Hong Kong Electric 2007, Envestra 2006-7 & 2012, Powercor 2005, AGL 2004, Energex 2004, Ergon Energy 2004)

Local government networks (Queensland Competition Authority 2009)

Electricity generation (National Generators Forum 2008)

Environmental consulting (Ecowise 2007)

Board memberships

CFA Society of Detroit, 2019-23

PR Run Club, Ann Arbor, 2019-23

Liberty Lofts Condominium Association, Ann Arbor, 2017-21 (Treasurer, 2017-21; President 2020-21)

Interests

I am interested in sport as a participant and spectator. I finished 3rd on three occasions in the Brisbane Half Marathon (2005 & 2009-10), 8th in the Toronto Half Marathon (2002) and 3rd in the Australian Universities Marathon Championships (2003). I have finished 41 marathons, recording a best time of 2:47:54 in the Chicago Marathon 2011. From 1994-96 I was a member of The University of Queensland tennis team, which placed 1st at the Australian University Games in 1994.
