

PRACTICAL VALUATION OF RISK TRANSFER IN ADVANCE PRICING AGREEMENTS¹

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Abstract

A recently published paper argues that Advance Pricing Agreements adopting the Comparable Profits Method or the Transactional Net Margin Method, overlook the risk transferred from the tested party (subsidiary) to the party related to the transaction (parent) - a shift caused by fixing the profitability of the tested party. In this paper, we propose a practical implementation methodology to estimate the model parameters and discuss the theoretical and practical reasons for our proposed method. Finally, we also provide numerical examples demonstrating the mis-allocation of profits and taxes. According to our examples, fixing the profitability level of a manufacturer equals a shift of 0.5% of its profitability, while fixing the profitability of a management entity means a shift of 0.85% of its profitability. These amounts can be significant on aggregate levels.

JEL classifications: G38, K29, K34, M42

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1. INTRODUCTION

An advance Pricing Agreement (APA) is a long-term agreement signed between at least one tax authority and a Multinational Enterprise (MNE) according to which, both sides agree on the future pricing of a cross-border intercompany transaction for a specified number of years. As long as the MNE prices its related transactions according to the APA, the tax authority agrees to accept this price as the arm's length price for the duration of the APA.

The pricing of intercompany transactions (sometimes referred to as "related transactions" or "internal transactions") is called "Transfer Pricing" (or "TP"). While determining its value for internal reasons, TP influences the profitability of the parties to the transaction. When both related parties reside in different tax jurisdictions, it can affect tax revenues. For this reason, TP regulations around the world require cross-border intercompany transactions to be priced at arm's length (as if the transaction was between two unrelated parties).

Naturally, any cross-border transaction involves at least two tax authorities. Therefore, it is possible that when setting a transfer price, while the MNE is in compliance with TP regulations in one jurisdiction, it is not in compliance in other jurisdictions. In such case, the MNE may elect to sign a unilateral APA (UAPA) with one tax authority, a bilateral APA (BAPA) with

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two tax authorities, or a multilateral APA (MAPA) with more than two tax authorities for a transaction that is between more than two entities.

TP regulations around the world are similar and based on the arm's length principle, in which related transactions should be priced as if the parties to the transaction are unrelated. Usually, TP documentation compares either prices or profitability. When data is available, the taxpayer can comply with TP regulations by showing that the transfer price is similar to that of comparable transactions made between unrelated parties. Alternatively, if data on prices of similar transactions is not available, the TP documentation would compare the profitability of one entity (the Tested Party) to a range of profitability levels of similar companies that operate in the same industry, engage in the same activities, and bear similar risks.

It is common knowledge among TP practitioners that most related transactions are unique, in the sense that comparable transactions are hard, if not impossible, to find. Examples are the transfer of rights to use certain intellectual property, or the sales of some patented device, or a pharmaceutical formula. Consequently, in most cases of TP documentation, the chosen method for the analysis is based on a comparison of profitability rather than prices. For the same reason, profit-based comparison is also applied in most APAs. While a contemporaneous (annual) TP documentation analyzes transactions that were already made in the past, an APA locks the future profitability level of a chosen tested party for the duration of the agreement.

Afik and Lahav (2014) argue that this practice contradicts the arm's length approach because such fixing of a company profitability level for a number of years is analogous to a free insurance policy that eliminates the risk of incurring a loss. TP regulations require that the comparable companies bear the same risks born by the tested party. When searching for comparable companies, TP analysts cannot find firms that are protected from profitability fluctuation risk because such risk can be avoided only by entities that entered a long term APA. Such firms cannot, of course, be used as comparable companies as a reference for arm's length trades because they are involved in intercompany transactions.

This inconsistency is settled by the model suggested by Afik and Lahav (2014). Building on their work, in this paper we show how to practically apply the model and estimate its parameters. We also provide two numerical examples that demonstrate the practicality, importance, and effect of the model.

Other papers also suggest modifications to APAs. Tomohara (2004) measures efficiency losses and proposes that tax authorities negotiate in order to split tax revenues between jurisdictions. Broomhall (2007) criticizes the dependence on the past performance to determine future prices and suggests a moving average as a measure of profitability. Broomhall also suggests linking performance of the tested party to its parent or to relevant stock indexes. Finally, Felgran et al. (2009) propose that transfer prices for APAs would be adjusted during economic downturns.

The rest of the paper is structured as follows: Section 2 presents transfer pricing regulations and APAs, Section 3 describes the profit fixing valuation model, Section 4 presents the details of the model parameter estimation, Section 5 demonstrates the model application on two examples, and Section 6 discusses the results and concludes.

2. TRANSFER PRICING REGULATIONS AND ADVANCE PRICING AGREEMENTS

TP regulations change from country to country, as each structures its own regulations based on its financial needs and on its political and industrial structures. However, most countries implement either the U.S. regulations as specified in section 1.482 of the U.S. department of treasury regulations (“U.S. Treas. Regs. 482”) or the Transfer Pricing Guidelines for Multinational Enterprises and Tax Administration specified by the OECD (“OECD Guidelines”).⁴ These two sets of regulations specify several methods available to the MNE to document the appropriateness of its transfer prices. Used both in APAs and in contemporaneous documentation, these methods can be divided into two groups: price-related (i.e., the Comparable Uncontrolled Price/Transaction, the Cost Plus and the Resale Price methods) and profit-related (the Comparable Price Method – or CPM – and the Profit Split Method). Since most related transactions involve proprietary products or services, the most common method used is the CPM/TNMM.⁵ According to these two methods, at least one side to the transaction (the tested entity) should earn a profitability level⁶ that lies within a range corresponding to similar companies that engage in similar activities, operate in similar environment and bear similar risks as the tested entity.

The first official APA was signed in Japan by the Japanese National Tax Association (NTA) in 1985. Soon to follow were the tax authorities of the U.S. (IRS) in 1991, Canada (CRA) in 1994, and Australia (ATO) in 1995.⁷ According to annual reports published by the U.S. APA program, the number of APAs in the U.S. is increasing annually. This is not surprising, considering the complexity inherent in navigating cross-border tax issues. Indeed, the main advantage of entering an APA lies in its main objective - to reduce the costs and risks associated with tax compliance⁸. A taxpayer that signs an APA ensures a transfer pricing arrangement accepted by the tax authority (and therefore free from risk of dispute by the tax authority) for several years, as long as the taxpayer follows the requirements laid out in the APA. In addition, the tax authority usually agrees to a ‘rollback,’ whereby the APA is implemented retroactively for the fiscal years during which the taxpayer negotiated its APA. This is highly advantageous to taxpayers who agree to enter the APA program as a result of an existing audit. In such a case, the tax authority would most likely agree to the taxpayer's request to apply the APA to the audited period. De Waegenare et al. (2007) show that MNEs are more likely to enter an APA when the tax difference between jurisdictions is relatively high and the amount of tax subject to double taxation is relatively low.

However, this is not the only advantage. It is possible that a taxpayer would be audited by more than one tax authority. In such cases, occasionally what is adequate for one tax authority is

⁴ See Internal Revenue Services (2006) and Organisation for Economic Co-operation and Development (2010), respectively.

⁵ The CPM is specified in the U.S. Treas. Regs., while the equivalent, almost identical, Transactional Net Margin Method – or TNMM – is specified in the OECD Guidelines.

⁶ Transfer pricing regulations specify several profit level indicators (PLIs). The operating margin is the ratio of operating profit to revenues. The Net cost plus ratio is the ratio between operating profit and total cost (cost of goods sold and operating expenses). Return on assets is the ratio of operating profit and total assets. The Berry ratio is the ratio of gross profit and operating expenses. Regulations also allow other unspecified PLIs when appropriate.

⁷ See Borkowski (2000, 2008) for historical review of APAs.

⁸ This is known among TP practitioners involved with APAs, and insinuated in several papers, e.g. Felgran et al. (2009) and Fan (2008).

insufficient for another. By signing either a BAPA or MAPA, the taxpayer can avoid this problem. Another advantage is that the APA changes the relationship between the tax authority and the taxpayer, who work together during the preparation of the APA. Such collaboration with the tax authority can be highly beneficial to the taxpayer when it is audited by another tax authority. In addition, the taxpayer's risk is further reduced because there is a pre-filing process during which the taxpayer can still opt out without scrutiny by the tax authority.

There are also inherent disadvantages to arranging an APA. First, the process is long and costly. The economic and business analyses are much more rigorous than the average annual documentation, and consequently, they demand more resources such as manpower and the use of proprietary databases. Second, because of this strict analysis, the taxpayer is more exposed to the tax authority, as it reveals more confidential information such as production expenses and the real values of intangible assets, among other closely guarded information. Although the tax authority is obliged under the APA not to use this information in other cases, there is always the fear that it will be used inappropriately by the tax authority in future audits. Additionally, there is always a chance that the tax authority will disagree with the transfer pricing method suggested by the taxpayer. Under these conditions, the taxpayer can always choose to withdraw from the program, but in doing so, it forfeits the money and effort it already invested in the program.

The American and Canadian APA programs issue (separately) annual reports documenting the activity of each program. According to the U.S. annual report of 2015 (issued on March 31, 2016), a total of 2,147 applications have been filed since the program was initiated in 1991, including 183 APA applications filed in 2015. Since 1991, 1,511 APAs were executed, of which 110 were executed during 2015. Of this total, 539 are UAPAs, 958 BAPAs, and 14 MAPAs. On the other hand, 211 applications were either revoked, cancelled or withdrawn since 1991, 10 of them during 2015. The difference between the numbers of submissions and executions indicates how much time it takes, on average, to execute an APA. According to the 2015 report, APA execution takes on average 34 months, while the average duration of an actual APA is about seven years.

According to the U.S. report, 81% of the covered transactions in the APAs executed during 2015 were analyzed using the CPM as the transfer pricing method. Adjusting for the number of APAs executed over the years means that approximately 1,746 entities were given profit guarantees 'for free' for an average duration of approximately six years.

3. A MODEL OF PROFIT MARGIN GUARANTEE

In this section, we briefly describe the model of Afik and Lahav (2014). The model is based on an MNE with a local parent company and a foreign subsidiary. To avoid TP compliance conflicts, the parent agrees to enter into an APA program with the tax authority, and the two sides agree to use the CPM/TNMM as the transfer pricing method and the profit margin (defined as EBITA divided by revenues) as the PLI.

After negotiations, the MNE and the tax authority agree on a profit margin θ^0 that the foreign subsidiary will earn annually in the next T fiscal years. Any deviation from this PLI at a given year t to, say, $\theta_t \neq \theta^0$ will result in a cash transfer between the two related entities to regain θ^0 . Fixing the profitability level of the subsidiary, the parent absorbs the operating margin risk originally faced by the subsidiary. This transfer of risk can be considered as a hidden benefit (τ) that should also be priced. Instead of earning θ^0 on each unit of local currency revenues,

the subsidiary should earn $\theta^0 - \tau$, where τ represents the premium (a fraction of each dollar of revenues) that the subsidiary should pay for “insuring” its operating margin.⁹ According to the APA:

$$(1) \quad \theta^0 = \frac{R_t - C_t + x_t}{R_t} = \theta_t + \frac{x_t}{R_t}$$

where C_t is the subsidiary’s total cost incurred in the tested transaction, R_t is the transfer price, θ_t is the uninsured subsidiary’s operating margin and x_t as the amount the parent pays to the subsidiary at the end of year t to achieve the fixed profitability level.¹⁰ To be able to fix its operating margin and avoid risk, had it dealt with a third party, the subsidiary would be willing to pay a premium, P_t , and the profit margin of the subsidiary would then be:

$$(2) \quad \hat{\theta} = \frac{R_t - C_t + x_t - P_t}{R_t} = \theta_t + \frac{x_t}{R_t} - \frac{P_t}{R_t} = \theta^0 - \tau$$

Now, each relevant cash flow is discounted with a proper risk-adjusted discount rate. Starting with a single period model, because τ and θ^0 are fixed by definition and θ_t is a stochastic outcome, the present value of the APA cash-flow results in:¹¹

$$(3) \quad \frac{\tau}{1+r_f} = \frac{\theta^0}{1+r_f} - \frac{E[\theta_t]}{1+k}$$

where r_f is the risk-free rate, and k is the risk-adjusted rate appropriate for the random future profit, and can be estimated by:

$$(4) \quad k = r_f + \beta(r_M - r_f)$$

where r_M is the market expected return and $\beta = cov(r_M, r_s) / \sigma_M^2$, r_s is the returns on the subsidiary stocks, and σ_M^2 is the variance of the market returns.¹² Rearranging Eq. (3), the premium can be calculated as follows¹³:

$$(5) \quad \tau = \theta^0 - \frac{(\theta^0 - \Delta\theta)(1+r_f)}{1+r_f + \beta(r_M - r_f)}$$

Extending the model to T periods, the annual premium in a multi-period model is:

⁹ The model assumes that the subsidiary provides a proprietary intermediate good or service and that its sole customer is the parent company.

¹⁰ If the operating margin of the subsidiary is higher than the agreed value, then $x_t < 0$.

¹¹ Formally both sides of equation (3) are multiplied by one unit of revenues, thus the equation represents an equality of discounted cash-flows and not of rates.

¹² r_s should formally be the relative changes (returns) of the subsidiary’s profit over time, for which we believe the best practical proxy is its equity returns. See more details of beta estimation in Section 4.

¹³ The model allows the targeted operating margin of the APA to be different than the average historical operating margins of the subsidiary by setting $\theta^0 = E[\theta_t] + \Delta\theta$, where $\Delta\theta$ represents any deviation from the expected value.

$$(6) \quad \tau_t = \theta^0 - (\theta^0 - \Delta\theta) \left[\frac{(1+r_f)}{1+r_f+\beta(r_M-r_f)} \right]^t$$

The term in the brackets of Equation (6) is the market risk factor (*MRF*). We elaborate on this measure and analyze its sensitivity to its components in Appendix A.

Since by definition APAs are long-term agreements, instead of setting a premium τ_t for each period t , an equivalent constant premium (ECP) is:

$$(7) \quad \tau_{ECP} = \frac{\sum_{t=1}^T \frac{\tau_t \cdot R_t}{(1+r_f)^t}}{\sum_{t=1}^T \frac{R_t}{(1+r_f)^t}}$$

where R_t is the expected revenue of the subsidiary for period t .¹⁴ If revenues are expected not to change significantly over time, the ECP becomes:

$$(8) \quad \tau_{ECP} = \frac{r_f}{1-(1+r_f)^{-T}} \sum_{t=1}^T \frac{\tau_t}{(1+r_f)^t}$$

4. PARAMETER ESTIMATION

To apply the model presented above, all of its parameters and variables must be estimated and set. As explained above, θ^0 has to conform to a comparable industry benchmark. However, $\Delta\theta$ is somewhat particular to the specific subsidiary, as it is the difference between θ^0 and the expected profit of the firm $E[\theta_t]$. Unless there is a valid argument otherwise, $E[\theta_t]$ can be assumed to be equal to the subsidiary's profitability in recent years. However, when a technological or a market structural change is verifiable and clearly affects $E[\theta_t]$, then an arm's length valuation must deviate from the historical average.

This section discusses the financial variables, namely, β , r_f , and r_M , of Equation (6). The financial literature often treats their estimation as trivial and avoids discussing the ambiguity and uncertainty involved in their practical use. The following discussion, except where specified otherwise, is based on Damodaran (2010).¹⁵

Choosing r_M

The market return affects two variables in Equation (6), the market risk premium ($r_M - r_f$) and β . As additional information is generally not available (and in accordance with the CAPM), r_M is the expected market return. Whether it should be the global wealth return or an alternative return has been discussed at length by the research community. For example, Fama and French (2004) provide a perspective on the CAPM, including prominent examples of its tests over the years. Roll's critique (1977) raise doubts about the testability of the model and about market

¹⁴ To calculate τ_{ECP} , it is sufficient to estimate the rate of annual change in revenues, as long as it can be estimated in advance, at the time of signing the APA.

¹⁵ Damodaran (2010) discusses at length the pros and cons of the selection of each component and its estimation and includes references to prior research and empirical evidence to support the discussion and recommendations. Repeating the details and depth of Damodaran (2010) is obviously beyond the scope of this paper.

proxy efficiency. Bounds on the deviations from exact CAPM pricing were developed based upon the relative efficiency of the proxy (i.e., its distance inside the mean-variance frontier). Examples of this analysis include Shanken (1987) and Kandel and Stambaugh (1987, 1995). Prono (2009) extends this research. Additional research evaluate the definition of the market portfolio. For example, Jagannathan and Wang (1996) investigate a conditional model of the CAPM (as opposed to a static model) and add the effect of human capital to the market portfolio proxy. We adopt the most popular benchmark widely used by practitioners and academics, as explained above. An often accepted proxy for r_M is the return on a large index such as the S&P 500.¹⁶

While the backwards estimation of beta is based on historically available data, the forward market premium ($r_M - r_f$) remains an unsolved puzzle. Historically, experts of the academic and practitioners' communities have missed in their predictions. The current "common" knowledge is that the premium is around 4.5-6%, yet even this range has no solid scientific basis, and opinions about its validity vary.¹⁷ A proper replacement to the above guesses is a forward-looking implied market premium, such as the one suggested by Damodaran (2011), who estimate a market risk premium of 5.2%.¹⁸

Estimating β

To estimate beta, the common practice in research, and often the choice of practitioners is to use Equation (4) with an appropriate r_s .¹⁹ When the subsidiary stock is traded (and liquid enough), its returns seem the most suitable proxy for its operating profits for the calculation of beta. When the subsidiary's stock data is not available or is improper, the most suitable proxy is the stock of a comparable firm, whose operating environment and size are similar to those of the subsidiary.

Bloomberg calculates beta using weekly returns of the tested asset and the S&P 500 most recent two years of data (this default can be changed to suit user preference). Bloomberg and other beta providers, such as BARRA, quote an adjusted beta, which is a weighted average of Equation (4) estimate and 1. They justify this adjustment by the expectations that in the long-run, a specific firm beta tends to revert to the market beta which equals 1 by definition.

The estimation of beta is usually very noisy. The standard error is often similar in magnitude to that of the estimated beta itself. In corporate finance and valuation, since the time horizon is often 5-10 years and even longer, the practice is to use five years of monthly data,²⁰ which is what we recommend for the APA case.

To reduce the noise in beta estimation, as an alternative to using Equation (4) directly, Damodaran (2010) suggests using instead the average beta of related firms (of the same business sector, with similar characteristics). Because typically, the set of comparable

¹⁶ In certain situations (see, for example, Damodaran 2010) a particular market index may be a more appropriate proxy to the market portfolio. However, often such a choice requires additional adjustments to the expected market premium. These cases are beyond the scope of this paper.

¹⁷ A perspective on the diversity of opinions about this matter is available in Fernandez et al. (2011a and 2011b). The first summarizes a survey on the U.S. market premium and the second explores the market premium demanded in 56 countries

¹⁸ Estimates for the implied market risk premium are available at: <http://pages.stern.nyu.edu/~adamodar/>

¹⁹ See, for example, Bodie, Kane, and Marcus (2009)

²⁰ See, for example, Fama and French (2004) and Damodaran (2010).

companies is relatively small and in line with common transfer pricing practices, we recommend using the median beta, estimated for the subsidiary proxy firms, from the set that is used to form the benchmark profitability. This practice is a solution to most cases of APAs, where the tested party is not traded and its beta cannot be directly estimated.

Choosing r_f

For estimating the historical beta using Equation (4), we adopt the common default choice of 4- or 13-week U.S. T-bills, that are highly liquid and whose data is easily accessible. For r_f in Equation (6), we match the maturity of the risk-free rate with that of the cash flows, following the suggestion of Damodaran (2010), and use U.S. T-bonds with 5-10 years to maturity. When the S&P 500 (index or sub-index) is not r_M and when the currency is not denominated in U.S. dollars, other risk-free rate benchmarks should be considered.

5. APPLICATION EXAMPLES

To illustrate risk transfer valuation under the presented model, we use the hypothetical example of a U.S. car manufacturer (“US Inc.”, or “the parent”) that owns several subsidiaries around the world. For two related transactions, US Inc. is interested in entering into an APA with the relevant tax authorities. The first transaction is the purchase of auto parts from US Inc.’s Canadian subsidiary “Canada Inc.”, a manufacturer of auto parts (“the auto parts transaction”). The second is the provision of management services by the UK headquarters, “UK PLC”, to US Inc. (“the management transaction”). In agreement with the tax authorities, US Inc. uses the CPM in both transactions. Furthermore, the firm agrees that in both transactions, the tested party will be the subsidiary (i.e., Canada Inc. and UK PLC in the auto parts and the management transactions, respectively), and the profit level indicator will be the operating margin. For both APAs, the most recent five years of available financial data is used and the duration of both APAs will be seven years. To ensure availability of financial and other data, and to include some “contraction” years, we use years 2006-2010 for data.

Table 1a: the manufacturing transaction

Annual and multi-annual interquartile ranges and median values of profit margins based on the companies comparable to Canada, Inc. (the first list of Appendix B). Standard deviation is presented in italics.

Fiscal Year	Quartile 1	Median	Quartile 3
2006	2.3%	3.2%	6.3%
2007	0.1%	3.3%	6.7%
2008	-2.2%	3.9%	6.9%
2009	-1.8%	-0.4%	2.2%
2010	2.5%	3.8%	5.6%
2006-2010	-0.3% (2.2%)	2.5% (1.8%)	4.9% (1.9%)

Table 1b: the management transaction

Annual and multi-annual interquartile ranges and median values of profit margins, based on companies comparable to UK, PLC (the second list of Appendix B). Standard deviation is presented in italics.

Fiscal Year	Quartile 1	Median	Quartile 3
2006	4.1%	6.0%	9.9%
2007	4.8%	7.6%	12.1%
2008	4.4%	7.6%	12.2%
2009	2.0%	6.1%	7.1%
2010	1.6%	4.2%	6.3%
2006-2010	3.2%	6.3%	7.2%
	<i>(1.5%)</i>	<i>(1.4%)</i>	<i>(2.7%)</i>

In the search for comparable companies, the parent found six Canadian auto parts manufacturers comparable to Canada Inc. and 22 UK management firms comparable to UK PLC.²¹ The lists are presented in Appendix B. Tables 1a and 1b present interquartile ranges and median operating margins for each year for Canada Inc. and for UK PLC, respectively. Beginning with the auto parts transaction, the six companies listed in Appendix B have a median profitability (θ^0) of 2.5% and a median beta of 1.17.²² The five-year T-bond rate is 0.917%,²³ and the market risk premium is assumed to be 5.2%, as explained above. Hence, for Canada Inc., the *MRF* of the Canadian auto parts manufacturer is 0.9372. Assuming that the expected profit of Canada Inc. resembles the median profitability ($\Delta\theta = 0$), substituting into Equation (6), we calculate the annual premium for the seven-year APA (Table 2).

Table 2: Annual Premiums of seven-year APA examples.

Premiums that should be deducted from the profit margins of Canada, Inc. (Auto parts) and of UK, PLC (Management) each year if it enters into an APA with US Inc. ECP (last column) is the equivalent constant premium for the seven-year APA, assuming constant yearly revenues over the duration of the APA.

t	1	2	3	4	5	6	7	<i>ECP</i>
τ_t (<i>Auto parts</i>)	0.14%	0.28%	0.40%	0.52%	0.64%	0.74%	0.84%	0.50%
τ_t (<i>Management</i>)	0.23%	0.46%	0.67%	0.88%	1.08%	1.27%	1.46%	0.85%

To complete the above example, assuming a constant revenue stream, we use Equation (8) to calculate its flat rate *ECP*, which is 0.50% for Canada Inc. This means that for the purposes of the APA, the actual profit margin of Canada, Inc. ($\hat{\theta}$) should be 2.00% and not 2.50%, an adjustment that increases the profit of the U.S. parent accordingly. In terms of tax revenues, the tax authority of the US parent would collect from it higher revenues, on the expense of the revenues that should have been collected from the subsidiary.

²¹ For comparable companies in the auto part transaction, we searched Compustat North America using SIC code 3714 for companies headquartered in Canada. For comparable companies in the management transaction, we searched Compustat Global using SIC codes 874X for companies headquartered in the UK. In both searches, we excluded companies that did not have financial information available for the last five fiscal years or that showed operating losses for more than three years within the last five fiscal years. With regards to the UK management set, we could not find financial information for two companies, therefore we excluded these companies from the final set. See Appendix A for more details.

²² Alternate Fuel Systems (see Appendix B) was acquired and Linamar Corp's price quotes have only been available since mid-2010, and thus we exclude these companies' beta from our sample.

²³ Late December 2011 (source: Yahoo! Finance).

Similarly, for UK-PLC the median profitability (θ^0) is 6.3% and the median beta is 0.743.²⁴ The five-year Gilts rate is 1.06%,²⁵ and the market risk premium is assumed to be 5.2%, as explained above. Hence, for UK-PLC, the *MRF* of the UK management firm is 0.9632. Assuming that the expected profit of UK-PLC resembles the median profitability ($\Delta\theta = 0$), substituting into Equation (6) we find the corresponding annual premiums for the seven-year APA (Table 2). Again, we assume a constant revenue stream and use equation (8) to find the *ECP* (0.85%) for the UK-PLC seven-year APA. This effectively reduces the UK-PLC profit margin from 6.3% to 5.45%, the relevant tax impact of which would be felt by its U.S. parent.

These premia seem significant to us and merit the attention of the regulator, the taxed firms, and their tax consultants.

DISCUSSION AND CONCLUSIONS

We limit our discussion and examples to simple setups to avoid cluttering the exposition with special circumstances and ramifications. However, real cases may not be as simple as the examples above, instead requiring special consideration. In this section, we discuss a few examples showing the potential complexity of APA management.

In the first case, in which the tested party does not reside in a developed market, APA considerations should address issues such as the marginal investor (and the type of portfolio held by the marginal investor). This may lead to beta estimation using a specific market, with country specific risks, where even the relevant local “risk-free” rate of the domestic government bonds may not be risk-free. In such cases adjustments for country risk and currency are required.

The second case is when the guarantor is not a diversified investor, and it is agreed by the firm and the tax authorities that the risky payoffs should be discounted appropriately, accounting for the total risk, including the idiosyncratic risk of the business.²⁶

The third case is subtle, as it links the APA with the tested party's capital structure. A firm's beta depends on its leverage, and as such, the financing decisions of the subsidiary affect the premium τ . In our examples, we assumed that the tested party's leverage is similar to that of its peers. When the financial leverage of the tested party diverges from that of its peer group, or when the parent and subsidiary can easily modify the leverage, the capital structure of the tested party should be considered. Therefore, when our model is used, researchers, practitioners, or transfer pricing analysts may suggest relevant adjustments to account for and even to benefit from this issue.

Like any model, especially in economics and finance, it relies on its underlying assumptions and the accuracy of its variables. To avoid trivial and tedious discussion of these sensitivities, we prefer to present a practical numerical example. However, we also provide the mathematical

²⁴ We deleted Ashley House PLC, Brainjuicer PLC, Hasgrove PLC, Jelf Group PLC, Office2Office PLC, Styles & Wood Group PLC, and Tribal Group PLC due to the short histories of their stock prices and Atkins PLC and Penna Consulting PLC due to questionable liquidity, noticeable by “frozen” prices over periods spanning successive months. For beta estimation, we use the short rate (3 months) UK government bond yield (monthly data from <http://www.bankofengland.co.uk>) and comparable firm stock and FTSE data from Yahoo! Finance.

²⁵ Source: <http://markets.ft.com/research/Markets/Bonds>.

²⁶ This parallels the cost of equity of a private firm that is owned by an undiversified investor. In such cases the proper beta is the market risk beta divided by the correlation of the sector with the market.

expressions for the sensitivity of the premium τ to its various parameters in Appendix A. While θ^0 is a negotiated variable and based on well-established practices followed by practitioners and accepted by the tax authorities, the estimation of beta is notoriously noisy and thus requires special attention.

For a broad perspective about beta we refer to Damodaran, who collects a wide variety of useful data, process it and posts useful results on his website.²⁷ Using his extensive beta calculations of 7,480 firms we calculate a large sample mean and its plus/minus one-standard-deviation range of [0.82, 1.45].²⁸ We use this range to calculate respective ECPs of 0.37% and 0.6% for the auto-part firm and 0.93% and 1.52% for the management firm. Such a simple analysis may provide tax authorities and practitioners with a useful range of ECPs to substantiate their claims and agree on values that are founded on facts despite the noise and uncertainty of the specific parameter values.

This paper sheds light on an economic aspect of APAs which seems to have been ignored by researchers and practitioners until Afik and Lahav (2014). They show that in addition to the high cost of an APA, negotiating profits in advance creates an obscure expenditure to the parent company. Fixing a future profit margin of a subsidiary is an insurance policy whose cost is overlooked. Obviously, such a service that the parent provides its subsidiary for free is not an internal matter of the MNE under the arm's length approach, it has consequences which concern policy makers and regulators. While Afik and Lahav (2014) seem to be the first to raise this issue and to provide an economic model to evaluate the arm's length cost of this insurance to the parent company, the current paper focuses on the practical implementation of the model and its parameters' estimation.

As of this writing, unlike similar intercompany services such as loans and guarantees, the cost of profit level insurance is ignored, meaning that one country is gaining tax revenues at the expense of another. This paper presents a methodology to practically apply Afik and Lahav (2014) model for pricing such a service, adhering to arm's length principles, when profit-based methods are used. However, critics may argue that the pricing of such a service is negligible and therefore not worth the analysis effort. There are three answers to this argument. The first lies in the amounts. We provide two examples that show the opposite. Neglecting the cost of the profit fixing service results in shifts of pretax profit from one country to another of 0.5% and 0.85%. Hence, significant additional tax revenue can potentially be collected from such profit increments. To enforce our point, we cite the research of Clausing and Lahav (2011), who computed the foreign taxable income of 50 'Fortune 100' companies. They found that the aggregate foreign taxable income was approximately \$202.6 billion during fiscal year 2007, which means an average foreign taxable income of approximately \$4 billion per company. Assuming a premium of 0.5%, the transfer of taxable income was approximately \$20.3 million. Assuming an effective tax rate of 35% (if, for instance, the parent resides in the U.S. and the subsidiary is abroad), the additional tax revenue to the IRS would have been approximately \$7.1 million per company per year. We are aware that MNEs do not enter into APAs for all of their intercompany transactions, yet APAs will likely involve at least the most important, and therefore larger, transactions, thus resulting in a material tax revenue effect.

²⁷ http://www.stern.nyu.edu/~adamodar/New_Home_Page/data.html

²⁸ These values are for levered beta. It is likely that management firms are only slightly levered and thus their betas are lower than this range. The mean of the large sample is 1.134, it is an equally weighted average, unlike the market beta which is a value weighted average.

The second answer is tax uncertainty which MNEs face. In March 2017, the International Monetary Fund (IMF) and the OECD issued a report, addressing the G20 leaders' concerns about tax uncertainty and its impact on cross-border trade and investment (at their September 2016 summit in Hangzhou, China). The IMF/OECD report (OECD and IMF, 2017; henceforth: "the Report") acknowledges the tax uncertainty risk and its negative effect on international trade and investment. The Report suggests four remedies: (i) reducing complexity of legislation; (ii) increasing consistency by tax administrations; (iii) creating effective dispute resolution mechanisms; and (iv) reducing tax uncertainty on the international level. Of all these four ideas, only the last one seems practical, and the first step to reduce tax uncertainty according to the Report is to engage in early resolution procedures such as APAs. The Report therefore acknowledges the role of an APA as a procedure aimed at reducing the risk of uncertainty. In economic theory, this role should be priced.

Finally, of particular interest is economic recession periods. From time to time, economies enter into periods of distress, in which many companies incur losses that may even result in bankruptcy. Some of these companies are potential comparables of tested entities in an APA conducted a few years back. While the arm's length principle dictates that these tested entities would also experience lower profits or even incur losses like their comparables, their APAs protect them from losses and this protection is backed by tax authorities.²⁹

The valuation model of Afik and Lahav (2014) and our application methodology rely on financial theory and conventions that are widely used and accepted by academics, investors, accountants, and economic and business consultants around the world. It is straightforward and when needed may be quite easily adapted to fit the specific settings, exhibiting a flexibility that is essential for APAs as these are factual and often depend on the interpretations of the negotiating parties.

This work leaves a few open issues that need further study such as those we list in the beginning of this section. However, we believe that the methodology presented in this paper is appropriate for many intercompany transactions around the world, and we encourage both MNEs, policy makers, regulators, and transfer pricing professionals to implement it to preserve the arm's length approach and to promote the accuracy and reliability of the tax systems.

²⁹ Interestingly, during contracting years, when filing for an APA, tax authorities may request that the interquartile range of profit level indicators consist of previous rather than recent years, arguing that financial data from the recession years are not representative of long-term profitability.

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APPENDIX A: SENSITIVITY OF THE PREMIUM TO ITS COMPONENTS

To complete the exposition of the model in Equation (6), we now analyze its properties using simple comparative statics. We first define a market risk (adjustment) factor MRF as follows:

$$i. \quad MRF = \frac{(1+r_f)}{1+r_f+\beta(r_M-r_f)}$$

Since MRF affects the derivatives in Equations (ii) – (vi), it deserves a closer look. The expression in Equation (i) is the risk-free discount factor over the risk adjusted discount factor (appropriate for the expected profits of the subsidiary). Hence, in a world of risk-neutral investors, $MRF = 1$ and $\tau_t = \Delta\theta$. The same result is obtained when $\beta = 0$ (i.e., the profit risk is uncorrelated with the market risk and is therefore perfectly diversifiable by large investors). In this case, it does not warrant a risk premium above the deterministic $\Delta\theta$. The case of $\beta < 0$ is that in which the subsidiary profits hedge the market risk, thereby reducing the risk of the parent (and of an arm's length diversified investor), ultimately lowering the premium. Naturally, we relate to the vastly common cases where $\beta > 0$ resulting in $0 < MRF < 1$.

The following are simple partial derivatives of Equation (6) using MRF for convenience. We start with the effect of θ^0 on the premium:

$$ii. \quad \frac{\partial \tau_t}{\partial (\theta^0)} = 1 - MRF^t = 1 - \frac{\partial \tau_t}{\partial (\Delta\theta)}$$

When $MRF = 1$ (i.e., risk-neutral investors or fully diversifiable profit risk), τ does not depend on θ^0 . Otherwise, in the common case, τ positively depends on θ^0 because a higher profit margin implies higher expected annual payments on behalf of the parent. This dependence, however, increases as MRF decreases.

Since β is a “noisy” estimate statistically, its estimation method deserves special attention.¹ Equation (iii) describes the influence of β on the premium – it is positive and diminishing with β . In addition, higher levels of θ^0 also increase the effect of β on the premium for reasons discussed above.

$$iii. \quad \frac{\partial \tau_t}{\partial \beta} = t(\theta^0 - \Delta\theta) \frac{r_M - r_f}{1 + r_f} MRF^{t+1}$$

The market premium and β product affects the valuation formulas (5) and (6), and their related sensitivities are similar:

$$iv. \quad \frac{\partial \tau_t}{\partial r_M} = \frac{\partial \tau_t}{\partial \beta} \frac{\beta}{r_M - r_f} = t(\theta^0 - \Delta\theta) \frac{\beta}{1 + r_f} MRF^{t+1}$$

¹ See, for example, Damodaran (2010) and our discussion below on parameter estimations and practical implantation matters.

The higher the risk premium $r_M - r_f$ is, the higher the systematic risk to the parent, and therefore, the premium requirement is higher. As expected, this connection is increasing with β and with the target profit margin θ^0 . On the other hand, the premium's sensitivity to the risk free rate is negative. This sensitivity is included here for completeness:

$$\text{v.} \quad \frac{\partial \tau_t}{\partial r_f} = -(\theta^0 - \Delta\theta) \frac{MRF^t}{1+r_f} [1 + MRF(\beta - 1)]$$

The sensitivity of the premium to the time horizon is described in Equation (vi):

$$\text{vi.} \quad \frac{\partial \tau_t}{\partial t} = -(\theta^0 - \Delta\theta) \cdot \ln(MRF) \cdot MRF^t$$

In normal circumstances, $MRF < 1$ and thus τ increases as t grows. The rate of increase depends on θ^0 .

APPENDIX B: LIST OF COMPARABLE COMPANIES

- a. Manufacturing (Canada)
 1. Alternative Fuel Systems (AFX.V)
 2. Automodular Corp (AM.TO)
 3. Linamar Corp (LIMAF)
 4. Magna International Inc (MGA)
 5. Pacific Insight Electronics (PIH.TO)
 6. Westcast Industries (WCSTF)

- b. Management (UK)
 1. Management Consulting Group*
 2. Interior Service Group PLC (ISG)
 3. Savile Group PLC (SAVG)
 4. Serco Group PLC (CRP)
 5. Christie Group PLC (CTG)
 6. Huntsworth PLC (HNT)
 7. Mitie Group PLC (MTO)
 8. Mears Group (MER)
 9. Penna Consulting PLC (PNA)
 10. Atkins PLC (ATK)
 11. Parkwood Holdings*
 12. Tribal Group PLC (TRB)
 13. Mouchel Group PLC (MCHL)
 14. Office2Office PLC (OFF)
 15. Begbies Traynor Group PLC (BEG)
 16. Jelf Group PLC (JLF)
 17. Driver Group (DRV)
 18. Altitude Group PLC (ALT)
 19. Styles & Wood Group PLC (STY)
 20. Hasgrove PLC (HGV)
 21. Brainjuicer Group PLC (BJU)
 22. Ashley House PLC (ASH)

* missing ticker and stock price data. We did not include these companies as comparables.