Diploma Thesis

Intellectual Property in Financing Contracts

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Abstract:

This paper analyses the use of intellectual property in financing contracts. It defines intellectual property assets as the codified, physical, fungible representation of an intangible asset. Such intellectual property assets have two functions: there primary use is to serve as property right on the usage of the intangible asset, there secondary use is as representation of future cash flows resulting from the intangible asset. Under the condition that primary and secondary function can be separated, financial instruments can be constructed from the latter. Such instruments have certain properties that distinguish them from other financing instruments. First, their valuation is still an unresolved question, why this paper sketches and comments the valuation techniques in use today. Second, markets for intellectual property assets are still small and illiquid. The institution of the intellectual property assets intermediary therefore is introduced. Having found a price for the asset and a marketplace, this paper finally introduces the existing instruments for financing.

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"Financiers are finally addressing the economy's shift to

the production of intellectual assets."[1]

Frank J. Fabozzi,
Frederick Frank Adjunct Professor of Finance
Yale University

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[1] Quoted in Clark (1997), pp. 50

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Acknowledgements

Intellectual Property's Second Nature

It is commonplace that the financial environment becomes more complex almost every day. With Basel II setting higher standards on rating, debt financing for small and medium sized companies is changing. Meanwhile, sector composition in Europe is evolving towards the tertiary sector and towards industries where high-skilled labour is predominant. Companies in these industries very often have only comparatively little tangible assets, their success bases on knowledge and ingenuity; intangible assets which until recently were not considered suitable for use in financing contracts.

But while the classical debt finance instruments become more expensive and / or harder to come by for smaller companies,[2] the financing need to support upcoming projects becomes the longer the more pressing, because establishing a new product[3] or a new brand[4] becomes more expensive. It is thus important to search for new sources of financing for companies in these sectors.

This paper's main focus lies in novel uses of intellectual property assets (IPAs) in financing instruments. IPAs are defined as the physical representation of an intangible asset, and can

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[2] Bessler, Bittelmeyer, Lipfert (2003), pp. 310

[3] DiMasi, Hansen, Grabowski (2003), pp. 154

[4] Wood (1995), pp. 553

be transferred from one individual to the other. Yet not all intangible assets can be easily transformed into intellectual property assets. Therefore the paper first categorises those kinds of intangible assets suited for the transformation into IPA and the use in financing contracts.

In a second part, having defined suitable assets, the paper turns to the valuation of these assets. Only with a well-defined price it is possible to derive the value of such assets in financing contracts. However, the valuation of the various forms of intangible assets is a very complex problem - on the valuation techniques of brands alone, there have been written a great number of papers all in their own light. This paper thus can only sketch the most important basic valuation approaches.

In a third part, the paper tries to catch a glimpse of the future. What would be needed to use intellectual property most efficiently in its new role as an underlying for a financing instrument? Here, the paper focuses on the role of the IPA intermediary. It summarises and classifies its purposes and tries to sketch out its main characteristics and possible structures.

In a fourth and last part the paper finally turns to the various instruments intellectual property assets can be used in to finance companies and projects, and tries to give a comprehensive overview of the available instruments.

Defining Intellectual Property Assets

Looking at the current literature, there is no clear cut, unequivocal definition of the term 'intellectual property'. Although several authors have proposed possible definitions, the consensus remains somewhat diffuse.[5] This paper defines intellectual property assets as the well-codified, fungible representation of an intangible asset. It thus emphasises the denotation 'property', the importance of proper property rights and their excludability.

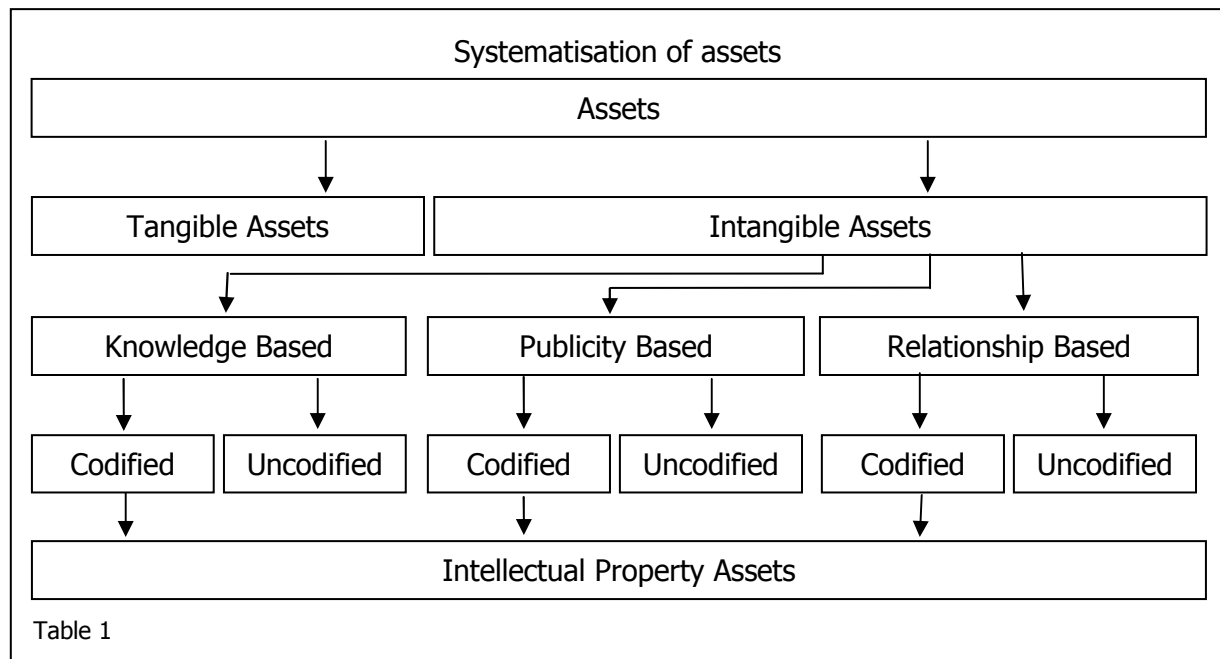## *Classifying Intellectual Property*

On the uppermost level, assets can be divided into tangible and intangible assets. Intangible assets in turn can be distinguished according to what component determines the value of the asset. This paper distinguishes three types of intangible assets:

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[5] Bessler, Bittelmeyer, Lipfert (2003), pp. 312

- knowledge based intangibles:

  like patents, licenses, copyrights, process structures, know-how, trade secrets etc.

- publicity based intangibles:

  like trademarks, brands, public awareness, history, longevity, positive (or negative, rather a liability though) news coverage etc.

- relationship based intangibles:

  like client information, long term client relationships, supply side networks, customer confidence etc.

In the literature, intellectual property and intangible assets are often closely related to human capital. It may be necessary to explain, why this paper does not follow this distinction. First, human capital is more like the means of production that generate the intangible assets which can then be transformed into intellectual property. Arguably, some intangible assets are very closely related to human capital, are more or less inherent in the person that created the asset (e.g. the relationship between client and advisor in the higher tiers of a bank, where it is not unusual for the advisor to take the clients with her if she changes her employer) . However, many intangible assets, which were produced from the human capital the company possesses, are easily separated from their creators and can be readily codified, securitised and used in financing contracts. Second, in most circumstances the company is unable to trade human capital explicitly. Thus, those intangible assets strongly entwined with the person who created them, are hardly qualified to be codified and used in financing contracts.

In each of the three groups, assets can be codified or not. Codified means, that the intangible asset is represented by a tangible, formal document or other physical structure. Such codified assets can change ownership by trading their physical representation, thus are fungible, which in principle makes it possible for them to serve as collateral or security, i.e. to be used in a financing contract. Codification of an intangible asset is closely related to securitisation, but is more general. The codification of intangible assets also encompasses the transfer into physical structures other than securities: the knowledge of information about clients a company possesses are an uncodified intangible asset; codification of this asset may mean establishing a client relationship management data base with a hard-disk or other data storage device as physical representation. Such codified assets, i.e. physical representations of intangible assets, are in this paper called intellectual property assets.

Systematisation of assets

Assets

Tangible Assets	Intangible Assets

Knowledge Based	Publicity Based	Relationship Based

Codified	Uncodified	Codified	Uncodified	Codified	Uncodified

Intellectual Property Assets

Table 1

Why Intellectual Property Is Different

Canonically, any good can be categorised along two dimensions: excludability and rivalry. Excludability means that any given individual can be excluded from the use of the good at reasonable cost. This in turn means that it is easy to charge all users of a good for their consumption. Those who do not want to pay the price cannot consume the good. Rivalry means that the consumption of the good by one individual prohibits the consumption of the good by anyone else: the consumption of the good destroys the good.

Classification of goods: rivalry and excludability		
	rival in consumption	*not rival in consumption*
excludable	**private goods** e.g. bananas, cars	**natural monopolies** e.g. toll roads, cable TV
not excludable	**common goods** e.g. (congested) toll-free roads	**public goods** e.g. national defence

Table 2

Basic economic theory, more precisely the first welfare theorem, claims that normal market mechanisms lead to Pareto efficient outcomes – but only with private goods. If a good is either not excludable or not rival in consumption, markets may not produce a Pareto efficient outcome if left to themselves. But to use intellectual property in a financing contract means

subjecting it to market forces (in the market for collateral and / or securities). Yet economically, such use only makes sense, if the outcome is expected to be efficient, thus if intellectual property can be classified as a private good.

Intangible assets are per se not a private good. As an example, take the formula for a potent pharmaceutical drug. Once the formula is discovered, it is difficult to protect the knowledge of the formula from competitors. While it is very costly to find such a formula and bring a new drug to the market – a recent study has estimated the capitalized costs upon market introduction of a new drug to about USD 800 million[6] – it is comparatively cheap to analyse the drug and copy it. Generalising, intangible assets are often not excludable.

Furthermore, empirical studies suggest that only about one third of all research projects undertaken in pharmaceutical companies cover average development costs.[7] Without market intervention, each individual competitor in the drugs market has a strong incentive to wait for any other competitor to develop a new drug and look if the product is a market success before entering the market, thus taking a share of the profits while leaving the inventor to bear development costs. This creates a classical free riding problem and will canonically lead to an undersupply of new drugs, if the intangible assets are not excludable.

Looking at the second dimension, rivalry, the answer is not so clear cut. Continuing the example of the drug formula, there is at first glance no rivalry in consumption, as the use of the formula to produce e.g. one pill of the new drug does not hinder any competitor to produce another pill with the same formula. However, a patient only needs a certain dose of the drug. Once the patient consumed the required dose (say, one pill), he will not consume the drug of any competitor. Thus, for the producers of the drug, there is rivalry in the "consumption" of consumers. But there are also intangible assets, which clearly are not rival in consumption. Take e.g. a client information database, which may allow banks to asses the credit rating of a prospective client better.

Regulators have developed means to cope with the excludability problem. Copyrights, patent law and trademarks are some examples of how regulators allow inventors to establish property rights on their intangible assets and thus create excludability. In fact, establishing

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[6] DiMasi, Hansen, Grabowski (2003), pp.

[7] Grabowski, Vernon, DiMasi (2002), pp. 23

excludability is the primary use of intellectual property assets. This paper will refer to the excludability right of the IPA as its primary aspect.

Intellectual Property In The Firm

Intangible assets are an important part of the capital of any firm. Trade secrets, client relationships or brand names are the foundation of many a company's success. As indicated before, the codification of intangible assets as copyrights, patents or trademarks primarily creates property rights on these assets, thus makes their use excludable. This use of intellectual property assets, the protection of the intangible asset against competitors, may be called their primary use or the primary aspect of the IPA. Until the recent past, this primary use of intellectual property assets was also the only use of it. Intellectual property assets were not something to be used other than as a property claim on intangible assets. The purpose of intellectual property assets was to ensure that the cash flows generated from the commercialisation of the intangible asset (whereof the intellectual property asset was the physical representation) went to the creator of the intangible asset, not some free-riding competitor.

Yet, since the 1990s, gradually a secondary use of intellectual property assets has arisen: the use of IPAs as collateral or underlying in a financing contract. The use of intellectual property in financing contracts is a new field, which only now begins to develop slowly, coming from the United States.

For this to be possible, a separation is necessary between the usage right of the intellectual property and the property claims on future cash flows resulting from the use of the intellectual property. This paper refers to the property rights in future cash flow resulting from the commercialisation of the primary aspect of the IPA as the secondary aspect of the IPA. Often, the primary usage right cannot be transferred, because the company uses the intellectual property in its own production. Only if the interest in future cash flows can be separated from the excludability function of the IPA, a broader application in financing contracts is possible. Thankfully, in the past, the financial community has shown much ingenuity in securitising all kinds of assets. It seems a reasonable assumption therefore, that such separation will be accomplished, where it should not already be achieved.

Such use of IPA in financing contracts is desirable, because it allows the allocation of resources according to the need and wishes of both investors and the owner of the IPA. An innovative company faces one major problem inherent in all businesses, but which is more

pronounced with firms who have a strong knowledge foundation: there is a time lag between the initial expenses to start a new project and finally earning revenues from commercialisation. In addition, revenues are often dispersed heavily over time, while expenses occur as lumps, e.g. for funding a new research and development project.

Taking e.g. a semiconductor company that holds the patent on a certain kind of computer chip and has licensed this patent to one of the major chip producers. Over the next years, i.e. over the lifetime of the patent, the major chip producer has to regularly pay license fees to the semiconductor company. Yet the semiconductor company will want to develop a new product, which requires quite a lot of capital up front.

Cash flow mismatch for innovative companies

license fees

R&D costs for new project

Time

Table 3
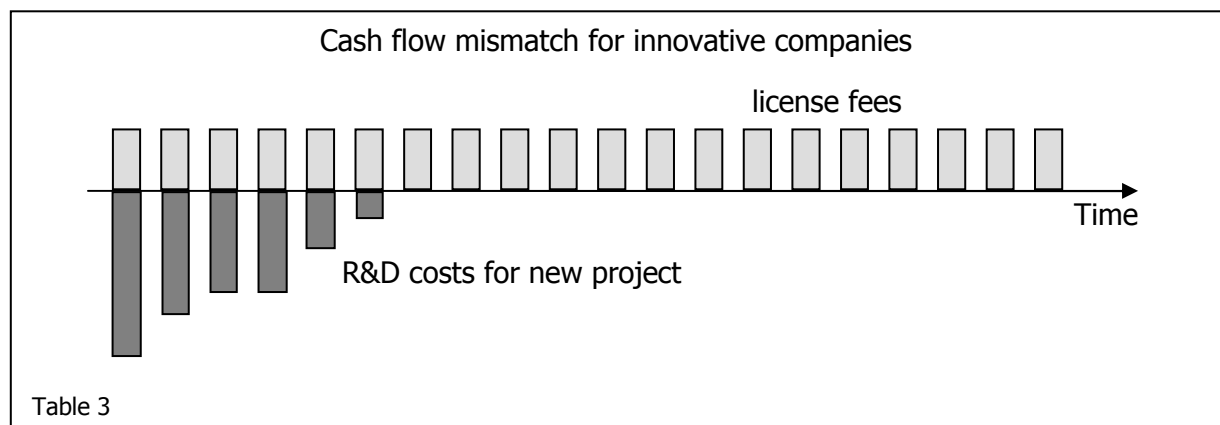
In the past, the capital to fund another project would have been obtained by borrowing money either from banks using a bank loan or from private investors by means of a bond, once all internal source of financing were exhausted, according to the pecking order theory as proposed by Myers and Majluf (1984) and Myers (1984).[8] But for smaller companies it is impossible to issue an ordinary bond on the capital market directly, and bank loans on the other hand bear high capital costs. Intellectual property assets open a new kind of debt financing. By separating the property claim on future cash flows from the intellectual property, these claims can be traded to allow reshaping the cash flow profile intertemporally.

Again, note that the underlying patent often does not change the owner. Apart from the own requirements of the inventor for the intellectual property, the reasons for this can be of a legal or technical nature. While it is easy to give a license to a third party, allowing it to use a certain technological innovation protected through a patent, it is comparatively complicated

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[8] Myers (2001), pp. 91ff gives a comprehensive overview.

and thus expensive to transfer the patent itself.[9] And while it is easy to provide e.g. client data to a third party, it is complicated to conserve excludability of the use of this data. This is a general problem inherent in most intellectual property assets, but while law provides excludability rights for certain kinds of IPAs, other kinds have to be protected by the creator of the IPA himself, which can be a technically demanding task.

The Price Of An Idea

Having defined intellectual property assets and their uses, the next question must be to assign a value (and thus a price) to these assets. The secondary use of intellectual property requires both a suitable form of property right, which is easily fungible among parties, but also a valuation technique which allows ascribing a proper price to the asset.

The valuation of an intangible asset is difficult by nature. As a general rule, ascribing a proper price becomes easier, the closer the intangible asset is to tangible assets. A licence which pays a known amount of royalties for a known period of time is easier to price than a patent for a drug which might or might not be a success on the market.

The different classes of intellectual property described in the first part of this paper have led to different valuation techniques. These techniques take into account the special properties of knowledge based, publicity based and relationship based intellectual property. A broad range of approaches exist to price an intangible asset. Some are well known from "normal" asset pricing, others consider the special properties of certain kinds of intellectual property, especially brand valuation, although the basic approaches are the same. This paper thus first takes the most common IPA, derived from knowledge based intangibles, and summarises the common valuation techniques, before turning to publicity based IPA and relationship based IPA.

As of today, markets for intellectual property are not well developed. Although transactions of intellectual property do happen regularly, there is no marketplace or exchange, like with the more common fixed income instruments. This means that valuation procedures are especially important. For every financial instrument traded on an exchange, there are pricing models. But all these models are subject to the peer review of all market participants. Gross mispricings will quickly be eliminated through market forces like arbitrage. Thus, there is a

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[9] Bessler, Bittelmeyer, Lipfert (2003), pp. 327

constant back-check of the valuation models through the market as a whole. Not so with many intellectual property assets. Because there is so little liquidity and because the goods are very heterogeneous, market forces do not act as review mechanism. Mispricings can occur and, worse, endure. Therefore it is important to address the question of pricing in some detail and sketch out, which valuation approaches are consistent with economic theory and – maybe more important – which ones are not.

Valuation of Knowledge Based Intellectual Property

The typical case of knowledge based intellectual property is a patent. Of the various intellectual property assets, patents and licenses thereon are probably among the easiest to price.

Cost Approach

The valuation problem of intellectual property has first arisen in financial accounting, especially in M&A-transactions. It is normal that the value of a company as a whole exceeds the value of its assets listed on the balance sheet. The difference between book value and the (fair) price is called "goodwill" by accountants. Accounting standards require that purchased goodwill normally should be eliminated from accounts by immediate write-off against reserves or through amortisation over its useful economic life time.[10]

Problems emerge when premium prices are paid for companies which are well beyond balance sheet figures. For companies with much intellectual property this is often the case. Through both, either one-shot elimination of the goodwill or through amortisation over a longer period of time, the shareholder interests are adversely affected. To milder these effects, "identifiable intangibles" (like e.g. a patent) can be subtracted from the goodwill and entered separately in the balance sheet.

The International Accounting Standard Board IASB has issued accounting standard IAS 38 to be applied to the accounting for intangible assets in business combinations. Broadly, an intangible asset is initially recognised at cost, and carried at cost or revalued amount. But an intangible asset can only be carried at revalued amount if there is an active market for the

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[10] Wood (1995), pp. 553

asset.[11] Yet, for most intangible assets, there is no such thing like an active market, why many intellectual property assets are carried at cost.

Financial accounting thus sets the value of an intellectual property asset as the price which has been paid for it. Implicit in this assumption is that the price paid is at least remotely connected to the fair value, because otherwise the two parties would not have agreed on the deal. This assumption cannot be sustained, if an external transaction has never occurred. Unfortunately, such valuation nevertheless has happened.[12] That this figure on the balance sheet does not need to have a close relation (or even a remote one, for that matter) to economic value seems obvious. An intangible asset can be very expensive to create without providing the company with any return at all. Thus, the cost approach, while being used in practice, is completely bogus for setting the value of a financing instrument based on intellectual property.

Renewal Rates

Once a patent is registered, annual fees have to be paid for the patent protection to continue. When using a patent or a license in a financing instrument, the valuation has to include renewal rates, because these future costs reduce the value of the asset today. However, renewal rates alone have no explanatory power and are no good estimation for the intrinsic value of the asset. In that respect, renewal rates are close to the cost approach and, like the former, are mentioned here only for completeness.

Market Approach

The idea of the market approach is quite easy at the first glance. It has, however, hidden depths. The principle idea of the market approach is that similar goods must have similar values. This approach has a strong microeconomic foundation, which gives it most of its appeal. Simplifying : if the price for red scarfs is USD 10, the price for blue scarfs will probably be something similar. Accordingly, if the value of one intellectual property is known, an estimate for the price of a similar intellectual property asset can be derived thereof.

There are two problems when using the market approach for intellectual property assets. First, patents are per definition unique. It is impossible to claim two patents on the same or similar ideas. In fact, two intangible assets must differ sufficiently to be accepted each as

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[11] IASB (2004), pp. 1

[12] Wood (1995), pp. 547

independent intellectual property. Thus, it is impossible to find a patent which is very similar to the one which should be valued.

Second, as has already been mentioned, there is yet almost no such thing as a market for knowledge based intellectual property. In the case of patents, this is because the transfer of such assets is legally laborious and thus expensive.[13] Thus, even if two patents can be found which are sufficiently similar to give a good value indication, market price information is not easy to find.

Yet, the market approach has the big advantage that there is no need to estimate any statistical distribution, discount rates or other model assumptions. The market can be supposed to provide a "fair value", which then can be fine-tuned, e.g. using various value indicators, to compensate for the differences between the intellectual property asset the market price is known of and the one to be valued.

Value Indicators

As an ad hoc approach, practitioners use value indicators to estimate the value of an asset on the base that similar assets with similar characteristics have similar values; in that respect, value indicators are a derivative of the more general market approach. For a patent, such value indicators are e.g. the remaining life time, backward citations, the patent family, rescissions etc.[14]

Consequently, value indicators are often used in conjunction with the market approach, to ameliorate the value estimation provided by these models. While one indicator alone generally has no explanation value, they can as a whole ameliorate the value estimation of the intellectual property asset obtained with other methods. Once a similar intellectual property asset is identified and a first price estimation is generated with e.g. the market approach, the miscellaneous value indicators can be used to fine-tune the value estimation.

Discounted Cash Flow

Having mentioned two approaches that are unsuited for pricing financing instruments from intellectual property, and two approaches which rely on available market information, this

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[13] Bessler, Bittelmeyer, Lipfert (2003), pp. 327

[14] IP Bewertungs AG (2005), pp. 9

paper now turns to some pricing techniques with stronger theoretical emphasis: discounted cash flows and real options.

In the literature, the discounted cash flow (DCF) model and the net present value (NPV) approach are probably the most widely used. They are inherent in all theoretical pricing models. This paper focuses on the discounted cash flow model, because the focus is the value of the intellectual property asset, and not the actual investment decision.

The principle of the DCF approach is sound and simple. The value of a given investment today equals the value of all future payments resulting from this investment, discounted to the present day. Individuals (and consequentially firms, which are ultimately owned by individuals) have a preference for income today versus income tomorrow. Thus, the further in the future a cash flow occurs, the less it is worth today.

$$V_0 = \sum_{t=1}^{T} \frac{C_t}{(1+\rho)^t} \tag{2.1}$$

Where

V_0	is the value of the asset today
T	is the number of periods it is expected to generate cash flows
C_t	is the cash flow generated in time period t
ρ	is the risk adjusted discount rate

If for some reason there should be costs associated with the possession of the asset, these must be taken into consideration:

$$V_0 = -\sum_{t=1}^{T} \frac{E_t}{(1+\rho)^t} + \sum_{t=1}^{T} \frac{C_t}{(1+\rho)^t} \tag{2.2}$$

Where

E_t	are the project-related expenses in time period t

The two terms can be merged, which yields:

$$V_0 = \sum_{t=1}^{T} \frac{N_t}{(1+\rho)^t} \qquad (2.3)$$

with $\qquad N_t = C_t - E_t$

Thus, N_t are the net cash flows in period t. The decision rule is that a project should be undertaken, if its present value V_0 as derived from equation (2.3) is positive. The present value of the project also equals the fair price any external investor should be willing to pay for it. This is the reason, why this paper focuses on the DCF method and not on the NPV approach: the question is not, if a given price is fair, but what the fair price is.

The accuracy of the DCF approach depends on three assumption or estimates to be made: first, the size of the net cash flow in each period (N_t); second, the time horizon (t); and third, the appropriate risk adjusted interest rate in each period (ρ).

The net cash flows resulting from the possession of most intellectual property asset are subject to two principle forms of risk. First, the market risk of the project. Looking e.g. on the project returns from new pharmaceutical drugs, one observes both a high skewness of the distribution and a wide difference between winner projects and projects with little success. While the top decile of newly introduced drugs in the U.S. between 1990 and 1994 earned almost six times the average research and development cost, more than 40% of the new drugs earned less than that average.[15] Second, the IPA is subject to the business risk of the issuer: even if the project the IPA is associated to proves a modest success, default of the issuer will reduce the value of the IPA massively.

Estimating the time structure of an IPA on knowledge based intangibles, e.g. a licence, is fairly easy. Once the patent approval is received, the lifetime of the patent is known.[16] The net cash flows after the expiration of the patent are minor, because competition drives prices down near marginal costs. And because these cash flows occur rather far in the future, a substantial depreciation effect occurs. Thus, cash flows occurring after patent expiration can be neglected in this framework. Note however, that this need not be an appropriate assumption for other kinds of intellectual property.

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[15] Grabowski (2002), pp. 22

[16] Although this need not correspond to the effective patent life; see Grabowski and Vernon (2000)

The appropriate discount rate ρ can be estimated using the capital asset pricing model CAPM. As a rule, a project should only be undertaken if it pays off more than available investment opportunities of individual investors. Therefore, the appropriate discount rate equals the expected return of an investment with the same risk. Under the assumption that beta risk of the project equals the total beta risk of the company, the appropriate discount rate ρ is:

$$\rho = R_f + \beta_{tot} \cdot \left(R_M - R_f \right) \tag{2.4}$$

Where

ρ	is the appropriate discount rate
R_f	is the risk-free rate of return
β_{tot}	is the total betarisk of the company
R_M	is the risk-adjusted market rate of return for the company

If the risk of the project differs significantly from the total risk of the company, separate project betas must be estimated. Such estimates can be generated e.g. from historical data of similar projects.

Real Option

Using the cost approach or renewal rates as base for valuing intellectual property cannot be economically justified. The market approach, although having a microeconomic foundation, has its own problems when applied to intellectual property. And while simulation and discounted cash flow models have better theoretical foundation than the accounting measures and are more practical than the market approach, they still lack one important feature of a patent. As Laxman and Aggarwal put it, "the main value of an early patent application lies not only in the possible future cash flows but also in the various options of expansion and abandonment in the patent process itself."[17]

The real option approach is able to model complex decision structures. Although in the core of the model there lies again a discounted cash flow approach, the cash flows in the various periods can be conditioned on the time path of the project up to that point. The general term is contingent claim analysis. Contingent claim approaches can be used to value any form of future cash flow.

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[17] Laxman, Aggarwal (2003), pp. 44

Laxman and Aggarwal (2003) develop a explicit model for the valuation of a patent. They apply broadly a binomial approach with explicit decision nodes for the Patent Cooperation Treaty, a system for filing patent applications internationally.

Schwartz (2004) develops a sophisticated pricing approach for research and development projects. He models both the costs to completion of the project and the cash flows received after completion as uncertain.

Real option models and contingent claim analysis in general are highly sophisticated. The models allow for almost any combination of cash flows under various assumptions or decisions trees. These models have a strong theoretical foundation. The downturn is, however, that their sophistication makes these models complicated and often mathematically exhaustive. The valuation of intellectual property assets using the real options approach therefore is difficult to implement for small businesses or individual investors.

Simulation

The simulation of time series is an accepted method to estimate financial indicators and test models or hypotheses. Two varieties of simulation algorithms are widely used: the Monte Carlo simulation and historical simulations. Both simulation techniques can be used to estimate future cash flows from intellectual property assets.

Note that while both of these simulations are well suited to estimate time series of market cash flows, estimating the future pay off of a patent while still in development is more difficult, because such cash flow distributions are most asymmetric; in such cases, the real option approach is best alternative. Simulations are able to generate market-like price processes, where real market figures are unavailable. Therefore, simulations can be subsumed as an abstraction or generalisation of the market approach.

Both simulations, the Monte Carlo simulation and the historical simulation, use the same basic principle: a large number N of future valuation paths are generated, leading to N possible future values of the patent. The mean of these future values is an estimate of the expected payoff. This estimate of the future can then be discounted to get an approximation for the value of the intellectual property asset today. The difference between the two procedures lies in the generation of the valuation paths.

For the Monte Carlo simulation, each path is expressed as a geometric Brownian motion. This corresponds to the implicit assumption that underlying the price path is a Markov process, where only the present value of the variable is relevant for predicting the future. So, in discrete time, the process of each path takes the form:

$$\frac{\delta C}{C} = \mu \cdot \delta t + \sigma \cdot z \cdot \sqrt{\delta t} \qquad (2.5)$$

Where:

δC	change of the cash flow between time t and t + 1
C	cash flow in period t
μ	expected cash flow from the patent in one period
σ	volatility of the cash flow
z	random drawing from a standardised normal distribution N(0, 1)
δt	length of one time period

This equation can be rearranged to yield an expression for generating the price path:

$$\delta C_t = \mu \cdot C_t \cdot \delta t + \sigma \cdot z \cdot \sqrt{\delta t} \cdot C_t$$

$$C_{t+1} - C_t = \mu \cdot C_t \cdot \delta t + \sigma \cdot z \cdot \sqrt{\delta t} \cdot C_t$$

$$C_{t+1} = \mu \cdot C_t \cdot \delta t + \sigma \cdot z \cdot \sqrt{\delta t} \cdot C_t + C_t \qquad (2.6)$$

In this way, a number of random price paths can be generated, yielding a set of possible estimated payoffs. Using the DCF approach, present values can be derived from these price paths, and the mean of these modelled present values can then be taken as estimate for the actual present value of the IPA.

The drawback of the Monte Carlo simulation is that it requires explicit assumptions on expected one-period return and volatility and on the specific stochastic distribution the price path follows – usually a normal distribution.

Historical simulations build the future price path from elements of past price paths. From available price data, a set of one-period price changes δC is calculated. Using random draws from this subset, a random price process can be generated. Repeating this process yields a set of price processes. Again, using the DCF approach, present values of each modelled price

path can be calculated, and the mean of these modelled present values can then be taken as an estimate of the actual present value of the IPA.

Historical simulation has the advantage, that no assumption on the stochastic distribution underlying the price process is necessary. The random pick from the generated sample of one-period returns copies the distribution implicitly. The drawback is that the historical simulation bases on past market data, which may be difficult to obtain.

Valuation of Publicity Based Intellectual Property

The typical publicity based intellectual property is a brand. Since accounting standards change slowly to allow taking brand values on the balance sheet, brand valuation becomes increasingly important. New accounting standards in effect since January 2005 in the U.K. for example force all listed companies to publish an Operating and Financial Review in the annual report, a description of the resources available to the company – including brands.[18] In the wake of these events, both the academic community and practitioners have developed methods to value brands and trademarks in various contexts. The question of the "right way" to value brands or trademarks still stays unresolved, but a number of general principles have become apparent. Aaker (1996) gives a good introductory overview of what measures are applied to estimate brand equity, the value of a brand.

The crux of brand valuation is that it is in most cases difficult to assign cash flows directly to brands or trademarks. The value of the brand is not explicit, like royalty fees from a patent, but "contained in the form of brand knowledge in the minds of customers."[19] It is not in the scope of this paper to analyse the measurement of brand equity in detail, but to give a concise overview of the measurement methods used to estimate these values.

Cost Approach

It has already been pointed out that applying the cost approach for economic valuation purposes is inappropriate, and why this is so. Nevertheless, this approach is used especially in brand valuation, due to historical reasons: the question of brand valuation arose first in the context of financial statements. "[T]he brand issue had emerged as expenditure, [...] which were accounted for via the profit and loss account."[20]

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[18] Lake (2005), pp. 34

[19] Wiedmann (2004), pp. 124

[20] Wood (1995), pp. 552

DCF revisited

The discounted cash flow approach, as has already been described, is economically well justified, while being rather simple to use, compared with other methods available. Consequently, DCF methods are used to valuate intellectual property based on publicity as well. The DCF framework is implicitly used in the price premium price measures and in the earnings multiplier approach as well as in most advanced models.

In comparison with the methodology described earlier to analyse patents, licenses and similar knowledge based intellectual property, brands and trademarks enjoy a longer protection than patents. Therefore, it is presumably not a valid assumption to take a given expiration date of the brand. Instead, the cash flows resulting from the brand continue for the foreseeable future – mathematically: forever.

For the model, this leads to a two-stage process. In the first stage, the cash flows resulting from the brand are estimated for every period individually. The second stage encompasses the rest of the future. A most simplistic assumption is to take the revenues generated through the trademark as constant over time. This may describe the situation in a saturated market, where market structure, market size and market share presumably will stay more or less unchanged for the foreseeable future. In such an environment, a well established brand will pay what may be approximated as a constant rent. The present value of such a stream of constant cash flows is:

$$V = \sum_{t=1}^{H} \frac{C_t}{(1+\rho)^t} + \sum_{t=H+1}^{\infty} \frac{\overline{C}}{(1+\rho)^t} = \sum_{t=1}^{H} \frac{C_t}{(1+\rho)^t} + \frac{\overline{C}}{\rho} \tag{2.7}$$

Where

V	is the present value of the brand
t	is the time period
C_t	is the varying cash flows resulting from the brand in stage one
$\overline{C}$	is the constant cash flow resulting from the brand in stage two
ρ	is the risk adjusted discount rate
H	is the time horizon, which equals the length of stage one

Other assumptions about the development of the cash flows in the second stage of the model can be made. Also, the model can be expanded to contain e.g. a third stage. However, the basic structure remains.

Premium Pricing

Up to this point, it has not been explained how to estimate the cash flows resulting from brands, where the DCF model described above can be applied to. Brands allow the brand owner to charge consumers a certain extra amount in comparison to "independent" suppliers. This surcharge is called brand premium. Depending on the market structure, this premium can be substantial.

Such price premiums are among the best estimators for the value of a brand. In addition, they are comparatively easy to measure, if an independent, non-brand competitor is present in the same market.

Earnings Multiplier / Score Card

The earning multiplier model is related to the premium price approach, but takes a broader view. The goal of this approach is to derive a assess the earnings capacity of the brand with provisions the made for the risks the brand faces, and apply it to the DCF methodology.[21]

The earnings capacity is calculated using various value indicators put together on a score card. Such indicators are e.g. perceived quality, perceived quality, organisational associations, brand awareness, market share or the price premium.[22] Once the score card model has yielded a result, this is taken as an estimate for the future earnings multiplication resulting from the brand.

From the basic valuation models for brands, this approach is considered the most appropriate. Yet, one should not take these figures as carved in stone. As Wood (1995) notes: "such methods can be very dangerous if viewed in a narrow "accounting" way. Putting a figure on the value of expected income from a brand based on past performance assumes that the world is not going to change. […] Also, it is often difficult to assess a brand's cash flow separately from other aspects of the business."[23]

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[21] Wood (1995), pp. 564

[22] Aaker (1996), pp. 105

[23] Wood (1995), pp. 564

Advanced Methods

Both, practitioners and scholars have developed complex models of brand valuation. As an example, this paper introduces the Advanced Brand Valuation (ABV) model as proposed by Hupp and Powaga (2004).

The underlying principle of the ABV model is future consumer demand, which ultimately determines the value of the brand. This future demand is estimated in four modules, encompassing separate brand-specific investment, revenue and earnings, short- and long-term projections of brand-specific earnings, a brand-specific risk-adjusted discount rate, and strategic options in the form of potential brand-specific synergies.[24]

Brand-specific revenue effect is split up into price effect and volume effect. The brand-specific price effect is measured by the price premium over the price of an unbranded product as described above. The volume effect usually is estimated based on an ad hoc survey. Once revenues resulting directly from the brand are determined, the brand-specific expenses due to brand-management are to be subtracted. The balancing between additional revenue and additional costs yields the brand-specific earnings.[25]

Forecasts for brand-specific earnings over the short term are estimated by analysing existing brand marketing and business plans. A complex index measurement called Brand Potential Index (BPI), which reflects the psychological power of a brand in the consumer mind, is used to estimate the quality of these plans. Long term forecasts take into account factors affecting the general future consumption of the good class, independent of the brand, like technological advancement or sociological change. Taking these factors into consideration, a long term growth rate is estimated.

The appropriate discount rate is derived using the CAPM as explained already. However, a moderate risk premium is added "because a brand's equity can be extremely sensitive to cash flow deviations caused by extraordinary market conditions and competitive actions."[26]

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[24] Hupp, Powaga (2004), pp. 226

[25] Hupp, Powaga (2004), pp. 228f

[26] Hupp, Powaga (2004), pp. 229

Finally, in the strategic options module things that are not manifested in the normal business plan are considered, mostly synergy effects. The results of all four modules are then aggregated into one final measure for the brand value.

Valuation of Relationship Based Intellectual Property

Intangible assets based on relationships between clients, suppliers or competitors and the company are probably hardest to codify. Many of these assets are bound directly to human capital, i.e. to the employees who produced the assets (e.g. the relationship between client and client advisor). Still, there are some assets based directly on client relationships, which nevertheless are not bound to the person who created the asset, e.g. client information databases.

In addition, relationship based intellectual property is not yet protected by law in the way knowledge based and publicity based intellectual property is. In contrary, privacy restrictions, law and regulations make such assets difficult to trade. Yet it would be very easy to transfer such data once codified. Today's telecommunication technology makes it possible to transfer large amounts of data around the globe in no time, a feature which would make such assets well suited for financial transactions.

On the other hand, it is very difficult to enforce property claims on an accumulation of information like a client data base. While the regulator provides means to protect the other two kinds of intellectual property assets – patent and copyright law, mainly – the excludability of the use of relationship based intellectual property must be established by its owner in order to protect the genuinely elusive asset. Although this may be possible, it is a technologically demanding task and not easily accomplished.

Finally, the impact of relationship based intellectual property is even more difficult to measure than e.g. the cash flows resulting from brand names and other publicity based assets.

These properties of relationship based intellectual property make it the "softest", most intangible category of the three. Relationship based intellectual property therefore is not used in the financing contracts as described in this paper – yet. Therefore, describing valuation techniques for relationship based intellectual property is a difficult and maybe futile task. Basically, the same caveats apply as to the pricing of the other intellectual property

assets, especially relationship based. Probably the best approach is to estimate the generated future revenues and use the discounted cash flow method to get a present value estimate.

The Role Of The IPA Intermediary

In the first two parts of this paper, first the intellectual property asset was defined and categorised. Then, valuation techniques for such IPAs were sketched out. Now, as the good and the price are defined, the last missing element for building a market structure which allows the use of IPA in financing contracts is the marketplace itself. In this third part, the paper turns to the role of the IPA intermediary and its functions and predicts a possible market structure for IPAs.

The technology transfer market is today the only marketplace for patents and other protected knowledge. Although activity in this market is increasing, it remains not very efficient, mostly because of high transaction costs.[27] Because there is no liquid market for intellectual property assets and because without such market structures it is very difficult for individual investors in or suppliers of intellectual property assets to find a matching counterparty, there is a need for an intermediary institution to help facilitate the allocation process.

This part of the paper first explains the relationship between intellectual property assets bank (IPA bank) and intellectual property assets exchange (IPA exchange), and why these two will probably not be observed as separate companies in practice. It then enumerates the functions of the intellectual property assets intermediary (IPA intermediary) and briefly explains them.

IPA bank and IPA exchange

An intermediary institution like an IPA bank or IPA exchange would take a number of responsibilities and have a number of functions. In many respects, the structure of the IPA intermediary is akin to financial intermediaries, and thus the issues to be addressed by the IPA intermediary are related to those of conventional financial intermediaries, i.e. commercial banks. This is a consequence of the fact that intellectual property assets' secondary use is

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[27] Bessler, Bittelmeyer, Lipfert (2003), pp. 326

akin to debt finance. Nevertheless, an IPA intermediary would also have to serve as a kind of exchange, mostly in order to reduce transaction costs.

Consequently, some authors distinguish between IPA banks and IPA exchanges.[28] However, as at present such organisational separation cannot be observed, this paper will not make this explicit distinction. Furthermore, the market structures observed today in the markets where the existing products are traded, and their affiliation with other instruments, lets a market structure without one central exchange appear more probable.

Today, most of the existing tradable IPA derivatives, namely asset backed securities and OTC options, are handled by the large investment banks. They possess the expertise, the infrastructure and the capital to build all necessary market structures for an organised IPA market. This paper therefore considers it most probable that the IPA intermediary institutions will form as business lines or subsidiaries of these investment banks. This assumption also influences the expected market structure this paper predicts for the IPA market.

In investment banking, the main instrument distinction is made between equity instruments (i.e. shares) and interest rates instruments (i.e. fixed income instruments and foreign exchange). While the equities market is centred on national exchanges, interest rates instruments historically have evolved into a decentralised market structure, with market makers, which form a closed "interbank market" and have broadly independent clientele. Such market structures are often referred to as dealers or OTC (over-the-counter) markets.

Thus, there is a purely organisational reason for instruments derived from intellectual property assets being traded in a decentralised market structure: because they are akin to debt instruments, they would most probably be handled by the fixed income and interest rates business lines of an existing bank, at least in the foreseeable future, and in these business lines a decentralised market structure is predominant.

There is also a technical indication which is in favour of a decentralised market: exchange traded assets need to be highly standardised. Otherwise, market segmentation would be to strong and no one market segment could develop sufficient liquidity to allow orderly market conditions like in today's equity market. But IP assets are heterogeneous by nature. In an

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[28] Bessler, Bittelmeyer, Lipfert (2003), pp. 329.

OTC market structure, the intermediary serves as counterparty, which pools interest and matches position both internally and externally via the interbank market. There is not the same need for standardisation as in exchange-traded instruments.

Table 4 below shows the market structure of an OTC market. The individual investors in and sellers of intellectual property assets have not an individual as counterparty, but a market making intermediary, most probably a bank. These intermediaries form a closed market among themselves, where they can trade bundled assets with minimal credit and settlement risk at very low transaction costs to allow for optimal risk and resource allocation.

Intellectual property asset market organisation: OTC market

Market Makers

Investors and Borrowers

"Interbank" Market

Table 4
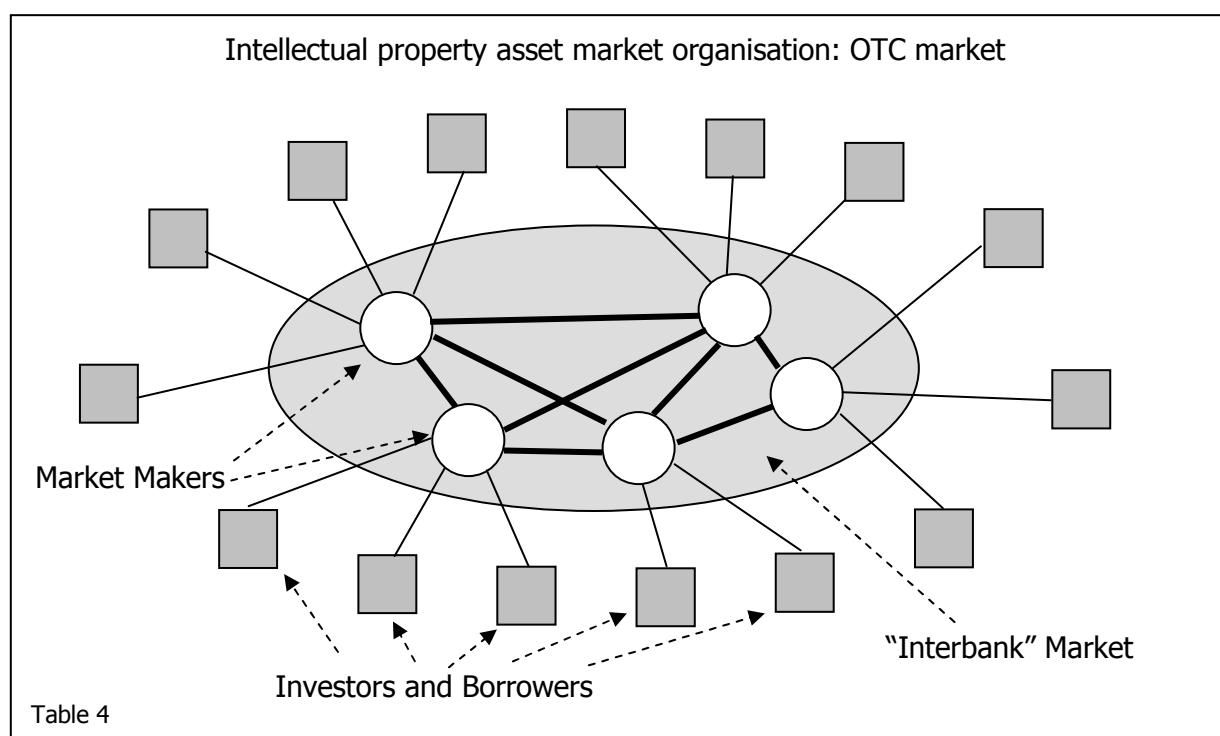
Although there is no real separation between IP bank and IP exchange, most functions of the IP intermediary can be assigned to one of the two implicit entities. Internally, as it is the case with investment banks already today, the separation of these functions will most probably be observed. The following table 5 shows the main functions of the intermediary, and to what implicit entity they belong.

Functions of the intellectual property assets intermediary	
IPA intermediary	
IPA exchange - Position matching - Establishing best practice standards - Generating public market information	**IPA bank** - Term transformation - Risk pooling - Consulting - Accumulating historical information on borrowers and lenders

Table 5

Position Matching

Although today there exist some platforms where owners of intellectual property assets can offer these asset for sale to investors, the reverse is not possible: owners of intellectual property cannot search for financiers to fund their projects; one speaks of one-sided transparency.[29]

Establishing an institution where both sides could advertise their goods and demands would enhance transparency. Not only could inventors and owners of intellectual property in general offer their projects, but investors seeking investment opportunities could state their interest publicly. The IPA intermediary in its role as exchange can take the various positions and match them. Note, that in the OTC market structure as described above, buyers and sellers do not meet explicitly. The IPA intermediary always serves as counterparty and matches supply of and demand for IPAs. Excess positions the IPA intermediary then again trades on the interbank market.

This would reduce the overall search costs for both parties, because a small number of intermediaries that act as market makers (and thus market places) facilitates searching. And in addition to the general reduction of overall search costs, the symmetric construction of the information supply facilities (i.e. both parties can advertise their will to participate in an IPA transaction to the IPA intermediary) enables a more even distribution of search costs between the parties.

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[29] Bessler, Bittelmeyer, Lipfert (2003), pp. 326

The most important distinction between normal financial instruments and IPA instruments is that it often does matter, who the counterparty is. The matching process is especially crucial when transferring usage rights on the intellectual property (usually this would be the sale of licenses), because such licenses are very heterogeneous, and both buyers and sellers of such assets have detailed requirements on their counterparties. For the buyer of a licence, the intangible assets which the licence represents must complement the existing portfolio of intellectual property assets, i.e. the licence must suit the company of the buyer. For a seller the reputation of the buyer may be a consideration as well, if there are linkages between the business success of the seller an the business attitude of the buyer of the license. This applies particularly to brand licenses which allow the licensee to use the brand name of the licensor. On behalf of the intermediary, it may be prove difficult to unbundle the licence and allocate it most effectively on counterparties. The transfer of the primary use IPA therefore may be difficult and demanding for the intermediary; most probably the reason, why such institutions have not formed earlier.

Of course, the matching of buyer and seller is also important when the subject of the deal is not the usage right of the intellectual property, but the property right on future cash flows resulting from the intellectual property asset, i.e. the secondary use IPA, although here the focus lies on somewhat more technical issues like the business prospects of the seller and the default risk, the investment time horizon of the buyer, covenants of the security to be traded and the like. The advantage of secondary use IPA is that they are much closer to ordinary financial instruments and therefore can easily be handle by the IPA intermediary using the existing business processes with only minor modifications.
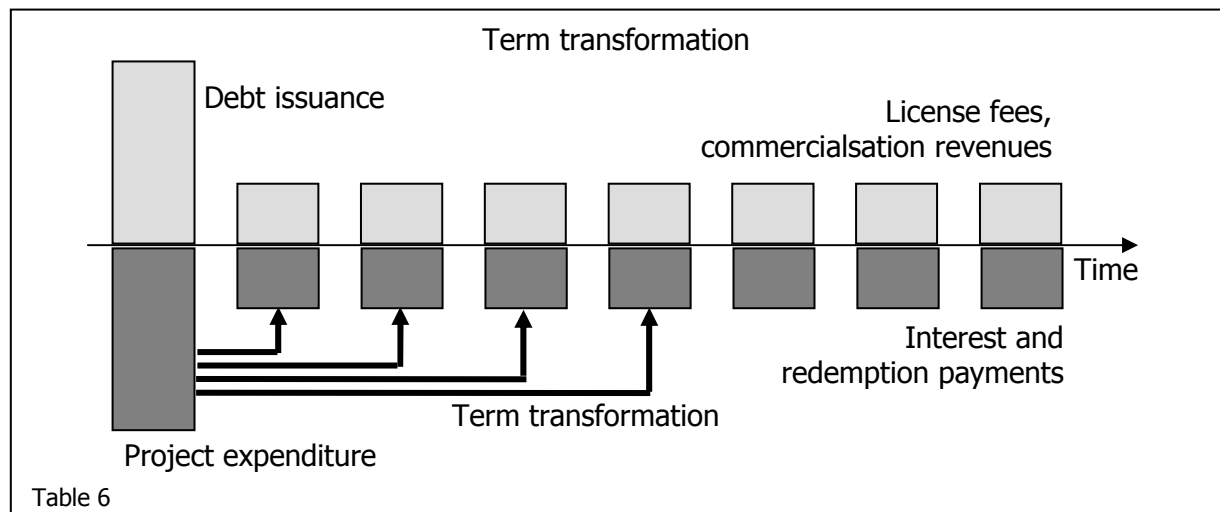
Term Transformation

Term transformation is the motivation for debt financing in general and the use of intellectual property assets in financing contracts in particular. Investments in IPAs can take two general forms: equity investments like private equity or venture capital on the one hand, debt investments on the other hand. While in equity investments a term transformation is inherent as well, it is not the motivation for the transaction. With equity investments, the hope on abnormal rates of return is in the foreground. With intellectual property assets used in debt financing instruments, the rate of return of the instrument is prespecified at the time of issuance usually, as well as the time horizon. Instead of gambling for abnormal returns,

investors here seek to trade their capital intertemporally, with a defined time horizon and a defined rate of return.

Most companies who's businesses base on intellectual property face the same problem already described in the first part of this paper: expenses to create and maintain intellectual property often occur in lumps, while revenues from the commercialisation occur with a considerable time lag longer than in other industries, and revenues are dispersed over a long period of time (see table 3, pg. 9).

Debt instruments from IPA allow the transformation of the cash flows, from lump expenses into a series of interest and redemption payments. Such an expenditure profile will probably match the revenue structure of the company better.

Table 6

The mechanism of term transformation described above is inherent in the IPA financing contracts, thus works without the IPA intermediary taking an active part. Apart from this "automatic" term transformation, the IPA intermediary may provide active term transformation, much like traditional commercial banks do between depositors and borrowers of bank loans.

This second kind of term transformation may be provided e.g. in the form of an intellectual property fund. Individual investors can pay capital into the fund, which in turn lends this capital to intellectual property companies for funding their projects. Much like depositors of a commercial bank, the individual investors can withdraw their money anytime. Yet, unlike a normal fund, the assets of the IPA fund are not readily liquidated, the fund though faces a

liquidity risk, again much like a commercial bank under a fractional reserves regime. Such funds therefore experience event similar to bank runs.[30]

Risk Pooling

Generally, most intellectual property assets must be considered risky. Technological progress can make a patent de facto use- and therefore worthless, or brand value can tumble because of negative news coverage. In addition, many intellectual property businesses who finance themselves using IPA instruments do their business in small niches and therefore have a comparatively high general business risk, which influences the value of the IPA.

Without an intermediary institution, investors must either bear the full non-systematic risk of the IPA or diversify on their own, which in turn requires large capital investments. The IPA intermediary can pool risks and thus create internal diversification among his assets.

Generating Public Market Information

In the second part of this paper, several valuation techniques were introduced that relied on the availability of market price information. Providing such market information to the public would be one of the functions a IPA intermediary would have to fulfil.

A public exchange, where liquid market activity takes place, generates market price data. Such data is valuable as a way to review pricing procedures of the market participants and ameliorate the value estimates generated through certain pricing models and methods (e.g. the value indicators approach or the market approach; simulations can be constructed from market information directly as well).

Unfortunately, the distribution of market price information is worse in OTC markets than in exchange based (auction) markets, because most transactions occur between an individual investor and the intermediary, thus are private. Only the transactions of the market makers among themselves in the interbank market are public. If and to what extent this proves to be a problem remains an open question.

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[30] Macey, Miller, Carnell (2001), pp. 57 – 59 gives a brief introduction into the mechanics of bank runs and banking panics.

Information Accumulation

Generating market data and making them accessible for the public is only one part of the information generation the IPA intermediary is engaged in. Again, as in the pooling of risk, the same conclusions apply as to loan finance by traditional commercial banks. The intermediary can build expertise in assessing business prospects and the risk profile of a given intellectual property asset.

It is also possible to build a track record of financing deals a certain borrower has undertaken in the past. Such track records could then be used e.g. as part of a rating instrument for issuers of intellectual property asset instruments. Such rating would allow investors in IPAs to assess the risk of their investment better.

Setting Best Practice Standards

In a nascent market like the one for IPAs, regulators often have not yet set standards on how typical transactions should be structured. Very often, the regulator will also lack the necessary expertise to issue rules which are suitable for everyday business.

Under such circumstances, the pioneering IPAs should elaborate best practice procedures and standards among themselves. Of course, these standards must be within the bounds of applicable law. Questions arising in such self-regulation are e.g. the typical maturity, usual covenants or settlement procedures of given classes of IPAs.

Once such standards evolve, this tends to facilitate the market organisation. Once an agreement is reached, negotiation costs will be lower, because standardised processes apply. This will reduce transaction costs.

Negotiating such standards is facilitated through the comparatively small number of participating institutions in the closed interbank market. An example of such a self-regulating global financial market is the foreign exchange market. Here, an independent non-governmental organisation (namely the Association Cambiste Internationale ACI) has set best practice standards e.g. for internal revision, quotation or settlement procedures. The ACI even provides help in dispute resolution in order to reduce litigation costs.

Until now, the market for intellectual property assets has not evolved enough independence and structure to develop an international organisation similar to the ACI, and it remains unclear, if such an institution will be founded in the close future. This will mainly depend on the evolution of the IPA market in general. If intellectual property assets will continue to be handled as a subset of debt products, existing professional or industry organisations (like e.g. the Bond Market Association) may be able to incorporate IPA markets in their existing structures. Should the IPA segment evolve more independence, or should the trading institutions for IPA differ significantly from those trading traditional debt instruments, a separation and secession of these institutions may occur.

Consulting

The target group of IPA instruments should be mostly small and medium enterprises who possess IPA and for whom the issuance of ordinary bonds and the access to the capital markets in general is difficult if not impossible. But such enterprises typically will have only little experience in structured financing.

Meanwhile, the financial industry invents highly sophisticated products almost (or completely) tailor-made to fit the financing needs of every company. The resulting constructs often are complex and manifold. For laymen in the financing context, it is difficult and expensive to find the right instrument matching the financing needs of the company best. Therefore, consulting issuers of IPA instruments will remain an important part of the work of the IPA intermediary.

Novel Uses Of Intellectual Property

In the first three parts of this paper, the theoretical foundations have been laid for the use of intellectual property assets in financing contracts. First, intellectual property assets were defined, and what is necessary to use them in financing contracts. Second, some valuation approaches for different IPAs were sketched out. Third, a possible organisation of the market place for IPAs was proposed, and the role of the IPA intermediary was analysed in some extent. In this last part, the paper now turns to the empirical, real-world uses of IPA in financing contracts.

It has already been pointed out that the changes in international financing, due to the general market structure, but also due to innovations like Basel II, makes it harder especially

for small and medium companies to use traditional debt financing instruments, like bank loans. Ongoing development and innovation of financing instruments however counteracts this development. Yet these instruments are not commonplace in today's smaller companies, especially so in continental Europe.

Basically, any company has three ways to provide the capital needed to fund a new project, ongoing growth or research and development. First, the company may be able to create the necessary free cash flows from existing revenue sources. Thus, the project can be financed internally. Although it will rarely be the case that a project can be funded completely from internal sources, because of the typical expenses and revenue profile such companies possess, a few financing instruments exist intellectual property can be used in to at least contribute to the financing of the business. Mainly, these instruments rely on selling or lending the usage rights of intellectual property assets the company possesses.

Second, the firm may issue debt. For large, well-established companies, debt issuance can take place on the capital market directly: the company issues a corporate bond. For smaller companies, this is not an option. Until the late 1980s, broadly only bank loans remained for smaller companies to fund their upcoming projects. Since the early 1990s, asset backed securities have expanded the available set of financing instruments, and since the late 1990s, intellectual property can be used in such instruments directly.

Third, the company raises additional capital through acquiring more equity. This can happen either in the form of non-public transactions like the acquisition of private equity or venture capital, or through public transactions like initial public offerings (IPO) or seasoned equity offerings (SEO). Existing shareholders will hesitate to use equity financing, however, because this reduces their share of the expected profits through dilution. Canonically, capital costs of equity are high, and firms should not be willing to use equity financing as long as other means of funding are available.

Although the availability of additional equity capital will certainly be influenced by the intellectual property assets the firm possesses, the IPAs are not explicitly part of the financing transaction. Shareholders own a part of the firm as a whole, their interest is not restricted to the intangible assets the firm possesses. Therefore, equity financing does not figure in this paper, even though equity is the primary source of financing for nascent intellectual property-based businesses.[31]

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[31] Bezant (1998), pp. 239f

This paper distinguished the primary and secondary use of intellectual property. It defined the primary use of intellectual property assets as the protection of intangible assets against competitors. Intellectual property assets are in this primary sense purely a property claim on intangible assets. The secondary use of intellectual property was defined as intellectual property's claim on future cash flows.

Table 7 below shows the basic possibilities of using IPA in financing. On the highest level, intellectual property can be sold without the company keeping any interests in it. The company loses the IPA. If the company does keep the intellectual property at its disposal, the available instruments available today rely on either the primary or secondary use of the IPA.

The usage of intellectual property in financing			
Intellectual Property			
sale of underlying intellectual property			
excludable property rights (primary use)		property claims on future cash flows (secondary use)	
internal usage	external usage	no change of ownership	change of ownership
generating cash flows from commercialisation	cash flows from commercialisation are generated externally	usage of intellectual property as debt securities and collateral	usage of intellectual property in sell-and-lease-back instruments

Table 7

Using the patent to generate cash flow from commercialisation is what a patent basically is all about. Commercialisation means the sale of goods or services produced using e.g. the exclusive knowledge of a patented technique or the trademarked name of a brand. An explicit financing contract is not used, this paper will not consider this case further therefore.

The The focus of this part of the paper lies on the secondary use of intellectual property. This is were the banking and financial services industry provides constantly new instruments, and where especially smaller companies are challenged in the new financing environment resulting from Basel II and general sector transformation.

Selling Intellectual Property Assets

Selling patents, brands or other intellectual property assets is one possible way to create liquidity for a company. However, the focus of this paper are financing contracts where the IPA can be repeatedly used in, i.e. after a defined period of time the IPA is within full control of the company again, at least in theory. "One-shot" financing, the unique creation of liquidity by selling productive assets of a company do not figure prominently in this paper.

In addition, the transfer of intellectual property from one party to another may be difficult. Regulation e.g. in continental Europe treats the change of ownership of a patent as exception (and the issuance of licences as default), which makes such transaction difficult to negotiate and legally laborious.[32] Therefore, the markets for knowledge based and other intellectual property assets are yet not well developed, which may lead to liquidity premiums the seller will have to pay. The valuation problems missing market structures create for intellectual property assets have already been described.

For these reasons, selling IPA to bridge a brief liquidity scarcity if almost certainly a bad idea. The fire-sale costs (in the form of liquidity premiums) will probably be considerably more expensive in IPA than in other saleable assets. Yet, there may be situations where it does actually make sense for a company to sell their IPA. E.g. if a company has no use for a patent because it changed its production line, or because the company's investment opportunities in the use of the patent has no positive net present value. However, a firm that restructures its production line and discovers it has no more use for a patent will probably divest not only the patent, but a whole part of the company, whereof the patent is an implicit part. It appears improbable that in such a case the patent would be sold on its own and explicitly. Therefore, these cases must be treated as artefacts with probably only little practical importance.

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[32] Bessler, Bittelmeyer, Lipfert (2003), pp. 327

Brand Licensing

Licensing of patents is the standard way of transferring protected knowledge. And even software, a good which most people think they buy, is often only licensed, e.g. Microsoft's Windows operating system with its famous End User Licence Agreement EULA – the small print one accepts in order to install the software, without ever really reading it.

So, licensing intellectual property to generate revenue is commonplace. Dow Chemical earned over USD 125 million in 2003 through licensing its patents, and Pfizer's licenses contribute more than 50 percent to the total turnover of all products.[33] But the concept of licensing intellectual property is not exhausted. Brand licensing is only one logical consequence.

The first to understand and embrace the meaning of brand marketing was the entertainment industry; it's what merchandise is all about. In the late 1980s, the convenience good industry began to follow the trend: Sugar Foods Corporation was a specialist for filling and distributing individual portion control packages for the food-service industry. To expand its business, Sugar Foods Corp. leased brands from other food producers and distributed individual portion packages of their products.

The reason for brand leasing a brand from another company is, that although "there is a market for generic and in-house products, provided you sell them cheaply enough",[34] it would be better to have a brand and enjoy the brand premium price difference. But building and maintaining a new brand in the saturated convenience goods market "represents hundreds of millions of dollars spent over years",[35] too much for small and medium enterprises (like Sugar Foods Corp).

Besides, building a brand is a difficult task. A given industrial enterprise will probably know little about consumer research and other marketing measures that are part of brand development.

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[33] von Scheffer, Loop, Lipfert (2005), pp. 37

[34] Richman (1990), pp. 107

[35] ibid.

A typical brand licensing contract runs ten years, with an option to renew. With no up-front fee, the licensee pays for the product he uses, plus a licensing fee of between 3% and 5% of gross dollar sales.[36]

Brand licensing is beneficial for the licensee, because it is possible to enjoy the price premium associated with the renowned brand, without having to bear all the expenses necessary to develop and maintain such a brand, what helps financing growth.

On the other hand, the brand owner benefits from licensing its brand in two major ways. First, the licensee pays regular license fees, thus generating real cash flows for the brand owner without the latter doing anything for it. Second, the brand owner gets advertising for its product for free, because consumers encounter the brand not only on the genuine products, but also on the products distributed by the licensee.

The drawback for the licensor of the brand lies in the (partial) loss of control over its brand. While it takes much time and money to create and establish a brand, it only takes little to severely damage the brand, with harsh effects on the brand's price premium and thus on revenue not only of the licensee, but also of the licensor. For any company that considers licensing its brand it is therefore crucial to assess the prospective licensee thoroughly and choose carefully.

Asset Backed Securities on Intellectual Property Assets

Since the second half of the 1980s, financiers have begun to turn almost anything into tradable securities. What in 1997 has been called an "arcane field" with a market size of about USD 150 billion a year[37] has become a major part of fixed income instruments. Alone in the first quarter of 2005, global volume of asset-backed securities (ABS) underwritings was about USD 340 billion.[38]

ABS transactions are structured in a two-stage process. First, the prospective issuer of the ABS transfers the collateral to a legally independent trust, a so-called SPE (special purpose entity). This transaction is irrevocable. The SPE then issues the ABS and transfers the

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[36] Richman (1990), pp. 108

[37] Clark (1997), pp. 50

[38] Donovan (2005), pp. 1 and 5

revenues back to the parent company (probably in form of an (unsecured) loan). Now, the parent company has to serve interest payments to the SPE, which passes them on to the investors in the ABS.

Asset Backed Security Construction

Table 8
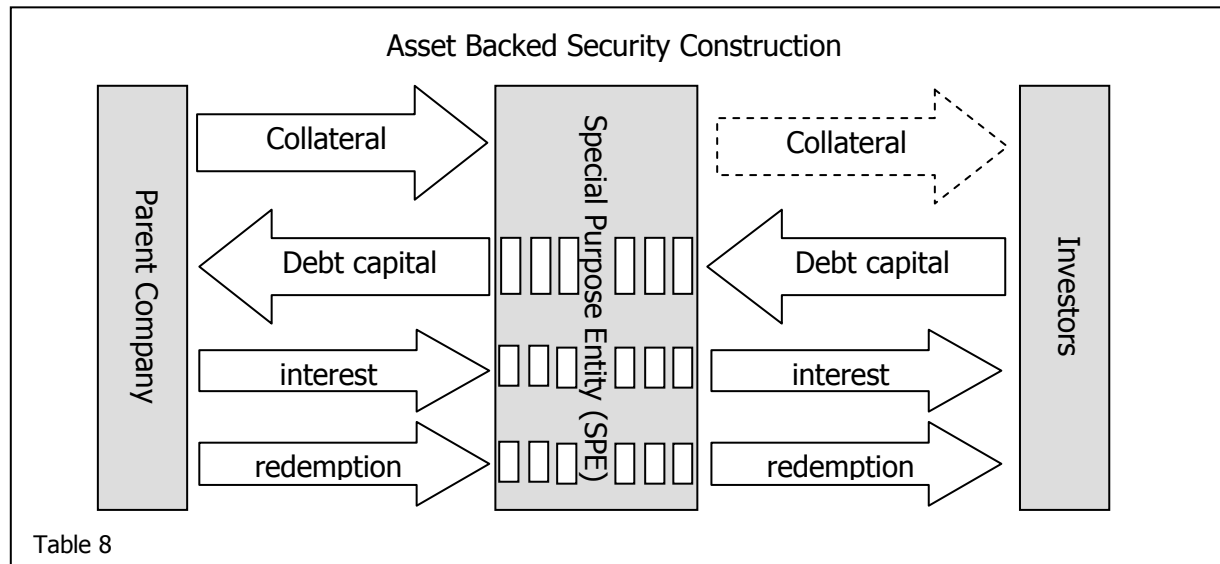
An ABS is a securitised interest in a pool of assets. Such assets often are real estate, cars, leased equipment or aircrafts, thus tangible assets. But there also exist a large number of ABS with receivables as collateral, like receivables from enterprise finance, trade receivables or credit card receivables.[39] In the same manner, receivable licence fees can be used as collateral for an ABS, because the cash flows are known beforehand and are only subject to credit risk of the licensee, much like credit card receivables.

Using intellectual property assets as collateral for an ABS needs certain conditions to be met. First, the receivable cash flows must be separated from the underlying IPA, mostly again because the underlying IPA is per se difficult to trade, but also because often the parent company will need to use the IPA for its own business, i.e. only the property claims on future cash flows can be sold, the property claim on the intangible asset must remain inside the company. Second, issuing an ABS only is possible (at least at acceptable costs of capital), if the collateral is only subject to minor risk. The exact structure of the collateral used for the ABS thus must be well considered.

Licence fees are not subject to the default risk of the company which issued the ABS; licence agreements will usually endure should the licensor default. Yet, the licence fees are subject to the default risk of the licensee. Therefore, the credit rating of the ABS (and thus the cost

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[39] Asset Securitization Report (2005), pp. 32f.

of capital) depends directly on the credit rating of the licensee. In many cases, if the licensee does not have an impeccable rating, it may therefore be advisable to use not only the licence fees of one license (or licensee), but to create a portfolio of licences, pool risks and hopefully create a diversification effect among the licenses that reduces overall risk and improves the rating of the ABS.

This paper has used licence fee receivables as an example on how an ABS could be constructed using an IPA as collateral. Such receivables are well suited, because their volume is basically known at the issue date of the deal. But other, less tangible intellectual property assets have already been used as collateral, e.g. Levi Strauss & Co. who completed a USD 500 million term loan backed by the Levi Strauss trademark.[40] Yet, although IPAs are suited for use as collateral in ABS instruments, they remain the exception. However, in mezzanine debt instruments, IPAs as collateral gain in importance.

Bowie Bonds (or: the problems with ABS on IPA)

Usually, ABS use tangible assets as collateral. But, as indicated earlier, it is commonplace to use receivables (i.e. series of cash flows) as collateral, and even a few instruments with only IPA as collateral have been issued.[41]

In 1997, rocker David Bowie took ABS with IPA collateral to the next level: he issued a ten-year bond worth USD 55 million backed with the future royalties from his early albums. The bond paid 7.9% interest and was rated A3 by Moody's.

What distinguishes bowie bonds from other ABS is that the collateral did not exist at the time of the bond issuance. If an ABS is secured with future license fees, the issuer possesses a contract which obliges the licensee to pay a specified amount in fees annually. Bowie's royalty earnings depended on the developments in the music market. Therefore, the collateral was directly subject to market risk (both for the music market in general as well as for Bowie's music in particular. On the other hand, as the royalties are generated by a larger number of consumers in a large number of stores, there is de facto no credit risk associated with the product.

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[40] Kantin (2005), pp. 33

[41] Bezant (1998), pp. 253 and Monga (2005)

Experiments in marketing science have shown, that "top stars, analogous to trusted brand names, are associated with high quality products."[42] Bowie Bonds are the attempt to capitalise directly the 'good name' of an individual, namely David Bowie, as lower interest payments on a bond, thus saving real money for the issuer of the bond. David Bowie needed to restructure his income stream because he required a lump sum for a management buy out.

David Bowie's securitisation deal was only one of the first an most prominent. Since 1997, other IPA-backed debt securities have been issued, namely on pharmaceutical drug patents and consumer good trademarks. Such transactions remain the exception, however. Since Davied Bowies pioneering move, only about two dozen such instruments have been placed publicly. This is not an accurate count of the number of IP monetisation deals, because most of them are private and sold to only one institutional or private investor.

The reason, why IPA backed ABS are not more common lies in the inherent risk of the collateral. Music royalties are relatively predictable over the medium run, as would be trademark and brand revenues, although here the isolation of the exact income streams may prove difficult; franchise earnings, retail and wholesale streams are probably only the start.

And although this paper has used a patent or license to introduce the idea of IPA in ABS, such transactions are even more uncommon than ABS on trademarks or copyrights. While monetising brands is tricky, finding value in patent portfolios is even trickier, because patents are so-called negative rights which do not come into force automagically when filed, but only when users agree to pay licensing fees or when they are defended successfully in court. In addition, while e.g. trademarks on consumer goods and copyrights on music are subject to fashion risk, patents are subject to obsolescence risk.[43]

Mezzanine Debt Instruments

While normal debt is secured with the company's assets in general, asset backed securities have a well-defined collateral that secures the debt. Mezzanine debt instruments are the asset backed securities market's pendant to junior or subordinated debt in the normal debt

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[42] Levin, Levin and Heath (1997)

[43] Monga (2005)

market. Where the normal ABS lender has a first priority lien in the defined collateral, mezzanine lenders have in case of bankruptcy only a residual claim on this collateral.

The value of the collateral of an asset backed security usually can be estimated quite well. It is not unusual that a market price already exists for the collateral, or that such a market value is easily derived. The amount of the possible loan depends of the marketability of the collateral. While readily marketable assets like e.g. bonds of highest rated debtors allow loan amounts of 70%, blue chip stocks 65%, this rate drops rapidly with increasing price volatility and decreasing liquidity.[44]

This rather conservative collateralisation of ABS gives room for a second lien of debt on the same collateral, corresponding to junior debt in ordinary debt contracts. Should the issuer of the debt be unable to pay either a rate of interest or pay back the principal at maturity, the collateral would be realised and any claims of the ABS lenders would be serviced of the revenue. Like with senior and junior debt in ordinary debt contracts, first the first-lien lenders are satisfied, the remaining capital, if any, is then used to satisfy the second-lien lenders.

Table 9
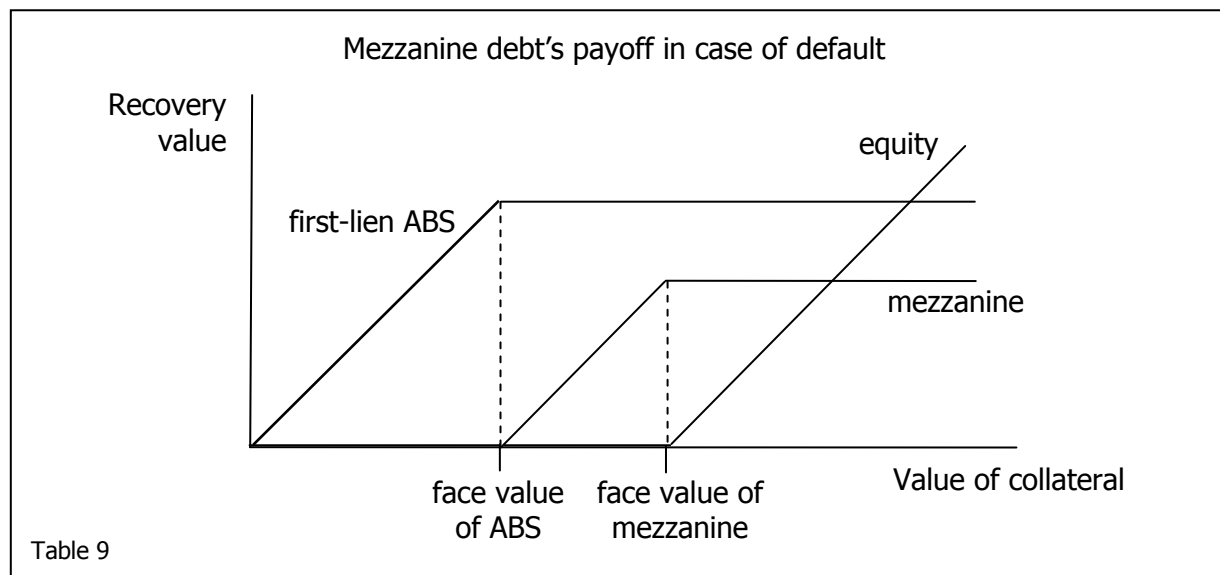
Such mezzanine debt instruments can basically be constructed on any ABS, regardless of the collateral, including IPA-backed ABS. But since very recently, intellectual property assets gain importance not as collateral of first-lien ABS, but as additional collateral on mezzanine instruments. While the mezzanine only promises a subordinated claim on the first-lien

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[44] Source: UBS.

collateral of the ABS, usually a tangible asset, it enjoys a first-lien claim on the intellectual property asset. This makes the collateral position more attractive to the second-lien lender, because it changes the risk situation for the second-lien lender and provides a real exit strategy, i.e. the realisation of the IPA in case of default. For the borrower in turn, adding IPA to the collateral justifies reduced return rates, thus makes the debt cheaper: IPA-backed mezzanine are typically priced at about 800 bp over LIBOR for middle-market companies and at about 600 bp over LIBOR for lager ones. [45]

Professionals see in this most recent development only the tip of the iceberg and believe, that "going forward, even more lenders will seek to create value in IP. […] Once [lenders] see a reasonable amount of [IP] deals, you'll see a recalibration on the part of [Asset Based Lending (ABL) …] shops, traditional banks with ABL groups, hedge funds and insurance companies."[46]

Sell-and-Lease-Back

Asset backed securities usually will rely on cash flow streams in the form of receivables transferred to an independent trust founded by the parent company, the special purpose entity (SPE). The SPE forms then issues a debt instrument to any group of investors (although until now, such ABS on IPA were mostly sold in one tranche to institutional investors). Not so with sell-and-lease-back constructions.
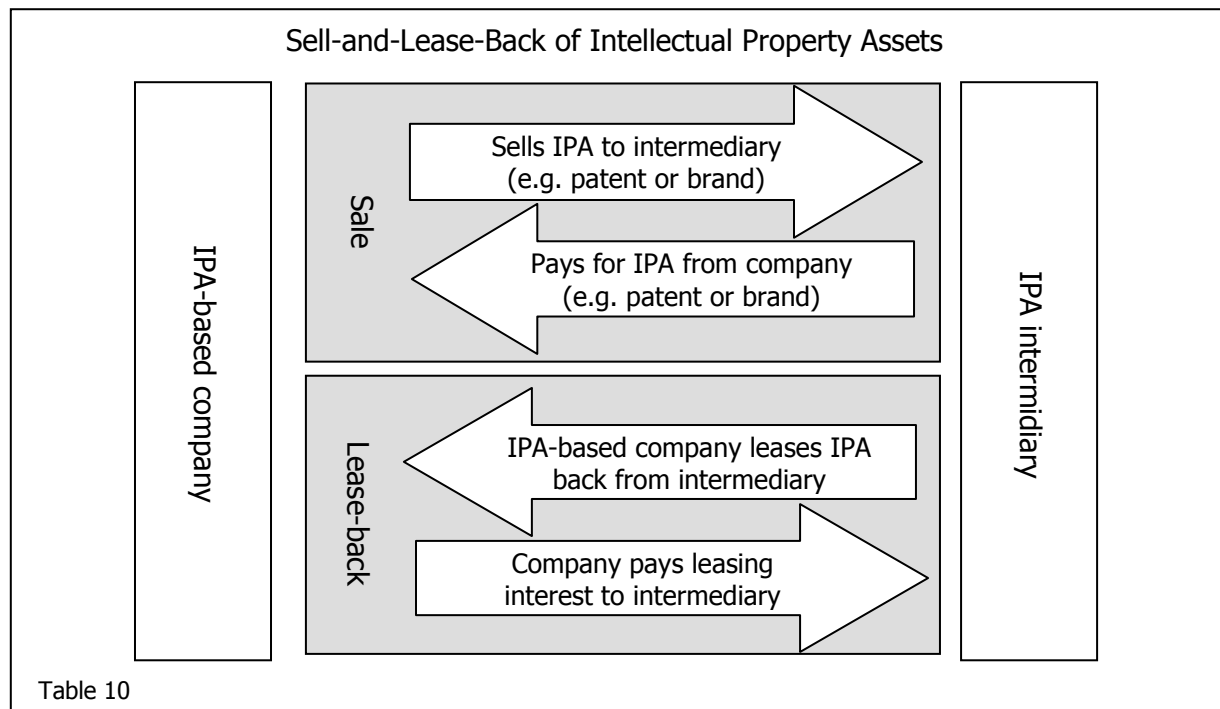
Here, the IPA is sold completely to the IPA intermediary (and not only the secondary aspect of future cash flow property claims). This is a normal sale transaction, i.e. the underlying IPA changes ownership. Subsequently, the IPA-based company (i.e. the original owner of the IPA) leases the IPA back from the intermediary and agrees to pay leasing interest and, depending on the contract specifications, amortisation. Table 10 illustrates the process.

In Germany, CommerzLeasing Mobilien GmbH, a subsidiary of Commerzbank, offers to structure such transactions, mostly for middle-market companies. Brands and trademarks have an asset depreciation length of 15 years, patents one of 8 years. For fiscal reasons,

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[45] Kantin (2005), pp. 33f

[46] Kantin (2005), pp. 34

leasing contracts in such assets therefore have a lifetime of six years for trademarks and brands, 3.2 years for patents.[47]

Sell-and-Lease-Back of Intellectual Property Assets

IPA-based company

Sale

Sells IPA to intermediary (e.g. patent or brand)

Pays for IPA from company (e.g. patent or brand)

Lease-back

IPA-based company leases IPA back from intermediary

Company pays leasing interest to intermediary

IPA intermidiary

Table 10

Although ownership of the IPA changes from the company to the intermediary, contractual specifications are so that all protection, support and utilisation remains with the company (i.e. is transferred back to the company through the leasing agreement).

As a special case of leasing contracts, under certain circumstances the payment of leasing rates can be postponed until the commercialisation of the IPA creates revenue ("pay as you earn"). Such constructs are specifically designed for project financing with the goal of preventing negative effects of such project expenses in the annual accounts. If project financing using sell-and-lease-back instruments is possible depends on the feasibility of financing the project with other means, taking e.g. risk into consideration. The same caveat applies to immaterial assets created by the company itself.[48]

 Again, for such assets without real market price information available, pricing and valuation again become a crucial issue, and only the more active market for such assets in general, the more sophisticated databases and the improvements in valuation techniques through

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[47] Commerzbank (2003), pp. 13

[48] Commerzbank (2003), pp. 14

better technology and better methodology in general allow the construction of such instruments.[49]

OTC Options

The creation of intellectual property is very costly, as has already been explained. Empirical studies observe a trend that it becomes exceedingly expensive to create new intellectual property.[50] For other businesses initial expenses are converted in a relatively short timescale into saleable assets, whereas intellectual property based businesses will have invested much of their funding in the development of the intellectual property itself. And while in any business cycle sales revenue and profitability will lag investment, in the context of intellectual property based businesses that lag may be considerably longer, and the ultimate success of a product or idea is more and longer uncertain, as it is based upon unproven innovation.[51]

Because of these properties, intellectual property assets are only useable in debt financing instruments beyond a certain development stage. Before this stage, equity finance is the only available source of funding from third party investors, with all the disadvantages additional equity brings to the company and its existing shareholders respectively.

One way to avoid equity financing in an early stage of development is the use of options on the future revenues generated by the intellectual property asset. The advantage of options is that they do not create any control rights on the company, which equity does. In that respect, they are akin to debt. On the other hand, the payoff profile of the option is similar to that of equity. If the project is not a success, the payoff of the option will be zero. If the project is a success, the option participates in this success without limitation. Thus, such an option would be similar to a call option.

Note, that in a financial options contract as described, the intellectual property itself will not be the underlying (because the transfer of the intellectual property is difficult, and because it is impossible to split the IPA up into small components in order to compensate the various buyers of the option). Therefore, synthetic underlyings must be created. One possibility

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[49] Kantin (2005), pp. 33

[50] DiMasi, Hansen, Grabowski (2003), pp. 154

[51] Bezant (1998), pp. 241f

would be e.g. a defined share of the generated earnings from the IPA commercialisation which have accumulated until option expiry.

Such options are obviously risky. The option value is not only subject to the project risk, but also to the business risk of the issuing company as a whole, because the IPA will lose much of its value in case the owning company defaults, even if the project per se should prove to be a success. Again, this value reduction stems from the fact that it is difficult to transfer a project or patent to a new owner, and even if the transaction is possible, it is questionable if the new owner will be able to commercialise the IPA with the same success as the original owner, because of missing expertise and experience.

For nascent businesses which do not yet have a marketable product, both owners and investors agree that equity is the best financing alternative. But once a product is marketable, the appraisal of the owners of the intellectual property business may change, as they will regard the exposure to development risk as having been extinguished. In this phase, the existing shareholders may think that further equity injections are not desirable, because much of the risk inherent within the business has been reduced. On the other hand, research indicates that investors' preferred method of funding remains equity, because in the their perception the businesses remain high risk, long term and sustainable profitability remain unproven.[52] In this stage, options may be a good instrument to match the interest of existing shareholders and investors, combining independence of the company with equity-like payoff characteristics.

Finally, the question of pricing such an option remains. Until very recently, no specific models were available to value a research and development or patent in the context of (real) options, until Schwartz (2004) proposed a valuation model for such assets. This model may be a good starting point for pricing a financial option in intellectual property assets, although some additional research may be necessary to incorporate e.g. general (credit) risk of the company into the valuation.

Intellectual Property Asset Trusts

The latest innovation in the field of financing instruments using IPAs are intellectual property asset trusts. The structure is similar to that of an ABS structure: the principal company

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[52] Bezant (1998), pp. 240

transfers the secondary aspect of the IPA to an independent legal entity, the SPE. But while "ordinary" ABS on IPA issues debt against collateral, the IPA trust issues equity shares.

Assessing the capital costs of such an instrument for the issuing company is difficult. Certainly, there is no debt capital to be paid back to the investors, as is the case for debt securities. On the other hand, the company loses any possibility to participate in excess returns of the IPA, apart from any retained equity shares, because all such earnings belong to the shareholders. In the event of an extraordinary success of the IPA whereof the revenues are transferred to the trust, such a facility would bear considerable opportunity costs for the issuing parent company. Such an IPA trust therefore is comparable to a real call option on the future earnings of the assets belonging to the trust. The premium is the face value (or the issue price) of the equity and the strike price is the future value of an opportunity investment, i.e. an investment with the same risk profile in the market.

Securitisation specialists on Wall Street are still thinking about creating such intellectual property asset trusts. First plans to do so were publicised in spring of 2004,[53] but no further information on the subject was published since. Nevertheless, an IPA trust has already been founded once, back in 1964 (!): the Mills Music Trust owns the rights to royalties from about 25'000 songs owned by the record label EMI. The yield on this over-the-counter stock is about 10%, and the stock has climbed from USD 25 to USD 37 between 2002 and 2004, more than 20% annually in a mediocre market environment.[54]

Royalty Interest Funds

In April 2000, Paul Capital Partners announced the Paul Capital Royalty Acquisition Fund, a global fund focused on the acquisition of healthcare royalty interests with a capital of USD 300 million.[55] Royalty interest funds actually are quite similar to intellectual property asset trusts. Again, an IPA-based company transfers secondary IPAs (i.e. property claims on future cash flows generated by the underlying primary IPA) to an external entity, which then issues equity shares (or in this case fund shares). The difference is that the external entity in this case is not created through the company specifically to place the own IPAs. Rather, this role is taken by the IPA intermediary.

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[53] Schoenberger (2004), pp. 93

[54] Schoenberger (2004), pp. 94

[55] Paul Capital (2004), pp. 6f

Royalty interest funds therefore have the advantage, that their assets do not consist of the IPA of only one company, but of IPAs of various companies. The described fund by Paul Capital focuses on healthcare royalties, thus bears the sector risk of the healthcare and medical sector, but the creation of general intellectual property assets funds, which are well diversified across sectors and therefore not subject to sector-specific risk, probably is only a matter of time.

Summary and Conclusion

This paper analysed, how intellectual property assets can be used in financing contracts. In the first part, it defined intellectual property assets as the physical, codified representation of an intangible asset. It further specified two aspects of such intellectual property assets: the primary aspect is the right to exclude others from using the intangible asset, the secondary aspect of the IPA is the implicit property right on future cash flows resulting from the commercialisation of the intellectual property asset. It held that in order to use intellectual property assets in financing contracts, these two aspects must be separable. Especially, the secondary aspect must be tradable independently.

In the second part of the paper, various valuation approaches of the three different classes of intellectual property assets were introduced. The valuation of intellectual property assets is important, the paper stated, because often market prices for the asset (or market prices of comparable assets) are not available, both because IPA transaction still are pretty uncommon, and because intellectual property assets differ one from each other by definition. The paper favoured the discounted cash flow and the real option pricing approach. It also concluded, that the third class of intellectual property assets defined in the first part (i.e. relationship-based IPA) is so difficult to valuate that they are unsuited for the use in financing contracts, at least until improved valuation methods for such assets are available.

The third part of the paper then turned to the market structure prevalent in IPA markets and introduced the role of the IPA intermediary. The functions of the IPA intermediary were formulated as position matching, term transformation (both implicit and explicit), risk pooling, generating public market information, information accumulation, setting best practice standards and consulting. The paper predicted that for organisational, historical and technical reasons, a decentralised dealer market structure similar to the foreign exchange and bond markets is most probable to evolve.

In the fourth and last part, the paper turned to a somewhat more empirical analysis and gave a tour d'horizon of the available and prospective financing instruments intellectual property assets may be used in.

Looking forward, the importance of intellectual property assets in financing will grow, especially so for middle-market companies. Debt financing in the wake of Basel II is facing such changes that the term revolution may apply. Bank loans and ordinary debt finance will most probably become more expensive and more difficult to raise. Also, the sector transformation will create businesses the longer the more often without sufficient tangible assets to fund the economically desirable level of growth. It is crucial to realise the importance and the value of intangible asset to promote growth and conserve the economic prosperity of the developed world. The financial community is beginning to realise this fact, as the quote preluding this paper shows.

However, providing the means is only the first step. It needs investors, firms, intermediaries, regulators and all market participants to embrace the idea, absorb it and apply it to their actual financing decisions. Only continuous research and promotion can achieve this aim.

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