

# A MULTINATIONAL MULTIVERSE: SIMULATING TAX-OPTIMAL INTERCOMPANY FUNDING STRUCTURES

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## ABSTRACT

To date, the literature has primarily focussed on the ‘debt bias’, which arises from the distortion in the tax treatment between debt and equity financing. Reforms traditionally designed to address the domestic debt bias include: the allowance for corporate equity (ACE), a comprehensive business income tax (CBIT) or a combined ACE-CBIT. This research presents a novel contribution to the literature by introducing and exploring the broader concept of the tax-induced cross-border ‘funding bias’, which includes licensing and finance leasing activities in addition to debt and equity financing.

While general equilibrium modelling is utilised throughout the literature, optimisation modelling remains largely unexplored in the context of anticipating MNE behaviour. Currently only two preliminary papers exist in this area. The most sophisticated model thus far covers a 6-jurisdiction MNE with 2 constraint functions across 2 scenarios considering intercompany debt and equity flows only, subject to thin capitalisation rules.

This research improves existing models by incorporating a 4-jurisdiction MNE with 26 constraint functions across over 20 scenarios with intercompany debt, equity, licensing and finance leasing activities, subject to thin capitalisation rules, withholding taxes and foreign tax credits. Unlike existing models which consider MNE behaviours only, this model undertakes multiobjective optimisation by also incorporating the government perspective. In doing so, it is possible to explore a ‘multiverse’ of possible MNE and government behaviours.

Amongst several findings, one of the most surprising is in relation to the existing thin capitalisation regime; namely, that the hypothetical MNE is indifferent to the existence of and/or variation in thin capitalisation rules. Further, the hypothetical MNE is also indifferent between the unilateral and multilateral implementation of the OECD’s BEPS Recommendation on Action 4 for a fixed ratio rule – with both reforms resulting in an increase in total tax payable by the MNE, most markedly for the most tax aggressive MNEs.

The most noteworthy finding in this paper is that a broadened thin capitalisation rule is more effective at protecting a jurisdiction’s tax revenue base than the OECD’s BEPS Recommendation. This confirms the economic literature on the merits of eliminating distortions by presenting the foundations for a broadened thin capitalisation regime as an alternative to existing thin capitalisation rules. Accordingly, a broadened thin capitalisation rule constitutes the first of three reform proposals developed by the author and explored in this paper.

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# 1 INTRODUCTION

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For nearly a century, tax authorities have been developing international principles for tax treaties in attempts to address the problem of international tax coordination, with their focus evolving into designing international principles to prevent both the double taxation and double non-taxation of MNE income.<sup>1</sup>

In October 2015, the OECD made a best practice recommendation in Action 4 of its BEPS project, suggesting a Fixed Ratio Rule in place of thin capitalisation rules. This review was almost 3 decades in the making, with the most recent OECD report on thin capitalisation rules published in 1986,<sup>2</sup> which omitted guidance on how these rules could best be designed.<sup>3</sup>

While the OECD makes a distinction between combating BEPS and reducing distortions between the tax treatment of debt and equity,<sup>4</sup> it is clear that both the OECD's BEPS project and the thin capitalisation rules' *raison d'être* is primarily concerned with protecting national tax revenue bases. However, it is the decision of the revenue authorities to create a cross-border tax-induced debt bias which actually results in said tax base erosion.<sup>5</sup>

The current international tax framework incentivises the location of expenses in higher-tax jurisdictions and income in low- or no-tax jurisdictions as it can result in significant tax minimisation. MNEs can shift expenses to, and income from, source countries to minimise tax payable with relative ease.<sup>6</sup> This is a particularly pressing issue for small, open economies such as Australia and New Zealand, which are net capital importers of capital. This can be achieved by interposing subsidiaries in low-tax jurisdictions such as Ireland or The Netherlands, and then utilise tax treaties to shift income onto tax havens such as Bermuda or the British Virgin Islands,<sup>7</sup> where profits can be stored for years. This is further exacerbated by the plethora of jurisdictions for MNEs to choose from, many of which are engaged in a 'race to the bottom' on corporate income tax rates. Of course, broader based corporate taxes with lower rates promote efficiency, investment and growth. However, if governments narrow their tax bases to attract the rerouting of flows of capital *through, rather than to*, their economy, then this quickly exits the realm of productive competition and enters the terrain of harmful tax competition. MNEs such as Apple, eBay, Google, Starbucks (to name a few) are reportedly engaging in practices similar to this in order to minimise their worldwide taxation.<sup>8</sup>

Given that cross-border intercompany transactions account for more than 60% of global trade in terms of value,<sup>9</sup> remain largely absent from a group's consolidated accounts (and therefore beyond public scrutiny), and can be readily determined by corporate treasury centres,<sup>10</sup> there is an urgent imperative

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<sup>1</sup> "The issue of international tax coordination has often been seen mainly as a problem of alleviating double taxation. This problem arises because most countries insist on their right to tax all income originating within their borders as well as all income earned by their residents. However, since some countries have found it in their interest to play the role of "tax havens", the international tax coordination problem may often be one of preventing tax evasion rather than a problem of double taxation": Sørensen PB, 'Issues in the Theory of International Tax Coordination' (Bank of Finland Discussion Papers No 4/90, 20 February 1990), 7–8.

<sup>2</sup> OECD, *Report on "Thin Capitalisation"* (OECD 1986), adopted by the OECD Committee on Fiscal Affairs on 26 November 1986 (the 'Thin Capitalisation Report'); Similarly, the OECD's survey of thin capitalisation regimes currently remains in draft form only, with no indication of when it will be finalised: OECD, *Thin capitalisation legislation a background paper for country tax administrations*, draft paper, available at: [http://www.oecd.org/ctp/tax-global/5.%20Thin\\_Capitalization\\_Background.pdf](http://www.oecd.org/ctp/tax-global/5.%20Thin_Capitalization_Background.pdf).

<sup>3</sup> Traversa E, 'Interest Deductibility and the BEPS Action Plan: nihil novi sub sole?' [2013] 5 *British Tax Review* 607.

<sup>4</sup> OECD, 'BEPS Action 4: Interest deductions and other financial payments' (Final Report, 5 October 2015), 47.

<sup>5</sup> Hanlon D, 'Thin Capitalisation Legislation and the Australia/United States Double Tax Convention: Can They Work Together?' (2000) 3(1) *Journal of Australian Taxation* 4.

<sup>6</sup> "...the relative ease with which MNE groups can allocate capital to lowly taxed minimal functional entities (MFEs). This capital can then be invested in assets used within the MNE group, creating base eroding payments to these MFEs.": see further, OECD, *Public Discussion Draft, BEPS Action 8, 9 and 10: Discussion draft on revisions to Chapter I of the Transfer Pricing Guidelines (including risk, recharacterisation and special measures)*, 1 December 2014 – 6 February 2015, 38. For completeness, residence issues are beyond the scope of this thesis.

<sup>7</sup> Somewhat relevantly, one of the British Virgin Islands is reputedly the model for Stevenson's 'Treasure Island'.

<sup>8</sup> See further: Australian Government, Senate Committee on Corporate Tax Avoidance: available at: [http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate/Economics/Corporate\\_Tax\\_Avoidance/Submissions](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Economics/Corporate_Tax_Avoidance/Submissions), which contains 70 submissions from academics, practitioners, businesses and policymakers.

<sup>9</sup> ICC Commission on Taxation and the ICC Committee on Customs and Trade Regulations, 'Transfer pricing and customs value' Policy Statement, Document No. 180/103-6-521, February 2012, 2.

<sup>10</sup> This is exemplified in the following extract from the *Chevron* judgment: "Ms Taherian accepted, by reference to an email dated 19 November 2002 from Mr Lewis, on which she was copied, that she was told that the profit in CFC from the interest rate margin within CFC, being a reference to the interest expense and the interest derived, would not be subject to tax either in the United States or in Australia ..."

for a strong conceptual basis in the tax treatment of cross-border intercompany transactions, grounded in the tax principle of efficiency.

Accordingly, the overarching question guiding this paper is whether, given the opportunity to ‘start over’, the tax-induced cross-border debt bias would be better addressed by retaining thin capitalisation rules in their current form or whether an alternative reform would be more suited to dealing with this ‘disease’. The concept of the tax-induced cross-border ‘funding bias’ developed by the author is explored in section 2.

Section 3 begins by observing that linear programming using optimisation modelling is a relatively underutilised technique in analysing MNEs potential behavioural responses to international tax laws and proposed reforms. In particular, this section explores the literature on whether optimisation modelling is suitable in the context of international tax planning by an MNE.

Section 4 of this paper establishes and operationalises the optimisation model, specifically: developing the objective function, defining and applying constraints and limitations in sections 4.1.1–4.1.4; and, overlaying additional parameters in section 4.1.5.

Section 5 presents the multinational “multiverses”. The first variation of the model in section 5.1 simulates the existing international tax regime, focussing on the effectiveness of thin capitalisation rules. The OECD’s BEPS recommendation for a fixed ratio rule is simulated with both unilateral and multilateral implementation and explored as two “parallel universes” in the below sections 5.2 and 5.3. Further, this paper proposes a broadened thin capitalisation rule as an alternative reform, which is simulated in the below section 5.4. This constitutes the first of three reform proposals developed by the author.

Finally, section 6 summarises the findings of this paper and includes areas for further research.

## 2 MAPPING THE TAX-INDUCED CROSS-BORDER ‘FUNDING BIAS’

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Integrity rules that deal with charactering and taxing “passive” income are general considered to include *inter alia* controlled foreign company (CFC), foreign investment fund (FIF), transfer pricing and thin capitalisation rules. However, as observed by Devereux and Vella, the allocation of primary taxing rights between “active” and “passive” income is ill-suited to dealing with modern MNE operations, particularly in the intercompany setting. This results in “*a system which is easily manipulated, distortive, often incoherent and unprincipled*”.<sup>11</sup>

More specifically, in the context of thin capitalisation rules which is the focus of this paper, “[t]here is no historical evidence that the OEEC gave any attention to thin capitalization when working on the dividend or interest articles”.<sup>12</sup>

In the economic literature analysing intercompany funding distortions, much attention has been directed towards the debt bias.<sup>13</sup> In contrast, there is little emphasis on eliminating distortions in the

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*She agreed that one of ChevronTexaco's key objectives was to maximise sustainable leverage. She also agreed that an objective was to repatriate cash to the United States: a general goal, as corporate treasury, was to centralise cash holdings in the United States because it was more efficient ... She also agreed that the effect of not granting security was to make the interest rate on a loan higher rather than lower ... She said in general no Chevron intercompany loans had CVX guarantees and agreed there would not be any need to guarantee an inter-company loan”: Chevron Australia Holdings Pty Ltd v Federal Commissioner of Taxation (No 4) [2015] FCA 1092, [152]–[155].*

<sup>11</sup> Devereux M and Vella J, ‘Double trouble: why landmark OECD tax reform is doomed before it starts’ on The Conversation (5 October 2015), available at: <https://theconversation.com/double-trouble-why-landmark-oecd-tax-reform-is-doomed-before-it-starts-48115>.

<sup>12</sup> Avery Jones JF, Baker P, De Broe L, Ellis MJ, van Raad K, Le Gall JP, Goldberg SH, Blessing P, Lüdicke J, Maisto G, Miyatake T, Torrione H, Vann RJ, Ward DA, Nikolakakis A, Wiman B, ‘The Definitions of Dividends and Interest in the OECD Model: Something Lost in Translation?’ (2009) 1(1) *World Tax Journal* 5, 27.

<sup>13</sup> See, for example, De Mooij RA, ‘Tax Biases to Debt Finance: Assessing the Problem, Finding Solutions’ (IMF Staff Discussion Note SDN/11/11, 3 May 2011); IMF Fiscal Affairs Department, ‘Debt Bias and Other Distortions: Crisis-related Issues in Tax Policy’ (International Monetary Fund Study, 12 June 2009); Blessing PH, ‘The Debt-Equity Conundrum – A Prequel’ (2012) 66(4-5) *Bulletin for International Taxation* 198.

tax treatment of cross-border intercompany passive income.<sup>14</sup> This paper posits that an unequal tax treatment of passive income involving certain categories of otherwise fungible intercompany debt and equity financing, licensing and finance leasing activities, can distort economic choices about commercial activities and encourage tax planning behaviours.

The reasoning for this is two-fold; first, intercompany dealings are fungible and mobile.<sup>15</sup> Second, a parent company would likely be neutral to these different funding options<sup>16</sup> particularly if they constitute purely financing activities that are determined and allocated by corporate treasury centres and eliminated on consolidation for accounting purposes.<sup>17</sup>

An underlying assumption in this paper is that as long as an MNEs can benefit from tax planning opportunities presented by existing rules including, *inter alia*, the arm's length standard, thin capitalisation rules, debt/equity rules, withholding taxes and foreign tax relief, there is a tax incentive to adjust its behaviour to maximise overall deductions in higher-tax jurisdictions to minimise the group-wide tax liability and, in turn, the overall net profit after tax.

The author recognises that not all MNEs will fall within this category in practice. Accordingly, this study is only concerned with MNEs that are responsive to cross-border tax-induced distortions.

Assuming that MNEs which exhibit tax planning behaviour make tax decisions as a global group with the objective of minimising total tax payable worldwide. In other words, such an MNE is a 'utility-optimiser'. Such tax planning is generally encouraged by tax professionals<sup>18</sup> and is statutorily, administratively and judicially condoned.<sup>19</sup>

Accordingly, the behaviourally distortive effects of existing and proposed tax rules relating to cross-border intercompany activities are of primary concern in this study. Specifically, the focus of this paper is on MNE's cross-border intercompany transactions relating to passive or highly mobile income; specifically how tax distortions affect MNE decisions on the funding mix between intercompany financing, licensing and finance leasing activities.

As such, this paper proposes restricting the tax deductibility of these otherwise fungible cross-border intercompany financing payments.<sup>20</sup> For completeness, other categories of intercompany payments also exist which may be included within the scope of the funding bias in future research. An analytical framework for this broader category of intercompany payments is extracted in the below Figure 1.

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<sup>14</sup> See further, Kayis-Kumar A, 'Taxing cross-border intercompany transactions: Are financing activities fungible?' (2015) 30(3) *Australian Tax Forum* 627-661; Kayis-Kumar A, 'Thin capitalisation rules: A second-best solution to the cross-border debt bias?' (2015) 30(2) *Australian Tax Forum* 299-355.

<sup>15</sup> For completeness, the OECD defines financial payments economically equivalent to interest as "... those which are linked to the financing of an entity and are determined by applying a fixed or variable percentage to an actual or notional principal over time": OECD, 'BEPS Action 4: Interest deductions and other financial payments' (Final Report, 5 October 2015), 17.

<sup>16</sup> Burnett C, 'Intra-Group Debt at the Crossroads: Stand-Alone versus Worldwide Approach' (2014) 6(1) *World Tax Journal* 40, 45 and 64.

<sup>17</sup> For example, a leading US consulting company recently advised that "...multinationals corporations need to view the intercompany payments as part of its cash repatriation strategy": Chen PG, 'Intercompany payments between multinational corporations and their affiliated companies in China', in: Charles River Associates, 'Insights: Transfer Pricing', 11.

<sup>18</sup> Seto TP, 'Four Principles of Optimal Tax System Design' (Legal Studies Paper No 2008-36, Loyola Law School, March 2013), 10-11.

<sup>19</sup> *Helvering v. Gregory*, 69 F.2d 809, 810 (2d Cir. 1934), *aff'd*, 293 U.S. 465 (1935) (Hand, J.) ("Any one may so arrange his affairs that his taxes shall be as low as possible; he is not bound to choose that pattern which will best pay the Treasury; there is not even a patriotic duty to increase one's taxes"). In so stating, Judge Hand was reflecting on the appropriate role of judges in enforcing existing law, not on principles of sound tax design.

<sup>20</sup> This paper builds on earlier work by the author, please see: Kayis-Kumar A, 'Taxing cross-border intercompany transactions: Are financing activities fungible?' (2015) 30(3) *Australian Tax Forum* 627-661; Kayis-Kumar A, 'Thin capitalisation rules: A second-best solution to the cross-border debt bias?' (2015) 30(2) *Australian Tax Forum* 299-355.

Figure 1

	Strategy/technique	Reduces taxable profit	Cash
Pre-tax	Interest	√	√
	Royalties	√	√
	Service fees	√	√
	Purchase of depreciable assets (e.g., intangibles asset)	√	√
	Others: Swaps and other contractual arrangements	√	√
Post-tax	Dividends	x	√
	Purchase of non-depreciable assets (e.g., share of affiliates)	x	√
	Loans to affiliates	x	√

Perhaps the most controversial aspect of the funding bias concept is that royalties are fungible. However, this paper does not suggest that all intercompany royalties are equivalent and fungible with other financing activities. Rather, the scope is limited to some categories of licenses or royalty financing ostensibly similar in their capacity to provide access to an underlying asset with the ability to provide a revenue stream (termed “royalties”) – but not dissimilar in operation to intercompany debt or equity financing or a finance lease.

It is noteworthy that, as observed by Vann, “[h]istorically, excess royalties were assumed by some OEEC delegates to be classified as dividends but it was decided to leave the question to domestic law”.<sup>21</sup> At a theoretical level, Benschalom provides an analysis on the fungibility of these intercompany financing activities, observing that “almost every type of tax reduction plan that uses affiliated financial transactions could be executed via other types of affiliated transactions”.<sup>22</sup> The fungibility and mobility of these intercompany financial flows means that attempts to allocate ownership to any one entity within an MNE is an arbitrary exercise.<sup>23</sup> However, Benschalom’s research is limited to separately and distinctly analysing the taxation of intercompany financing<sup>24</sup> and licensing, briefly mentioning leasing activities but distinguishing them as separate from financing transactions,<sup>25</sup> despite acknowledging that “it is impossible to draw a perfect line between financial transactions and non-financial transactions ... affiliated leasing transactions could replicate the consequences of related lending”.<sup>26</sup> Nonetheless, Benschalom observes that the mobility of intercompany activities erodes the source jurisdiction’s tax base from both the perspective of intangible and tangible manufacturing and merchandise activities.<sup>27</sup>

<sup>21</sup> Vann R, ‘The History of royalties in tax treaties 1921-61: why?’ in: Avery Jones JF, Harris P and Oliver D (eds), *Comparative Perspectives on Revenue Law* (Cambridge: CUP, 2008), 166, 186 and 193; see further: Avery Jones JF et al, ‘The Definitions of Dividends and Interest in the OECD Model: Something Lost in Translation?’ (2009) 1(1) *World Tax Journal* 5, 36.

<sup>22</sup> Benschalom I, ‘The Quest to Tax Financial Income in a Global Economy: Emerging to an Allocation Phase’ (2008) 28 *Virginia Tax Review* 165, 193-195; see also: Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619.

<sup>23</sup> Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619, 660-661.

<sup>24</sup> Benschalom I, ‘The Quest to Tax Financial Income in a Global Economy: Emerging to an Allocation Phase’ (2008) 28 *Virginia Tax Review* 165, 193-195; see also: Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619, 647.

<sup>25</sup> Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619, 647.

<sup>26</sup> Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619, 642.

<sup>27</sup> Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619, 647.

So, while the literature implicitly contains support for the proposition that cross-border intercompany financing, licensing and finance leasing activities are fungible, there is very little literature that directly studies the taxation implications of this observation. This is also typified in practice. However, there is some guidance from, for example, the US Treasury which defined a “financing arrangement” as:<sup>28</sup>

*“...as a series of transactions by which one person (the financing entity) advances money or other property, or grants rights to use property, and another person (the financed entity) receives money or other property, or the right to use property, if the advance and receipt are effected through one or more other persons (intermediate entities) and there are financing transactions linking the financing entity, each of the intermediate entities, and the financed entity”*

Similarly, the term “financing transaction” was defined to include:<sup>29</sup>

*“...any other advance of money or property pursuant to which the transferee is obligated to repay or return a substantial portion of the money or other property advanced or the equivalent in value”*

The following sections explore whether adopting this characterisation in the design of thin capitalisation rules would constitute a valuable step in equalising the playing field between MNEs and tax authorities. On one hand, MNEs are largely indifferent to the structuring of their internal financial flows because these are fungible and mobile with no substantial economic cost. In contrast, tax authorities generally do not have adequate resources to audit the increasing volumes of intercompany activities. Administrative complexity is further exacerbated by the arm’s length standard requirement of finding the proper market comparables of specifically tailored financial flows.<sup>30</sup>

### **3 THE MERITS OF EXPLORING THE ‘MULTIVERSE’ BY FUSING LINEAR PROGRAMMING WITH INTERNATIONAL TAX PLANNING**

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As observed by Markle and Shakelford:

*“We cannot observe how a firm structures its internal affairs in a tax-optimal manner. For example, we can observe firms’ using leverage to lower their global tax liabilities through external debt financing, but we cannot observe their using internal debt to generate interest deductions in high-tax countries and interest income in low-tax countries ... intrafirm transactions are nontrivial and may even exceed the avoidance opportunities with third parties”<sup>31</sup>*

In the absence of a requirement to fully disclose their intercompany transactions in financial statements, cross-referencing the information reported to taxing authorities and reported in financial statements is a highly challenging task.<sup>32</sup> Further, if a subsidiary is a private company it does not even

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<sup>28</sup> On August 10, 1993, US Congress enacted section 7701(1) of the Internal Revenue Code; Section 1.881-3(a)(2) of the final regulations provides definitions of certain terms used throughout the regulations; see further: <http://www.irs.gov/pub/irs-regs/td8611.txt>; see further, Ring DM, ‘Risk-Shifting Within a Multinational Corporation: The Incoherence of the U.S. Tax Regime’ (1997) 4(4) *Boston College Law Review* 667, 712

<sup>29</sup> *Ibid.*

<sup>30</sup> Benschalom I, ‘The Quest to Tax Financial Income in a Global Economy: Emerging to an Allocation Phase’ (2008) 28 *Virginia Tax Review* 165, 193-195; see also: Benschalom I, ‘Taxing the Financial Income of Multinational Enterprises by Employing a Hybrid Formulary and Arm’s Length Allocation Method’ (2009) 28 *Virginia Tax Review* 619.

<sup>31</sup> Markle KS and Shakelford DA, ‘Cross-Country Comparisons of the Effects of Leverage, Intangible Assets, and Tax Havens on Corporate Income Taxes’ (2012) 65 *Tax Law Review* 415, 417-432.

<sup>32</sup> Commentators such as De Simone and Stomberg observe that “Financial reporting for income taxes is so complex that even sophisticated financial statement users often ignore detailed tax disclosures” and “taxation is often viewed by the market as beyond meaningful analysis”: De Simone L and Stomberg B, ‘Do investors differentially value tax avoidance of income mobile firms?’ (Working Paper, University of

need to disclose comprehensive financial statements in the source jurisdiction.<sup>33</sup> Accordingly, this presents a gap in the literature.

Generally, quantitative evaluations are conducted utilising regression based evaluation methods and general equilibrium modelling. For example, there is a growing theoretical literature on the relationship between tax planning and investment locations, and its implications for tax policies.<sup>34</sup> There is also a rich literature which utilises empirical data in this context, extensively considering the relationship between MNE leverage and taxation with US, Canadian and European Union (particularly German) data.<sup>35</sup>

Substantially less developed is the literature on the effect of taxation on leverage in a multilateral context, with ‘n<sub>xn</sub> countries’.<sup>36</sup> Huizinga, Laeven and Nicodème present the primary exploration of whether MNEs make multilateral capital structure decisions based on the tax rates faced by various subsidiaries. Under their model, the MNE’s objective is to maximize its overall firm value.<sup>37</sup>

Even less attention has been directed to economic modelling frameworks beyond general equilibrium modelling. While many types of mathematical models can be utilised in practice to solve ‘real-world’ problems,<sup>38</sup> the focus of this research is optimisation modelling. Optimisation modelling using linear programming remains largely unexplored in the context of anticipating MNE behaviour; specifically, observing how an MNE may structure its internal affairs in a tax-optimal manner.

This is particularly surprising because some literature does exist suggesting that international tax planning decisions can be approximated as linear programming problems. Specifically, only two papers have been authored in this area: first, Brada and Buus, and second, Vasarhelyi and Moon. Each are briefly summarised in turn below.

First, Brada and Buus focus on cross-border intercompany transfer pricing issues; specifically, whether it is possible to identify subsidiaries within an MNE which engage in profit shifting. They note that empirical studies are rare in this area since transfer pricing is considered to be a confidential

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Texas at Austin, June 2012), 2. Consolidated accounts undergo intercompany eliminations so are not helpful in this regard. While some MNEs provide some detail regarding their intercompany transactions in their segment reports, this is not a requirement across the board. See further, “*this large shift in pre-tax income without any corresponding change in revenues suggests the presence of significant intercompany payments – likely royalty payments attributable to the transfer of intellectual property into Ireland*”: Balakrishnan K, Blouin J and Guay W, ‘Does Tax Aggressiveness Reduce Financial Reporting Transparency?’ (Working Paper, Wharton School, University of Pennsylvania, 20 September 2011), 29.

<sup>33</sup> For example, in the financial year ending 2014, Google Australia Pty Ltd’s disclosure omitted itemising over \$35 million in expenses from its financial statement and the corresponding notes, not even categorising these expenses as ‘COGS’ and/or ‘Other expenses’. Further, Google Australia Pty Ltd’s intercompany financing activities were presumably classified as ‘operating’ activities, as the ‘financing’ section of the cash flow statement was entirely blank, with no details afforded in the notes.

<sup>34</sup> Hong Q and Smart M, ‘In praise of tax havens: International tax planning and foreign direct investment’ (2010) 54(1) *European Economic Review* 82; see references cited therein, including: Grubert H and Slemrod J, ‘The effect of taxes on investment and income shifting to Puerto Rico’ (1998) 80 *Review of Economics and Statistics*, 365–373; Haufler A and Schjelderup G, ‘Corporate Tax Systems and Cross-country Profit Shifting’ (2000) 52 *Oxford Economic Papers*, 306–325; Mintz J and Smart M, ‘Income shifting, investment, and tax competition: Theory and evidence from provincial taxation in Canada’ (2004) 88 *Journal of Public Economics* 1149–1168; Bucovetsky S and Haufler A, ‘Tax competition when firms choose their organizational form: Should tax loopholes for multinationals be closed?’ (Technical Report 1625, CESifo, 2005); Slemrod J and Wilson JD, ‘Tax competition with parasitic tax havens’ (Technical Report, University of Michigan 2006).

<sup>35</sup> Substantial literature review by Huizing H, Laeven L and Nicodème G, ‘Capital Structure and International Debt Shifting’ (Economic Paper No 263, European Economy, December 2006), 3; see further references cited therein.

<sup>36</sup> “... unlike previous research, our modeling and our empirical work take a fully multilateral approach and is the first to study the effect of taxation on leverage in a n<sub>xn</sub> countries context. The main contribution of our paper is to explore in an international context the possibility that multinationals set the capital structure of individual subsidiaries by taking into account the tax rate faced by all other subsidiaries of the firm. Our finding that subsidiary leverage within a multinational firm responds to bilateral tax rate differences vis-à-vis both the parent firm and other foreign subsidiaries provides direct support for this multilateral approach”: Huizinga H, Laeven L and Nicodème G, ‘Capital Structure and International Debt Shifting’ (Economic Paper No 263, European Economy, December 2006), 3–4.

<sup>37</sup> Huizinga H, Laeven L and Nicodème G, ‘Capital Structure and International Debt Shifting’ (Economic Paper No 263, European Economy, December 2006), 8. For a further discussion of limitations please see: Kayis-Kumar A, ‘International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD’s Recommendation on BEPS Action 4’ (submitted to the *Australia Tax Forum*).

<sup>38</sup> Castillo E, Conejo AJ, Pedregal P, García R and Alguacil N, *Building and Solving Mathematical Programming Models in Engineering and Science* (New York, United States: John Wiley and Sons Ltd, 2001).

issue for most MNEs.<sup>39</sup> Further, they note that the extensive literature modelling optimal tax systems does not deal with MNEs utilising transfer pricing to profit shift.<sup>40</sup> Nonetheless, Brada and Buus provide a mathematical proof that the basic tax optimisation task of MNEs can be conceptualised as a linear programming problem.<sup>41</sup>

Second, Vasarhelyi and Moon also presented the suitability of linear programming for solving international tax planning problems. This was on the basis that international tax planning problems are concerned with the optimal allocation of tax, subject to relevant tax laws and other limitations; thereby echoing linear programming problems:<sup>42</sup>

*“International tax planning optimisation problems can be formulated as linear functions to maximize or minimize a particular objective function”*

However, Buus and Brada’s research in this area remains untested<sup>43</sup> and Vasarhelyi and Moon’s work has also since ceased.<sup>44</sup> Accordingly, this paper presents a unique contribution to the literature by developing a tax optimisation model which considers four forms of fungible intercompany financing across 4 jurisdictions to simulate complex cross-border intercompany tax planning strategies. This facilitates a formal analysis of one of the most significant challenges presented by the mobility and fungibility of capital.

#### **4 BUILDING AN APPROPRIATE MODEL TO EXPLORE THE ‘MULTIVERSE’**

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This paper establishes a model which facilitates hypothetical scenario analysis, presenting firm-specific illustrative examples to demonstrate the tax effects of various cross-border intercompany instruments at different rates of return and degrees of leverage to examine the extent of cross-border funding neutrality in both the existing system, variations of the existing system and proposed reform options.

This hypothetical approach is preferable due to the accessibility issues associated with collecting various revenue authorities’ corporate tax return data and the limitations of using accounting data. Even if accounting data was gathered through annual reports this approach is problematic given the difference between accounting profit and taxable income. Specifically, MNEs start with accounting profit and then make adjustments to accounting profit<sup>45</sup> to reach their taxable profit.<sup>46</sup> Accordingly, it is difficult to glean intercompany tax-related information from financial statements.

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<sup>39</sup> Brada J and Buus T, ‘Detection of Possible Tax-Evasive Transfer Pricing in Multinational Enterprises’ (2009) 4(2) *European Financial and Accounting Journal* 65, 65.

<sup>40</sup> Buus T and Brada J, ‘VAT and Tax Credits: A Way to Eliminate Tax-Evasive Use of Transfer Prices?’ (2010) 5(1) *European Financial and Accounting Journal* 28, 45.

<sup>41</sup> Brada J and Buus T, ‘Detection of Possible Tax-Evasive Transfer Pricing in Multinational Enterprises’ (2009) 4(2) *European Financial and Accounting Journal* 65, 75; Brada and Buus note that further mathematical proofs and more detailed specification conditions of validity have not been conducted: Brada J and Buus T, ‘Detection of Possible Tax-Evasive Transfer Pricing in Multinational Enterprises’ (2009) 4(2) *European Financial and Accounting Journal* 65, 73-74.

<sup>42</sup> Vasarhelyi MA and Moon D, ‘Optimizing tax allocation among countries in the multinational entity: a tale of many contingencies’ (Presentation delivered at the TTN Taxation Seminar New York 2011, Morgan Lewis Bockius LLP: New York, NY, 16 May 2011), 6.

<sup>43</sup> For completeness, in a subsequent paper, Brada and Buus proposed that VAT be used as a solution to reach a Pareto-optimal state that would prevent harmful tax competition and tax-evasive transfer pricing; see: Buus T and Brada J, ‘VAT and Tax Credits: A Way to Eliminate Tax-Evasive Use of Transfer Prices?’ (2010) 5(1) *European Financial and Accounting Journal* 28, 45; see also, Kayis-Kumar A, ‘International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD’s Recommendation on BEPS Action 4’ (submitted to the *Australia Tax Forum*).

<sup>44</sup> Vasarhelyi and Moon developed a single-period model, with a 6-jurisdiction MNE subject thin capitalisation rules with 2 constraint functions only. Withholding taxes were assumed zero, foreign tax relief was not considered, none of the parameters were flexed and the model focussed on optimal firm policy only, not considering the government perspective. See further: Kayis-Kumar A, ‘International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD’s Recommendation on BEPS Action 4’ (submitted to the *Australia Tax Forum*).

<sup>45</sup> Net profit before tax pursuant to the relevant accounting standards.

<sup>46</sup> This is discerned through applying the relevant tax regulations.



Further, this is exacerbated by recent amendments to the *Corporations Act 2001*, enacted 28 June 2010, which have removed the requirement for companies to include full unconsolidated parent entity financial statements in their group annual financial reports under *Chapter 2M of the Corporations Act 2001* where consolidated financial statements are required.<sup>47</sup> This renders it even more difficult to discern intercompany tax-related information. Also, there is currently no requirement to produce “general purpose” financial reports in subsidiary locations where the MNE determines that that subsidiary is not a “reporting entity”. Further, given the gaps in reporting requirements and the fact that some items are off-balance sheet to begin with, it is highly difficult to undertake a meaningful analysis of data from financial statements in this context. This is exacerbated by the absence of official data about MNEs’ non-portfolio investment activities, despite their significance to the Australian economy.<sup>48</sup>

These issues are bypassed by developing a hypothetical model of an MNE from which to conduct scenario analysis, thereby making observable how a utility-optimising MNE structures its internal affairs in a tax-optimal manner. The remainder of this section outlines and justifies the optimisation model.

#### 4.1 DEVELOPING THE TAX OPTIMISATION MODEL<sup>49</sup>

This section expresses MNEs’ decisions to utilise various conduit financing structures to minimise taxation for the overall group in the form of an algorithmic expression. This is conceptualised as the ‘objective function’ to the optimisation model developed using the IBM® ILOG® CPLEX® for Microsoft® Excel (‘CPLEX’) software.<sup>50</sup> Microsoft Excel is utilised to generate the data, delineate the parameters and display the solution in a multidimensional format, while the CPLEX software is used to express and solve the optimisation problem. Quantitative analysis facilitates a deeper understanding of the interplay of effects determining tax-induced distortions than may not be observable with a qualitative analysis alone.

The hypothetical MNE modelled by this paper has entities in 4 jurisdictions; two high-tax jurisdictions (one capital-exporter and one capital-importer; specifically, a US parent and Australian subsidiary) and two lower-tax jurisdictions (one non-treaty country and one treaty country, in Hong Kong and Singapore, respectively).<sup>51</sup>

Given its focus on intercompany funding options, this optimisation model focusses on funding constraints and regulatory limitations directly relevant to intercompany funding decisions. This ensures the model is flexible in relation to representing both funding structure decisions and regulations influencing those decisions.

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<sup>47</sup> APRA requests that “APRA reporting” MNEs continue producing their general purpose financial reports to them, though this is on a voluntary basis: see further, [http://www.apra.gov.au/GI/Documents/Letter-for-Website\\_Parent-Entity-Financial-Statements-September-2010.pdf](http://www.apra.gov.au/GI/Documents/Letter-for-Website_Parent-Entity-Financial-Statements-September-2010.pdf).

<sup>48</sup> McDonnell A, Russell H, Sablok G, Burgess J, Stanton P, Bartram T, Boyle B, Manning K (2011) ‘A Profile of Human Resource Management in Multinational Enterprises Operating in Australia’, University of South Australia, University of Newcastle, Victoria University, La Trobe University and Curtin University; available at: [http://www.unisa.edu.au/Global/business/centres/chrm/docs/projects/intrepid/Australia11\\_MNE\\_Report\\_Final.pdf](http://www.unisa.edu.au/Global/business/centres/chrm/docs/projects/intrepid/Australia11_MNE_Report_Final.pdf).

<sup>49</sup> Please note, an earlier version of this section outlining the formulae developed by the author appears in: Kayis-Kumar A, ‘International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD’s Recommendation on BEPS Action 4’ (submitted to the *Australia Tax Forum*).

<sup>50</sup> CPLEX is a sophisticated software appropriate for both building and solving optimisation problems, and for interfacing with Microsoft Excel; “IBM® ILOG® CPLEX® for Microsoft® Excel is an extension to IBM ILOG CPLEX that allows you to use Microsoft Excel format to define your optimization problems and solve them. Thus a business user or educator who is already familiar with Excel can enter their optimization problems in that format and solve them, without having to learn a new interface or command language. CPLEX is a tool for solving linear optimization problems, commonly referred to as Linear Programming (LP) problems”: IBM ILOG CPLEX V12.1 IBM ILOG CPLEX for Microsoft Excel User’s Manual, 12; available at: [ftp://public.dhe.ibm.com/software/websphere/ilog/docs/optimization/cplex/cplex\\_excel\\_user.pdf](ftp://public.dhe.ibm.com/software/websphere/ilog/docs/optimization/cplex/cplex_excel_user.pdf).

<sup>51</sup> In the Australian context, it appears that Singapore is a relatively more popular jurisdiction than other well-known low-tax jurisdictions such as Ireland in terms of the volume of intercompany payments made by Australian companies: Butler B and Wilkins G, ‘Singapore, Ireland top havens for multinational tax dodgers’, *Sydney Morning Herald* (online), 1 May 2014; available at: <http://www.smh.com.au/business/singapore-ireland-top-havens-for-multinational-tax-dodgers-20140430-37hzi.html>.

The baseline model in the optimisation problem consists of the current global tax framework and its treatment of fungible funding options. It is necessary to develop a baseline model because modelling in this area has not yet focussed on the fungibility of intercompany funding options, as highlighted in the above section 0. So far, the predominant focus in the literature has been on an economy-wide scale<sup>52</sup> with firms identified with, for example, one unit of capital with different firm types linked to different types of capital whereby MNEs dispose of as unit of mobile capital.<sup>53</sup> Even when the analysis is constrained to a single MNE, models developed have focussed on, for example, the model-firm approach<sup>54</sup> or determining the MNE's optimal after-tax income by reference to labour, capital and production<sup>55</sup> or have only considered debt financing without exploring its economic equivalents.<sup>56</sup>

Rather than projecting MNEs' decisions over time this paper considers behavioural implications of different rules at a given point-in-time. A key disadvantage of a single-MNE one-period model approach is that the results are heavily dependent on the particular characteristics of the hypothetical MNE. To that end, a consideration of various types of MNEs is beyond the scope of this study.<sup>57</sup> However, this model can take into account different funding situations or planning options so it has the ability to engage in detailed scenario/"what-if" analysis. This enables validation testing to be conducted to anticipate MNE behaviour and quantify the impact on the total tax payable by the MNE of different reform options. As observed by Jacobs and Spengel, the technique of sensitivity analysis is used in all important studies on international tax burden comparisons regardless of the methodical approach and the underlying model.<sup>58</sup>

This model also extends the analysis of behavioural implications beyond the limited perspective of a single MNE by also considering optimal government policy. This was not previously contemplated by the literature in this area. More generally, the literature on transfer pricing contains very few papers considering both optimisation problems jointly, with Raimondos-Møller and Scharf presenting a notable exception.<sup>59</sup>

Accordingly, this model presents a single-period model for a hypothetical MNE, applying multiple scenarios and sub-scenarios. This framework is 'flexed' by adjusting the values of various parameters to test the relative impact of a change in specific tax laws. This facilitates a comparison between the baseline model and alternative reform options proposed both in this paper and subsequent papers by the author. Validation testing consists of representing algorithmically the alternative reform options by incorporating their different funding constraints and regulatory limitations. This aims to provide an objective assessment of each reforms' impact on MNE intercompany tax minimisation behaviour.

<sup>52</sup> See, for example, Jacobs OH and Spengel C, 'The Effective Average Tax Burden in the European Union and the USA: A Computer-based Calculation and Comparison with the Model of the European Tax Analyzer' (ZEW Discussion Paper No 99-54, Centre for European Economic Research (ZEW) and University of Mannheim, September 1999).

<sup>53</sup> Hauffer A and Runkel M, 'Firms' financial choices and thin capitalization rules under corporate tax competition' (2012) 56(6) *European Economic Review* 1087, 1090.

<sup>54</sup> Jacobs OH and Spengel C, 'The Effective Average Tax Burden in the European Union and the USA: A Computer-based Calculation and Comparison with the Model of the European Tax Analyzer' (ZEW Discussion Paper No 99-54, Centre for European Economic Research (ZEW) and University of Mannheim, September 1999), 9.

<sup>55</sup> See further: Sommer C, *Separate Accounting Or Unitary Apportionment? The Fairy Tale of Arm's Length Pricing and General Equilibrium Analysis of Multinational Enterprise Behavior Under the Formulary Taxation Alternative* (Lohmar: Köln, Reihe Steuer, Wirtschaft und Recht, 2011).

<sup>56</sup> Mardan M, 'Why Countries Differ in Thin Capitalization Rules: The Role of Financial Development' (CESifo Working Paper Series No 5295, CESifo Group Munich, 2015), 9: in Mardan's model each MNE's headquarters chooses the amount of internal loans that maximises the overall profits of the MNE such that the MNE's overall profits are:

$$\pi^j = (1 - t_1)\theta^j f(K^j) - rK^j + t_1 r D_E^j + t_1 \min(r D_I^j, \phi^j(z)) - t_2 r D_I^j - C(D_I^j)$$

<sup>57</sup> This limitation has been echoed in the literature; see for example: Brada J and Buus T, 'Detection of Possible Tax-Evasive Transfer Pricing in Multinational Enterprises' (2009) 4(2) *European Financial and Accounting Journal* 65, 69.

<sup>58</sup> Jacobs OH and Spengel C, 'The Effective Average Tax Burden in the European Union and the USA: A Computer-based Calculation and Comparison with the Model of the European Tax Analyzer' (ZEW Discussion Paper No 99-54, Centre for European Economic Research (ZEW) and University of Mannheim, September 1999), 9; and references cited therein at footnote 43.

<sup>59</sup> Raimondos-Møller P and Scharf K, 'Transfer pricing rules and competing governments' (2002) 54(2) *Oxford Economic Papers* 230, 234-235.

For ease of reference, the abbreviations used throughout the remainder of this section are summarised in Table 1 below:

Table 1

Optimisation model abbreviations	
$NPBT_{i,0}$	Net profit before tax for company 'i' at the start of the period
$NPBT_{i,1}$	Net profit before tax for company 'i' at the end of the period
$r_i^*$	Headline corporate income tax rate in country 'i'
TTP	Total tax payable
$r_{ij}^D$	The rate of return on debt financing from company 'i' to company 'j'
$D_{ij}$	The balance of debt financing provided from company 'i' to company 'j'
$I_i$	The interest received by company 'i' (or, if negative, interest paid)
$r_{ij}^E$	The rate of return on equity financing from company 'i' to company 'j'
$E_{ij}$	The balance of equity financing provided from company 'i' to company 'j'
$V_i$	The dividends received by company 'i' (or, if negative, dividends paid)
$r_{ij}^C$	The rate of return on licensing from company 'i' to company 'j'
$C_{ij}$	The balance of licenses provided from company 'i' to company 'j'
$R_i$	The royalties received by company 'i' (or, if negative, royalties paid)
$r_{ij}^S$	The rate of return on finance leasing from company 'i' to company 'j'
$S_{ij}$	The balance of finance leases provided from company 'i' to company 'j'
$P_i$	The finance lease payments received by company 'i' (or, if negative, finance lease payments paid)

#### 4.1.1 Defining the objective function

Since this model is only concerned with the intercompany activities conducted to minimise tax, the only relevant constraints relate to these intercompany transactions.  $NPBT_{i,0}$  is the amount of Net Profit Before Tax ('NPBT') of company  $i$  at the beginning of the period;  $NPBT_{i,1}$  is the amount of EBIT of company  $i$  at the end of the period;  $r_i^*$  is the tax rate<sup>60</sup> defined by the government of country  $i$ . For simplicity, the 'real' NPBT is a constant for each entity in each jurisdiction and is given ( $NPBT_{i,0}$ ). The impact of the sum of intercompany transactions' in each affiliate on NPBT is denoted as follows:

$$NPBT_{i,1} = NPBT_{i,0} + I_i + V_i + R_i + P_i \quad (1)$$

Provided  $NPBT_{i,t+1} > 0$ ,  $TTP > 0$ . However, if  $NPBT_{i,t+1} \leq 0$ , then  $TTP = 0$ . For completeness, if  $EBIT_{i,t+1} > 0$ , then  $TTP = NPBT_{i,t+1} \times r_i^*$ .

Importantly, this model assumes that there are no tax losses, so  $TTP \geq 0$ .

The general optimisation problem is the minimisation of the objective function by adjusting the design variables and at the same time satisfying the constraints. In the present analysis, the objective function is Total Tax Payable ('TTP') for the corporate group.

$$\text{Minimise: } TTP = \sum_{i=1}^n NPBT_{i,t+1} \times r_i^* \quad (2)$$

<sup>60</sup> While the 'effective tax rate' would arguably be preferable, for simplicity the headline corporate income tax rate is used in this iteration of the model.

As illustrated in an earlier paper by the author,<sup>61</sup> the preliminary iteration of the model is set with NPBT at \$100 for both affiliates in the high-tax jurisdictions and with NPBT as \$0 for the affiliate in the lower-tax jurisdiction.

#### 4.1.2 Baseline model: Applying the objective function

First, the objective function is the minimisation of TTP. Once the current headline corporate income tax rates ( $r_i^*$ ) are included, the objective function is denoted as:

$$\text{Minimise: } TTP = 0.39 \times NPBT_{A,1} + 0.17 \times NPBT_{B,1} + 0.30 \times NPBT_{C,1}$$

For completeness, the current headline corporate income tax rates for the US, Singapore and Australia are 39%, 17% and 30%, respectively.

As other jurisdictions are added to the model, this will need to be reflected in the objective function. For example, the addition of a conduit subsidiary in Hong Kong<sup>62</sup> in the below section 4.1.5.3 will result in the following revised objective function:

$$\text{Minimise: } TTP = 0.39 \times NPBT_{A,1} + 0.17 \times NPBT_{B,1} + 0.30 \times NPBT_{C,1} + 0.165 \times NPBT_{D,1}$$

#### 4.1.3 Defining the constraints and other limitations

The four categories of fungible intercompany funding that constitute the focus of this paper are debt financing ( $D$ ), equity financing ( $E$ ), licensing ( $C$ ) and finance leasing ( $S$ ).<sup>63</sup>

Accordingly, this optimisation problem is subject to the following four primary constraints:

$$I_i = \sum_{j=1, j \neq i}^n D_{ij} \times r_{ij}^D \quad (3)$$

Interest ( $I_i$ ) is received by company  $i$ , where  $D_{ij}$  is the debt provided by company  $i$  to company  $j$ ;  $r_{ij}^D$  is the rate of return on debt financing.

$$V_i = \sum_{j=1, j \neq i}^n E_{ij} \times r_{ij}^E \quad (4)$$

Dividends ( $V_i$ ) are received by company  $i$ , where  $E_{ij}$  is the equity provided by company  $i$  to company  $j$ ;  $r_{ij}^E$  is the rate of return on equity financing.

$$R_i = \sum_{j=1, j \neq i}^n C_{ij} \times r_{ij}^C \quad (5)$$

<sup>61</sup> Kayis-Kumar A, 'Taxing cross-border intercompany transactions: Are financing activities fungible?' (2015) 30(3) *Australian Tax Forum* 627, 644–646.

<sup>62</sup> This reflects Hong Kong's current headline corporate income tax rate of 16.5%.

<sup>63</sup> For completeness, in the context of leases, this model focusses on finance leases only and this iteration does not contemplate the impact of depreciation.

Royalties ( $R_i$ ) are received by company  $i$ , where  $C_{ij}$  is the license provided by company  $i$  to company  $j$ ;  $r_{ij}^C$  is the rate of return on licencing.

$$P_i = \sum_{i=1, i \neq j}^n S_{ij} \times r_{ij}^S \quad (6)$$

Finance lease payments ( $P_i$ ) are received by company  $i$ , where  $S_{ij}$  is the finance lease provided by company  $i$  to company  $j$ ;  $r_{ij}^S$  is the rate of return on finance leasing.

This optimisation problem can then be remodelled by layering additional parameters that reflect the tax laws applicable to each reform variation, as further detailed in the below section 4.1.4. One example is thin capitalisation rules, which apply in both the subsidiaries in the US and Australia. This is factored into the model by considering that the ratio of debt to equity for each company should be kept at less than 1.5, assuming the debt-to-equity ratio is 1.5:1 for both the US parent and Australian subsidiary.<sup>64</sup>

This can be expressed algorithmically as follows:

$$D_{ij} - 1.5 \times E_{ij} \leq 0 \quad (7)$$

With the above algorithm, it is possible to target both or either inbound and outbound investment.

For simplicity, this iteration also assumes that the amount of intercompany transfers between each company ranges from a minimum of \$0 to a maximum of \$1000. This is expressed as follows:

$$\begin{aligned} 0 &\leq D_{ij} \leq 1000 \\ 0 &\leq E_{ij} \leq 1000 \\ 0 &\leq C_{ij} \leq 1000 \\ 0 &\leq S_{ij} \leq 1000 \end{aligned} \quad (8)$$

#### 4.1.4 Baseline model: Applying the constraints and other limitations

The constraints are represented formulaically below, separated by category of funding; namely, debt financing, equity financing, licensing and finance leasing assuming for simplicity all rates of return ( $r$ ) are 10% for each entity within the MNE. The model is designed so that  $r$  can later be adjusted to simulate the impact of tax rules on the cost of capital, enabling a more complex analysis of MNE behaviour. The baseline model constraints are expressed algorithmically as follows:

Intercompany debt financing ( $D$ ) resulting in interest payments ( $I$ ):

$$\begin{aligned} I_A &= 0.10 \times D_{AB} + 0.10 \times D_{AC} + 0.10 \times D_{BA} + 0.10 \times D_{CA} \\ I_B &= 0.10 \times D_{BA} + 0.10 \times D_{BC} + 0.10 \times D_{AB} + 0.10 \times D_{CB} \\ I_C &= 0.10 \times D_{CA} + 0.10 \times D_{CB} + 0.10 \times D_{AC} + 0.10 \times D_{BC} \end{aligned}$$

Intercompany equity financing ( $E$ ) resulting in dividend payments ( $V$ ):

<sup>64</sup> It is noteworthy that Australia's thin capitalisation regime had its safe harbour rules tightened from 3:1 to 1.5:1 through the *Tax and Superannuation Laws Amendment (2014 Measures No. 4) Bill 2014* (Cth), which received Royal Assent on 16 October 2014.

$$V_A = 0.10 \times E_{AB} + 0.10 \times E_{AC} + 0.10 \times E_{BA} + 0.10 \times E_{CA}$$

$$V_B = 0.10 \times E_{BA} + 0.10 \times E_{BC} + 0.10 \times E_{AB} + 0.10 \times E_{CB}$$

$$V_C = 0.10 \times E_{CA} + 0.10 \times E_{CB} + 0.10 \times E_{AC} + 0.10 \times E_{BC}$$

Intercompany licensing ( $C$ ) resulting in royalty payments ( $R$ ):

$$R_A = 0.10 \times C_{AB} + 0.10 \times C_{AC} + 0.10 \times C_{BA} + 0.10 \times C_{CA}$$

$$R_B = 0.10 \times C_{BA} + 0.10 \times C_{BC} + 0.10 \times C_{AB} + 0.10 \times C_{CB}$$

$$R_C = 0.10 \times C_{CA} + 0.10 \times C_{CB} + 0.10 \times C_{AC} + 0.10 \times C_{BC}$$

Intercompany finance leasing ( $S$ ) resulting in finance lease payments ( $P$ ):

$$P_A = 0.10 \times S_{AB} + 0.10 \times S_{AC} + 0.10 \times S_{BA} + 0.10 \times S_{CA}$$

$$P_B = 0.10 \times S_{BA} + 0.10 \times S_{BC} + 0.10 \times S_{AB} + 0.10 \times S_{CB}$$

$$P_C = 0.10 \times S_{CA} + 0.10 \times S_{CB} + 0.10 \times S_{AC} + 0.10 \times S_{BC}$$

#### 4.1.5 Overlaying parameters: Applying concurrent and/or alternative constraints

This section incrementally adds concurrent and/or alternative tax rules (or ‘parameters’) to simulate the impact of various rules on MNEs’ tax planning behaviour. This scenario analysis makes it possible to address the question of what the most likely behavioural responses would be to alternative rates of taxes being levied on otherwise fungible intercompany activities and to what extent alternative reform proposals developed by this paper could ameliorate the distortions leading to said behavioural responses. These implications can be examined and cross-referenced in the context of both the standalone entity and the overall group.

This enables a more complex analysis to be conducted which also highlights the breadth of the problem; specifically, that the literature has thus far been too focussed on modification of one parameter at a time.

The parameters developed by this paper are as follows:<sup>65</sup>

- Parameter 1: Withholding Taxes
- Parameter 2: Foreign Tax Credits
- Parameter 3: Conduit in Hong Kong

##### 4.1.5.1 Withholding Taxes

Unlike most of the other parameters built into the model, withholding tax rates are beyond the unilateral control of governments. Each tax treaty – and, by extension, each withholding tax rate within each treaty – is the result of a distinct and separate bilateral negotiation process. Since the rate limits on withholding taxes cannot be unilaterally increased, this parameter is conceptualised as a ‘supernational parameter’.

Specific withholding tax rates apply for each of the types of intercompany flows examined in this model. Table 2 below indicates the withholding tax rates for each type of intercompany funding applicable for each jurisdiction (with notation in the second column representing a flow from country ‘j’ to country ‘i’, given the notation of the underlying transfer would be ‘ij’).

<sup>65</sup> For completeness, parameters such as the PE rules and the CFC regime are beyond scope.

Table 2

Withholding tax rates					
		Interest	Dividends	Royalties	Finance lease payments
USA	A, B $\circ$	30% $\square$	30%	30%	30%
	A, C	0/10% $\diamond$	<b>0/5/15%</b> $\bullet$	5% <sup>66</sup>	0/10% $\diamond$
Singapore	B, A $\circ$	15%	0%	10%	15%
	B, C	10%	0%	10%	10%
Australia	C, A	0/10% $\diamond$	<b>0/5/15%</b> <sup>67</sup> $\bullet$ $\blacksquare$	5%	0/10% $\diamond$
	C, B	10%	0/15% $\blacksquare$	10%	10% <sup>68</sup>

Key:  $\circ$  represents absence of a comprehensive tax treaty;  $\diamond$  government authorities/ financial institutions are afforded a withholding tax exemption;  $\square$  interest on certain ‘portfolio debt’ obligations are exempt from withholding tax;  $\blacklozenge$  withholding tax exemption applies to interest paid in relation to either a sale on credit of goods, merchandise or services, or a sale on credit of industrial, commercial or scientific equipment;  $\bullet$  higher withholding rates apply if there is a lower level of participation;<sup>69</sup>  $\blacksquare$  relates to different rates arising from imputation system; the higher rate applies to unfranked dividends

For completeness, in the above Table 2 where one form of intercompany funding may be subject to varying rates of withholding tax, the rate most likely to apply is highlighted in bold. For example, assuming a high level of participation, the withholding tax rate of dividends from Co C and Co A would be 0%. It is important to note the difference in tax treatment between franked and unfranked dividends in the context of Australia’s imputation system, which in the first instance, this model assumes are unfranked.

For the purposes of the optimisation model, the existence of withholding tax gives rise to a potentially increased *TTP*. This necessitates a modification to the objective function, as follows:

$$\text{Minimise: } TTP = \dots + (D_{ij} \times r_{jt}^{WHT^I} + E_{ij} \times r_{jt}^{WHT^V} + C_{ij} \times r_{jt}^{WHT^R} + S_{ij} \times r_{jt}^{WHT^P})$$

where  $r_{ij}^{WHT}$  represents the potential marginal increase in *TTP*, which is a function of the rates of return ( $r$ , assumed to be 10% in the baseline iteration for all types of funding) multiplied by the respective ‘relative value’ for each decision variable (denoted as *WHT*, with each ‘relative value’ shown in the above Table 2).

A run-time test indicates that the MNE will funnel all funds through a combination of the decision variable with the lowest withholding tax rate and the jurisdiction with the lowest corporate income tax rate. This can be further validated by a two-fold analysis; first, anecdotal evidence from leading tax practitioners suggests that this reflects MNEs’ behaviour. Second, from the perspective of the MNE as a group, withholding taxes increase the cost of capital of the funding type by the amount of the tax rate withheld.<sup>70</sup>

<sup>66</sup> For completeness, the Australia–United States DTA was amended in 2003, reducing the rate of RWT from 10% to 5%; see further: *Protocol amending the Convention between the Government of Australia and the Government of the United States of America for the Avoidance of Double Taxation and the Prevention of Fiscal Evasion with Respect to Taxes on Income 2003*.

<sup>67</sup> “Australia does not impose withholding tax on dividends to the extent they are franked. To the extent dividends are unfranked, the rate is 0% or 5%, if the beneficial owner of the dividends is a company that holds at least 80% or 10%, respectively, of the voting power in the payer. In all other cases, the rate is generally 15%”: EY Worldwide Corporate Tax Guide (2015), 89-91; Australia–United States DTA, Article 10 amended in 2003; “While the top withholding rates are similar across jurisdictions, substantial concessions are available to investors from the US and the UK, including a zero withholding tax rate on unfranked dividends which may be available where the investor beneficially holds an 80% or greater stake in an Australian company”: Tang R and Wan J, ‘Tax treaties for Asian Century’, *The Australian Financial Review* (Sydney) 7 November 2012.

<sup>68</sup> “Section 128AC was introduced by the *Taxation Laws Amendment Act (No 2) 1986* ... The mischief to be remedied was the loss of revenue by the use of non-traditional methods of finance where a resident enters into a hire-purchase agreement or finance lease arrangement with a non-resident ... The EM recognises the dual purpose served by the agreements in question, namely, purchase and financing the purchase. Consistent with this objective, the section deemed that part of the hire payments that were equivalent to interest in the financing arrangement to be interest for withholding tax purposes”: Australian Taxation Office, *Income tax: withholding tax implications of cross border leasing arrangements* (2 December 1998) ATO Taxation Ruling TR98/12, 12; available at: <https://www.ato.gov.au/law/view/document?docid=TXR/TR9821/NAT/ATO/00001&PiT=20100630000001>.

<sup>69</sup> However, the differences between direct and portfolio investment are beyond the scope of this iteration.

<sup>70</sup> European Commission, *The Economic Impact of the Commission Recommendation on Withholding Tax Relief Procedures and the FISCO Proposals* (European Commission Staff Working Document, 24 June 2009), 44.

This relationship can be expressed as follows:

$$r^{WHT} = r(1 + \tau)$$

where  $r^{WHT}$  is the cost of capital following the imposition of withholding taxes,  $r$  is the rate of return prior to the imposition of withholding taxes,  $\tau$  is the withholding tax rate.

#### 4.1.5.2 Foreign Tax Credits

To avoid double taxation, foreign income may be exempt from tax under the relevant jurisdiction's foreign tax credit (FTC) regime. Each jurisdiction unilaterally controls its FTC system, rendering this a parameter.

It is noteworthy that FTC systems and rates differ markedly between jurisdictions. For example, even though passive income is included within the FTC calculations for USA,<sup>71</sup> Singapore and Australia,<sup>72</sup> Australia's FTC regime was replaced in 2008 with a Foreign Income Tax Offset ('FITO') pursuant to Division 770 of the ITAA97.<sup>73</sup> Also, even though Singapore has not entered into a comprehensive double tax treaty with the USA, as indicated in the above Table 2, Singapore's unilateral tax credit system provides similar relief to a FTC.<sup>74</sup>

However, the purpose of this model is not to replicate the nuances of each jurisdiction's unique system. Rather, this model aims to algorithmically express the top-level design of FTC's. While some jurisdictions (including Singapore<sup>75</sup>) calculate their FTC's on a "country-by-country" basis, this is not built into the model in the first instance. Further, since this model offers a single-period analysis, carry-backs or carry-forwards are not relevant. For simplicity, controlled foreign companies, pooling, other types of tax credits, etc are beyond the scope of this section.

In order to convert the FTC regime into an algorithmic expression, it is instructive to first articulate the operation of this system. The FTC is limited to the domestic tax liability that would be due on the foreign source income.<sup>76</sup> Specifically, a jurisdiction's FTC is the lower of: (A) the amount of tax attributable to the foreign source income; or (B) the actual amount of foreign tax paid.

In other words, if the amount of tax attributable to the foreign source income (A) exceeds the actual amount of foreign tax paid (B), then  $TTP$  will increase by the difference; namely,  $A - B$ . If, however, the actual amount of foreign tax paid (B) exceeds the amount of tax attributable to the foreign source income (A), then  $TTP$  will remain unchanged, because there will be no increase to domestic tax liability.

For the purposes of the optimisation model, FTC can be built into the objective function with the addition of the following notation:

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<sup>71</sup> EY Guide, 1541; "...[one of] The main income baskets are for passive income (primarily interest, dividends, royalties, rents, or annuities received by the subsidiary) ... The maximum foreign tax credit that can be claimed in any basket (the foreign tax credit limitation) is the tentative U.S. tax. Any excess credits can offset residual U.S. tax on foreign source income earned during the previous two years or the following five years, but credits that cannot be used within that period are lost. The separate income baskets help discourage U.S. corporations from moving offshore highly mobile investments (such as international shipping, financial services, and portfolio loans) that can easily be located in low-tax countries." <http://www.taxpolicycenter.org/taxtopics/encyclopedia/Foreign-Tax-Credit.cfm> [NOTE: this has changed in 2007 amendments to only 2 baskets, one of which is still passive income].

<sup>72</sup> "All types of income are treated the same for the purposes of working out the foreign income tax offset": ATO, Guide to foreign income tax offset rules (NAT 72923), <http://law.ato.gov.au/atolaw/view.htm?docid=SAV/FOROFFSET/00001&PiT=20130701000001>.

<sup>73</sup> "The FITO differs from the FTC in that it applies to both Australian and foreign residents and is not subject to quarantining rules": Barkoczy, 930.

<sup>74</sup> EY Guide, 1243; see also, <http://taxsummaries.pwc.com/uk/taxsummaries/wvts.nsf/ID/Singapore-Corporate-Income-determination>; "Effective Year of Assessment (YA) 2009, a UTC will be granted on all foreign-sourced income received in Singapore by Singapore tax residents from jurisdictions that do not have DTAs with Singapore": <https://www.iras.gov.sg/irashome/Businesses/Companies/Working-out-Corporate-Income-Taxes/Claiming-Reliefs/Foreign-Tax-Credit/>.

<sup>75</sup> For completeness, "The foreign tax credit (FTC) is granted on a country-by-country, source-by-source basis unless the resident taxpayer elects to claim FTC under the pooling method, subject to meeting certain conditions.": EY Guide.

<sup>76</sup> "Essentially, the foreign tax credit is limited to the US tax liability that would be due on the foreign source income" [An International Perspective, 107/8].



$$\text{Minimise: } TTP = \dots + \sum_{\substack{j \\ i \neq j}} \sum_k (D_{ijk} + E_{ijk} + C_{ijk} + S_{ijk}) (r_{ijk} \times r_{ijk}^{FTC} - r_{ijk} \times r_{kji}^{WHT})$$

where  $ijk$  represents the inclusion of all three jurisdictions,  $r_{ijk}$  is the initial rate of return (assuming the “tax attributable” is calculated on the gross-up, this is the same as the initial rate of return of 10%),  $r_{ijk}^{FTC}$  represents the amount of tax attributable to the foreign source income,  $r_{kji}^{WHT}$  represents the actual amount of foreign tax paid.

#### 4.1.5.3 Conduit in Hong Kong

It is instructive to observe MNE behaviour when interacting with a non-treaty, lower tax jurisdiction. Accordingly, this model includes a Hong Kong subsidiary (‘Co. D’), which has a headline corporate income tax rate of 16.5%.

It is also necessary to build all of the previous parameters into this variation of the model. Regarding the withholding tax parameter, as indicated in Table 3 below, Hong Kong has not entered into comprehensive double tax treaties with any of the jurisdictions in the Baseline model. Hong Kong allows substantially the same withholding tax rates (at or near 0%) for both treaty and non-treaty countries. However, the FTC regime does not apply to any of the Baseline jurisdictions.<sup>77</sup>

Table 3

Withholding tax rates					
		Interest	Dividends	Royalties	Finance lease payments
Hong Kong	A, D ◯	30% ◻	30%	30%	30%
	D, A ◯	0%	0%	4.95/16.5% ◼	0%
	B, D ◯	15%	0%	10%	15%
	D, B ◯	0%	0%	4.95/16.5% ◼	0%
	C, D ◯	10%	0/30% ◼	30%	10%
	D, C ◯	0%	0%	4.95/16.5% ◼	0%

Key: ◯ represents absence of a comprehensive tax treaty; ◊ government authorities/ financial institutions are afforded a withholding tax exemption; ◻ interest on certain ‘portfolio debt’ obligations are exempt from withholding tax; ◄ withholding tax exemption applies to interest paid in relation to either a sale on credit of goods, merchandise or services, or a sale on credit of industrial, commercial or scientific equipment; ● higher withholding rates apply if there is a lower level of participation; ■ relates to different rates arising from imputation system; the higher rate applies to unfranked dividends; ◼ the higher rate applies if the royalties are received by or accrued to a non-resident from an associate.

<sup>77</sup> “Foreign tax credits are available if foreign taxes are payable/paid on income derived from a jurisdiction that has entered into a CDTA with Hong Kong and the same income is subject to tax in Hong Kong”: <http://taxsummaries.pwc.com/uk/taxsummaries/wwts.nsf/ID/Hong-Kong-Corporate-Tax-credits-and-incentives>.

## 5 SIMULATING FOUR MULTINATIONAL ‘UNIVERSES’

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This section is designed to test the existing thin capitalisation regime against the OECD/G20 BEPS Project recommendation on Action Item 4; namely, the recommendation for a fixed ratio rule (the ‘OECD’s BEPS Recommendation’). Accordingly, this section presents the results of incrementally adding both concurrent and alternative tax rules (or ‘parameters’) to simulate three scenarios; first, the current tax regime. Second, if the OECD’s BEPS Recommendation were adopted by Australia. Third, if the OECD’s BEPS Recommendation were adopted by both Australia and the USA. Finally, a fourth scenario of broadened thin capitalisation rules will be tested, constituting this paper’s proposal.

### 5.1 OUR UNIVERSE: SIMULATING THE EXISTING THIN CAPITALISATION RULES

One of the most surprising findings in relation to the existing system is that the hypothetical MNE is indifferent to the existence and/or variation in thin capitalisation rules. This is because while thin capitalisation rules change the funding mix of entities within an MNE, the TTP remains unchanged.

This finding is significant because even though there is a growing literature challenging the traditional belief that thin capitalisation rules protect the tax revenue base, including Ruf and Schindler<sup>78</sup> and Vann,<sup>79</sup> there is currently no empirical evidence that new FDI is simply financed at or around the debt-to-equity ratio limits set by thin capitalisation rules.

Accordingly, this model presents a novel contribution to the literature, exploring this research gap utilising a novel methodology; namely, optimisation modelling. Contrary to the majority of the empirical literature, this model finds that there is no difference in TTP regardless of whether there are inbound-only, outbound-only, or both inbound/outbound.

Specifically, in relation to capital structure decisions, the Australian subsidiary experiences no change in its funding mix between inbound-only, outbound-only, or both inbound/outbound rules. Similarly for the US parent, there is also no change in funding mix between inbound-only, both inbound/outbound rules. These result in the same quantum and direction of intercompany payments; specifically, to Hong Kong. However, if inbound-only rules apply then the MNE switches the US parent’s intercompany financing from royalties to finance lease payments – simply ‘mixing and matching’ to still obtain the same TTP as any of the above alternative reform configurations.

Further, contrary to policymakers perception that thin capitalisation rules can be tightened by restricting debt-to-equity ratio, this model finds no impact on TTP. There is no change in TTP from tightening thin capitalisation rules from a debt-to-equity ratio of 3:1 to 1.5:1. Also, capital structure and both the quantum and direction of funds flow remains the same under so-called tightened thin capitalisation rules.

While at first blush these results may appear unusual, the anecdotal research presented by Ruf and Schindler<sup>80</sup> anticipates this result. Accordingly, this finding could have significant policy implications globally, especially given the worldwide popularity of implementing and tightening thin capitalisation rules.

This finding is particularly timely given the *Chevron*<sup>81</sup> decision in relation to the operation of Division 820, which is now authority for the proposition that, contrary to the ATO’s position, thin capitalisation rules set limits on the amount of debt and do not deal with the interest rate charged on that debt.<sup>82</sup>

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<sup>78</sup> Ruf M and Schindler D, ‘Debt Shifting and Thin-Capitalization Rules – German Experience and Alternative Approaches’ (NHH Discussion Paper, RRR 06-2012, 13 December 2012), 9-10.

<sup>79</sup> Vann RJ, ‘Corporate Tax Reform in Australia: Lucky Escape for Lucky Country?’ [2013] 1 *British Tax Review* 59, 71.

<sup>80</sup> Ruf M and Schindler D, ‘Debt Shifting and Thin-Capitalization Rules – German Experience and Alternative Approaches’ (NHH Discussion Paper, RRR 06-2012, 13 December 2012), 9-10; see further : Kayis-Kumar A, ‘Taxing cross-border intercompany transactions: Are financing activities fungible?’ (2015) 30(3) *Australian Tax Forum* 627-661; Kayis-Kumar A, ‘Thin capitalisation rules: A second-best solution to the cross-border debt bias?’ (2015) 30(2) *Australian Tax Forum* 299-355.

<sup>81</sup> *Chevron Australia Holdings Pty Ltd v Federal Commissioner of Taxation (No 4)* [2015] FCA 1092.

## 5.2 PARALLEL UNIVERSE ONE: SIMULATING THE UNILATERAL ADOPTION OF THE OECD'S BEPS RECOMMENDATION<sup>83</sup>

This section designs and tests the unilateral implementation of the OECD/G20 BEPS Project recommendation on Action Item 4; namely, the recommendation for a fixed ratio rule (the 'OECD's BEPS Recommendation').

### 5.2.1 OECD's BEPS Recommendation: Fixed Ratio Rule

Released in October 2015, the OECD's BEPS Recommendation for a fixed ratio rule would be in place of existing rules limiting the deductibility of interest, such as thin capitalisation rules. For completeness, a subsequent paper by the author explores the implementation of a cross-border ACE-CBIT as an alternative to rules which only mitigate the 'symptom' of thin capitalisation.<sup>84</sup>

Under the best practice approach, interest and payments economically equivalent to interest will be deductible to the extent that the net interest expense-to-EBITDA ratio is less than the allowable threshold (or benchmark fixed ratio). A benchmark fixed ratio within the corridor of 10% to 30% is recommended. As observed by the OECD and extracted in Table 4 below, the majority of countries which current adopt fixed ratio rules to restrict interest relief utilise a 30% benchmark ratio:<sup>85</sup>

Table 4

Finland:	25 per cent of EBITD calculated based on the taxable profit and loss account. The calculation is made by entity and adjusted by taking into account group contributions received or made.
Germany:	30 per cent of taxable EBITDA.
Greece:	30 per cent of EBITDA. Phased-in system according to which the percentage will reduce from 60 per cent in 2014 to 30 per cent in 2017.
Italy:	30 per cent of EBITDA, adjusted by adding rental payments under finance lease transactions.
Norway:	30 per cent of taxable EBITDA.
Portugal:	30 per cent of EBITDA, adjusted by excluding certain items such as income resulting from shares eligible for the participation exemption or attributable to a permanent establishment outside Portugal to which the option for exemption is applied. Phased-in system according to which the percentage will reduce from 70 per cent in 2013 to 30 per cent in 2017.
Spain:	30 per cent of operating profits adjusted by adding certain items such as depreciation and amortisation and financial income from equity investments.
United States:	50 per cent of adjusted taxable income, ie. EBITDA plus specific deductions taken into account when calculating the taxable income.

Accordingly, this paper assumes the use of a 30% benchmark ratio for the OECD's Recommendation. Unlike thin capitalisation rules, which reference the levels of debt and equity, a fixed ratio based on the level of interest expense and earnings appears to be a more robust base protection technique. Despite the complexities arising in the calculation of the EBITDA, this model adopts the simplifying assumption that the NPBT measure used in the model developed by this paper is effectively the same.

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<sup>82</sup> "The respondent submitted in this respect that Subdiv 815-B provided no comfort to the applicant, first, because this was an inappropriate approach to construction and, secondly, because on the very terms of Div 13, Subdiv 815-A and Art 9 there was no warrant for an approach which set in stone all aspects of the non-arm's length agreement save as to interest rate ... I agree with this submission made by the respondent. It is necessary to start and finish with the words of Subdiv 815-A, both as to what they do provide and as to what they do not.": *Chevron Australia Holdings Pty Ltd v Federal Commissioner of Taxation (No 4)* [2015] FCA 1092, [596]–[598].

<sup>83</sup> Please note, an earlier version of this section outlining the formulae developed by the author appears in: Kayis-Kumar A, 'International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD's Recommendation on BEPS Action 4' (submitted to the *Australia Tax Forum*).

<sup>84</sup> For an analysis of the economic theory, please see: Kayis-Kumar A, 'Thin capitalisation rules: A second-best solution to the cross-border debt bias?' (2015) 30(2) *Australian Tax Forum* 299-355.

<sup>85</sup> OECD, 'BEPS Action 4: Interest deductions and other financial payments' (Public Discussion Draft, 18 December 2014), 49.

The purpose of this section is not to provide an extensive analysis of the OECD's Recommendation.<sup>86</sup> Rather, it only provides an algorithmic expression of the fixed ratio rule which acts as proxy for the OECD's proposed reform, as follows:

$$|I_i + P_i| \leq (30\% \times NPBT_{i,t+1})$$

### 5.2.2 Unilateral Fixed Ratio Rule

Assuming that the OECD's BEPS Recommendation was adopted by Australia in place of the existing thin capitalisation rules, this reform would result in an increase in TTP for the most tax aggressive MNEs, albeit nominally. Specifically, there would be a maximum 1.45% increase in TTP for the most tax-aggressive MNE (where NPBT<sup>C</sup>=0), as shown in the below Table 5.

Table 5

NPBT <sup>C</sup>	Model 1 Current	Model 2 Fixed Ratio Rule <sup>Australia</sup>
0	53.00	53.77
10	53.85	54.50
20	54.70	55.22
30	55.55	55.95
40	56.40	56.68
50	57.25	57.40
60	58.10	58.13
<b>70</b>	<b>58.95</b>	<b>58.95</b>
80	59.80	59.80
90	60.65	60.65
100	61.50	61.50
200	75.00	75.00

In terms of capital structure and funding mix, the US entity is not impacted by Australia's unilateral adoption of the OECD recommendation. Australia sees no substantial change, with the MNE simply switching the funding type utilised in Australia from finance lease payment a combination of royalty and interest payments. On the other hand, Singapore is a substantial beneficiary because it gets the majority of NPBT from the most tax-aggressive MNEs through royalty payments (from NPBT<sup>C</sup>=0–60).

### 5.3 PARALLEL UNIVERSE TWO: SIMULATING THE MULTILATERAL ADOPTION OF THE OECD'S BEPS RECOMMENDATION<sup>87</sup>

Implementation of the OECD's BEPS Recommendation by both the US and Australia in place of their respective existing thin capitalisation rules results in the same results as the above section 5.2, irrespective of the benchmark fixed ratio selected by the US.

While at first blush these results may appear unusual, the basis for this replication is logical. Under the minimisation problem involving a unilateral fixed ratio rule, the MNE ensured that NPBT<sup>A</sup>

<sup>86</sup> For completeness, the OECD's Recommendation was drafted with other key features, but this paper focussed only on the Fixed Ratio Rule. For an overview of the entirety to the OECD's Recommendation, see: OECD, 'BEPS Action 4: Interest deductions and other financial payments' (Final Report, 5 October 2015), 27.

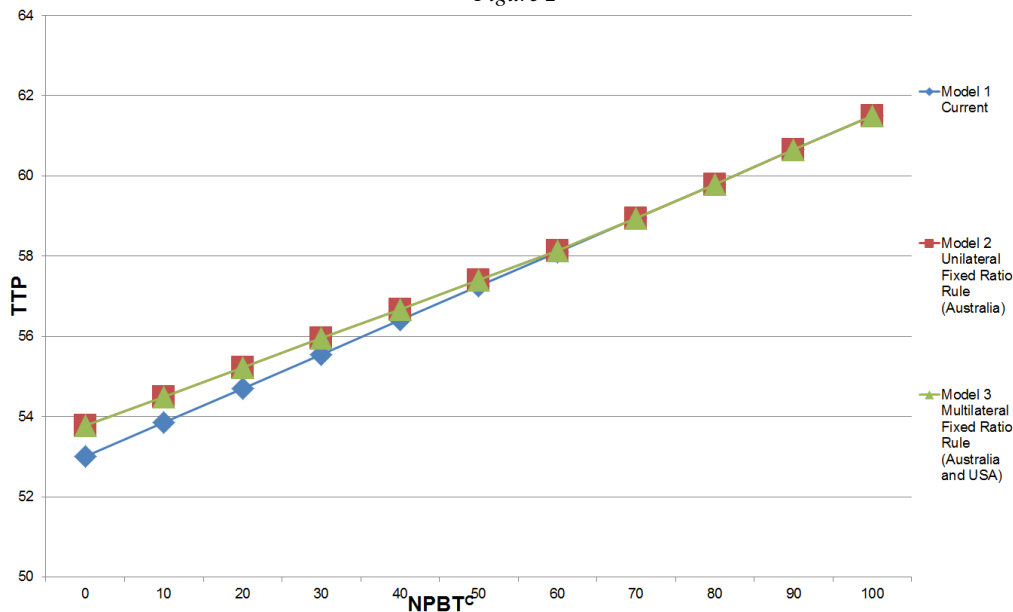
<sup>87</sup> Please note, an earlier version of this section outlining the formulae developed by the author appears in: Kayis-Kumar A, 'International Tax Planning by Multinationals: Simulating a Tax-Optimal Intercompany Response to the OECD's Recommendation on BEPS Action 4' (submitted to the *Australia Tax Forum*).

remained zero throughout. Accordingly, there was no need to change its capital structure nor its funding mix upon the implementation of the OECD’s Recommendation in the USA, because NPBT<sup>A</sup> was already nil. This is expressed in the below Table 6, with the summary of findings presented graphically in the below Figure 2.

Table 6

NPBT <sup>C</sup>	Model 1 Current	Model 2 Fixed Ratio Rule <sup>Australia</sup>	Model 3 Fixed Ratio Rule <sup>USA/Australia</sup>
0	53.00	53.77	53.77
10	53.85	54.50	54.50
20	54.70	55.22	55.22
30	55.55	55.95	55.95
40	56.40	56.68	56.68
50	57.25	57.40	57.40
60	58.10	58.13	58.13
<b>70</b>	<b>58.95</b>	<b>58.95</b>	<b>58.95</b>
80	59.80	59.80	59.80
90	60.65	60.65	60.65
100	61.50	61.50	61.50
200	75.00	75.00	75.00

Figure 2



#### 5.4 PARALLEL UNIVERSE THREE: SIMULATING A BROADENED THIN CAPITALISATION RULE

This section explores the implications of implementing a broadened thin capitalisation rule; with a consistent outcome of an increased TTP as a result of broadening the scope of thin capitalisation rules such that the cross-border ‘funding bias’ is eliminated. Currently, the debt-to-equity rules set limits on the amount of debt, rather than the interest rate changed on debt. Since limiting the deductibility of the interest rate changed on debt is considered in a subsequent paper by the author, this section focusses on the setting of limits on the amount of debt only.

The model clearly shows improved tax base protection outcomes from broadening the scope of thin capitalisation rules to also include royalties and finance lease payments within the scope of financing

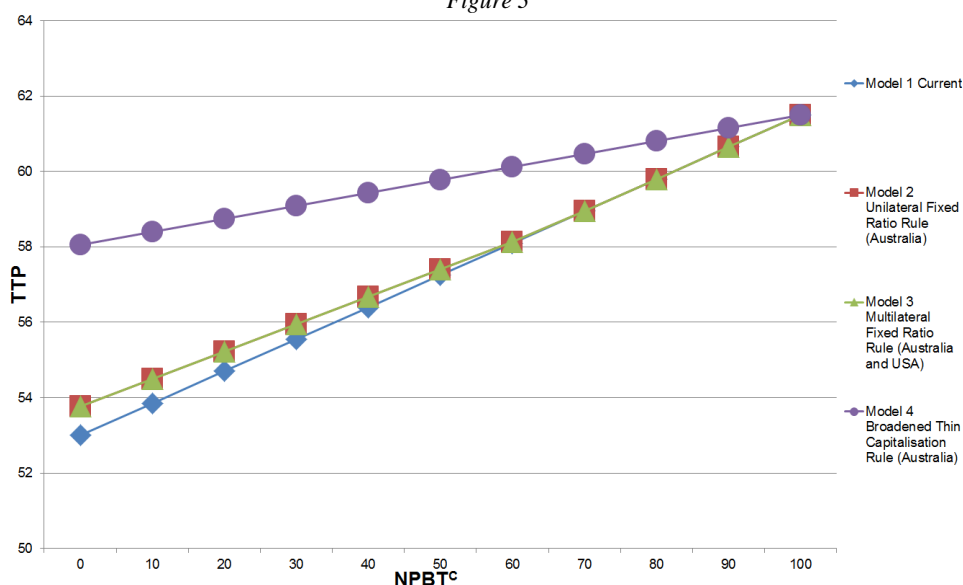
because these flows are economically equivalent to, or fungible with, interest, as discussed in the above section 0. The findings of this iteration are shown in the below Table 7.

Table 7

NPBT <sup>C</sup>	Model 1 Current	Model 2 Fixed Ratio Rule <sup>Australia</sup>	Model 3 Fixed Ratio Rule <sup>USA/Australia</sup>	Model 4 TC <sup>C</sup> <sub>DECS</sub>
0	53.00	53.77	53.77	<b>58.05</b>
10	53.85	54.50	54.50	<b>58.40</b>
20	54.70	55.22	55.22	<b>58.74</b>
30	55.55	55.95	55.95	<b>59.09</b>
40	56.40	56.68	56.68	<b>59.43</b>
50	57.25	57.40	57.40	<b>59.78</b>
60	58.10	58.13	58.13	<b>60.12</b>
<b>70</b>	<b>58.95</b>	<b>58.95</b>	<b>58.95</b>	<b>60.47</b>
80	59.80	59.80	59.80	<b>60.81</b>
90	60.65	60.65	60.65	<b>61.16</b>
100	61.50	61.50	61.50	<b>61.50</b>
200	75.00	75.00	75.00	<b>80.67</b>

These findings suggest that a unilaterally broadened thin capitalisation rule is more effective at base protection than any of the other reforms considered. The marked improvement in base protection afforded by a broadened thin capitalisation rule in comparison to both the existing regime and the OECD’s BEPS Recommendation is presented in the below Figure 3.

Figure 3

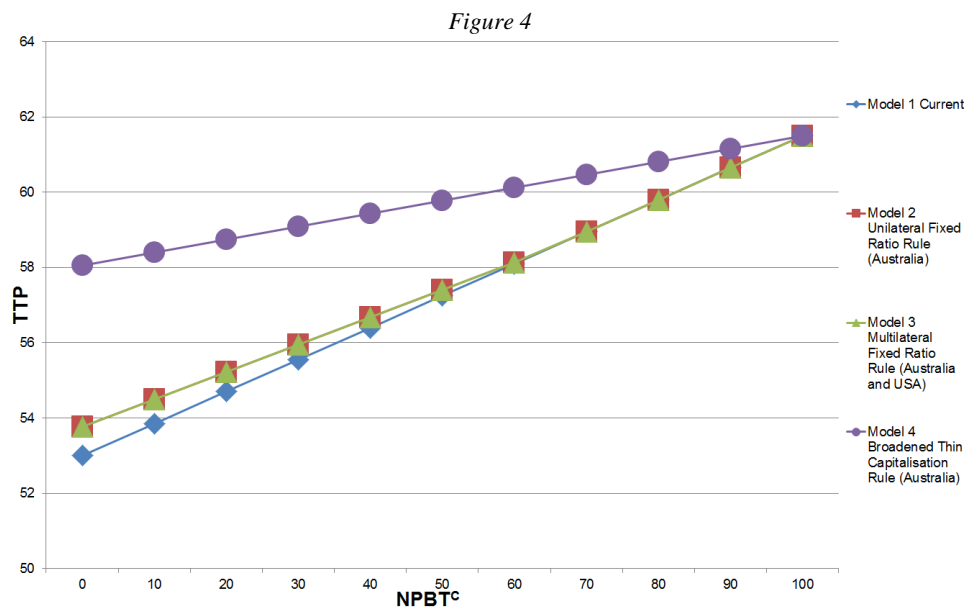


This finding has significant international tax policy implications; indicating that broadening the scope of existing thin capitalisation rules may be a highly effective reform alternative to the OECD’s BEPS Recommendation. This results in two-fold tax policy advantages from a simplicity perspective. First, the relative ease of implementation since it can be built on the already-existing domestic rules and tax treaty network; and second, no transition issues as would be associated with implementing a more ‘fundamental’, ACE-inspired reform.

## 6 CONCLUSION

This paper approaches the taxation of MNEs from a novel perspective. Given the mobility and fungibility of cross-border intercompany activities, this paper establishes a framework to explore a utility-optimising MNE's behavioural responses to the international tax system. It analyses the hypothetical, 'utility-optimising' MNE's behavioural responses to laws relating to the taxation of cross-border intercompany activities; specifically, existing thin capitalisation rules against the OECD's BEPS Recommendation on Action 4, by developing an optimisation model.

One of the most surprising findings in relation to the existing thin capitalisation regime is that the hypothetical MNE is indifferent to the existence of and/or variation in thin capitalisation rules. Further, the hypothetical MNE is also indifferent between the unilateral and multilateral implementation of the OECD's BEPS Recommendation – with both reforms resulting in an increase in total tax payable by the MNE, most markedly for the most tax aggressive MNEs. However, the most noteworthy finding in this paper is that a broadened thin capitalisation rule is more effective at protecting a jurisdiction's tax revenue base than the OECD's BEPS Recommendation. These results are summarised in the below Figure 4.



Accordingly, the model developed in this paper confirms the economic literature on the merits of eliminating distortions by presenting the foundations for a broadened thin capitalisation regime as an alternative to existing thin capitalisation rules. This proposal constitutes the first of three reform proposals developed by the author. Further research and the remaining proposals will derive from simulations of the allowance for corporate equity (ACE), a comprehensive business income tax (CBIT) and a combined ACE-CBIT. This combined with subsequent legal comparative analysis carried out by the author will form the basis for suggested improvements to existing tax regimes.